Petroleum Testing Equipment

Koehler
INSTRUMENT COMPANY, INC.

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Worldwide Support

Providing quality testing instrumentation and technical support services for research and testing laboratories has been our specialty for more than 50 years. Meeting your testing needs is the primary focus of our business, which is why Koehler Instrument Company is a leading producer and supplier of petroleum, synfuels and petrochemical instrumentation worldwide.

For the user of petroleum testing equipment and support services, Koehler products are backed by our staff of technically knowledgeable, trained specialists who are experienced in both petroleum products testing and instrument service either at our service center or at your location. Koehler also offers service contracts as well as extended warranty on all of our instrumentation.

With this catalog, we are pleased to present our comprehensive line of petroleum laboratory instrumentation, both manual and automatic as well as standards and accessories conforming to the latest ASTM, ISO, IP and related international specifications. We invite you to look through our extensive product offerings for instrumentation and services to meet your testing needs, or contact us for custom solutions for your specialized requirements. We have many satisfied customers worldwide in virtually every part of the world because of our attention to customer needs. Our goal is to be the best and most dependable instrument company in the market place. We invite your comments and input so that we may continue to serve your laboratory needs.

A broad range of technical services before and after your purchase – Koehler Instrument Company is more than an instrument manufacturer. We are committed to providing you with full support for your laboratory testing needs. We take care of you through the whole process…before and after you purchase from Koehler.

Our philosophy is to fully understand your needs before offering technical advice and product solutions. Koehler's trained staff has direct experience with the test method standards for which we offer products and services and can discuss your needs in a knowledgeable way. If one of our standard products does not fit your particular need, we can recommend an alternative solution.

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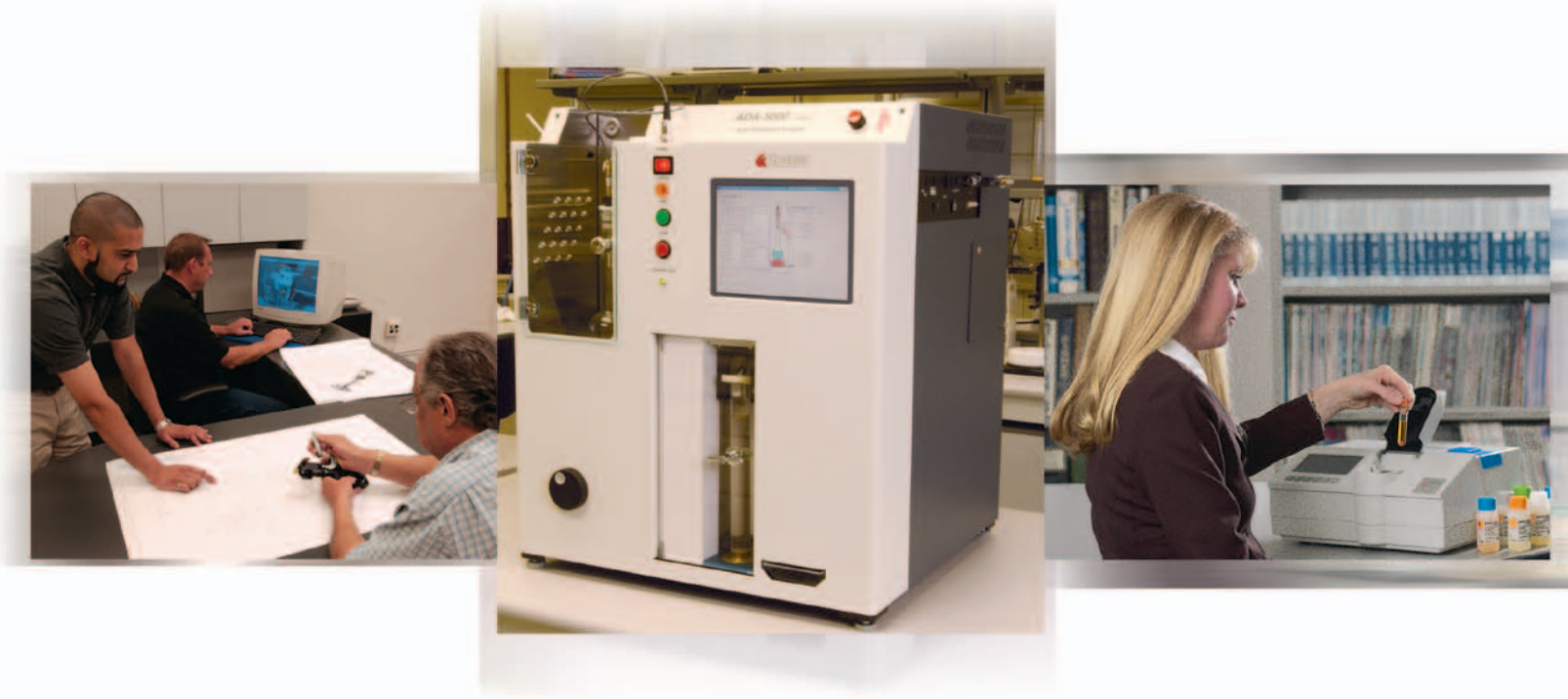

After your instrument is delivered to your laboratory – Our staff will contact you to answer any questions that you may have and to make certain that you have everything you need. Koehler technical service specialists are always just a phone call away to provide you with information and assistance for your testing needs.

Documentation for your testing and quality program needs can be provided with the many software offerings from Koehler Instrument Company– We provide complete documentation for every facet of your testing program, from comprehensive operation manuals to test, calibration and service data for your ISO 9000 or related quality system.

Training seminars – Koehler periodically conducts training seminars for laboratory personnel on the use of Koehler instrumentation and the technical aspects of the related test method standards. We also actively train our worldwide distributors to ensure the best service to our customers. Customized seminars are available for any combination of Koehler instruments and test method standards.

Calibration services and reference fluids – Koehler also has available numerous ASTM reference fluids to calibrate our instruments. In addition, we offer calibration services for your convenience. Please contact our Technical Service Department with your needs for industry reference standards.

Testing services – In-house testing services are available for selected test method standards. At the Koehler laboratory we have available the technical expertise and the best instrumentation to get accurate and reliable test results back to you in a timely manner. We invite you to send us samples for testing and evaluation. We specialize in all tests for which we offer instrumentation as well as other test methods. This newly added facet to our Technical Service Department has made us a complete source for testing solutions for our petroleum and petrochemical customers. Please contact your Koehler representative for additional information.

Instrument maintenance and service – Koehler is committed to providing fast service when the need arises. Koehler has added qualified service technicians to support our expanded instrument offering. We offer onsite installation and extended warranty programs. Our trained technicians will quickly and efficiently diagnose any problem and find the correct solution. Detailed service records are kept for each instrument to assist in recommending maintenance or finding a fast solution to a problem, and an extensive stock of replacement parts is on hand for immediate delivery.

Warranty coverage – Koehler provides a comprehensive warranty with each instrument you purchase. Please refer to the back page of this catalog for further warranty information.

Worldwide support – Our network of appointed distributors covers markets in most parts of the world to provide you with knowledgeable sales and service assistance. Koehler distributors send representatives to receive product applications and instrument service training so that they will be able to give you the fast, efficient support that you need.

Customer service – Our Customer Service personnel are a dedicated team who will assist you with pricing, availability, ordering and shipping of Koehler products. They will be happy to answer any product questions that you may have.

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How To Order

For most of the ASTM, ISO, FTM and international standards featured in this catalog, you will find a complete offering of the equipment needed to perform the test. Many instruments are available in several different configurations to enable you to tailor your selections to your individual requirements. Certain standard laboratory items have not been listed but are available on special order. Our Customer Service representatives can answer any questions you may have and provide you with information you may require.

Please be sure to use the Koehler catalog number for the instrument model which is compatible with your local power service. Consult individual product listings for complete information on electrical requirements. All of our products listed in this catalog can be ordered by phone, fax or e-mail. Orders may also be placed using your Visa, Mastercard, American Express, or Discover:

CALL TOLL FREE IN THE U.S.: 1-800-878-9070
PHONE: +1 631 589 3800 • FAX: +1 631 589 3815
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Koehler offers laboratory reference standards for our full line of testing equipment. Each test standard comes with original certification listing the ASTM test method, the name and ISO status of each testing laboratory, and the average test result and standard deviation. Please inquire with Koehler's Customer Service Department about ordering these reference standards for your testing needs.

Viscosity

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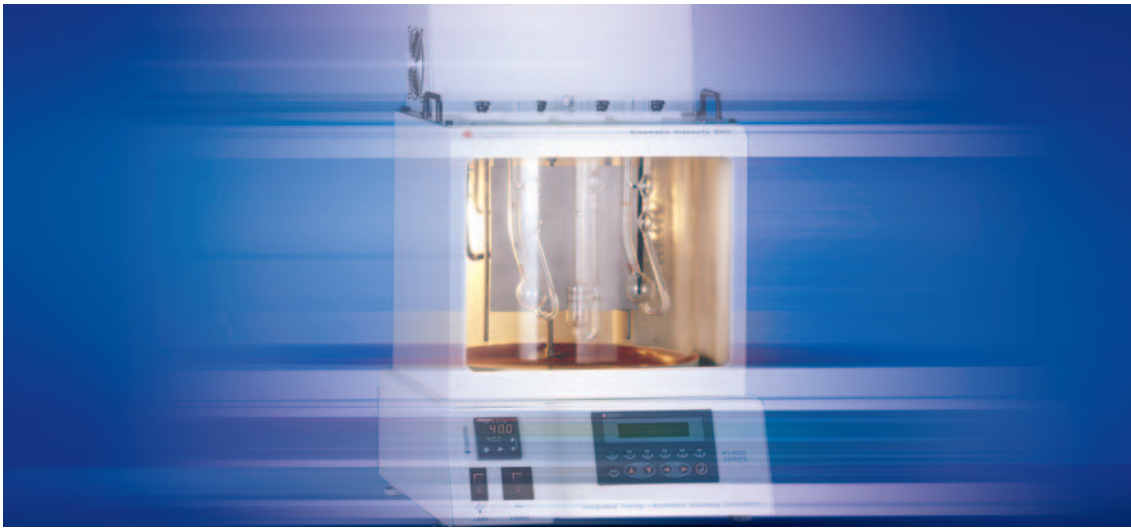


Kinematic Viscosity

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

Kinematic Viscosity

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.

Kinematic Viscosity

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		

Kinematic Viscosity

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

Kinematic Viscosity

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					

Kinematic Viscosity

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)

Kinematic Viscosity

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

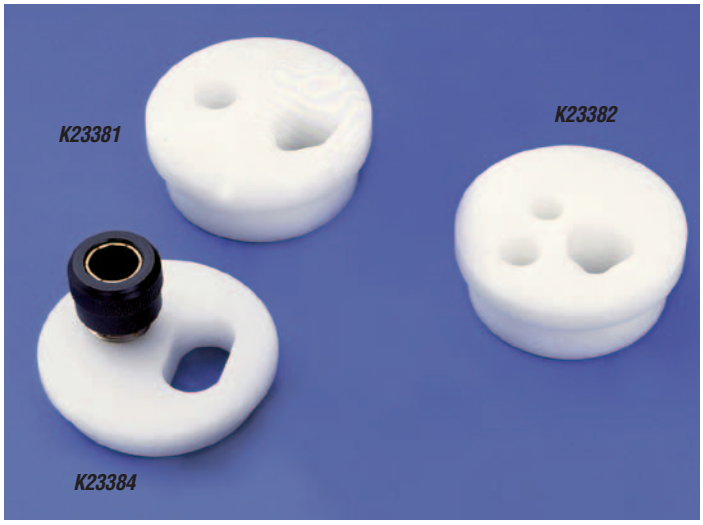
Digital Stopwatch

- 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.

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

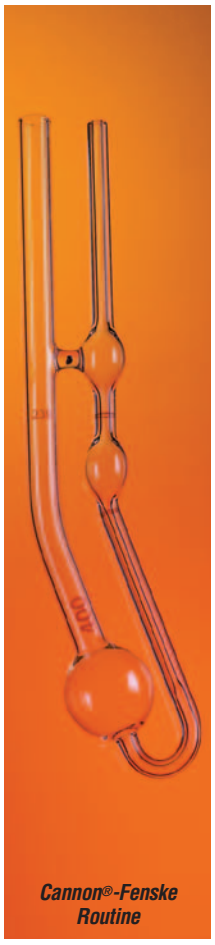
Several semi-micro viscometers have been designed which require one milliliter or less of liquid, which include the Cannon®-Manning Semi-Micro, Cannon®-Manning Semi-Micro Extra Low Charge, and Cannon®-Ubbelohde Semi-Micro viscometers.

Dilution Viscometers

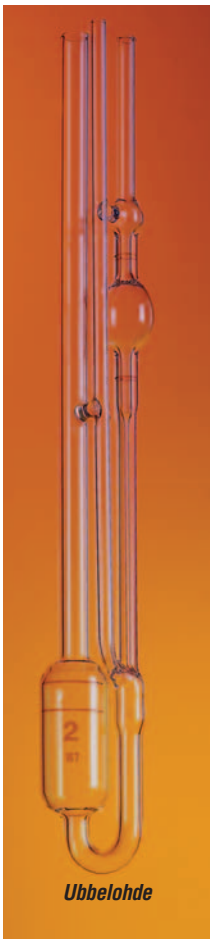
Estimates of the molecular size and shape of large polymers molecules can be obtained from kinematic viscosity measurements of dilute solutions. The Cannon®-Ubbelohde Dilution viscometer has an extra large reservoir which allows polymer solutions to be diluted several times and measures viscosities at 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

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.

Low Temperature Viscosity Measured by Brookfield Viscometer

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	—	—

Viscosity

K26000 Temperature Controlled Laboratory Viscometer with Jacketed Sensor

Test Method

This viscosity technology is based on a simple and reliable electro-magnetic concept. Two coils move the piston back and forth magnetically at a constant force. Proprietary circuitry analyzes the piston's two-way travel time to measure absolute viscosity. Built-in temperature detector (RTD) senses the actual temperature in the sampling chamber. Constant in and out motion keeps samples fresh and mechanically scrubs the sampling area.

Temperature Controlled Laboratory Viscometer

- Correlates with ASTM D445
- Integrated temperature control
- Requires less than 1mL of fluid
- Simple to use, easy to clean
- Displays Centipoise or Centistokes
- Temperature display in ˚C or ˚F
- RS-232 interface
- Easily field calibrated
- Removable jacket and cap insulation

The Temperature Controlled Laboratory Viscometer contains a piston-style electromagnetic sensor and RTD that provides continuous viscosity, temperature and temperature compensated viscosity (TCV) readings. Measurements can be made in any of thirteen 20:1 viscosity ranges and temperature can be displayed in ˚C or ˚F. Multiple operating ranges can be pre-calibrated. *Please specify the piston range(s) when ordering or contact a Koehler Customer Service representative for more information.*

Integrated temperature control allows user defined measurements at any setting from slightly above ambient to 180˚C (356˚F). The sensor is easily field calibrated.

Data can be output to a PC via the RS-232 serial port for tracking, storage or graphical display. The electronics allow the user to define TCV equation values, data averaging interval, alarm points, density and much more.

Specifications

Overall Measurement:
0.2 to 20,000 cP (centipoise)
Piston Ranges:
A. 0.2 - 2 cP
B. 0.25 - 5 cP
C. 0.5 - 10 cP
D. 1 - 20 cP
E. 2.5 - 50 cP
F. 5 - 100 cP
G. 10 - 200 cP
H. 25 - 500 cP
I. 50 - 1,000 cP
J. 100 - 2,000 cP
K. 250 - 5,000 cP
L. 500 - 10,000 cP
M. 1,000 - 20,000 cP
Accuracy: ±1.0% of full scale (±5% of full scale for 1,000 - 20,000 cP range)
Repeatability: ±0.8% of reading
Temperature Control: Slightly above ambient to 180˚C (356˚F)
Temperature Sensor: Internal Platinum RTD
Wetted Materials: 316L and 430 Stainless Steel
Maximum Particle Size: 25 - 360 microns (Range Dependent)

Included Accessories

Piston
Calibration Fluid (2 oz)
Forceps, Straight 5.5"
Fan, Bench Top

Dimensions dia.xh,in.(cm)

3.5x5 (8.9x12.7) Sensor
Net Weight: 4 lbs (1.8kg)

Shipping Information

Shipping Weight: 22 lbs (10kg)
Dimensions: 1.75 Cu. Ft.

Ordering Information

Catalog No.	
K26000	Temperature Controlled Laboratory Viscometer, 110-240V, 50/60Hz

Viscosity

Laboratory Viscometer

- Correlates with ASTM D445
- Viscosity measurements from 0.5 to 10,000 cP
- Requires less than 1½mL of sample
- Fluids measured at ambient temperature
- Piston-style electromagnetic sensor

The Laboratory Viscometer contains a piston-style electromagnetic sensor and an internal platinum RTD that provides continuous viscosity and temperature readings. Viscosity measurements for fluid samples with viscosity ranges of 0.5 to 10,000 cP (centipoise) are taken by determining the resistance of piston motion through the sample.

Dimensions lxwxh,in.(cm)

9.5x4x7.5 (24x20x19)
Net Weight: 7 lbs (15.5kg)

Shipping Information

Shipping Weight: 8 lbs (3.6kg)
Dimensions: 1.5 Cu. Ft.

Specifications

Overall Measurement:
0.5 to 10,000 cP
Piston Ranges:
A. 0.2 - 2 cP
B. 0.5 - 20 cP
C. 5 - 200 cP
D. 50 - 2,000 cP
E. 500 - 10,000 cP
Please specify one piston range when ordering.
Accuracy: ±1.5% of full scale
Repeatability: ±1.0% of reading
Temperature Sensor: Internal Pt RTD
Wetted Materials: 316L and 430 Stainless Steel
Maximum Particle Size: 200 microns

Ordering Information

Catalog No.	
K26030	Laboratory Viscometer, 100-240V 50/60Hz

In-Line Viscosity

Processor Options for In-Line Viscosity Sensors

Each in-line viscosity sensor requires a processor to drive the sensor, process, display and transmit the data. The electronics, cable and sensor are an integral system upon which the system calibration is based.

In-Line Viscosity Processor

There are two processor options: the Advanced Viscosity Processor and the Basic Viscosity Processor. The Advanced Viscosity Processor is microprocessor based while the basic Viscosity Processor is a solid state circuit. Each processor is housed in a compatible enclosure which will incorporate a display.

The NEMA 4 enclosure option is a standard NEMA 4 box for explosion proof installations. The bench top enclosure is ideal for easy table top display. It has rubber feet, fold down bail and handles for convenient display in an industrial enclosure. The same box is used without the rubber feet for easy mounting in any control box or panel.

Specifications

Advanced Viscosity Processor:	Basic Viscosity Processor:
±1% accuracy	±1.5% accuracy
Available ranges:	Available ranges:
A. 0.2 - 2.0cP	A. 0.2 - 2.0cP
B. 0.25 - 5cP	B. 0.5 - 10cP
C. 0.5 - 10cP	C. 1 - 20cP
D. 1 - 20cP	D. 5 - 100cP
E. 2.5 - 50cP	E. 10 - 200cP
F. 5 - 100cP	F. 50 - 1,000cP
G. 10 - 200cP	G. 100 - 2,000cP
H. 25 - 500cP	H. 500 - 10,000cP
I. 50 - 1,000cP	I. 1,000 - 20,000cP
J. 100 - 2,000cP	
K. 250 - 5,000cP	
L. 500 - 10,000cP	
M. 1,000 - 20,000cP	
Display cSt or cP	Display cP
Display ˚C or ˚F	Display ˚C
Display Temp/Comp	
Measure Multiple Ranges	Measure Single Range
Automatic Calibration	Factory Calibration
4 - 20 mA output	4 - 20 mA output
RS-232 output	
2400 or 9600 user selectable Baud	
Data Logging	
Alarms	

Electrical Requirements:
- 115V, 50/60Hz, 1.5A
- 220-240V, 50/60Hz, 2A

Dimensions lxwxh,in.(cm)

- NEMA 4 7½x3½x11 (19x8.9x28)
- Benchtop 9½x7x4½ (24.1x8.9x18.9)
- Panel Mount 9½x7½x4½ (24.1x8.9x18.9)

Net Weight:
- NEMA: 27 lbs (12.2kg)
- Benchtop: 16 lbs (7.3kg)
- Panel Mount: 16 lbs (7.3kg)

Shipping Information

Shipping Weight:
- NEMA: 35 lbs (15.9kg)
- Benchtop: 22 lbs (10kg)
- Panel Mount: 22 lbs (10kg)

Dimensions:
- NEMA: 2.85 Cu. Ft.
- Benchtop: 1.75 Cu. Ft.
- Panel Mount: 1.75 Cu. Ft.

Ordering Information

Catalog No.	
K26600	Basic Viscosity Processor, 110-240V 50/60Hz
K26610	Advanced Viscosity Processor, 110-240V 50/60Hz

Accessories

K26601	Benchtop/Panel Mount
K26602	NEMA 4 Enclosure

In-line installation with a 1¼" NPTM thread, explosion-proof.

In-line installation with a 2" Tri-Clamp, explosion-proof.

Probe design for in-tank viscosity measurements. (Please specify required length when ordering.)

Flow-through design with ¼" NPTF thread, flow rates to ⅛ lpm, jacketed for temperature control.

In-line miniature design, ½" NPTM thread for compact installations.

In-line design, 1½" SAE flange.

One factory calibrated piston accompanies each system. Please specify the piston range when ordering or contact a Koehler Customer Service representative for more information.

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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)

Penetration

Test Methods

Penetration of Bituminous Materials ASTM D5; IP 49; DIN 52010

Cone Penetration of Lubricating Grease ASTM D217; IP 50; ISO 2137; DIN 51804; FTM 791-311, FTM 791-313

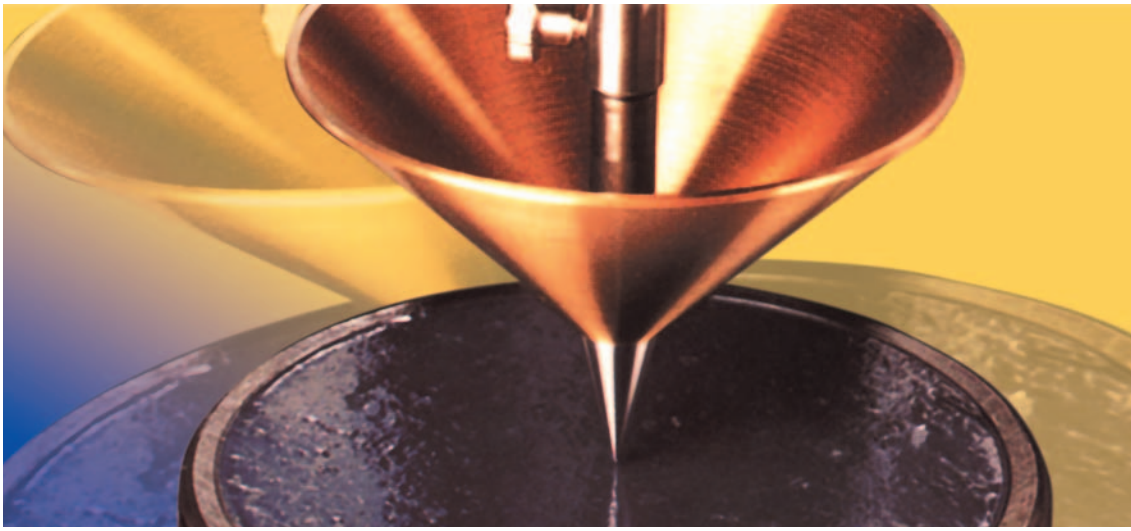
Cone Penetration of Petrolatum ASTM D937; IP 179; ISO 2137; DIN 51580

Needle Penetration of Petroleum Waxes ASTM D1321; IP 376; DIN 51579

Cone Penetration of Lubricating Grease Using One-Quarter and One-Half Scale Cone Equipment ASTM D1403; IP 310; ISO 2137; DIN 51804

Yield Stress of Heterogeneous Propellants by Cone Penetration Method ASTM D2884

Roll Stability of Lubricating Grease ASTM D1831



Penetration

K19500 Penetrometer with K20800 Penetration Cone

Ordering Information

Catalog No.	
K19500	Penetrometer
	Accessories
K19520	Plunger, 15g For use with K20200, K19800 and K20300 Cones
K20910	Plunger, 6.9g For use with K20900 Cone
K19525	Plunger, 47.5g
K19510	Auxiliary Weight Set Includes one each 2.5g, 5g and 10g weights and two 20g weights
K19535	Loading Weight, 50g
K19536	Loading Weight, 100g

Penetration of Bituminous Materials

Cone Penetration of Lubricating Grease

Cone Penetration of Petrolatum

Needle Penetration of Petroleum Waxes

Cone Penetration of Lubricating Grease Using One-Quarter and One-Half Scale Cone Equipment

Yield Stress of Heterogeneous Propellants by Cone Penetration Method

Test Method

Penetration tests are performed on petroleum products to determine consistency and shear stability (lubricating greases) for design, quality control and identification purposes. A standard cone or needle is released from a penetrometer and allowed to drop freely into the sample for 5 seconds (or a different specified interval) at constant temperature. The depth of penetration of the cone or needle into the sample is measured in tenths of a millimeter by the penetrometer.

Penetrometer

- Conforms to ASTM and related specifications for penetrometers
- Suitable for laboratory or field use

Designed for ASTM penetration tests on petroleum products and for consistency tests on a wide range of food products, cosmetics, pastes and other solid to semi-solid products. Precision machined and assembled to exacting specifications, and ruggedly constructed to insure long service life in both laboratory and field applications. Features a full penetration range of 0-62.0mm with 1/10mm subdivisions (0-620 penetration scale). Accommodates cones and needles to perform all of the ASTM tests on lubricating greases, asphalts, petroleum waxes and petrolatums. Compact design facilitates transport for field use. Head assembly adjusts for accurate placement of the tip of the needle or cone on the surface of the sample. Sturdy cast iron base provides excellent support and has a built-in spirit level and levelling screws to insure proper alignment of the penetrometer during testing. Supplied with 50 and 100 gram weights and standard 47.5g plunger assembly. Order test cones, needles and lightweight plunger (where applicable) separately.

Specifications

Conforms to the specifications of:

ASTM D5, D217, D937, D1321, D1403, D2884, D4950; IP 49, 50, 179, 310; ISO 2137; DIN 51579, 51580, 51804; FTM 791-311, 791-312, 791-313; AOCS Cc 16-60; AACC 58-14; NFT 60-119, 60-123, 60-132, 66-004

Included Accessories

Plunger, 47.5g
Weights, 50 and 100g

Dimensions lxwxh,in.(cm)

6x6x18 (15x15x46)
Net Weight: 12 lbs (5.4kg)

Shipping Information

Shipping Weight: 15 lbs (6.8kg)
Dimensions: 1.7 Cu. ft.

Penetration

Microprocessor Based Digital Penetrometer

- Tests the consistency of lubricating greases, petroleum waxes, bitumens, pastes, creams and other solid to semi-solid products
- Automatically timed operator programmable penetration measurements
- Motorized placement of penetrator on sample surface
- Large LCD to display all functions
- RS232 port for data transfer
- Full measurement range of 0-620 in ⅒mm scale or 1/100mm scale
- Rechargeable battery or AC operation
- Large, removable base accommodates grease worker cups and other ASTM and non-standard sample containers
- Complete selection of penetrometer cones, needles and accessories for petroleum products testing and for a wide range of other applications
- Conforms to all ASTM, IP, ISO 9001 and related specifications for penetrometers

Microprocessor based penetrometer loaded with advanced features to provide ease of operation and highly reproducible consistency measurements of petroleum products. Microprocessor control provides a full range of measurement and reporting options, and operation is simplified by four user programmable presets that facilitate lowering the penetrator tip to the sample surface.

Automatically timed penetrations—The penetrometer defaults to the standard ASTM interval of 5.0 seconds, or the operator may conveniently program a different interval in the range between 0.1 and 9999.9 seconds (in 0.1 second increments). A curing or temperature stabilization period may also be programmed by the operator (to delay the release of the penetrator into the sample) and for added convenience all selected parameters are retained in memory and automatically repeated in subsequent tests until changed by the operator. Separate keypad controls for each parameter simplify operation. Penetration and delay intervals count down on a large, easy to read LCD on the head of the unit.

Convenient measurement and reporting options—Penetration measurements in the full range of 0 - 620 in ⅒mm scale are reported in either ⅒mm or 1/100mm increments at the operator's option. For quality control testing, a penetration range can be entered into memory prior to testing. If a test result falls outside of the programmed range, an audible signal and visual error message alert the operator of a failed sample. Test results are displayed in digital format on a large LCD readout on the head of the penetrometer and can be communicated to a printer or computer via a built-in RS232 interface.

Simplified penetrator tip placement—Correct placement of the penetrator tip on the sample surface is essential for accurate penetration test results. The Koehler Digital Penetrometer has four operator programmable presets that lower the penetrator to the sample surface height at the touch of a button, greatly simplifying the process to ensure reproducibility. A fine adjustment button permits slight adjustments as needed. Full manual operation is also available with the use of coarse and fine push button controls and built-in magnifier and illuminator arms. When testing electrically conductive samples, a built-in circuit senses the sample surface for automatic placement. After testing, the penetrometer head returns to a raised position at the touch of a button to facilitate cleaning of the penetrator and changing of the sample.

More convenience features—The detachable machined base provides a large platform to accommodate a wide range of sample containers and constant temperature cylinders. It removes easily to permit the head assembly to be reversed (for use with a constant temperature bath) or mounted directly to a bath housing or other location. A built-in rechargeable battery pack permits field operation and provides back-up in the event of power interruption. Battery recharges automatically during operation of the penetrometer on standard AC electrical service.

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

Software compatible, inquire with Koehler Customer Service.

K95500 Digital Penetrometer

Specifications

Conforms to the specifications of: ASTM D5, D217, D937, D1321, D1403, D2884, D4950; IP 49, 50, 179, 310; ISO 2137; DIN 51579, 51580, 51804; FTM 791-311, 791-312, 791-313; AOCS Cc 16-60; AACC 58-14; NFT 60-119, 60-123, 60-132, 66-004

Penetration Range: 0-62.0mm (0-620 penetration scale) in ⅒mm or 1/100mm
Penetration Interval: Operator variable from 0.1 to 9999.9 seconds with automatic repeat function and 5.0 second default

Included Accessories

Standard Plunger, 47.5g
Weights, 50 and 100g

Dimensions lxwxh,in.(cm)
Base: 12½x14 (31.7x35.6)
Overall: 12½x14x18 (31.7x35.6x45.7)
Net Weight: 21 lbs (9.5kg)

Shipping Information
Shipping Weight: 27 lbs (12.3kg)
Dimensions: 2 Cu. ft.

Ordering Information

Catalog No.		Order Qty
K95500	Digital Penetrometer, 115V, 50/60Hz	1
K95590	Digital Penetrometer, 220-240V, 50/60Hz	

Accessories

K19552	Calibration Kit Consists of 0.500, 1.000 and 2.000" gauge blocks with calibration certificate traceable to NIST
K95573	Plunger, 15g For use with K20200, K19800 and 20300 Cones
K95519	Plunger, 6.9g For use with K20900 Cone
K95577	Standard Plunger, 47.5g
K19587	Loading Weight, 50g
K19588	Loading Weight, 100g

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Penetration

Penetrometer Cones, Needles and Accessories

- Precision machined cones and needles for ASTM and related methods
- Sample containers
- Constant temperature baths
- Grease workers and accessories
- Roll stability testers
- USDA and AOCS penetrometer cones

Use together with K19500 and K95500 series penetrometers to determine the consistency of petroleum products. Please call or write for information on non-petroleum test applications.

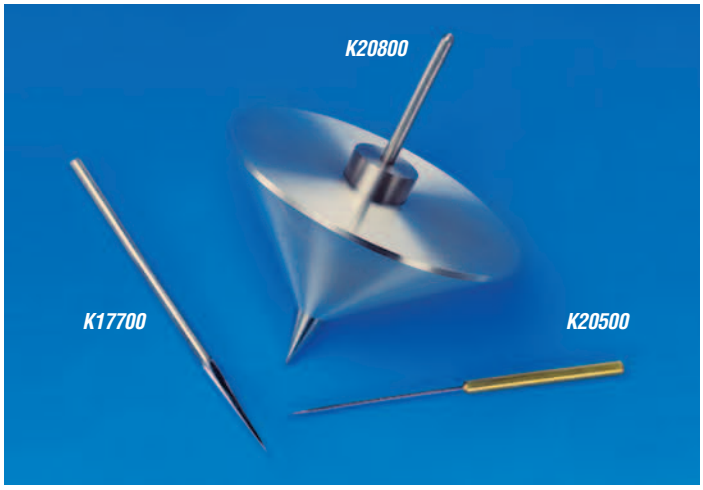
Needle Penetration of Petroleum Waxes

Test Method Standards

ASTM D1321; IP 376; DIN 51579

K17700	Needle, Stainless Steel, 2.5g
K17770	Needle, Stainless Steel, 2.5g, NIST Certified
K17710	Wax Specimen Container Brass cylinder with base plate conforming to ASTM D1321 specifications
K95600	Penetration Bath, 115V, 60Hz
K95690	Penetration Bath, 230V, 50Hz
K95696	Penetration Bath, 230V, 60Hz

K20000 Brass Cone



K20090 Aluminum Cone

Penetration of Bituminous Materials

Test Method Standards

ASTM D5; IP 49; DIN 52010

K20500-00000	Needle. Stainless steel with brass ferrule, 2.5g
K20570-00000	Needle. Similar to K20500, NIST certified, 2.5g
K20600-00000	Needle. Stainless steel with stainless steel ferrule, 2.5g
K20670-00000	Needle. Similar to K20600, NIST certified, 2.5g
388-001-003	Sample Container, 55mm dia. x 35mm depth for penetrations below 200
388-001-006	Sample Container, 70mm dia. x 45mm depth for penetrations between 200 to 350
357-000-001	Transfer Dish Submerges sample container per ASTM specifications
K95600	Penetration Bath, 115V, 60Hz
K95690	Penetration Bath, 230V, 50Hz
K95696	Penetration Bath, 230V, 60Hz

Cone Penetration of Lubricating Greases

Test Method Standards

ASTM D217; IP 50; ISO 2137; DIN 51804; FTM 791-311, FTM 791-313

K20800	Cone, Magnesium With hardened stainless steel tip, 102.5g Standard cone per ASTM D217
K20000	Cone, Brass With hardened stainless steel tip, 102.5g Optional cone per ASTM D217
K18100	Grease Worker series. Refer to page 28 for specifications and ordering information
K19100	Grease Cutter For 'block penetration' tests
K95600	Penetration Bath, 115V, 60Hz
K95690	Penetration Bath, 230V, 50Hz
K95696	Penetration Bath, 230V, 60Hz

Please inquire with Koehler Customer Service about accessories for food, cosmetics, paints, soaps, and other consistency measurement applications utilizing the Penetrometer.

Penetration

K20200 K20210 K21000 K20900

Cone Penetration of Petrolatum

Test Method Standards

ASTM D937; IP 179; ISO 2137; DIN 51580

K20800	Cone, Magnesium With hardened stainless steel tip, 102.5g
K20700	Sample Container With cover, conforms to ASTM D937 specifications
K95600	Penetration Bath, 115V, 60Hz
K95690	Penetration Bath, 230V, 50Hz
K95696	Penetration Bath, 230V, 60Hz

Roll Stability of Lubricating Grease

Test Method Standard

ASTM D1831

K18300	Roll Stability Tester series (page 156)
K20900	Cone Penetration Test Equipment, One-Quarter or One-Half Scale series

Additional Penetration Cones

K19800	Magnesium Cone, 15g For ASTM D2884 testing of Heterogeneous Propellants
K19900	Aluminum Cone, 45g For AOCS CC 16-60 testing of fats, butter, margarine
K20090	Aluminum Cone, 35g For USDA testing of pastes
K20300	Aluminum Micro-Cone, 5g For lubricating greases, cosmetic creams. Use together with K20310 Sample Cup and Collar

Cone Penetration of Lubricating Grease Using One-Quarter and One-Half Scale Cone Equipment

Test Method Standards

ASTM D1403; IP 310; ISO 2137; DIN 51804

K20900	Quarter-Scale Cone, Aluminum, 2.48g
K95519-00000	Plunger, 6.9g For use with K95500 series Digital Penetrometer
K20910	Plunger, 6.9g For use with K19500 series Digital Penetrometer
K21000	Quarter-Scale Grease Worker Consists of cup and cover assembly with plunger plate, shaft, handle and valve
K21002	Retaining Base Plate Mounts on bench or wall to retain Quarter-Scale Grease Worker when working heavy greases.
K21001	Blank Lid With seal, for Quarter-Scale Grease Worker. Use when heating samples prior to test.
K20200	Half-Scale Cone. Stainless Steel, 22.5g
K95573-00000	Plunger, 15g For use with K95500 series Digital Penetrometer
K19520	Plunger, 15g For use with K19500 Penetrometer
K20210	Half-Scale Grease Worker
K95600	Penetration Bath, 115V, 60Hz
K95690	Penetration Bath, 230V, 50Hz
K95696	Penetration Bath, 230V, 60Hz


K20300 Aluminum Micro Cone


K19900 Aluminum Cone

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Penetration

K18190 Mechanical Grease Worker

Ordering Information

Catalog No.

Mechanical Grease Workers

K18100	Single-Unit Model, 115V 60Hz
K18110	Single-Unit Model, 220-240V 50Hz
K18119	Single-Unit Model, 220-240V 60Hz
K18190	Double-Unit Model, 115V 60Hz
K18191	Double-Unit Model, 220-240V 50Hz
K18192	Double-Unit Model, 220-240V 60Hz

Manually Operated Model

K18000	Grease Working Machine

For Quarter-Scale and Half-Scale Grease Workers, refer to page 27.

Accessories

K18022 Dial Thermometer
Inserts in petcock of steel grease worker.
Supplied with adapter.

K18021 Overflow Ring
Collects displaced grease during penetration measurements.

K18020 Steel Grease Worker
Complete per ASTM specifications.
Consists of cup, cover, plunger and vent cock.

K18030 Steel Grease Worker
Similar to K18020 above, but with 270-hole plunger plate per FTM 791-313 (AN-G-15) specifications.

K18028 Cover Assembly
Replacement cover assembly for steel grease worker.
Includes vent cock, plunger plate, shaft and handle.

K18029 Grease Cup

K18023 Blank Lid, with seal
For ASTM Steel Grease Worker.
Use when heating samples prior to test.

Grease Workers

- Conform to ASTM D217 and related specifications
- Mechanical and manually operated types
- Single and double-unit models

Mechanical Grease Workers–For "worked penetration" and "prolonged worked penetration" tests to determine consistency of lubricating greases. Consists of single or dual steel ASTM grease workers mounted on a sturdy base and driven by a powerful gear reduction motor. Meets ASTM specifications for stroke length and rate. Equipped with a presetting electronic counter that automatically shuts off the drive motor after any desired number of strokes up to 99,999. Steel grease workers have threaded cup and cover, and steel plunger plate with shaft and handle that connects to eccentric cam on drive unit. Accessory dial thermometer inserts in plated vent cock. Spring loaded tightening clamps hold grease workers securely on base, and steel pins in base facilitate disassembly of grease workers after testing.

Manually Operated Grease Worker–Hand lever operated grease working machine designed for short duration "worked penetration" tests on lubricating greases. Consists of one steel ASTM grease worker with hand lever mechanism mounted on a sturdy steel base. Spring loaded tightening clamps hold grease worker securely on base, and steel pins in hand lever upright support facilitate disassembly of grease worker. Base plate is drilled at corners to allow for bolting to table top.

Specifications

Conforms to the specifications of:
ASTM D217, D4950; IP 50; ISO 2137; DIN 51804; FTM 791-311, 791-313*
*Requires substitution of 270-hole grease worker (K18030)
Drive Motor: fan cooled gear reduction type, ⅛hp (single-unit model)
or ½ hp (dual-unit model)
Electrical Requirements:
Mechanical Grease Workers:
115V 60Hz, Single Phase, 3A
220-240V 50/60Hz, Single Phase, 1.5A

Included Accessories

Mechanical ASTM Steel Grease Worker (1 or 2)

Dimensions lxwxh,in.(cm)

Mechanical Grease Workers:
Single-Unit: 10x13½x14¾ (25x34x37)
Double-Unit: 14x13½x14¾ (36x34x37)
Manually Operated Grease Worker: 30x10x15½ (76x25x39)
Net Weight:
Mechanical Single-Unit: 106 lbs (48.1kg)
Mechanical Double-Unit: 139½ lbs (63.3kg)
Manual: 21 lbs (9.6kg)

Shipping Information

Shipping Weight: Single-Unit: 141 lbs (64.0kg)
Mechanical Double-Unit: 171 lbs (77.6kg)
Manual: 28 lbs (12.7kg)
Dimensions: Mechanical: 4.2 Cu. ft.; Manual: 2.7 Cu. ft.

Penetration

K95600 Penetrometer Bath

Ordering Information

Catalog No.	
K95600	Penetrometer Bath, 115V 60Hz
K95690	Penetrometer Bath, 230V 50Hz
K95696	Penetrometer Bath, 230V 60Hz

Accessories

250-000-17F	ASTM 17F Thermometer Range: 66 to 80°F
250-000-17C	ASTM 17C Thermometer Range: 19 to 27°C
250-000-63F	ASTM 63F Thermometer Range: 18 to 89°F
250-000-63C	ASTM 63C Thermometer Range: –8 to +32°C
250-000-64F	ASTM 64F Thermometer Range: 77 to 131°F
250-000-64C	ASTM 64C Thermometer Range: 25 to 55°C

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

Penetrometer Bath

- Conforms to ASTM and related specifications
- Conditions petroleum samples and others requiring close temperature control prior to or during testing
- For use with manual and microprocessor penetrometer models
- Digital temperature control with low-liquid and overtemperature safety cut off

Constant temperature water bath for conditioning samples prior to a penetration test. Full visibility bath has a large shelf to accommodate a wide range of sample containers, including all containers used in ASTM tests. Sample containers can be left in the bath during the penetration test if required. The base of the Koehler manual penetrometer can be placed directly on the shelf of the bath, or the head assembly of the digital automatic model can be reversed to overhang the bath. Microprocessor digital temperature control maintains bath liquid temperature with ±0.05°C stability throughout the operating range. A large LED provides bath temperature readout in switchable °C/°F format and a dual-speed circulating pump assures temperature uniformity. The bath is protected by a separate adjustable overtemperature thermostat and a low liquid cut-off. A built-in cooling coil is provided for circulating a refrigerated coolant or tap water if needed.

Specifications

Conforms to the specifications of:
ASTM D5, D217, D937, D1321, D1403, D2884
Temperature Range: Ambient to 70°C
Temperature Stability: 0.05°C (0.1°F)
Electrical Requirements:
115V 60Hz, Single Phase, 9A
220-240V 50/60Hz, Single Phase, 4.5A

Dimensions lxwxh,in.(cm)

18x13⅛x8½ (45.7x33x21.6)
Net Weight: 6 lbs (2.7kg)

Shipping Information

Shipping Weight: 10 lbs (4.5kg)
Dimensions: 1.2 Cu. ft.

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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.

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ASTM D217; IP 50; ISO 2137; DIN 51804; FTM 791-311, FTM 791-313

Spatula
Paper
Light Petroleum Naphtha

Needle Penetration of Petroleum Waxes ..... **Page 26**

ASTM D1321; IP 376; DIN 51579

Glycerin

Cone Penetration of Petrolatum ..... **Page 27**

ASTM D937; IP 179; ISO 2137; DIN 51580

Laboratory Oven

Cone Penetration of Lubricating Grease Using One-Quarter and One-Half Scale Cone Equipment ..... **Page 27**

ASTM D1403; IP 310; ISO 2137; DIN 51804

Spatula

Flash Point

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Automated Flash Point Testers

Automated Pensky-Martens Flash Point Tester

Automatic Abel Flash Point Tester

- Conforms to IP 170 and related specifications
- Simple automation routine for easy operation

The automated Abel flash point tester is used primarily to test flammable and combustible materials for shipping and safety regulations. The flash tester provides an increased temperature range of operation as compared with other testers, allowing greater flexibility in testing samples according to the Abel test method. The unit provides a test range to 110°C and can be extended to –30°C by any appropriate external chiller. The flash point tests are simply conducted by mounting the flash cup filled with sample into the test position and selecting a pre- or user-programmed test method. Automation routines provide accurate test results. A quick search method is available to determine the flash point of unknown samples. The dual detection system (thermal and ionization) allows for testing all types of products. Ignition by gas flame or electrical ignitor is included, along with safety cut-off devices. Test results are automatically corrected to standard pressure (101.3 kPa). The system is equipped with a differential Pt-100 RTD probe designed to duplicate the response time of a mercury-in-glass thermometer and with multiple sensors that continually monitor instrument function, displaying an error message if a problem is detected. Supervision software is included.

Temperature range of Flash Tester can be extended. Please contact Koehler Customer Service for additional information.

Specifications

Conforms to the specifications of:
IP 170; ISO 1523, 13736;
NF M 07-011; NF T 66-009
Electrical Requirements:
115V 60Hz, Single Phase
230V 50Hz, Single Phase

Dimensions lxwxh,in.(cm)

10.25 x21x19.75 (26x5.53x50)
Net Weight:
44 lbs (20kg)

Auto Pensky-Martens Closed Cup Flash Point Tester

- Conforms to ASTM D93 and related specifications
- Dual flash point detection system (thermal and ionization) for measurement of samples containing water and/or silicone
- Gas or electric ignition
- Flash point operation range between 0 and 400°C
- Simple automation routine for easy operation
- Large viewing screen for observing test status at a distance from the unit
- Automatic barometric correction

The automated Pensky-Martens flash point tester accurately determines the lowest flash point temperature of fuels, lubricating oils, and homogenous liquids (ASTM D93 A), or liquids containing suspended solids as well as liquids that tend to form a surface film during testing (ASTM D93 B). Flash point tests are simply conducted by mounting the flash cup filled with sample into the test position and selecting a pre- or user-programmed test method. A quick search method allows for determination of flash points for unknown samples and a method for asphalts is also included. The automation routines provide accurate test results, even with users inexperienced in flash point test methods. The flash point test result is automatically corrected to standard pressure (101.3 kPa). The unit is equipped with a differential Pt-100 RTD probe designed to duplicate the response time of a mercury-in-glass thermometer as per ASTM D93-02a and E1-03a. The system features multiple sensors for continually monitoring of instrument function and displaying an error message if a problem is detected. The performance of the electrical ignitor is continuously checked, and the user is notified upon the need of replacement due to either damage or the end of its useful life. The system is easily interfaced with an external PC for operation and method updates. When performing a test, the system will display the stirring speed, temperature curve (also printed out), and current test status. The system alerts the user if the first application of the ignitor results in a flash or if no flash point is detected at the end of the test program. If a flash is not detected 30°C above the expected flash point or at 400°C, then the test is automatically aborted for safety. An easy connection to the air ventilation system or external water connection provides a quick cool down between test runs for operational efficiency.

Specifications

Conforms to the specifications of:
ASTM D93; IP 34; ISO 2719; DIN EN 22719;
NF M 07-019; JIS K2265
Electrical Requirements:
115V 60Hz 1000W
230V 50Hz 1000W

Dimensions lxwxh,in.(cm)

10.25 x21x19.75(26x5.53x50)
Net Weight:
44 lbs (20kg)

Automated Flash Point Testers

Automatic Tag Closed Cup Flash Point Tester

- Conforms to ASTM D56 and related specifications
- Simple automation routine for easy operation

The automated Tag Closed Cup flash point tester ensures the accuracy and precision required according to the ASTM D56 and related test methods. The test sample is heated at a prescribed rate of temperature increase throughout the standard temperature test range to 100°C. The flash point tests are simply conducted by mounting the flash cup filled with sample into the test position and selecting a pre-programmed test method or the search mode to determine an approximate flash point. The automation routines provide accurate test results. Ignition by gas flame or electrical ignitor is included, along with safety cut-off devices. The measurement range can be extended to –30°C by any appropriate external chiller. Supervision software is included.

Temperature range of Flash Tester can be extended. Please contact Koehler Customer Service for additional information.

Specifications
Conforms to the specifications of:
ASTM D56; IP 304
Electrical Requirements:
115V 60Hz, Single Phase
230V 50Hz, Single Phase

Dimensions lxwxh,in.(cm)
21x10.5x19.75 (53.5x26x50)
Net Weight:
44 lbs (20kg)

Automated Tag closed Cup Flash Point Tester

Automatic Cleveland Open Cup Flash Point Tester

- Conforms to ASTM D92 and related specifications
- Simple automation routine for easy operation
- Flash point operation between ambient and 400°C
- Gas or electric ignition

The automated Cleveland Open Cup flash point tester accurately determines flash and fire point temperatures of viscous petroleum products including oils and bitumens over an extended temperature range. When examining highly viscous specimens, a preheating time and temperature are set in order to liquefy the sample for testing. The surface skin from bituminous samples can be removed with a skimmer. The flash/fire point tests are simply conducted by mounting the flash cup filled with sample into the test position and selecting a pre-programmed test method or the search mode to determine an approximate flash point. The test results are automatically corrected to standard pressure (101.3 kPa). Equipped with a differential Pt-100 RTD probe, the system is designed to duplicate the response time of a mercury-in-glass thermometer. Multiple sensors continually monitor instrument function, displaying an error message if a problem is detected. The performance of the ionization sensor which detects the flash and fire points is continuously monitored, and the user is notified upon the need of replacement. If a flash is not detected 20°C above the expected flash point or at 420°C, then the test is automatically aborted for safety. The system is easily interfaced with an external PC for operation and method updates. When performing a test, the system will display the stirring speed, temperature curve (also printed out), and current test status. The system alerts the user if the first application of the ignitor results in a flash or if no flash point is detected at the end of the test program. If a flash is not detected 30°C above the expected flash point or at 400°C, then the test is automatically aborted for safety.

Specifications
Conforms to the specifications of:
ASTM D92; IP 36; ISO 2592
Electrical Requirements:
115V 60Hz 1000W
230V 50Hz 1000W

Dimensions lxwxh,in.(cm)
21x10.5x19.75 (53.5x26x50)
Net Weight:
44 lbs (20kg)

Ordering Information

Catalog No.		Order Qty
Automatic Abel Flash Point Tester		1
K87300	Automatic Abel Flash Point Tester, 115V 60Hz	
K87390	Automatic Abel Flash Point Tester, 230V 50Hz	
Automatic Pensky-Martens Closed Cup Flash Point Tester		1
K87100	Automatic Pensky-Martens Closed Cup Flash Point Tester, 115V 60Hz	
K87190	Automatic Pensky-Martens Closed Cup Flash Point Tester, 230V 50Hz	
Automatic Tag Closed Cup Flash Point Tester		1
K87700	Automatic Tag Closed Cup Flash Point Tester, 115V 60Hz	
K87790	Automatic Tag Closed Cup Flash Point Tester, 230V 50Hz	
Automatic Cleveland Open Cup Flash Point Tester		1
K87400	Automatic Cleveland Open Cup Flash Point Tester, 115V 60Hz	
K87490	Automatic Cleveland Open Cup Flash Point Tester, 230V Hz	

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Flash Point by Pensky-Martens Closed Cup Tester

K16200 Pensky-Martens Flash Tester with K16220 Accessory Stirrer Motor

Specifications

Conforms to the specifications of:
ASTM D93; AASHTO T73-811; IP 34; ISO 2719; DIN 51758; FTM 791-1102; NF M 07-019

Electrical Requirements:
115V 50/60Hz, Single Phase, 6.5A
220-240V 50/60Hz, Single Phase, 3.4A

Included Accessories

Brass Test Cup with Handle
Thermometer Holder

Dimensions lxwxh,in.(cm)

9½x8x22½ (24x20x57) with optional stirrer motor installed

Net Weight:
K16000: 21 lbs (9.5kg)
K16200/K16270: 24 lbs (10.9kg)

Shipping Information

Shipping Weight: 30 lbs (13.6kg)
Dimensions: 3.1 Cu. ft.

Please refer to page 32 about our automated Pensky-Martens Closed Cup Flash Point Tester or inquire by contacting Koehler Customer Service.

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

Test Method

For flash point determinations of fuels, lubricating oils, liquids containing suspended solids and liquids that tend to form a surface film during testing.

Pensky-Martens Closed Cup Flash Tester

- Conforms to ASTM D93 and related specifications
- Choice of electric or gas heating

Determines flash points of a wide range of products by a closed cup method with two option speed stirring of the sample. Extensively used in shipping and safety regulations for detection of contamination by volatile and flammable materials in fuel oils and lubricating oils, and for characterization of hazardous waste samples.

Smooth operating cover mechanism slides shutter open and applies test flame at the turn of a knob. Cover fits over brass test cup and includes pilot flame, test flame reference bead, built-in stirrer and plated brass thermometer ferrule.

Electrically heated model is equipped with a 750W nickel-chromium heater with stepless variable control for accurate, repeatable temperature rate of rise settings per specifications. Heater unit is enclosed in a stainless steel housing with cooling vents. Includes line cord receptacle and switch for accessory slow speed stirrer.

Gas heated model has a built-in nickel plated brass natural gas burner, or can be supplied with an artificial gas burner or liquid propane burner (specify when ordering). Both models are mounted on a sturdy cast iron base.

Ordering Information

Catalog No.		Order Qty
Pensky-Martens Closed Cup Flash Tester		1
K16200	Electrically Heated Model, 115V 50/60Hz	
K16270	Electrically Heated Model, 220-240V 50/60Hz	
K16000	Gas Heated Model	
	Accessories	
K16220	Stirrer Motor, 115V 50/60Hz Slow speed gear motor rotates stirrer of Pensky-Martens Tester at 115rpm for Procedure A and at 250rpm for Procedure B. Includes adjustable support bracket and mounting rod. Installs in base of flash tester.	1
K16229	Stirrer Motor, 220-240V 50Hz	
250-000-09F	ASTM 9F Thermometer Range: 20 to 230°F	
250-000-09C	ASTM 9C Thermometer Range: –5 to +110°C	1
250-000-10F	ASTM 10F Thermometer Range: 200 to 700°F	
250-000-10C	ASTM 10C Thermometer Range: 90 to 370°C	1
K16010	Cover Assembly Complete assembly. Includes shutter, flame exposure device, stirrer and thermometer ferrule.	
K16020	Brass Test Cup With heat resistant handle.	

Flash Point by Tag Closed Tester

Test Method

For flash point determinations of liquids with a viscosity of below 5.5 centistokes (cSt) at 104°F (40°C) or below 9.5cSt at 77°F (25°C), and a flash point below 200°F (93°C) except cut-back asphalts, those liquids which tend to form a surface film under test conditions and materials which contain suspended solids.

Tag Closed Cup Flash Tester

- Conforms to ASTM D56 and related specifications
- Gas or electrical heating

Determines flash points of liquid products by the Tag Closed Cup method. Features stepless variable heat control with reference dial for accurate repeat setting of temperature rate of rise per specifications. Also available with gas burner instead of electric heater. Precision machined cover mechanism simultaneously opens slide shutter and applies test flame to sample at the turn of a knob. Includes liquid bath with constant level overflow, brass test cup, plated brass thermometer ferrules and test flame reference bead. Bath and cover mechanism are constructed of plated brass. Heater is enclosed in a cast aluminum base assembly.

Please refer to page 33 about our automated Tag Closed Cup Flash Point Tester or inquire by contacting Koehler Customer Service.

Ordering Information

Catalog No.		Order Qty
Tag Closed Cup Flash Tester		1
K14600	Electrically Heated Model, 115V 50/60Hz	
K14670	Electrically Heated Model, 220-240V 50/60Hz	
K14690	Gas Heated Model	
	Accessories	
250-000-09F	ASTM 9F Thermometer Range: 20 to 230°F	2
250-000-09C	ASTM 9C Thermometer Range: –5 to +110°C	
250-000-57F	ASTM 57F Thermometer Range: –4 to +122°F	2
250-000-57C	ASTM 57C Thermometer Range: –20 to +50°C	
K14510	Cover Assembly Includes slide shutter burner and thermometer ferrules	
K14520	Brass Test Cup	

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

K14600 Tag Closed Cup Flash Tester

Specifications

Conforms to the specifications of:
ASTM D56; IP 304; FTM 791-1101
Electrical Requirements:
115V 50/60Hz, Single Phase, 1.3A
220-240V 50/60Hz, Single Phase, 0.6A

Included Accessories

Brass Test Cup
Cover Assembly (includes Slide Shutter, Burner and Thermometer Ferrules)

Dimensions lxwxh,*in.(cm)

5x5x16 (13x13x41)
*with thermometers inserted
Net Weight: 7 lbs (3.2kg)

Shipping Information

Shipping Weight: 8 lbs (3.6kg)
Dimensions: 0.76 Cu. ft.

Koehler INSTRUMENT COMPANY, INC.

Flash and Fire Points by Cleveland Open Cup

K13900 Cleveland Open Cup Flash Tester

Specifications

Conforms to the specifications of:
ASTM D92, D6074, D6158; AASHTO T48; ANS Z-11.6; IP 36; ISO 2592; DIN 51376; FTM 791-1103, FTM 141-4294

Electrical Requirements:
115V 50/60Hz, Single Phase, 6.5A
220-240V, 50/60Hz, Single Phase, 3.4A

Included Accessories

Brass Test Cup

Dimensions lxwxh,in.(cm)

10x5½x14 (25x14x36)

Net Weight: 8½ lbs (3.9kg)

Shipping Information

Shipping Weight: 12 lbs (5.4kg)

Dimensions: 1.5 Cu. ft.

Test Method

For flash and fire points of all petroleum products, except fuel oils and those having an open cup flash below 79°C (175°F).

Cleveland Open-Cup Flash Tester

- Conforms to ASTM D92 and related specifications
- For flash points above 79°C (175°F)

Determines flash and fire points by the Cleveland Open-Cup method. Consists of test flame applicator, brass test cup, thermometer support, heating plate and electric heater. Applicator is precisely aligned per specifications and pivots for test flame application at specified temperature intervals. Hinged thermometer support raises to facilitate placement and removal of test cup. Adjust flame size using built-in needle valve and comparison bead.

Equipped with a 1000W nickel-chromium heater with stepless variable heat control for accurate repeat setting of temperature rate of rise per specifications.

Heater unit is enclosed in a stainless steel housing with cooling vents. Test flame applicator and thermometer support are constructed of machined nickel plated brass.

Please refer to page 33 about our automated Cleveland Open Cup Flash Point Tester or inquire by contacting Koehler Customer Service.

Ordering Information

Catalog No.		Order Qty
Cleveland Open-Cup Flash Tester		1
K13900	Electrically Heated Model, 115V 50/60Hz	
K13990	Electrically Heated Model, 220-240V 50/60Hz	
Accessories		
250-000-11F	ASTM 11F Thermometer Range: 20 to 760°F	1
250-000-11C	ASTM 11C Thermometer Range: –6 to +400°C	
K14000	Cleveland Open Flash Cup Precision machined brass with heat resistant handle	

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

Flash Point by Tag Open-Cup Apparatus

Flash Point and Fire Point of Liquids by Tag Open-Cup Apparatus

Flash Point of Cutback Asphalt with Tag Open-Cup Apparatus

Test Method

For determination of flash and fire points of liquids at temperatures of up to 325°F (163°C) and flash points of cutback asphalts at temperatures of less than 200°F (93°C).

Tag Open-Cup Flash Tester

- Conforms to ASTM D1310, D3143 specifications
- Choice of gas or electrically heated

Determines Tag Open-Cup flash point of liquid products and cutback asphalts. Includes sample test cup, plated brass liquid bath with constant level overflow, pivoting ignition taper with pilot light and reference bead, pivoting thermometer holder, heater and cast aluminum base.

Electrically heated model is equipped with stepless variable heat control for accurate control of temperature rate of rise per specifications. Also available with gas or burner.

K15600 Tag Open-Cup Flash Tester

Ordering Information

Catalog No.		Order Qty
Tag Open-Cup Flash Tester		
K15600	Electrically Heated Model, 115V 50/60Hz	1
K15670	Electrically Heated Model, 220-240V 50/60Hz	
K15690	Gas Heated Model	
	Accessories	
250-000-33F	ASTM 33F Thermometer Range: –36.5 to +107.5°F	1
250-000-33C	ASTM 33C Thermometer Range: –38 to +42°C	
250-000-09F	ASTM 9F Thermometer Range: 20 to 230°F	1
250-000-09C	ASTM 9C Thermometer Range: –5 to +110°C	
250-000-35F	ASTM 35F Thermometer Range: 194 to 338°F	
250-000-35C	ASTM 35C Thermometer Range 90 to 170°C	1
K15610	Levelling Device For proper adjustment of sample level in test cup. Meets ASTM specifications. Polished aluminum	
K15620	Draft Shield	1
K15520	Sample Cup	

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

Specifications

Conforms to the specifications of:
ASTM D1310, D3143
Electrical Requirements:
115V 50/60Hz, Single Phase, 13A
220-240V 50/60Hz, Single Phase, 0.6A

Included Accessories

Pyrex™ Sample Cup

Dimensions lxwxh,*in.(cm)

10x7x17 (25x18x43)
*with thermometer inserted
Net Weight: 7½ lbs (3.4kg)

Shipping Information

Shipping Weight: 9½ lbs (4.3kg)
Dimensions: 1.3 Cu. ft.

Flash Point and Sustained Burning of Liquids

K16500 Rapid Flash Tester, Closed Cup

Ordering Information

Catalog No.	
K16500	Rapid Flash Tester, Closed Cup, 115V Aluminum Test Cup/Brass Lid & Shutter
K16591	Rapid Flash Tester, Closed Cup, 220-240V Aluminum Test Cup/Brass Lid & Shutter
K16502	Rapid Flash Tester, Closed Cup, 115V Stainless Steel Test Cup, Lid & Shutter
K16592	Rapid Tester, Closed Cup, 220-240V Stainless Steel Test Cup, Lid & Shutter
K16503	Rapid Flash Tester, Open-Cup, 115V Aluminum Test Cup
K16593	Rapid Flash Tester, Open-Cup, 220-240V Aluminum Test Cup
K16504	Rapid Flash Tester, Open-Cup, 115V Stainless Steel Test Cup
K16594	Rapid Flash Tester, Open-Cup, 220-240V Stainless Steel Test Cup

Accessories

K16506	Fuel Cylinder Valve
K16507	Heat Transfer Compound for thermometer
K16508	Metal Cooling Block to facilitate cooling of the sample cup between tests
K16509	Refrigerant Charged Cooling Block to hold cooling mixture for subambient testing
K16510	Syringe 2mL/4mL
K16511	Thermometer, range 32 to 572˚F/0 to 300˚C
K16512	Thermometer, range 32 to 230˚F
K16513	Thermometer, range 212 to 572˚F
K16514	Thermometer, range 0 to 110˚C
K16515	Thermometer, range 100 to 300˚C
K16516	Thermometer, range –36 to +105˚F
K16517	Thermometer, range –38 to +40˚C

Flash Point of Liquids by Small Scale Closed Cup Apparatus

Flash Point by Small Scale Closed Tester

Sustained Burning of Liquid Mixtures by Setaflash Tester (Open-Cup)

Test Method

Verifies the flash point or the sustained burning qualities of small samples in the range of –30˚C to +300˚C.

Rapid Flash Tester

- Conforms to ASTM D3278, D3828, D4206; DOT CFR 49-173.115; IATA; ISO 9038 and related specifications
- One minute test with a 2mL sample
- Simple to operate

Rapid Tester® provides rapid determinations of flash point or sustained burning qualities by using a small sample. A flash/no flash test result is achieved in one minute for flash points below 212˚F (100˚C) with a 2mL sample. Ideally suited for quality assurance and environmental compliance testing as well as actual flash point for paints, fragrances, hydrocarbons and other liquids. Open cup models are used for determining sustained burning qualities characteristics of mixtures of flammable and nonflammable liquids or liquids with widely different flash points when assessing flammability characteristics. Features convenient semi-automatic operation for flash/no flash tests. Set the test temperature on the digital display and inject a 2mL or 4mL sample into the sample cup. The tester quickly stabilizes itself at the desired value, permitting the test flame to be applied and the result to be observed by the operator. Unit also performs conventional determinations of actual flash temperature by the small scale closed tester method.

Two models are offered: the Closed Cup Model is for routine flash point tests in the range from –30 to +300˚C (–22 to +572˚F); the Open-Cup Model is for sustained burning tests in the range from ambient to 212˚F (100˚C). Both models include automatic temperature control with ˚C/˚F selector switch, syringe, electronic timer, integral NIST traceable thermometer, and an external fuel cylinder valve for connection to a customer-supplied fuel cylinder or other fuel source.

Specifications

Conforms to the specifications of:
ASTM D3278, D3828, D4206; IP 303; ISO 3679, ISO 3680, ISO 9038; DOT CFR 49-173.115; IATA

Included Accessories

Thermometer, range 32 to 572˚F (0 to 300˚C)
Syringe

Dimensions: lxwxh,in.(cm)

15x23.4x6.3 (38.1x8.6x16.2)
Net Weight: 10 lbs (4.6kg)

Shipping Information

Shipping Weight: 16 lbs (7.26kg)
Dimensions: 2.3 Cu. ft.

Autoignition Temperature of Liquid Chemicals

Test Method

Determines the lowest temperature at which the vapors of a liquid or solid chemical sample will self-ignite under prescribed laboratory conditions. The temperatures at which 'cool flame' and 'hot flame' ignitions occur, as evidenced by sudden temperature increases in the sample flask, are measured and recorded, and the delay time between introduction of the sample and ignition is timed.

Autoignition Apparatus

- Conforms to ASTM E659 specifications
- Digital furnace temperature control
- Digital flask temperature display

Modified crucible furnace with digital thermocouple readout of flask temperature at prescribed points per ASTM specifications. Linearized analog output permits connection to a strip chart recorder or datalogging instrument. Furnace provides rapid response and ±1°C stability throughout the operating range of 200 to 1200°C. Cylindrical heating chamber provides excellent radial temperature uniformity. Furnace cover has ports for flask exterior thermocouples, and a borosilicate glass thermocouple tube is provided to assure correct positioning of the gas temperature thermocouple inside the test flask. Thermocouples plug directly into the furnace control unit for quick disconnection when removing the flask. A hinged holder in the cover facilitates handling of the test flask. Adjustable mirror permits safe viewing of the flask interior during testing. Control panel has temperature controls and digital thermocouple readout with four-position selector switch.

Specifications

Conforms to the specifications of:
ASTM E659
Temperature Range: 200 to 1200°C
Temperature Control: digital setpoint solid state controller
accurate to within ±1°C
Flask Temperature Display: 0-1200°C, with four position selector switch
Electrical Requirements: 220-240V 50/60Hz, Single Phase, 7.7A

Included Accessories

Test Flask, 500mL
Thermocouples (4)

Dimensions lxwxh,in.(cm)

Furnace: 15x15x22 (38x38x56)
Control Cabinet: 22x10x14 (56x25x36)
Net Weight: 72 lbs (32.8kg)

Shipping Information

Shipping Weight: 98 lbs (44.5kg)
Dimensions: 16.3 Cu. ft.

Special apparatus for performing the Autoignition Test according to the ASTM D2155 test method is available. Please contact Koehler Customer Service for additional and ordering information.

K47000 Autoignition Apparatus

Ordering Information

Catalog No.		Order Qty
K47000	Autoignition Apparatus, 220-240V 50/60Hz	1
	Accessories	
362-001-000	Syringe, 1mL	1
K470-0-1-14	Needle, 6", stainless steel	1
308-115-001	Recorder, 115V 50/60Hz Records signal from the internal gas thermocouple in strip chart form.	1
308-230-006	Recorder, 220-240V 50/60Hz	1

Accessories (Con't)

Catalog No.		Order Qty
374-115-001	Hot Air Gun For purging product gases between tests 115V 50/60Hz	1
374-230-001	Hot Air Gun, 220-240 50/60Hz	
332-003-007	Test Flask, 500mL	

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.

Flash Point by Pensky-Martens Closed Tester ..... **Pages 32, 34**

ASTM D93, AASHTO T73-811, IP 34, ISO 2719, DIN 51758, FTM 791-1102

Propane
Toluene
Acetone
Calcium Chloride
Barometer

Flash Point by Tag Closed Tester ..... **Pages 33, 35**

ASTM D56, IP 304, FTM 791-1101

Ethylene Glycol
Propane
Barometer
Water

Flash and Fire Points by Cleveland Open-Cup ..... **Pages 33, 36**

ASTM D92, AASHTO T48, ANS Z-11.6. IP 36, ISO 2592, DIN 51376, FTM 791-1103, FTM 141-4294

Barometer

Flash Point of Cutback Asphalt with Tag Open-Cup Apparatus ..... **Page 33**

ASTM D3143

Ethylene Glycol
Distilled Water

Flash Point and Fire Point of Liquids by Tag Open-Cup Apparatus ..... **Page 37**

ASTM D1310

Flasks, 500mL (2)
Distilled Water
Solid Carbon Dioxide
Acetone
n-Heptane
p-Xylenol
Isopropanol
Diethylene Glycol

Autoignition Temperature of Liquid Chemicals ..... **Page 39**

ASTM E659

Laboratory Balance
Powder Funnel

General Test Equipment

Test Methods	Page
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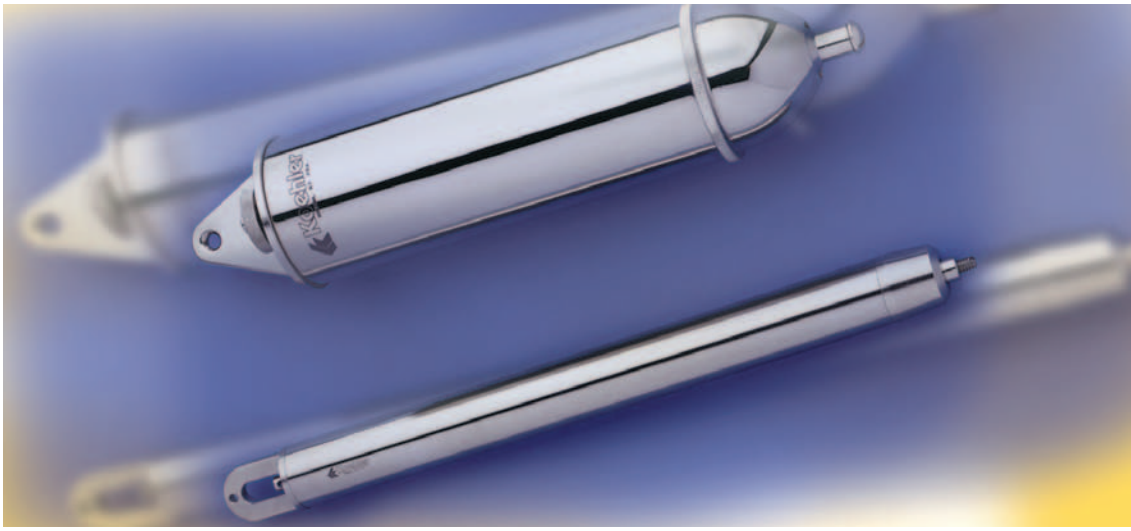


Aniline Point and Mixed Aniline Point of Petroleum Products

K10200 Automatic Aniline Point Apparatus

Ordering Information

Catalog No.		Order Qty
Automatic Aniline Point Apparatus		
K10200	Automatic Aniline Point Apparatus, 115V 50/60Hz	1
K10290	Automatic Aniline Point Apparatus, 220-240V 50/60Hz	
Accessories		
250-000-33F	ASTM 33F Thermometer Range: –36.5 to +107.5°F	1
250-000-33C	ASTM 33C Thermometer Range: –38 to +42°C	
250-000-34F	ASTM 34F Thermometer Range: 77 to 221°F	1
250-000-34C	ASTM 34C Thermometer Range: 25 to 105°C	
250-000-35F	ASTM 35F Thermometer Range: 194 to 338°F	1
250-000-35C	ASTM 35C Thermometer Range: 90 to 170°C	
K10210	Pyrex™ Test Cell with drain	
K10220	Heating-Cooling Tube with platinum element	

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

Aniline Point and Mixed Aniline Point of Petroleum Products and Hydrocarbon Solvents

Test Method

Aniline point is used to characterize pure hydrocarbons and to indicate the aromatic content of hydrocarbon mixtures. Equal volumes of aniline and sample or sample plus *n*-heptane are stirred together while being heated at a controlled rate. After the two phases become miscible, the mixture is cooled at a controlled rate and the temperature at which the two phases separate is the aniline point or mixed aniline point of the sample.

Automatic Aniline Point Apparatus

- Conforms to ASTM D611 and related specifications
- For samples ranging from clear to very dark
- Temperature range 0°C to 150°C (32°F to 302°F)
- Digital temperature display

Performs aniline point and mixed aniline point determinations automatically by means of a modified thin film technique (ASTM D611 Method E). The sample-aniline mixture is directly heated by a platinum immersion heater and the aniline point is detected photoelectrically. Temperature is displayed on a large LED indicator. Built-in pressure regulator and solenoid valve permit the use of cooling air for quicker cooling cycles or to determine subambient aniline point temperatures. Aniline points as low as 0°C (32°F) can be determined with the use of refrigerated cooling air. Equipped with variable controls for heater, light source and stirrer speed. Cabinet exterior surfaces have a chemical resistant polyurethane enamel finish.

Specifications

Conforms to the specifications of:
ASTM D611; IP 2; ISO 2977; DIN 51775; FTM 791-3601; NF M 07-021
Testing Range: 0 to 150°C (32 to 302°F)
Temperature Display: 0-999.9°C
Electrical Requirements:
115V 50/60Hz, Single Phase, 0.4A
220-240V 50/60Hz, Single Phase, 0.2A

Included Accessories

Standard Pyrex™ Test Cell with drain

Dimensions lxwxh,in.(cm)

14½x8½x20¾ (37x22x53)
Net Weight: 32½ lbs (14.7kg)

Shipping Information

Shipping Weight: 46 lbs (21kg)
Dimensions: 8.2 Cu. ft.

Aniline Point and Mixed Aniline Point of Petroleum Products

Thin Film Aniline Point Apparatus

- Conforms to ASTM D611 and related specifications

For aniline point and mixed aniline point determinations according to Method B. Stirs aniline-sample mixture in a borosilicate glass thin film tube suspended in a heating bath. Thin film of mixture flows over a light well illuminated by a variable 6V lamp. Adjust heating rate per specifications using accessory Powertrol Heater. When lamp filament brightens inside well, allow mixture to cool until the two phases separate as indicated by obscuring of the lamp filament. Consists of thin film tube; 400mL Pyrex™ beaker; cover assembly with bath stirrer; sample pump rotor and cooling coil; 6V lamp with line cord; and drive motor. Positive drive pulley system rotates sample and bath stirrers. Accessory Powertrol Heater has variable stepless control and a reference dial for repeatable control of heating rate. Porcelain refractory top plate shields 750W heater and has a positioning well for the Pyrex™ bath. Low voltage receptacle in heater housing accepts line cord of 6V lamp.

Specifications

Conforms to the specifications of: ASTM D611; IP 2; ISO 2977;
DIN 51775; FTM 791-3601; NF M 07-021
Bath Medium: 400mL of heat transfer fluid
(355-000-001 mineral oil is suitable for this application)
Electrical Requirements:
115V 50/60Hz, Single Phase, 6.5A
220-240 V 50/60Hz, Single Phase, 13.4A

Included Accessories

Thermometer Ferrules (2)
Clamps and Support Rod

Dimensions lxwxh,in.(cm)

14½x18½x20¾ (37x22x53)
Net Weight: 24 lbs (10.9kg)

Shipping Information

Shipping Weight: 42 lbs (19.1kg)
Dimensions: 5.7 Cu. ft.

K10190 Thin Film Aniline Point Apparatus

Ordering Information

Catalog No.		Order Qty
K10190	Thin Film Aniline Point Apparatus, 115V 50/60Hz	1
K10191	Thin Film Aniline Point Apparatus, 220-240V 50/60Hz	
K10020	Powertrol Heater, 115V 50/60Hz	1
K10029	Powertrol Heater, 220-240V 50/60Hz	
	Accessories	
250-000-33F	ASTM 33F Thermometer Range: –36.5 to +107.5°F	2
250-000-33C	ASTM 33C Thermometer Range: –38 to +42°C	
250-000-34F	ASTM 34F Thermometer Range: 77 to 221°F	2
250-000-34C	ASTM 34C Thermometer Range: 25 to 105°C	
250-000-35F	ASTM 35F Thermometer Range: 194 to 338°F	2
250-000-35C	ASTM 35C Thermometer Range: 90 to 170°C	

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

U-Tube Aniline Point Apparatus

- Developed by Standard Inspection Laboratories

Similar to the Thin Film Aniline Point Apparatus but with 'U-Tube' aniline-sample tube and stirrer as developed by Standard Inspection Laboratories. Suitable for samples having 6.5 or lighter ASTM D1500 color. As illustrated in IP2-56, Method D. Consists of U-tube; 400mL Pyrex™ beaker; cover assembly with bath stirrer; sample stirrer and cooling coil; 6V lamp with line cord; and drive motor. Thermometer ferrules and mounting hardware are included. Accessory Powertrol Heater provides variable stepless control of heating rate and 6V tap for lamp.

Ordering Information

Catalog No.		Order Qty
K10090	U-Tube Aniline Point Apparatus 115V 50/60Hz	
K10091	U-Tube Aniline Point Apparatus 220-240V 50/60Hz	1
K10020	Powertrol Heater, 115V 50/60Hz	
K10029	Powertrol Heater, 220-240V 50/60Hz	1

Saybolt Color of Petroleum Products

K13009 Saybolt Chromometer

Specifications
Conforms to the specifications of:
ASTM D156; DIN 51411; FTM 791-101; NF M 07-003

Included Accessories
Whole Color Standards (3)
Half Color Standard (1)
Engraved Conversion Chart

Dimensions lxwxh,in.(cm)
5½x5½x26½ (14x14x67)
Net Weight: 15½ lbs (7kg)

Shipping Information
Shipping Weight: 31 lbs (14.1kg)
Dimensions: 4.0 Cu. ft.
Includes accessory lamp

Test Method
The Saybolt Color test is used for quality control and product identification purposes on refined products having an ASTM Color of 0.5 or less. Products in this range include undyed motor and aviation gasolines, jet propulsion fuels, naphthas, kerosene and petroleum waxes. Color is an important quality characteristic for many products, and can also be used to detect product contamination. The Saybolt Chromometer measures color by comparing a column of sample against standard color discs. The Saybolt Wax Chromometer measures color of non-fluid waxes by heating the samples during the test.

Saybolt and Saybolt Wax Chromometers
- Conforms to ASTM D156 and related specifications
- Three-position color standard turret
- Tests non-fluid waxes and liquid petroleum products

Determines Saybolt Color of highly refined petroleum products. Consists of a matched set of sample and standard tube assemblies with optical viewer. Compares a sample of the product to be tested against standard color discs under a uniform light source. Reduce column height until the sample field is lighter than the color standard and convert height to Saybolt Color using chart on instrument. Three-position turret on standard tube permits convenient changing of color disc combinations. Accessory Daylight Lamp (Cat. No. K13010) provides standard light source per ASTM specifications.

For petroleum waxes, the Saybolt Wax Chromometer is equipped with heaters to keep waxes that are not fluid at ambient temperature molten during testing. Sample tube has a 200W chrome steel strip heater and a hinged cover to maintain even heat distribution. An aluminum block heater with 50W cartridge element keeps wax molten in the draincock assembly. Accessory variable transformer may be used to regulate the sample temperature. Optical viewer and stand are fully insulated from the heaters. Sample tube assembly has heat resistant fiber handles.

Ordering Information

Catalog No.		
K13009	Saybolt Chromometer	1
K13100	Saybolt Wax Chromometer, 115V 50/60Hz	1
K13190	Saybolt Wax Chromometer, 220-240V 50/60Hz	
	Accessories	
K13010	Daylight Lamp Meets ASTM D156 and related test specifications for illumination of Saybolt Chromometers. Adjustable for correct positioning. Standard 60W bulb not included.	1
K13020	Whole Color Standard	
K13029	Half Color Standard	
K13032	Matched Set of Tubes with Turret and Draincock Assembly for K13009 Saybolt Chromometer	
K13033	Matched Set of Tubes with Turret and Draincock Assembly for K13100/K13190 Saybolt Wax Chromometer	
279-115-005	Frosted Bulb, 60W, 115V	1
279-230-002	Frosted Bulb, 60W, 220-240V	
280-115-005	Variable Transformer, 115V Regulates heaters of Saybolt Wax Chromometer.	
280-230-003	Variable Transformer, 220-240V	

ASTM Color of Petroleum Products

Test Method

The ASTM color of petroleum products applies to products having an ASTM color of 0.5 or darker, including lubricating oils, heating oils and diesel fuel oils. (For products having an ASTM color lighter than 0.5, use the Saybolt Chromometer.) To determine ASTM color, the sample is compared against standard color discs in the Petroleum Colorimeter.

Petroleum Colorimeter

- Conforms to ASTM D1500 specifications

Grades and compares petroleum oils and waxes according to ASTM D1500 specifications. Color discs situated on either side of the sample contain standards conforming to the chromaticity coordinates of ASTM D1500. Rotate the discs by turning dials on the front of the comparator until the sample color matches the color standards and take the reading directly from the dials. Two-disc configuration offers a distinct advantage over single-disc systems—the sample is always bracketed between the next lower and higher color standards allowing the viewer to easily determine the actual sample color. Comparator may also be used to quickly determine if a sample falls between two predetermined color limits.

View the sample from either a standing or sitting position through a prism eyepiece that brings the standards and sample together in a three-field comparison. A detachable prism light shield may be inserted to eliminate any outside light interference. Color corrected filtered halogen light source corresponding to Illuminant C of the CIE system provides clear visibility, assuring accurate readings.

Specifications

Conforms to the specifications of:
ASTM D1500, D6074; IP 196; ISO 2049; FTM 791-102

Included Accessories

Light Shield
Sample Containers (3)
Calibration Certificate

K13200 Petroleum Colorimeter

Dimensions lxwxh,in.(cm)
10x10½x7¼ (25x27x18)
Net Weight: 10 lbs (4.5kg)

Shipping Information

Shipping Weight: 15 lbs (6.8kg)
Dimensions: 2.6 Cu. ft.

Ordering Information

Catalog No.		Order Qty
K13200	Petroleum Colorimeter, 115V 50/60Hz	1
K13290	Petroleum Colorimeter, 220-240V 50/60Hz	
	Accessories	
K13210	Sample Container	
K13222	Replacement Halogen Lamp	

Visual Examination of Used Electrical Insulating Oils

Visual Examination of Used Electrical Insulating Oils of Petroleum Origin in the Field

Test Method

Provides an estimate of the color and condition of in-service oils by visual observation and comparison with ASTM color standards in an oil comparator.

Oil Comparator

- Conforms to ASTM D1524 specifications
- Yields results equivalent to ASTM D1500

Complete ASTM oil color test outfit for comparison of oils against ASTM color standards. Includes two color discs, ranging from 0.5 to 5.0 in 10 steps and 5.0 to 8.0 in 7 steps. Magnifying prism brings the sample and standard color fields together for side by side comparison. Portable unit is suitable for laboratory or field use. Supplied with two precision 33mm rectangular glass cells, carrying case and instructions.

Shipping Information

Shipping Weight: 10 lbs (4.5kg)
Dimensions: 1 Cu. ft.

Ordering Information

Catalog No.		Order Qty
K13203	Oil Comparator	1
	Accessories	
K13204	Daylight Illuminator, 115V Provides uniform lighting for Oil Comparator	1
K13294	Daylight Illuminator, 220-240V	
K13205	Rectangular Glass Cell	

Portable Automated Colorimeter

K13250 Portable Automatic Colorimeter

Portable Automated Colorimeter

- Conforms to ASTM D156, D1500, D1544, D1209, DIN 6162, and related international test specifications
- Measures up to 5 color ranges
- Portable design for remote applications

Single-beam filter colorimeter system utilizes reference beam path technology to measure samples over eight spectral wavelengths ranged between 400 and 700nm in comparison to 5 standard color scales. Provides photometric high precision color measurements that are objective, accurate, and consistent over a wide variety of samples required for quality control programs. Measurements are initiated by just a single key press and require less than one minute to complete. The test results can be either displayed on the LCD screen or sent to an external printer.

Color Ranges

- Saybolt Color (ASTM D156, ISO 2049, NF M 07-003)
- Mineral Oil Color (ASTM D1500, NF M 60-104)
- Iodine Color (DIN 6162)
- Hazen Color, APHA Color, Pt/Co Color (ASTM D1209, ISO 6271)
- Gardner Color (ASTM D1544, ISO 4630)

Specifications

Conforms to the specifications of:
ASTM D156, D1209, D1500, D1544; ISO 4630, 6271; DIN 6162; NF M 07-003; NF T 60-104
Reproducibility: ±0.2% T (referenced to distilled water)
Reference Standard: distilled water
Data Output: RS232/printer
Light Source: krypton lamp

Dimensions lxwxh,in.(cm)

7.9x10x3.5 (20x26x90)
Net Weight: 2.9 lbs (1.3kg)

Shipping Information

Shipping Weight: 10 lbs (4.5kg)

Electrical Requirements

115-240V 50/60Hz

Ordering Information

Catalog No.	
K13250	Portable Automatic Colorimeter
	Accessories
K13251	Printer (w/cable & paper)
K13253	Color Calibration Standards

Automated Colorimeter for Saybolt and ASTM Color


K13150 Automated Colorimeter

Saybolt and Mineral Oil Colorimeter

- Conforms to ASTM D156, D1500, D6045, and related test specifications
- Designed for color measurement of waxes and other petroleum products

High precision spectrophotometer for objective color analysis of petroleum fuels, oils, waxes and petrochemicals according to the Saybolt and ASTM Color scales. Test results can also be displayed in terms of CIE values and spectral data. The colorimeter is rugged with a fabricated steel housing which is designed to function equally as a QC instrument within the laboratory or on 24 hour operation in a production environment. A diagnostic test routine allows users to conduct periodic checks on the instrument or to identify faults. Direct access of the precision filament lamp from outside the instrument allows for easy replacement. The colorimeter is also supplied with a colored glass filter of known Saybolt value for regular conformance testing.

Specifications

Conforms to the specifications of:
ASTM D156, D1500, D6045, E 308; JIS K2580
Reproducibility: ±0.25% T, ±1 Saybolt value
Spectral Range: 410-710 nm
Data Output: RS232/printer
Light Source: tungsten halogen lamp
Illuminant: CIE Illuminant C
Observer: 2°

Dimensions lxwxh,in.(cm)

7.7x20.3x6.7 (19.5x51.5x17)
Net Weight: 17 lbs (7.75kg)

Shipping Information

Shipping Weight: 23 lbs (10.5kg)

Ordering Information

Catalog No.	
K13150	Automatic Saybolt and ASTM Colorimeter, 115-240V 50/60 Hz

Automated Colorimeter

Automated Colorimeter

- Conforms to ASTM D156, D1500, and related specifications
- Spectral range for color measurement: 340-900nm
- Versatile and readily tailored to various applications
- Capable of measuring up to 15 color ranges
- Additional feature allows measurements of solid samples
- Automatic cuvette recognition and measurement
- 11mm cylindrical cuvettes for standard color applications and 50x10mm rectangular cuvettes for lighter "water white" samples are available

Provides photometric color measurements required for purity and quality control testing that are objective, accurate, and consistent over a wide variety of samples. Microprocessor-based unit features a modern optical system with reference beam path (RST-technology) and measures samples in comparison to 15 possible color ranges. The colorimeter is custom configured to user specifications and easily performs single measurement, multi-measurement, color difference, and color strength tests. Tests take less than one minute to complete, and results can be either displayed on LCD screen or sent to an external printer.

Color Ranges

- Saybolt Color (ASTM D156, ISO 2049, NF M 07-003)
- Mineral Oil Color (ASTM D1500, NF M 60-104)
- Iodine Color
- Hazen Color (APHA Color, Pt/Co Color)
- Gardner Color
- Lovibond®
- European Pharmacopoeia
- Klett Color
- Hess-Ives Color
- Yellowness Index
- CIE-L*, a*, b* Values
- CIE-L*, a*, b* Difference
- Hunter Lab Values
- Chromaticity Coordinates
- Tristimulus Values

Specifications

Conforms to the specifications of:
ASTM D156, D1209, D1500, D1544, D5386, D6045; ISO 2049; ISO 4630, 6271; DIN 5033, 6162, 6174; EN 1557; AOCS Cc 13e; Ph EUR; NF M 07-003; NF T 60-104
Viewing Geometry: 0°/180° (transmission)
Reproducibility: ±0.2% T (referenced to distilled water)
Display: backlit graphical LCD display
Reference Standard: distilled water
Data Output: RS232 port (LIMS ready), serial printer port and 3.5" floppy disk
Spectral Range:
Monochromator: optical concave grating
Receiver: two Si photodiode cells
Color Measurement: 380-720nm in steps of 10nm, X, Y, Z illuminant C and standard observer 2° (DIN 5033)
Photometer: 340-900nm in steps of 1nm
Light Source: halogen lamp 12V/20W
Electrical Requirements:
115-240V 50/60Hz

K13500 Automatic Colorimeter

Dimensions lxwxh,in.(cm)
12¾x14¾x8 (32½x37½x20)
Net Weight: 15.4 lbs (7kg)

Shipping Information

Shipping Weight: 19.8 lbs (9kg)

Ordering Information

Catalog No.	
K13500	Automatic Colorimeter 115-240V, 50/60Hz

Accessories

K13350	Printer (w/cable & paper)
K13503	Barcode Reader
K14460	Windows-based Spectral QC Software
K13253	Color Calibration Standards

Please specify color range choices and/or test methods when ordering. Please inquire with Koehler Customer Service about our advanced models as well as the additional feature which allows for the measurement of solid samples.

Density, Relative Density (Specific Gravity), or API Gravity

Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method

ASTM Hydrometers

For density, relative density (specific gravity) or API gravity determination of crude petroleum, liquid petroleum products and mixtures of petroleum and non-petroleum products. For density of LPG and light hydrocarbons refer to page 103.

Specifications

Conforming to the specifications of: ASTM E100

Applicable Test Method Standards:

ASTM D287, D1298, D6074, D6158;
API MPMS Chapter 9.1; IP 160; ISO 3675; DIN 51757

API Gravity Hydrometers

Standard temperature 60°F, subdivisions 0.1° API, length 330mm

Catalog No.	ASTM Hydrometer No.	Nominal API Gravity Range, deg.
251-000-01H	1H	–1 to +11
251-000-02H	2H	9 to 21
251-000-03H	3H	19 to 31
251-000-04H	4H	29 to 41
251-000-05H	5H	39 to 51
251-000-06H	6H	49 to 61
251-000-07H	7H	59 to 71
251-000-08H	8H	69 to 81
251-000-09H	9H	79 to 91
251-000-10H	10H	89 to 101

Specific Gravity Hydrometers

Standard temperature 60/60°F, subdivisions 0.0005, length 330mm

Catalog No.	ASTM Hydrometer No.	Nominal Specific Gravity Range
251-000-82H	82H	0.650 to 0.700
251-000-83H	83H	0.700 to 0.750
251-000-84H	84H	0.750 to 0.800
251-000-85H	85H	0.800 to 0.850
251-000-86H	86H	0.850 to 0.900
251-000-87H	87H	0.900 to 0.950
251-000-88H	88H	0.950 to 1.000
251-000-89H	89H	1.000 to 1.050
251-000-90H	90H	1.050 to 1.100

Calibrated hydrometers and thermohydrometers are available from Koehler with an ISO/IEC 17025 and ANSI/NCSL Z-540-1 Report of Calibration.

When inquiring about calibrated hydrometers and thermohydrometers, please refer to the catalog number for the corresponding hydrometer/ thermohydrometer and replace the middle three zeros in the catalog number with 004. Example: 251-000-01H API Gravity Hydrometer would be 251-004-01H Certified API Gravity Hydrometer.

API Gravity Hydrometers

Standard temperature 60°F, subdivisions, 0.1° API, length 330mm

Catalog No.	ASTM Hydrometer No.	Nominal API Gravity Range, deg.
251-000-21H	21H	0 to 6
251-000-22H	22H	5 to 11
251-000-23H	23H	10 to 16
251-000-24H	24H	15 to 21
251-000-25H	25H	20 to 26
251-000-26H	26H	25 to 31
251-000-27H	27H	30 to 36
251-000-28H	28H	35 to 41
251-000-29H	29H	40 to 46
251-000-30H	30H	45 to 51
251-000-31H	31H	50 to 56
251-000-32H	32H	55 to 61
251-000-33H	33H	60 to 66
251-000-34H	34H	65 to 71
251-000-35H	35H	70 to 76
251-000-36H	36H	75 to 81
251-000-37H	37H	80 to 86
251-000-38H	38H	85 to 91
251-000-39H	39H	90 to 96
251-000-40H	40H	95 to 101

API Gravity Thermohydrometers - Thermometer in Body

Standard temperature 60°F, subdivisions 0.1° API, length 380mm, thermometer scale °F 0-150 (designation L), 30 to 180 (designation M), 60 to 220 (designation H)

Catalog No.	ASTM Thermohydrometer No.	Nominal API Gravity Range, deg.
251-000-51HH	51HH	–1 to 11
251-000-51HL	51HL	–1 to 11
251-000-52HH	52HH	9 to 21
251-000-52HL	52HL	9 to 21
251-000-53HM	53HM	19 to 31
251-000-53HL	53HL	19 to 31
251-000-54HM	54HM	29 to 41
251-000-54HL	54HL	29 to 41
251-000-55HL	55HL	39 to 51
251-000-56HL	56HL	49 to 61
251-000-57HL	57HL	59 to 71
251-000-58HL	58HL	69 to 81
251-000-59HL	59HL	79 to 91
251-000-60HL	60HL	89 to 101

API Gravity Thermohydrometers - Thermometer in Stem

Standard temperature 60°F, subdivisions 0.1° API, length 380mm, temperature scale °F 30-220

Catalog No.	ASTM Thermohydrometer No.	Nominal API Gravity Range, deg.
251-000-71H	71H	–1 to 11
251-000-72H	72H	9 to 21
251-000-73H	73H	19 to 31
251-000-74H	74H	29 to 41

Density, Relative Density (Specific Gravity), or API Gravity

Specific Gravity Hydrometers

Standard temperature 60/60°F, subdivisions 0.001 length 260mm

Catalog No.	ASTM Hydrometer No.	Nominal Specific Gravity Range
251-000-102H	102H	0.650 to 0.700
251-000-103H	103H	0.700 to 0.750
251-000-104H	104H	0.750 to 0.800
251-000-105H	105H	0.800 to 0.850
251-000-106H	106H	0.850 to 0.900
251-000-107H	107H	0.900 to 0.950
251-000-108H	108H	0.950 to 1.000
251-000-125H	125H	1.000 to 1.050
251-000-126H	126H	1.050 to 1.100
251-000-127H	127H	1.100 to 1.150
251-000-128H	128H	1.150 to 1.200
251-000-129H	129H	1.200 to 1.250
251-000-130H	130H	1.250 to 1.300
251-000-131H	131H	1.300 to 1.350
251-000-132H	132H	1.350 to 1.400
251-000-133H	133H	1.400 to 1.450
251-000-134H	134H	1.450 to 1.500
251-000-135H	135H	1.500 to 1.550
251-000-136H	136H	1.550 to 1.600
251-000-137H	137H	1.600 to 1.650
251-000-138H	138H	1.650 to 1.700
251-000-139H	139H	1.700 to 1.750
251-000-140H	140H	1.750 to 1.800
251-000-141H	141H	1.800 to 1.850

ASTM Metric Thermohydrometers

Standard temperature 15°C, subdivisions 0.5kg/m³, length 380mm, thermometer scale °C: –20 to +65 (designation L), 0 to 85 (designation M), 20 to 105 (designation H).

Catalog No.	ASTM Thermohydrometer No.	Density, Range kg/m³
251-000-300HL	300HL	600 to 650
251-000-301HL	301HL	650 to 700
251-000-302HL	302HL	700 to 750
251-000-302HM	302HM	700 to 750
251-000-303HL	303HL	750 to 800
251-000-303HM	303HM	750 to 800
251-000-304HL	304HL	800 to 850
251-000-304HM	304HM	800 to 850
251-000-305HL	305HL	850 to 900
251-000-305HM	305HM	850 to 900
251-000-306HL	306HL	900 to 950
251-000-306HM	306HM	900 to 950
251-000-307HL	307HL	950 to 1000
251-000-307HH	307HH	950 to 1000
251-000-308HH	308HH	1000 to 1050
251-000-308HL	308HL	1000 to 1050
251-000-309HH	309HH	1050 to 1100
251-000-309HL	309HL	1050 to 1100

Hydrometer Cylinders*

- Wide base for maximum stability
- Convenient pour-out lip
- Choice of glass or metal construction

K26300 Brass Hydrometer Cylinder

Ordering Information

Catalog No.	Construction	Dimensions dia.xh.
K26300	Brass	2½x12" (64x305mm)
K26390	Brass	2x15" (51x381mm)
332-002-011	Glass	2x15½" (51x394mm)

**Not suitable for use with K26400 series baths*

Calibrated hydrometers and thermohydrometers are available from Koehler with an ISO/IEC 17025 and ANSI/NCSL Z-540-1 Report of Calibration.

When inquiring about calibrated hydrometers and thermohydrometers, please refer to the catalog number for the corresponding hydrometer/thermohydrometer and replace the middle three zeros in the catalog number with 004. Example: 251-000-01H API Gravity Hydrometer would be 251-004-01H Certified API Gravity Hydrometer.

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

Density, Relative Density (Specific Gravity), or API Gravity

Constant Temperature Hydrometer Bath

- Holds 12 hydrometer cylinders
- Can be used for Reid Vapor Pressure immersion type cylinders
- Conforms to ASTM D323, D1298, D6074, D6158 and related specifications

A versatile constant temperature bath designed for density/gravity determinations of petroleum products at temperatures of up to 195°F (90°C), and also for Reid Vapor Pressure determinations using immersion bombs. Microprocessor PID control provides quick temperature stabilization without overshoot and the unit is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.*

Also available–Special bath to accommodate both ASTM D323 (Vapor Pressure of Petroleum Products–Reid Method listed on page 93) and D942 (Oxidation Stability of Lubricating Greases by the Oxygen Bomb Method listed on pages 152-153), as well as D525 (Oxidation Stability of Gasoline–Induction Method listed on pages 81-82). Please contact a Koehler Customer Service representative for additional information.

Dimensions lxwxh,in.(cm)
30x14x28 (76x36x71)
Net Weight: 64 Lbs (29.0kg)

Shipping Information
Shipping Weight: 118 lbs (53.5kg)
Dimensions: 11.4 Cu. ft.

Specifications

Capacity: twelve (12) hydrometer cylinders (without base)
or Reid Vapor Pressure one-opening type bombs
Temperature Range: ambient to 250°F (121°C)
Temperature Control Stability: ±0.2°F (±0.17°C)
Heater Range: 0-2500W
Bath Medium: 19 gal (71.9L) water
Electrical Requirements:
115V 50/60Hz, Single Phase, 22A
230V 50/60Hz, Single Phase, 11A

Ordering Information

Catalog No.		Order Qty
K26400	Constant Temperature Hydrometer Bath, 115V	1
K26490	Constant Temperature Hydrometer Bath, 230V	
	Accessories	
K26410	Hydrometer Cylinder Borosilicate glass, 15½"lx2"dia. with 2½" lip	12
250-000-61F	ASTM 61F Thermometer Range: 90 to 260°F	1
250-000-61C	ASTM 61C Thermometer Range: 32 to 127°C	

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

Density, Relative Density (Specific Gravity), or API Gravity

Constant Temperature Hydrometer Bath

- Accommodates one standard 2"x15" (51x380mm) hydrometer cylinder with base
- Compact design saves space

Thermostatically controlled water bath with 500W copper immersion heater and hydraulic thermoregulator for operation at temperatures of up to 210 ±2°F (99±1°C). Holds one 2"x15" (51x381mm) hydrometer jar — top of jar extends 1½" (38mm) above the top of the bath for easy viewing of the hydrometer. Insulated double-wall construction with stainless steel tank and shelf and finished steel exterior. Has variable speed control for magnetic stirrer, temperature control dial, and on/off switches for motor and power.

Specifications

Temperature Range: Ambient to 210°F (99°C)
Temperature Control Stability: ±2°F (±1°C)
Bath Medium: 2 gal (7.57L) water
Electrical Requirements: 115V 50/60Hz, Single Phase, 4.3A
230V 50/60Hz, Single Phase, 2.2A

Dimensions dia.xh.(cm)
Bath Interior: 6x16½(15x42)
Overall: 9x22 (23x56)
Net Weight: 20 lbs (9.1kg)

Shipping Information
Shipping Weight: 35 lbs (15.9kg)
Dimensions: 5 Cu. ft.

Ordering Information

Catalog No.	
K26200	Constant Temperature Hydrometer Bath, 115V 50/60Hz
K26290	Constant Temperature Hydrometer Bath, 230V 50/60Hz

K26200 Hydrometer Bath

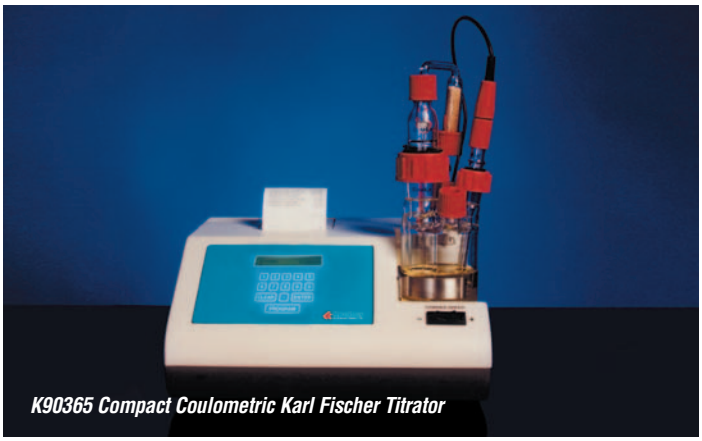
Coulometric Karl Fischer Titrator

Test Method

Determines low concentrations of water in a wide range of liquid, gas and powder samples. Used for assessing water content in petroleum and petrochemical products including oils, gasolines, solvents, and fluids as well as other products such as pharmaceuticals and cosmetics.

Coulometric Karl Fischer Titrator

- ASTM D 1533, D4928, D6304, IP 386, IP 438, API MPMS Chap. 10.9, BS 60814, ISO 10101-3, ISO 10337, ISO 12937
- Simple operation
- Multi-language display and print out
- Integral high-speed thermal printer
- Small footprint
- Automatic Compensation of Errors



K90365 Compact Coulometric Karl Fischer Titrator

The AKF5000 offers new standards in versatility and ease of operation. Providing fast, accurate and reproducible determinations of water content in liquids, gases and powders. This easy to use titrator incorporates many state-of-the-art features. Designed to be equally suitable for meeting the routine needs of the Quality Control laboratory or the more demanding and varied requirements of research applications. Hard copies of results are provided by the built in high-speed thermal printer, along with statistics, data input parameters, sample ID numbers and time/date of analysis. At the heart of the AKF5000 is state of the art ACE (Automatically Compensated Errors) control system. The ACE control system guarantees that the actual electrolysis current produced and the count rate displayed are always correctly synchronised, regardless of changes to the electrolysis cell resistance.

Ordering Information

Catalog No.	
K90365	AKF5000 Compact Coulometric Karl Fischer Titrator, 115-240V 50/60Hz

Included Accessories

LDC (Low Drift Cell) glassware pack comprising twin port titration vessel, detector electrode, generator electrode, dessicant tube, molecular seive, stirrer bar, injection septa, funnel & 1ml glass syringe with luer needle.

Accessories

K90365-7	Gas Analysis Kit (comprises gas inlet, gas outlet, seal ring & cap)
K90365-8	Carry Case
K90365-9	Reagents (Pack of 8 x 100ml anode reagent, 8 x 5ml cathode reagent, 1 x 0.1mg/ml & 1 x 1.0mg/ml water standards)

Specifications and Features

Titration method: Coulometric Karl Fischer titration
Electrolysis control: Patented “ACE” control system
End point detection: AC polarisation
End point indication: Visual display/print out/acoustic beep
Display: 40 character alphanumeric backlit LCD
Measuring range (possible): 1µg – 100mg water
Measuring range (typical): 1µg – 10mg water
Moisture range: 1 ppm – 100%
Max. sensitivity: 0.1 µg
Max. titration speed: 2.0 mg per minute
Max. current: 400 ma
Drift compensation: Automatically controlled
Start delay time: 0 - 30 minutes, user selectable
End delay time: 0 - 30 minutes, user selectable
Power supply: 90-264VAC, 47-63Hz Universal input
Precision: 10-100µg ±3µg, 100µg-1mg ±5µg, above 1mg ±0.5%
Calculation modes: Weight/weight, user programmable
Weight/dilution ratio, user programmable
Volume/density, user programmable
Volume/volume, user programmable
Display format: µg, mg/kg, ppm, %
Print format: µg, mg/kg, ppm, %
Statistics: max, mean, min values upto 99 runs
Method storage: 10 user programmable methods
Sample ID number: user programmable
Printer: 42 character high-speed thermal printer
Stirrer speed: Microprocessor controlled
Dimensions: 250 x 245 x 120 mm
Weight: 3 kg
Language: English, Francais, Espanol, Portugues, Deutsch and Magyar
Calendar/clock: Analysis time and date print out

Automatic Flocculation Titrimeter

Test Method

Samples of asphalt or heavy oil, or residuum are dissolved in toluene at various concentrations and titrated with iso-octane or n-heptane at controlled temperatures to determine the point of flocculation (asphaltene precipitation) and calculate the Heithaus compatibility parameters. These results are intended primarily as a laboratory diagnostic tool for estimating the colloidal stability or compatibility of asphalt, asphalt cross blends, aged asphalt, pyrolyzed asphalt, crudes, and heavy oil (residuum). The stability values will allow the refiner to increase yields by allowing longer retention time in process. The compatibility values will allow blending of crudes so as to prevent asphaltene formation during blending and storage. Both of these parameters are of utmost importance when we consider the price of crude in today's market.

Automated Flocculation Titrimeter

- Complete instrument and data acquisition system
- Rapid, accurate and highly reproducible
- Determines blending insolubility and solubility numbers
- Generates the data to calculate the WRI Coking Index (patent pending) to predict the proximity to coke formation during heavy oil distillation and improve distillate yield

The Automated Flocculation Titrimeter (AFT) is a highly automated, computerized instrument that acquires oil stability and compatibility parameters directly. The AFT can be used to perform ASTM D6703 test method for Automated Heithaus Titrimetry. The instrument operates as a closed system with accurately controlled temperatures between 20-100°C, important for properly determining Heithaus compatibility parameters. The flocculation point is determined spectroscopically and the results are analyzed by the data acquisition system, virtually eliminating operator error in the interpretation of endpoints. A key benefit to the user is the fact that the asphaltene concentration can be calculated by the software much faster that tradition methods and with more accuracy. The utility of the original Heithaus method has been expanded by developing multiple titration schemes. The software uses the data from the expanded method to predict the proximity to coke formation during heavy oil distillation. Many refiners stop distillation short of coke formation to avoid fouling in distillation equipment, tanks and transfer lines. The expanded AFT methodology allows the refiner to recover additional distillate without the fear of fouling. This attribute of the instrument should allow an incremental increase in yields if applied to a process. Conversely, the added benefit of being able to predict coking tendency, would prevent fouling of the process and thus decrease the use of energy in production as well as reduce down time due to having to clean vessels after fouling.

One of the primary uses of Heithaus values is to predict the compatibility (P Index) of which oils and petroleum residua or asphalts can be mixed together for shipping, processing, or in formulations without causing phase separation. This is valuable to the refiner, researcher, or asphalt jobber who supplies petroleum asphalts for highway and roofing applications because it ensures that compatible asphalt blends are supplied. Incompatible asphalts show early failure in both applications.

Coking Index (US Patent 6,773,921)-Stability also influences coke formation in the refining process. Another major use for the AFT is to acquire the data needed to employ the Coking Index. The Coking Index is a quantitative measure of the proximity to coking (fouling) during visbreaking, distillation, transfer and storage of heavy oil. This allows the petroleum refiner to optimize heavy oil processing and to recover the maximum amount of distillate, and to stop the processing before fouling occurs.

Solubility Parameter-The solubility parameter at which asphaltenes begin to precipitate and the solubility parameter of the whole oil can be calculated from the AFT data.

K47100 Automated Flocculation Titrimeter

Specifications

Conforms to the specifications of:
ASTM D6703
Temperature Range: 20 to 100°C

Included Accessories

Computer with Data Acquisition Software
Fiber Optic Spectrometer with Multi-Bandpass Detector
High and Low Flow Rate Metering Pumps
Magnetic Stirring Plates
Circulator
Reaction Vessels
Quartz Flow Cell
Glassware
Thermometer Probes

Shipping Information

Shipping Weight: 40 lbs (18.1kg)
Dimensions: 11 Cu. ft.

Dimensions lxwxh,in.(cm)
Base/Support Assembly: 12x24x36 (30.5x61x91.4)

Ordering Information

Catalog No.	
K47100	Automated Flocculation Titrimeter, 115V 50/60Hz
K47190	Automated Flocculation Titrimeter, 230V 50/60Hz

In collaboration with Western Research Institute

Distillation of Petroleum Products at Reduced Pressure

Test Method

The sample is distilled at a controlled, reduced pressure under conditions which provide approximately one theoretical plate fractionation. A distillation curve relating volume distilled and boiling point atmospheric equivalent temperature is prepared.

VDA3000 Vacuum Distillation System

- Conforms to ASTM D1160 and ISO 6616 test specifications

The Koehler VDA3000 Vacuum Distillation System performs reduced pressure distillations of petroleum products in accordance with ASTM specifications. Complete borosilicate glassware system with support panel and base, heating mantle and clamps. Includes vacuum jacketed, strip silvered column with integral primary and secondary condensers and 35/25 spherical joints, PRT thermocouple adapter, PRT Temperature Probe, 500mL quartz distilling flask with thermowell, 200mL water jacketed receiver, vacuum adapter, two Dewar-type cold traps with 10mL graduated receiver and stopcock drain and 35/25 ball adapter for extra cold trap. Finished aluminum panel and base and stainless steel spring leashes. Glassware is assembled by adjustable No. 35 clamps to assure proper alignment to panel and base. Accessory control unit includes digital temperature indicator with selector switch for reading pot temperature or overhead temperature; vacuum gauge; variable controls for heating mantle, and line switch. Control unit is housed in a finished aluminum cabinet.

Vacuum Pump not included.

Specifications

Conforms to the specifications of:
ASTM D1160; ISO 6616

Shipping Information

Shipping Weight: 40 lbs (18.1kg)
Dimensions: 11 Cu. ft.

Dimensions lxwxh,in.(cm)

Base/Support Assembly: 12x24x36 (30.5x61x91.4)
Control Unit: 8x10x12 (20.3x2.5x30.5)
Net Weight: 25 lbs (11.3kg)

K80201 Control Unit

Semi-Automatic Vacuum Distilllation instrumentation is available. Please contact Koehler Customer Service for additional information.

Ordering Information

Catalog No.		Order Qty
K80200	VDA3000 Vacuum Distillation System, 115V 50/60Hz	1
K80290	VDA3000 Vacuum Distillation System, 230V 50/60Hz	
K80201	Control Unit, 115V 50/60Hz	1
K80291	Control Unit, 230V 50/60Hz	

Accessories

K80202	Column, vacuum jacketed, strip-silvered, with integral primary and secondary condensers and 35/25 spherical joints	
K80203	Receiver, 200mL, water jacketed, with 35/25 joints	
K80204	Cold Trap, Dewar-type, with 10mL receiver and stopcock drain	
K80205	Vacuum Adapter, with 35/25 joints	
K80206	Quartz Flask, 500mL round bottom, with thermowell and 35/25 joint	
K80208	Thermocouple Adapter, PRT Type	
K80211	Temperature Probe, PRT Type	

VDA7000 Automatic Vacuum Distillation System

K87150 Automatic Vacuum Distillation System (VDA 7000)

VDA7000 Automatic Vacuum Distillation System

- Conforms to ASTM D1160 and ISO 6616 test specifications
- Windows®-based software fully automates data acquisition and analysis
- Operating Range: 0.1 to 760 mm Hg
- Test data is displayed in real-time
- Automatic shutdown and cleaning procedures
- Automatic nitrogen degassing at test conclusion
- RS 232 interface for LIMS connection

Ordering Information

Catalog No.	
K87150	VDA7000 Automatic Vacuum Distillation System, 230V 50Hz
K87160	VDA7000 Automatic Vacuum Distillation System, 230V 60Hz

Dimensions lxwxh,in.(cm)
23½x63x35½ (60x160x90)
Net Weight: 220 lbs (100kg)

Shipping Information
Shipping Weight: 374 lbs (170kg)
Dimensions: 190 Cu. ft.

VDA9000 Automatic Vacuum Distillation System

Test Method

Crude petroleum and/or heavy hydrocarbon samples are distilled under controlled, reduced pressure conditions to determine their value. The test provides samples for analytical studies, engineering and product quality evaluations as well as an estimate of the yields of fractions of various boiling ranges.

VDA9000 Automatic Vacuum Distillation System

- Conforms to ASTM D2892 and D5236 test specifications for True Boiling Point (TBP) and Vacuum Potstill petroleum product distillation test methods
- Windows®-based software fully automates data acquisition and analysis
- Vapor and hydrogen sulfide (H_2S) leak detection and notification system
- Automatic nitrogen degassing at test conclusion
- RS 232 interface for LIMS connection

The Koehler VDA9000 Automatic Vacuum Distillation System performs automated reduced pressure distillations for the fractionation and collection of crude petroleum products and/or high boiling components according to ASTM D2892 and D5236. The system is fully computer automated, featuring an automatic fraction collector equipped with twelve (12) receivers and a built-in internal balance, a distillate volume optical sensor system used for the simultaneous determination of the fractional weight and collected volume for direct distillation rate control, and a separate volume follower system for discharging the fractions into the final receivers with determination of the fraction volume. Under the TBP mode, the following steps are automatically performed: debutanization, atmospheric distillation, and vacuum distillations at 100, 10, and 2 mm Hg. Under the Potstill mode, two distillations are automatically performed at predesignated pressures programmed by the operator between 0.1 and 10 mm Hg. The final test data including the TBP and/or the Potstill distillation curves in weight % and volume % are printed out at the conclusion of the test.

Includes: distillation flask; upper distillation flask insulation jacket; Pt-100 temperature sensors for distillation head and flask; ASTM-compliant column with silvered high vacuum jacket, reflux divider, and packed with 4mm Propak 316 providing approximately 15 theoretical plates; 2400W high-temperature heating mantle with Pt-100 temperature sensor, electrical lifting platform, and integrated stirrer; tower heating mantle for adiabatic operation; volume follower system for automatic control of the distillation rate (mL/min) and heating rate (°C/min) with product discharge and collection system; absolute vacuum detector with stainless steel diaphragm, range 0.01 – 100.0 mm Hg; fraction collector with twenty (20) final receivers and integrated internal balance for measuring the fraction weights; gas trap for the debutanization; cryostat for main condenser, distillate cooler, and volume measuring system with a range of –20° to +60°C; vacuum control valve with automatic motor driven throttle valve; 2-stage vacuum pump with final pressure of 0.005 mbar; pressure drop sensor; mobile mounting frame equipped with all electric and mechanic control elements.

Dimensions lxwxh,in.(cm)
23½x102¼x138¾ (60x260x350)
Net Weight: 1320 lbs (600kg)

Shipping Information
Shipping Weight: 2200 lbs (1000kg)
Dimensions: 570 Cu. ft.

Ordering Information

Catalog No.	
K87250	VDA9000 Automatic Vacuum Distillation System, 400V, 50Hz, 3ø,N,G
K87260	VDA9000 Automatic Vacuum Distillation System, 400V, 60Hz, 3ø,N,G

Please inquire about our custom-designed and other standard models for reduced-pressure distillations, including separate systems for ASTM D2892 or D5236.

Distillation of Petroleum Products

Test Method

The sample is evaporated and condensed under controlled conditions, and observations are made of the temperatures at which various percentages are recovered and/or the percentages recovered at specified temperatures.

Front View Distillation Apparatus

- Conforms to ASTM D86, E133 and related ASTM and international standards
- Choice of three different models

Front View Distillation Apparatus, Groups 0, 1, 2 and 3–Meets all ASTM and related specifications for distillation of motor and aviation gasolines, aviation turbine fuels, naphthas, kerosenes, distillate fuels, natural gasoline, liquid hydrocarbon mixtures and other petroleum products. Consists of fully insulated stainless steel condenser and heater units. Heater unit includes flask support platform, viewing window, 1000W heater with stepless variable control, and rack and pinion heater elevation mechanism with push-turn control knob. *Please inquire about higher wattage heaters.* White receiving flask background facilitates viewing of fractions during test. Available with right-hand or left-hand heater unit for convenient pairing. Includes graduate support block and flask support boards.

Group 4 Front View Distillation Apparatus–Front View Distillation apparatus designed for testing of Grade No. 2 fuel oil, Grade No. 2-D diesel fuel oil, gas oils and other distillates requiring condenser bath temperatures of up to 140°F (60°C). Also suitable for gasolines, aviation turbine fuels, naphthas, kerosenes and other liquid petroleum products. Similar in features and construction to the standard Front View Distillation Apparatus, but equipped with a 300W copper immersion condenser heater with stepless electronic control. Available with right or left-hand heater unit. *Note: The Group 4 Apparatus can also run distillations for petroleum products categorized as Groups 0, 1, 2 and 3.*

Specifications

Conforms to the specifications of:
ASTM D86, D216, D233, D447, D850, D1078, E133; IP 123, 195; ISO 3405; DIN 51751; FTM 791-1001, 791-1015; NF M 07-002

Dimensions lxwxh,in.(cm)

15¼x18¼x19½ (39x46x50)

Included Accessories

Flask Support Boards A and C
Graduate Support Block

Shipping Information

Shipping Weight: 65 lbs (29.5kg)
Dimensions: 13.3 Cu. ft.

K45090 Front View Distillation Apparatus

Ordering Information

Catalog No.	
Front View Distillation Apparatus	
K45000	Right-Hand Model, 115V 50/60Hz
K45100	Left-Hand Model, 115V 50/60Hz
K45090	Right-Hand Model, 220-240V 50/60Hz
K45190	Left-Hand Model, 220-240V 50/60Hz
Group 4 Front View Distillation Apparatus	
K45200	Right-Hand Model, 115V 50/60Hz
K45300	Left-Hand Model, 115V 50/60Hz
K45290	Right-Hand Model, 220-240V 50/60Hz
K45390	Left-Hand Model, 220-240V 50/60Hz

ASTM Distillation Thermometers

Catalog No.	Thermometer	Range
250-000-02C	ASTM 2C Partial Immersion	–5 to +300°C
250-000-07F	ASTM 7F Low Distillation	30 to 580°F
250-000-07C	ASTM 7C Low Distillation	–2 to +300°C
250-000-08F	ASTM 8F High Distillation	30 to 760°F
250-000-08C	ASTM 8C High Distillation	–2 to +400°C
250-000-37C	ASTM 37C Solvents Distillation	–2 to +52°C
250-000-38C	ASTM 38C Solvents Distillation	24 to 78°C
250-000-39C	ASTM 39C Solvents Distillation	48 to 102°C
250-000-40C	ASTM 40C Solvents Distillation	72 to 126°C
250-000-41C	ASTM 41C Solvents Distillation	98 to 152°C
250-000-42C	ASTM 42C Solvents Distillation	95 to 255°C
250-000-102C	ASTM 102C Solvents Distillation	123 to 177°C
250-000-103C	ASTM 103C Solvents Distillation	148 to 202°C
250-000-104C	ASTM 104C Solvents Distillation	173 to 227°C
250-000-105C	ASTM 105C Solvents Distillation	198 to 252°C
250-000-106C	ASTM 106C Solvents Distillation	223 to 277°C
250-000-107C	ASTM 107C Solvents Distillation	248 to 302°C

Accessories

Catalog No.	Type	Capacity, mL
Flasks		
332-003-006	A	100
332-003-001	B	125
332-003-002	C	200
332-003-005	D	250
Graduates		
332-002-013	A	25
332-002-003	B	100
332-002-014	C	200
Flask Support Boards		
K45410	A	1¼" (3.18)
K45420	B	1½"(3.81)
K45430	C	2" (5.1)
K45440	D	2¾"(6.98)
Centering Stoppers		
K45500	Centering Stopper	125mL Flask
K45520	Centering Stopper	200mL Flask

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

Automatic Distillation of Petroleum Products

K45603 Automatic Distillation Analyzer with Optional External PC

Specifications

Conforms to the specifications of:
ASTM D86, D285, D850, D1078, D4737; D189 Section 10; DIN 51751; ISO 3405; IP 123; JIS J2254l; NF M 07-002

Electrical Requirements:
120V 50/60Hz 20A
230V 50/60Hz 10A

Temperature

Distillation Range:	0 to 450°C (±0.1°C accuracy)
Condenser:	-5 to 60°C (±0.1°C accuracy); closed loop system
Receiver Chamber:	0 to 60°C (±0.1°C accuracy)

Distillation Parameters:

Distillation Rate:	2 to 15mL/min in 0.1mL increments, user selectable
Receiver Volume:	0 to 100mL (±0.01mL accuracy) by photoelectric infrared detection of meniscus by level following system utilizing a precision stepper motor and a special calibrated glass receiver; automatic calibration of evaporated loss volume and automatic volume calibration system ensures highest accuracy
Barometic Pressure:	Automatic barometric correction utility with automatic sensor, range 550 to 900 mm Hg (±1 mm Hg accuracy)
Dry Point Detection:	Automatic dry point detection board is included with standard equipment and only requires a dry point sensor, 200mL flask and PTFE plug for ASTM D850 and D1078 tests.
Environment:	Operates at 0 to 45°C (113°F)

Dimensions lxwxh,in.(cm)
21x21.5x27.75 (53.3x54.6x70.5)
Net Weight: 230 lbs (91kg)

Shipping Information
Shipping Weight: 260 lbs (95 kg)
Dimensions: 28 Cu. ft.

Test Method

The sample is evaporated and condensed under controlled conditions, and observations are made of the temperatures at which various percentages are recovered and/or the percentages recovered at specific temperatures.

Automatic Distillation Analyzer 5000 Series

- Conforms to ASTM D86, D285, D4737 and related international specifications
- Pt-100 RTD probe with **automatic temperature calibration system** (°C or °F)
- Windows®-based software package for PC control with LIMS export capabilities
- Automatic determination of initial boiling point (IBP), final boiling point (FPB), dry point and barometric and residue corrections
- Diagnostic system continuously ensures proper unit performance and user safety
- Automatic temperature and volume calibration
- Programmable distillation rate (2-15mL/min)
- Ready for distillation groups 0 - 4
- Networking for up to 32 units
- Powerful CFC-free cooling and heating system
- Receiver chamber heating system up to 60°C
- Precision level follower system with optical meniscus detector
- Integrated automatic fire extinguishing system with manual operation override

The Koehler Automatic Distillation Analyzer is designed to perform optimal distillation analyses of gasolines, fuels, oils, solvents, aromatics, napthas, kerosenes, hydrocarbons, and other volatile products to ensure conformity to rigid quality control standards. The analyzer automatically perform tests, process results, and produce standard reports according to ASTM, ISO, and related specifications.

Two Models are Available-The Automatic Distillation Analyzer 5000 Series may be ordered for operation with an external PC (purchased separately) or may be ordered with a built-in PC, internal touch screen monitor, virtual keyboard and mouse. An easy-to-use Windows®-based PC communication software expands user capabilities for data analysis and unit control. Distillation methods and parameters can be easily created or modified. Software calculates repeatability and reproducibility as per ASTM D86 as well as standard and deviation against reference materials. Test results are displayed in real-time and can include distillation curve and temperature with or without barometric compensation and/or evaporation correction, distillation rate, heating power curve, master curve comparison, and zoom function for high resolution of heating and temperature curves. The heater compartment is rapidly cooled at the completion of a distillation run to reduce operator downtime. The analyzers are of rugged construction for instrument longevity with a modular design for easy routine maintenance.

Receiver Chamber Heating System-The receiver chamber heating system is ideal for samples that form waxes or other solids during distillation.

Automatic Distillation of Petroleum Products

Dry Point Detection as Standard Feature- Dry point can be detected visually or by automatic detection for ASTM D850 and D1078 test methods. The unit is delivered ready with the PC board components already included as standard to perform the dry point analysis. Simply order the Automatic Dry Point Detection Kit for Solvents (see Ordering Information at right) which includes dry point thermocouple, 200mL flask and PTFE plug to perform dry point detection analysis automatically.

Ready for Groups 0 - 4 and more-Each Koehler Automatic Distillation Analyzer 5000 Series comes ready with the equipment, accessories and features as standard to properly run distillation groups 0 to 4 per ASTM D86 and related test specifications. No additional accessories are required. The Windows®-based software package allows simple operator selection of the programmed settings for each distillation protocol. No complicated routines are needed to set up the unit. User defined programs are easily created for customization of the analyzer.

Calculated Cetane Index-Calculated cetane index is a useful tool for estimating ASTM D4737 cetane number where a test engine is not available for determining this properly. It may be conveniently employed for approximating cetane number where the quantity of sample is too small for an engine rating. In cases where the cetane number of a fuel has been initially established, the index is useful as a cetane number check on subsequent samples of that fuel, provided its source and mode of manufacture remain unchanged. The Cetane index is automatically calculated at the end of the test if all the necessary variables are entered and is a component of the Windows-based software which comes standard with the unit.

Carbon Residue on 10% Distillation Residue-As per section 10, ASTM D189 the procedure for carbon residue of light distillate oils can be performed.

Included Accessories

Distillation Flask, 125mL with Markings
Ceran Plate, 32mm dia. hole
Ceran Plate, 38mm dia. hole
Ceran Plate, 50mm dia. hole
3 Point Calibrated PT100 Thermometer with Cable and Plug
Special Graduated Receiver Cylinder with Base
Wiper for Condenser Tube
Dropping Plate
Teflon Plug for 125mL Flask
Silicone Plug for Flask Side Arm
Dry Point Detection Board
Windows®-based Automatic Distillation Software

K45703-TS Automatic Distillation Analyzer with Touch Screen Display and Integrated PC

Ordering Information

Automatic Distillation Analyzer 5000 Series

Catalog No.	
K45603	Automatic Distillation Analyzer, 120V 50/60Hz
K45604	Automatic Distillation Analyzer, 230V 50/60Hz
K45703-TS	Automatic Distillation Analyzer with Touch Screen Display and Integrated PC, 120V 50/60Hz
K45704-TS	Automatic Distillation Analyzer with Touch Screen Display and Integrated PC, 230V 50/60Hz

Accessories

K45634	Distillation Flask, 125mL with Markings
K45635	TFE Centering Stopper for 125mL Flask
K45655	Ceran Plate, 32mm dia. hole
K45656	Ceran Plate, 38mm dia. hole
K45657	Ceran Plate, 50mm dia. hole
K45656-A	Ceran Plate, 25mm dia. hole
K45650	PT100 Thermometer with Cable and Plug
K45651-E	Special Graduated Receiver Cylinder (with base)
K45651-B	Special Graduated Receiver Cylinder (without base)
K45668-A	Wiper for Condenser Tube
K45668	Dropping Plate
K45654-A	Flask 200mL with Silicon Plug
K45652-C	Silicone Plug
K45654	Automatic Dry Point Detection Kit for D850 and D1078

Sulfur, Trace Sulfur, Volatile Chlorides

K47590 Wickbold Combustion Apparatus

Sulfur in Liquefied Petroleum Gases (Oxy-Hydrogen Burner)

Traces of Volatile Chlorides in Butane-Butene Mixtures

Trace Quantities of Total Sulfur (Wickbold Apparatus)

Sulfur in Petroleum Products (Wickbold Apparatus)

Test Method

Determines total sulfur in liquefied petroleum (LP) gases and in liquid petroleum products by the Wickbold oxy-hydrogen burner method. Also suitable for burning butane-butene mixtures to determine trace amounts of volatile chlorides.

Wickbold Combustion Apparatus

- Conforms to ASTM D2384, D2784, D2785 and related specifications

Burns samples in a stainless steel oxy-hydrogen burner to determine total sulfur in petroleum products in the 0.1 to 300ppm range. Tests samples which are viscous, highly aromatic or of high sulfur content with the use of appropriate solvents.

Combustion chamber and stainless steel burner are housed in an insulated chamber with hinged heat-resistant and glare-proof shield for viewing burner flame. To ignite flame, depress electronic spark ignitor handle at side of unit. Ignitor shuts off when handle is released. Built-in pressure regulators with gauges allow for accurate adjustment and monitoring of hydrogen, oxygen and nitrogen pressure. Burner is easily disassembled for cleaning.

Supplied with a complete set of Pyrex™ and quartz glassware, including 200mL sample reservoir, sample capillary, combustion chamber, absorber, spray trap and cooling bulb, and compression-type gas connection fittings for ¼" (6mm) O.D. tubing. Housed in a finished aluminum cabinet. For LPG, natural gas and refinery gas samples, order accessory sample adapter.

Specifications

Conforms to the specifications of:
ASTM D2384, D2747, D2784,
D2785; GPA 2140; IP 243;
ISO 4260; DIN EN 41; NF T 60-142

Included Accessories

Complete Glassware Set
Sample Capillary
Sample Reservoir
Combustion Chamber
Absorber
Spray Trap
Cooling Bulb
Stainless Steel Burner

Dimensions lxwxh,in.(cm)

Cabinet only: 15x13x18½(38x33x47)
Net Weight: 40 lbs (18.1kg)

Shipping Information

Shipping Weight: 62 lbs (28.1kg)
Dimensions: 11.9 Cu. ft.

Ordering Information

Catalog No.		Order Qty
K47500	Wickbold Apparatus, 115V 50/60Hz	1
K47590	Wickbold Apparatus, 220-240V 50/60Hz	

Accessories

K47580	Gas Sample Adapter For burning liquefied petroleum, natural and refinery gases in the Wickbold Apparatus. Constructed entirely of stainless steel, with 150mL sample cylinder, connecting tubing and all necessary valves and couplings	1
K47510	Sample Capillary	
K47520	Sample Reservoir	
K47530	Combustion Chamber	
K47540	Absorber	
K47550	Spray Trap	
K47560	Cooling Bulb	
K47570	Stainless Steel Burner	

Ramsbottom Carbon Residue of Petroleum Products

Test Method

Determines the 'carbon residue' left after evaporation and pyrolysis of a sample oil in the Ramsbottom furnace, providing an indication of the deposit forming tendencies of fuels and guidelines for the processing of refinery products.

Ramsbottom Carbon Residue Apparatus

- Conforms to ASTM D524 and related specifications
- Microprocessor temperature control with digital display and overtemperature cut-off

Thermostatically controlled coking furnace for five samples. Cast-iron block type furnace reaches the standard test temperature of 550°C (1022°F) rapidly and controls with ±1°C stability. Microprocessor temperature control has °C/°F switchable digital setpoint and display. Operator and equipment are protected by an overtemperature control circuit which automatically interrupts power to the unit should block temperature exceed the programmed cut-off point. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* Heavily insulated stainless steel cabinet with three-layer refractory top provides excellent heat retention.

Ordering Information

Catalog No.		Order Qty
K27100	Ramsbottom Carbon Residue Apparatus, 115V 50/60Hz	1
K27190	Ramsbottom Carbon Residue Apparatus, 220-240V 50/60Hz	

Accessories

332-007-001	Coking Bulb Pyrex™, with capillary Conforms to ASTM D524 specifications	5
362-010-001	Sample Charging Syringe	1
382-018-001	Needle, 18 gauge, 2"	1
K27320	Coking Bulb Filling Device Convenient time saving device fills up to five coking bulbs at a time. Ideal for viscous fluids that are difficult to handle at room temperature.	1
K27200	Control Bulb Stainless steel, with IC thermocouple. May be used with a thermocouple pyrometer* to verify compliance of the furnace with ASTM performance requirements.	1
K29310	Digital Thermometer, 115V	
K29319	Digital Thermometer, 220-240V **The K29310 Digital Thermometer is suitable for this purpose.*	

K27100 Ramsbottom Carbon Residue Apparatus

Specifications

Conforms to the specifications of:
ASTM D524, D6074; IP 14; ISO 4262; FTM 791-5002; NF T 60-117
Furnace Type: Cast iron block
Capacity: 5 coking bulbs
Maximum Temperature: 650°C (1200°F)
Controller Sensitivity: ±1°C (± 2°F)
Heater: 0-2400W, ceramic band heater
Electrical Requirements:
115V 50/60Hz, Single Phase, 20.8A
220-240V 50/60Hz, Single Phase, 10.9A

Dimensions lxwxh,in.(cm)

16x21½x14½ (41x55x37)
Net Weight: 64 lbs (29kg)

Shipping Information

Shipping Weight: 78 lbs (35kg)
Dimensions: 8.2 Cu. ft.

Software compatible, inquire with Koehler Customer Service.

Lead in Gasoline, Acidity, Salt Content


K46600
Dual Extraction
Apparatus

Lead in Gasoline by Volumetric Chromate Method

Acidity (Inorganic) of Petroleum Products by Color Indicator Titration Method

Salt Content of Crude Petroleum and Products

Test Method

Determines lead, acid or salt content of crude petroleum and products by extraction.

Dual Extraction Apparatus

• Conforms to ASTM D2547, IP 77, 182, 248 and ISO 2083 specifications

Consists of two sets of glassware mounted on a sturdy base/upright assembly with separate line switches, rheostats and condenser water control valves for each. Each glassware set includes 500mL boiling flask, Hopkins reflux condenser with aspirator, thistle tube, heating tube, 250W heating coil and 400mL Pyrex™ beaker.

Specifications

Conforms to the specifications of:
ASTM D2547; IP 77, 182, 248;
ISO 2083; NF M 07-014, 07-023

Dimensions lxwxh,in.(cm)

17x11x36½ (43x28x93)
Net Weight: 46 lbs (21kg)

Shipping Information

Shipping Weight: 66 lbs (30kg)

Ordering Information

Catalog No.		Order Qty
K46600	Dual Extraction Apparatus, 115V 50/60Hz	1
K46690	Dual Extraction Apparatus, 220-240V 50/60Hz	

Conradson Carbon Residue of Petroleum Products

Test Method

Provides an indication of relative coke forming properties of petroleum oils. The residue remaining after a specified period of evaporation and pyrolysis is calculated as a percentage of the original sample.

Conradson Carbon Residue Apparatus

• Conforms to ASTM D189 specifications

A weighed quantity of sample is placed in a crucible and heated to a high temperature for a fixed period. The crucible and the carbonaceous residue is cooled in a desiccator and weighed. The residue remaining is calculated as a percentage of the original sample and reported as conradson carbon residue.

Ordering Information

Catalog No.		Order Qty
K80030	Conradson Carbon Residue Apparatus	1
	Accessories	
250-000-08F	ASTM 8F Thermometer. Range: 30 to 760°F Recommended for testing light distillate oils	1
250-000-08C	ASTM 8C Thermometer. Range: –2 to +400°C	
K80031	Porcelain Crucible	
K80032	Skidmore Crucible, with Monel Cover	
K80033	Monel Crucible, with cover	
K80034	Monel Hood, with bridge	
K80035	Refractory Block	

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


K80030
Conradson
Carbon Residue
Apparatus

Specifications

Conforms to the specifications of:
ASTM D189, D6074;
ANS Z-11.25; IP 13; ISO 6615;
DIN 51551; FTM 791-5001;
NF T 60-116

Shipping Information

Shipping Weight: 7 lbs (3.2kg)

Included Accessories

Porcelain Crucible
Skidmore Crucible, with
Monel Cover
Monel Crucible, with Cover
Monel Hood, with Bridge
Refractory Block

Sediment in Crude Oils and Fuel Oils by the Extraction Method

Test Method

Determines sediment content of crude oil and fuel oils by extraction with toluene.

Sediment Extraction Apparatus

- Conforms to ASTM D473 and related specifications

A test portion of the sample is placed in a refractory thimble. Toluene is gently boiled and its vapors condensed and allowed to drip into the sample funnel. The toluene washes out all of the crude oil or fuel oil leaving the insoluble residue only in the thimble. The mass of the residue is calculated as a percentage and is referred to as the sediment by extraction. Includes condenser thimble basket, water cup and extraction thimble.

Ordering Information

Catalog No.		Order Qty
K48300	Sediment Extraction Apparatus	1
	Accessories	
K42000	Powertrol Heater, 115V 50/60Hz	1
K42090	Powertrol Heater, 220-240V 50/60Hz	
K48400	Condenser	
K48500	Thimble Basket	
K48600	Water Cup	
K48700	Extraction Thimble	

K48300 Sediment Extraction Apparatus

Specifications

Conforms to the specifications of:
ASTM D473; IP 53; ISO 3735; DIN 51789; FTM 791-3002; NF M 07-010

Salts in Crude Analyzer

Test Method

Salt content is determined by measuring the conductivity of a solution of crude oil in a polar solvent when subjected to an alternating electrical current and is obtained by comparison of the resulting conductance to a calibration curve of known salt mixtures.

Electrometric Salt Determinator

- Conforms to ASTM D3230 test specifications
- Measures salt content, conductance, and temperature of crude oil samples, and pH measurements of aqueous samples
- Portable for field or laboratory testing with up to 8 hours of continuous operation from internal Ni-Cd rechargeable batteries (extended battery-powered operation option available)
- 18-bit analog-to-digital converter for high precision
- 24Kb RAM dedicated for data storage (about 500 test results)
- Data can be easily uploaded in a comma delimited format to a PC with Windows® 95/98/NT-based software via an RS232 serial data port

Determines the salt content, conductance, and temperature of crude oil samples according to ASTM D3230 specifications. Utilizes the latest low-voltage, synchronous detection technology for conductivity measurements and a high-accuracy thermistor array to measure sample temperature. Automatically calculates salt concentration directly from acquired temperature and conductivity values. Measures conductivity over four ranges 0-2, 2-20, 20-200, and 200-1500 µS with automatic range selection. Self-calibration feature allows operator to adjust for any drift without re-entering standard temperature curves. Complete data storage of test results which is limited only by the hard drive capacity of external PC. Easy-to-read alpha-numeric display shows any four of the following parameters at one time as chosen by the operator: salts, conductance, conductance @ 25°C, pH, pH millivolts, temperature (°C or °F), internal and external battery voltages, date, time, logging ID, and ID increment value.

K23000 Electrometric Salt Determinator

Dimensions lxwxh,in.(cm)
12x20x12 (30½x51x30½)
Net Weight: 6 lbs (2¾kg)

Shipping Information
Shipping Weight: 9 lbs (4kg)
Dimensions: 2.3 Cu. ft.

Ordering Information

Catalog No.	
K23000	Electrometric Salt Determinator, 115V 50/60Hz
K23090	Electrometric Salt Determinator, 230V 50/60Hz

Koehler INSTRUMENT COMPANY, INC.

Water & Sediment in Crude Oil & Fuel Oils by Centrifuge Method

Test Method

Centrifugation provides a convenient means of determining sediment and water content in crude oil, fuel oils, and middle distillate fuels. Also used in determining the precipitation number, demulsibility characteristics, trace sediments, and insolubles in used lubricating oils.

Oil Test Centrifuge

- Choice of long, short or pear rotor assembly to accommodate corresponding centrifuge tubes
- Accommodates four (4) centrifuge tubes of 6 or 8" conical ASTM types, long, short or pear-shaped tubes
- Automatic control of acceleration ramp, centrifugation speed, and timing functions
- Digital speed and temperature displays
- Doubly-insulated to reduce heat loss
- Self balancing, quiet operation
- Sliding stainless steel lid
- Explosion resistant

Fully automatic bench top centrifuge designed expressly for petroleum testing applications. Accommodates four (4) centrifuge tubes of ASTM long (8"), short (6") cone or pear-shaped tubes with the use of appropriate rotor assembly. Molded PTFE supports provide for maximum protection and easy positioning of tubes. Quiet running unit features elastic suspension of the drive motor for self-balancing operation. Voltage compensating circuitry ensures constant operating speed in the event of voltage fluctuations at the main power supply. Includes automatic electronic braking system and safety interlocks.

Specifications

Conforms to the specifications of:
ASTM D91, D96, D893, D1796, D2273, D2709, D2711, D4007; IP 75, 145, 359; API 2542, 2548; ISO 3734; DIN 51793; NF M 07-020
Capacity: Four (4) oil test centrifuge tubes: long, short or pear-shaped tubes (100 mL)
Maximum Speed: 1850 rpm
Maximum RCF: 865 (pear-shaped); 900 (short); 940 (long)
Timer: 0 to 99:99:99 (hh:mm:ss)
Set Speed: 200-1850rpm
Speed Readout: 0-1850rpm
Temperature Control: ambient to 93°C
Temperature Readout: Digital
Brake: Automatic Electronic
Safety Features: Powers off when power is interrupted; Lid stays locked when motor is spinning; Motor will not start when lid is open
Explosion resistant in accordance to the specifications of Group D, Class 1, Division 2 Areas

Electrical Requirements:

115V 50/60Hz, 10A
230V 50/60Hz, 5A

Dimensions lxwxh,in.(cm)

23x30x13½ (51x76x34)
Net Weight: 93 lbs (42 kg)

Shipping Information

Shipping Weight: 110 lbs (50 kg)
Dimensions: 11.2 Cu. ft.

K61092 Oil Test Centrifuge

Ordering Information

Catalog No.	
K61002	Oil Test Centrifuge, 115V 50/60Hz with integrated heating system and Long Tube Rotor Assembly
K61092	Oil Test Centrifuge, 230V 50/60Hz with integrated heating system and Long Tube Rotor Assembly

Accessories

K61101	Centrifuge Tubes, Long, 100mL, 8", marked in mL (ASTM D91, D893, D1796, D4007)
K61106	Centrifuge Tubes, Long, 100mL, 8", marked in 200 parts (ASTM D96)
K61110	Centrifuge Tubes, Long, 100mL, 8", marked in mL every 1mL above 10mL (ASTM D4007)
K61112	Centrifuge Tubes, Long, 100mL, 8", marked in 200 parts every 2 parts above 20 parts (ASTM D4007)
K61149	Rotor Assembly for Short Tubes
K61102	Centrifuge Tubes, Short, 100mL, 6", marked in 200 parts every 4 parts above 20mL (ASTM D96)
K61105	Centrifuge Tubes, Short, 100mL, 6", marked in mL (ASTM D96)
K61107	Centrifuge Tubes, Short, 100mL, 6", marked in mL every 2mL above 10mL (ASTM D96)
K61108	Centrifuge Tubes, Short, 100mL, 6", marked in 200 parts (ASTM D96)
K61122	Rotor Assembly for Pear-Shaped Tubes
K61104	Centrifuge Tubes, Pear-Shaped, 100mL, marked in mL
K61152	Trace Sediment Tube (ASTM D2273), pack of 3
K61111	Cork Stopper for Centrifuge Tube

Portable Oil Test Centrifuge

ASTM D96, accommodates two 6" conical tubes, 12VDC power requirement, Max. RCF 1050, Max. RPM 2200

Ordering Information

Catalog No.	
K61094	Portable Oil Test Centrifuge, 12V DC

Programmable Muffle Furnace

Test Method

Determines the amount of ash in distillate and residual fuels, gas turbine fuels, crude oils, lubricating oils, waxes, and other petroleum products.

Programmable Muffle Furnace

- Three capacity options
- Up to 12 heating/cooling ramps or dwell periods available
- Achieves 2 to 4 complete air changes per minute

The Koehler Programmable Muffle Furnace combines microprocessor control with state-of-the-art construction and forced draft capability. They are ideal for ashing a variety of samples, including petroleum products, food, pharmaceuticals, chemicals, and paper. They can also be used as standard muffle furnaces for firing or annealing glass or ceramic specimens, solid-state inorganic reactions, rock and mineral fusions, sample drying, and tempering.

Ordering Information

Catalog No.	
K24110	Programmable Muffle Furnace, 0.14 cu. ft., 208-240V, 50/60Hz Single Phaswe, 7.1A
K24120	Programmable Muffle Furnace, 0.58 cu. ft., 208-240V, 50/60Hz Single Phaswe, 12.5A
K24130	Programmable Muffle Furnace, 1.26 cu. ft., 208-240V, 50/60Hz Single Phaswe, 19.2A

Specifications

Conforms to the specifications of:
ASTM D482, D1026, D3174, D4422; IP 4, IP 163; ISO 3987, ISO 6245; NF M 07-045; DIN 51352, DIN 51575
Capacity: 0.14, 0.58 and 1.26 cu. ft. (0.004, 0.016, 0.036m3)
Temperature Range: Ambient to 1125°C (2057°F)
Setpoint Repeatability: ±1°C (±2°F)
Setpoint Accuracy: ±4°C (±7°F)
Temperature Uniformity:
0.14 cu. ft. model: ±5°C (±9°F)
0.58 cu. ft. model: ±8°C (±14°F)
1.26 cu. ft. model: ±10°C (±18°F)
Number of Air Exchanges Per Minute:
0.14 cu. ft. model: 4
0.58 cu. ft. model: 3
1.26 cu. ft. model: 2
Electrical Requirements:
208-240V, 50/60Hz
Dimensions lxwxh,in.(cm)
0.14 cu. ft. models: 19.4x14.5x19.5 (49x37x50)
Net Weight: 60 lbs (27kg)
0.58 cu. ft. models: 23.4x21.5x21.5 (59x55x55)
Net Weight: 90 lbs (41kg)
1.26 cu. ft. models: 23.4x21.55x28.5 (59x55x72)
Net Weight: 110 lbs (50kg)

Calibration of Liquid-in-Glass Thermometers

Thermometer Calibration Bath

- Calibrates thermometers, temperature controllers and other temperature instruments against a factory certified thermometer traceable to NIST standards
- Verifies accuracy of routine thermometers
- For temperatures between ambient to 200°C (–30°C with the use of circulated refrigerated coolant)
- Digital temperature control with temperature uniformity of ±0.02°C
- Built-in ice bath for performing ice point calibrations
- Meets the requirements of NBS Monograph 150

Constant temperature calibration bath for liquid-in-glass thermometers, dial thermometers, digital thermometers and other temperature measuring instruments. Consists of an oil bath with digital electronic control providing temperature uniformity of ±0.02°C in the range –30°C to +200°C. Accessory Standard Thermometer is calibrated and certified traceable to NIST standards. Turntable rack inserts in bath to immerse six thermometers or temperature probes and the standard thermometer. Bath depth of 12" (30.5cm) accommodates all partial immersion thermometers and most 15" total immersion thermometers.

Features digital setpoint and display (°C/°F switchable) of bath temperature for maximum convenience, and overtemperature control to prevent accidental overheating. Built-in cooling coil permits circulation of tap water or refrigerated coolant to permit operation at sub-ambient temperatures or to facilitate rapid cool down for multi-point calibrations. Equipped with drains for oil bath and ice bath.

Dimensions: lxwxh,in.(cm)
28x24x21(71x61x53)
Net Weight: 52¾ lbs (23.9kg)

Shipping Information
Shipping Weight: 66 lbs (30kg)
Dimensions: 8.2 Cu. ft.

Specifications

Temperature Range: –30°C to +200°C
For sub-ambient temperatures, refrigerated recirculating coolant is required from an external source.
Temperature Uniformity: ±0.02°C
Temperature Limit Control: –16.7°C (30°F) above setpoint and 204°C (400°F) maximum
Heater Range: 0-750W
Circulator: 1/20 hp impeller
Working Depth: Oil Bath: 12" (30.5cm)
Ice Bath: 10½" (26.7cm)

Ordering Information

Catalog No.		Order Qty
K26500	Thermometer Calibration Bath, 115V 50/60Hz	1
K26590	Thermometer Calibration Bath, 220-240V 50/60Hz	
	Accessories	
K26501	Standard Thermometer, certified traceable to NIST Standards at 0, 20, 37, 56, 80, 100, 121, 140, 160, 180 and 200°C	1
K26503	Thermometer Magnifier(10X)	1
K26502	Thermometer Carrying Case, holds K26501 Standard Thermometer	1

Micro GC - Refinery Gas Analyzer and Natural Gas Analyzer

The Micro GC combines micro-machined injectors and detectors and high resolution capillary columns into a compact, modular gas chromatgraph. It analyzes the individual components in sample gas and provides detailed reports of properties including composition, calorific value and density up to 10 times faster than a conventional GC system. The hardware combined with Data System software and LAN interfacing, provides a powerful system complete with calorific value BTU or Mega Joule/m3) calculations and reporting according to GPA, ASTM and ISO standards. There is no need to change the detector range to compensate for wide fluctuations in component concentration normally present in gas samples of various sources and types. Analysis of pressurized liquid samples, which are gases under standard temperature and pressure, is possible using optional sample conditioners.

Test Method

Fast and accurate measurement of the composition and heating value of gas is demonstrated using a portable GC. The Gas Analyzer measures the individual components and calculates physical properties such as specific gravity and heating value in approximately 100 to 160 seconds.

Features & Benefits

- Conforms to ASTM D3588, ISO 6976, and GPA 2172 test specifications
- Compatible with highly pressurized (liquefied) gases with heated vaporizer accessory
- Compact size
- Fixed volume injector on GC gives results with high precision, repeatability, and accuracy
- Analysis times up to 30 times faster than a conventional GC
- Modular design for easy maintenance

Specifications

Conforms to the specifications of:
ASTM D3588; ISO 6976; GPA 2172
Operating Conditions: 0-50°C,
5-95%RH, up to 15,000ft altitude
Column Heater Range:
Ambient + 15°C to 180°C
Detector: Thermal Conductivity (TCD),
240 nL internal volume
Repeatability: 0.2%RSD
Linear Dynamic Range:
10_6 ±10%
Compatible with Helium, Argon
(min. input pressure 80±2psig).
Electrical Requirements:
100-240V 50/60Hz 200VA

Refinery Gas Analyzer

Refinery gas samples are delivered to the sample inlet of the GC after passing through a sample conditioning system, which selectively removes any liquid fractions and particulate matter from the sample. This ensures that only gas phase sample is delivered to the RGA. An internal vacuum pump draws this conditioned sample into each channel's micro injector, when then injects the mixture onto each of the capillary columns for analysis. A complete analysis of hydrogen, saturated and olefinic hydrocarbons (C1-C5, and C6+ grouped peaks), plus fixed gases (O2, N2, CO, and CO2) is performed. Precise retention times and component areas translate into accurate component identification and quantification of the individual components present in refinery gas. Four chromatographic modules are optimized and integrated to quickly separate and measure the individual components in refinery gas. Critical performance parameters such as sample volume, temperature and carrier gas pressure are precisely controlled to produce accurate and reliable measurements independent of ambient temperature and pressure. vaporization for gas introduction into the analyzer.

Ordering Information

Catalog No.	
K47300	Refinery Gas Analyzer, 100-240V 50/60Hz
	Accessories
K47310	Pressure reducer
K47311	Heated regulator for gas sampling
K47320	Refinery Gas Analyzer standard gas mixture

K47200/K47300

Natural Gas Analyzer

This analyzer is applicable to natural gas samples from wellhead to pipeline-quality gas and Liquefied Petroleum Gas (LPG). Additionally, the analyzer can handle Y-Grade Liquefied Natural Gas (LNG). Samples are easily introduced using sample cylinders, Tedlar bags or by direct connection to the pipeline or wellhead sampling points. Two chromatographic modules are optimized and integrated to quickly separate and measure the individual components in natural gas. The analyzer quickly separates and measures the permanent gases and hydrocarbons present using an optimized, dual-channel portable gas chromatograph. This powerful, yet easy-to-use configuration is equally applicable to a wide range of sample types including pipeline gas, wellhead gas, LPG and Y-grade liquefied natural gas. Wellhead samples, or samples taken directly from the gas well, often contain significant amounts of hydrogen sulfide, yet there are no interferences and H2S can be measured from 50 PPM to 30 mol%. The portable GC uses digital signal processing with an expanded dynamic range.

For analysis of LPG, a heated vaporizer provides the backpressure necessary to ensure representative sampling and vaporization for gas introduction into the analyzer.

For Y-Grade LNG, a de-methanized natural gas liquid under pressure which contains significant amounts of C6 plus material, an optional Heated Vaporizer interface is used to maintain sample integrity and provide the heat necessary to ensure complete sample.

Ordering Information

Catalog No.	
K47200	Natural Gas Analyzer, 100-240V 50/60Hz
	Accessories
K47210	Pressure reducer
K47211	Heated regulator for gas sampling
K47220	Natural Gas Analyzer standard gas mixture
K47230	Laptop Computer

Rust Protection by Metal Preservatives in the Humidity Cabinet

Test Method

Tests the ability of metal preservatives to prevent steel panels from rusting under conditions of high humidity. Polished steel panels are immersed in the sample oil and then suspended in the humidity cabinet for a specified test period.

Humidity Cabinet

- Conforms to ASTM D1748 and FTM 791-5310 specifications

Produces a moisture saturated atmosphere with continuous condensation at a constant 120°F (48.9°C) for 33 steel test specimens. Test panels are suspended on a ⅓rpm rotating stage. Air flow and water level control systems maintain required conditions inside the cabinet per Mil. Spec. and ASTM specifications. Air temperature is maintained at 120 ±2°F (48.9 ±1.1°C) by a digital LCD electronic controller. A continuous heater circuit assists the control heater in bringing the cabinet up to temperature prior to testing. Overtemperature protection is provided by an adjustable digital thermostat which cuts off power to the cabinet in case of overheating.

Cabinet interior is stainless steel lined and all interior components are of stainless steel or chrome plated steel construction. Hinged cover consists of two layers of desized cotton cloth mounted on a metal frame. Oil and condensate dripping from the specimens are collected in a drip pan and piped to an external drain.

Ordering Information

Catalog No.		Order Qty
Humidity Cabinet		
K35200	Humidity Cabinet, 115V 60Hz	1
K35295	Humidity Cabinet, 220-240V 50Hz	
K35296	Humidity Cabinet, 220-240V 60Hz	
	Accessories	
K35210	Steel Test Panels Soft temper low carbon cold rolled steel, surface ground on both faces to a 10-20 micro-inch finish. 2x4x⅛"(51x102x3.2mm)	33
380-240-002	Aluminum Oxide Cloth, 240-grit For test panel preparation. Pack of 50	1
250-000-09F	ASTM 9F Thermometer Range: 20 to 230°F	1
250-000-09C	ASTM 9C Thermometer Range: –5 to +110°C	

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

Digital Flowmeter option is available for this unit.

K35200 Humidity Cabinet

Specifications

Conforms to the specifications of:
ASTM D1748; FTM 791-5310
Capacity: 33 rust test specimens
Water Level Control: 8 in. (203mm)
Temperature Control Stability: ±2°F (± 1.1°C) (air temperature)
Heater Range: 0-1500W
Air Metering: 0.878±0.02832m³/h at standard temperature and pressure (31±1 ft³/h)
Air Distribution: 20-diffuser manifold
Rotating Stage: ⅓rpm
Electrical Requirements: 115V 60Hz, Single Phase, 13.0A
220-240V 50Hz or 60Hz, Single Phase, 6.8A

Included Accessories

Monel Test Specimen Hooks (33 sets)

Dimensions lxwxh,in.(cm)

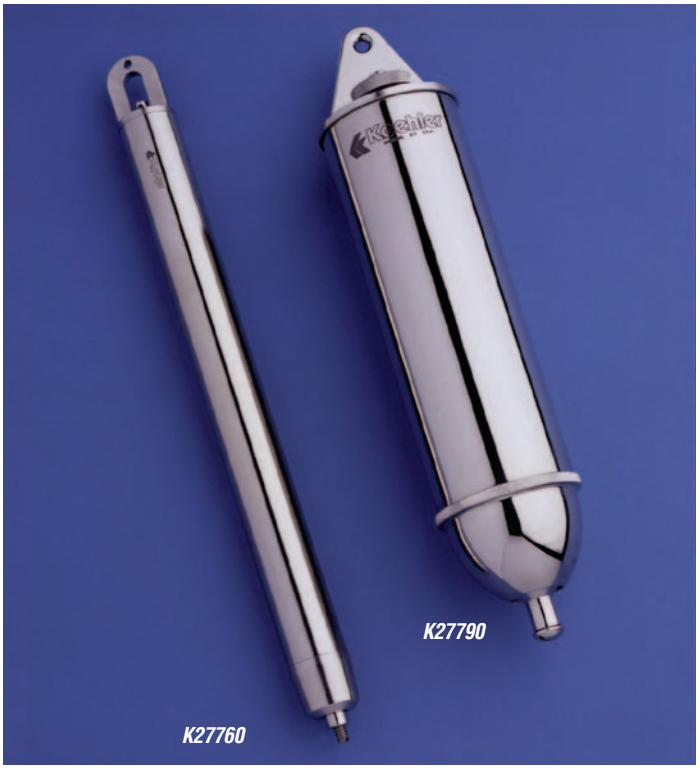
32x28x41½ (81x71x105)
Net Weight: 206 lbs (93.4kg)

Shipping Information

Shipping Weight: 279 lbs (126.6kg)
Dimensions: 41 Cu. ft.

Koehler INSTRUMENT COMPANY, INC.

Sampling of Petroleum and Petroleum Products and LP Gases



Sampling of Petroleum and Petroleum Products

Sampling Liquefied Petroleum (LP) Gases

Test Method Standards

All samplers conform to ASTM D4057 (formerly ASTM D270), D6074 or ASTM D1265 specifications.

Sample Thief (Bacon Bomb)

- Obtains bottom samples or samples from any level
- Four different capacities
- Plated brass, stainless steel or acrylic construction
- Standard Viton O-ring seal
- Optional metal-to-metal seal

Obtains samples from storage tanks, tank cars and drums. When the thief strikes the bottom of the tank, a plunger assembly opens to admit the sample. The plunger closes again when the bomb is withdrawn, forming a tight seal. Samples can be taken at any depth with the use of a secondary trip line, or extension rods may be added for obtaining samples at levels of up to 18"(46cm) off the bottom. Equipped with plunger locking cam for tight closure during transport (except for 4 oz 1⅛" dia. model). Special models include a 4 oz (118mL) 'pencil' model for sampling through small diameter pipes and openings, and clear acrylic samplers with plated brass plunger and end pieces. Modified samplers can be supplied for special applications – we invite your inquiries.

Specifications and Ordering Information

Catalog No.	Capacity oz(mL)	Construction	Seal	Outside Diameter (O.D.)in.(cm.)	Overall Length in.(cm)	Shipping Weight lbs(kg)
K27700	32 (946)	plated brass	Viton O-ring	3⅜ (8.6)	15 5/32 (38.5)	13 (5.9)
K27701	32 (946)	stainless steel	Viton O-ring	3⅜ (8.6)	15 5/32 (38.5)	13 (5.9)
K27790	16 (473)	plated brass	Viton O-ring	2¾ (7)	12 1/32 (30.6)	9 (4.1)
K27795	16 (473)	plated brass	Metal Seat	2¾ (7)	12 1/32 (30.6)	9 (4.1)
K27791	16 (473)	stainless steel	Viton O-ring	2¾ (7)	12 1/32 (30.6)	8 (3.6)
K27792	16 (473)	acrylic	Viton O-ring	2¾ (7)	12 1/32 (30.6)	8 (3.6)
K27780	8 (237)	plated brass	Viton O-ring	2 5/16 (5.9)	10 5/32 (25.8)	5 (2.3)
K27785	8 (237)	plated brass	Metal Seat	2 5/16 (5.9)	10 5/32 (25.8)	5 (2.3)
K27781	8 (237)	stainless steel	Viton O-ring	2 5/16 (5.9)	10 5/32 (25.8)	5 (2.3)
K27782	8 (237)	acrylic	Viton O-ring	2 5/16 (5.9)	10 5/32 (25.8)	5 (2.3)
K27770	4 (118)	plated brass	Viton O-ring	1⅞ (4.7)	9 1/16 (24.6)	4 (1.8)
K27771	4 (118)	stainless steel	Viton-O-ring	1⅞ (4.7)	9 1/16 (24.6)	4 (1.8)
K27772	4 (118)	plexiglass	Buna N O-ring	1⅝ (4.01)	9 1/16 (24.6)	3 (1.4)
K27760	4 (118)	plated brass	Viton O-ring	1⅛ (2.8)	13¼ (33.7)	3 (1.4)
K27761	4 (118)	stainless steel	Viton O-ring	1⅛ (2.8)	13¼ (33.7)	3 (1.4)
K27762	4 (118)	acrylic	Viton O-ring	1⅛ (2.8)	13¼ (33.7)	3 (1.4)

Sample Thief Extension Rods

Installs in sample thief plunger assembly. Stainless steel with threaded end.

Catalog No.	Length in. (cm)	Application
K277-EXT1	1 (2.5)	
K277-EXT2	2 (5.1)	
K277-EXT3	3 (7.6)	32,16 and
K277-EXT6	6 (15.2)	8 oz models
K277-EXT12	12 (30.5)	
K277-EXT18	18 (45.7)	
K277C-EXT1	1 (2.5)	
K277C-EXT2	2 (5.1)	
K277C-EXT3	3 (7.6)	4 oz models
K277C-EXT6	6 (15.2)	
K277C-EXT12	12 (30.5)	
K277C-EXT18	18 (45.7)	

All-Levels Sample Thief

Similar to the standard 16 oz (473mL) Sample Thief (Bacon Bomb), but equipped with an adjustable needle valve opening instead of a plunger to control rate of flow during 'all-levels' and 'running' sampling from storage tanks. Plated brass construction.

Ordering Information

Catalog No.	
K27800	All-Levels Sample Thief

Adjustable-Level Sample Thief

Takes samples at depths up to 12" (30.5cm) from bottom. Similar to the standard 16 oz (473mL) Sample Thief (Bacon Bomb), but with built-in graduated extension rod adjustable between 0-12" (30.5cm). Plated brass construction.

Ordering Information

Catalog No.	
K27900	Adjustable Level Sample Thief

Sampling of Petroleum and Petroleum Products and LPG

Drum Thief (Sampling Tube)

- Choice of plated brass or stainless steel construction

For tube sampling from barrels and drums. Takes bottom samples or all-levels samples. 40" Long x 1¼" dia. (102x3.2cm). Maximum sample capacity of 24 oz (710mL). Shipping Weight: 6 lbs (2.7kg).

Ordering Information

Catalog No.	
K27400	Drum Thief, plated brass
K27401	Drum Thief, stainless steel

K27400
Drum Thief

Weighted Beaker

- Capacity 32 oz. (946mL)
- Choice of ¾" or 1½" (19 or 38mm) opening

For beaker sampling from tank cars, tank trucks, shore tanks, ship tanks and barge tanks. Copper or stainless steel construction with weighted bottom. Includes handle and chained cork. Takes all level samples, running samples, and top, upper, middle, lower and outlet samples. Select ¾" (19mm) opening for light crude oils, light lubricating oils, kerosenes, gasolines, transparent gas oils, diesel fuels, and distillates, or 1½" (38mm) for heavy crude and fuel oils, heavy lubricating oils and nontransparent gas oils. Shipping weight: 6 lbs (2.7kg).

Ordering Information

Catalog No.	
K27600	Weighted Copper Beaker, with ¾" opening
K27610	Weighted Copper Beaker, with 1½" opening
K27601	Weighted Stainless Steel Beaker, with ¾" opening

K27600
Weighted Beaker

LPG Sample Containers

- Two-valve type with 20% outage tube
- Built-in pressure relief valve
- Conforming to ASTM D1265 and GPA 2140 specifications

Welded stainless steel cylinders for obtaining representative samples of liquefied petroleum (LP) gases. Two-valve type (¼ IPS), with 20% outage tube and built-in pressure relief valve factory preset between 540 to 600psi (38-42 kg/cm^2).

Ordering Information

Catalog No.	
K27851	LPG Sample Cylinder, 150mL
K27852	LPG Sample Cylinder, 300mL
K27853	LPG Sample Cylinder, 500mL
K27854	LPG Sample Cylinder, 1000mL
K27856	LPG Sample Cylinder, 3000mL

K27851 Series LPG Sample Cylinder

Tank Car Gauging Pole

- Meets ASTM D1085 specifications
- 36" or 32⅛" in length, with ⅛" graduations

Ordering Information

Catalog No.	
K28000	Tank Car Gauging Pole, 36"
K28010	Tank Car Gauging Pole, 32⅛"

Freezing Point of Aqueous Engine Coolant Solution

Test Method

Determines the freezing point of aqueous engine coolant solutions by cooling a sample with continuous agitation until a plateau is observed in a time-temperature curve.

Freezing Point Apparatus

- Conforms to ASTM D1177 specifications

Determines freezing points of aqueous engine coolants. Includes 200mL freezing tube with drilled cork, outer flask, motorized stirrer, clamps and stand. Similar to K29700 Freezing Point Apparatus.

Ordering Information

Catalog No.		Order Qty
K29750	Freezing Point Apparatus, 115V 60Hz	1
K29758	Freezing Point Apparatus, 220-240V 50Hz	
K29759	Freezing Point Apparatus, 220-240V 60Hz	
250-000-75F	ASTM 75F Thermometer Range: –35 to +35°F	1
250-000-76F	ASTM 76F Thermometer Range: –65 to +5°F	

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

K29750 Freezing Point Apparatus

Color of Maleic and Phthalic Anhydrides

K56300 Anhydride Purity Bath

Dimensions lxwxh,in.(cm)
12x12x21 (31x31x54)
Net Weight: 65 lbs (30 kg)

Shipping Information
Shipping Weight: 76 lbs (35 kg)
Dimensions: 9 Cu. ft.

Test Method

Molten samples of maleic or phthalic anhydride are compared with Platinum-Cobalt color standards for determining sample purity and the qualitative stability in the presence of contaminants. High color content normally indicates contamination.

Anhydride Purity Bath

- Conforms to ASTM D3366 specifications
- Redundant overtemperature protection circuitry
- Microprocessor-based temperature controller

Electrically heated aluminum block features a microprocessor-based temperature controller with overtemperature protection circuitry and a dual LED temperature display. The heating unit provides temperature stability, heating rates, and minimal temperature gradients which exceed ASTM specifications, and is housed in an insulated steel cabinet with a chemically-resistant painted finish. Up to six samples can be tested at a time using Nessler tubes. Visual color comparisons are made against solutions of Platinum-Cobalt color standards. (Please refer to pages 44-47 for Koehler's line of color measurement and comparison instrumentation.)

Ordering Information

Catalog No.		Order Qty
K56300	Anhydride Purity Bath, 115V 50/60Hz	1
K56390	Anhydride Purity Bath, 220-240V 50/60Hz	
K56306	Nessler Tubes	6

Automatic Melting Point Range Apparatus

Automatic Melting Point Range Apparatus

Test Method

The melting point of a crystalline solid is the temperature at which the solid to liquid phase transition occurs, referenced at one atmosphere (1 ATM) of pressure.

- Conforms to BP Appendix 5 - Method 6 and GLP specifications
- Readily interchanged between automatic and manual detection of melting point ranges
- Intelligent Lamp Intensity Control with Soft Start
- Storage capacity for up to 20 sample tests
- User-interactive software and data entry, including easy alphanumeric entry of sample name, ID number, and date
- User selectable operating modes:
  - **AUTO detection mode:** Start/end of melting point range is automatically detected by a photosensing infrared device. The melting process is recorded and viewed on-screen in real-time by a CCD camera.
  - **MANUAL detection mode:** Start/end of melting point range can be selected manually with a key-press by user. Sample melting point can be determined as per BP method by 'Heat & Cool' temperature function. As above, the melting process is recorded and viewed on-screen in real-time by a CCD camera.

Melting apparatus is the latest technology for microprocessor-based determinations of melting point ranges of crystalline, powdered and polymeric materials, and is used to assess sample purity. Requires approximately. 5mg of sample spread uniformly on a glass slide, covered with a glass coverslip. The slide is placed on a uniformly heated, round furnace and subjected to a heating profile as required by the user. Precise temperature control gives reproducible results to within 1%. The unit contains an automatic temperature safety cut-off feature if no melting points are detected 15°C above the expected melting point or if the oven reaches 315°C. The melting process is magnified, recorded, and viewed on-screen in real-time by a CCD camera. The change in physical appearance of the sample with respect to temperature is recorded, and the start/end of melting is observed automatically. A representation of the entire process can be printed out in graphical form for validation.

Dimensions lxwxh,in.(cm)
Main Unit: 16½x12¼x13 (42x31x33)
Monitor: 8x5½x5½ (20x14x14)
Net Weight: Main Unit: 22 lbs (10 kg)
Monitor: 1.8 lbs (0.8 kg)

Shipping Information
Weight: 29 lbs (13 kg)
Dimensions: 3.6 Cu. ft.

Ordering Information

Catalog No.		Order Qty
K90100	Automatic Melting Point Range Apparatus, 115V 60Hz	1
K90190	Automatic Melting Point Range Apparatus, 220V 50Hz	

Accessories

K90104	Glass slides and cover slips (pack of 100)

K90100 Automatic Melting Point Range Apparatus

Specifications

Conforms to the specifications of:
BP Appendix 5-Method 6; GLP
Visual Image: 10x magnified displayed on monitor
Temperature Range: ambient + 5 to 315°C
Heating Rates: 0.2, 0.5, 1.0, 2.0, 3.0, 6.0, 12.0°C/min
Temperature Readability: 0.1°C
Cooling Time: 20 minutes (300°C to ambient)
Temperature Accuracy: ±0.5°C (ambient + 5 to 200°C)
±0.8°C (200 to 315°C)
Sample size: 5 mg (approximately.)
Sample Holder: Glass Slide ≤1mm ±0.02mm thick
Sample Cover: Glass Coverslip ±0.17mm thick
Temperature Sensor: Pt-100 (2 wire RTD)
Test Storage: Up to 20 tests with parameters
Electrical Requirements:
115V, 60Hz, Single Phase
220V, 50Hz, Single Phase

General Purpose Baths

Constant Temperature Water Baths

- Three models, ranging from 3 liter to 22 liter capacity
- Microprocessor controller with LED display of setpoint and actual temperature to 0.1°C, and redundant overtemperature control
- Temperature stability within ±0.2°C
- Built-in timer with RS232 port

Economical constant temperature water baths in a range of sizes for a variety of laboratory applications. Convenient digital temperature control provides °C/°F switchable LED setpoint and display to 0.1°C, and temperature stability to within ± 0.2°C. A separate adjustable thermostat provides overtemperature protection. The bath reservoir is constructed of 304 series stainless steel. Utilizes water as the bath medium and the heaters will not burn out if the bath should run dry. Optional hinged, removable acrylic cover tilts to permit condensate to flow back into the bath and is gabled to accommodate sample containers of a variety of different shapes and sizes. Available flat bath covers with set of rings can be used for the evaporation of liquids and solvents and melting of solids or to accommodate sample containers of different sizes. Drain is included with all models to facilitate emptying of the bath liquid. Bath exterior is constructed of galvanized steel with an powder coating finish.

Specifications

Temperature control: 0.1°C setpoint and C°/F° switchable LED display
Temperature stability: ±0.2°C
Temperature range: 25 to 100°C (20 to 100°C with cooling accessory)
Electronic timer: 0:01 to 9:59 hours

K33203 Constant Temperature Water Bath

Ordering Information

Catalog No.	Capacity	Electrical Requirements	Overall Dimensions lxwxh,in.(cm)	Inside Dimensions lxwxh,in.(cm)
K33201	3-8 liter	115V 60Hz, 8.7A	11½x11½x12½	10½x9x5½
K33202	(0.8-2.1 gal)	230V 50Hz, 8.7A	(29.2x29.2x31.8)	(26.7x22.9x14)
K33203	5-12 liter	115V 60Hz, 8.7A	15¾x11½x12½	10½x13½x5½
K33204	(1.3-3.2 gal)	230V 50Hz, 8.7A	(40x29.2x31.8)	(26.7x34.3x14)
K33205	8-22 liter	115V 60Hz, 8.7A	22x13x13¾	11½x19½x7
K33206	(2.1-5.8 gal)	230V 50Hz, 8.7A	(55.9x33x34.9)	(29.2x49.5x17.8)

Accessories

Acrylic Covers

K33201-0	Acrylic Cover for K33201/K33202 Baths
K33203-0	Acrylic Cover for K33203/K33204 Baths
K33205-0	Acrylic Cover for K33205/K33206 Baths

Flat Bath Covers with Ring Sets

K33201-1	1-Hole Cover (7.5 in./19cm hole diameter) and 1 Ring Set for K33201/K33202 Baths
K33201-4	4-Hole Cover (3.6 in./9.2cm hole diameter) and 4 Ring Sets for K33201/K33202 Baths
K33203-6	6-Hole Cover (3.6 in./9.2cm hole diameter) and 6 Ring Sets for K33203/K33204 Baths
K33205-2	2-Hole Cover (7.5 in./19cm hole diameter) and 2 Ring Sets for K33205/K33206 Baths
K33205-6	6-Hole Cover (4.5 in./11.5cm hole diameter) and 6 Ring Sets for K33205/K33206 Baths

Other General Purpose Baths Available.

Koehler also offers both Ultra Low Temperature (–95 to 0°C) and Heating (–88 to +100°C) Circulators. These powerful systems feature dual-stage semi-hermetic compressors, full range cooling at all temperatures for faster cool down times, heavy duty refrigeration tubing, CFC-free refrigerants, high flow pressure & suction pump system designed for large external systems, adjustable high/low temperature warning and shut-off functions, low liquid level alarm, LED temperature display, and a digital RS-232 interface. Please inquire with Koehler Customer Service about any additional or ordering information.

General Purpose Baths

Constant Temperature Circulating Baths

- Three Models with operating ranges up to 100, 200, or 250°C
- Bath capacities ranging from 3 to 12 liters
- Redundant safety temperature control and low liquid cut-off
- Built-in cooling coil for counter cooling

Standard Model–Constant temperature circulating bath with analog temperature controller, large LED display, and an operating range to 100°C with ±0.03°C stability. Choice of 3-4.5L or 7.5-12L bath capacities. Circulator has adjustable pumping speeds (3 to 15 Lpm), and hose-barb fittings for external circulation. A separate adjustable thermostat provides safety cutoff. Bath exterior is constructed of galvanized steel with an acrylic enamel finish.

Elite Model–Similar in design and construction to the standard model, but features a microprocessor-based temperature controller with drift compensation, an operating range to 200°C, an improved temperature stability of ±0.01°C, an RS-232 interface, visual and audible overtemperature warning, and low liquid level protection.

Ultra Model–Similar in design and construction to the elite model, but features a programmable controller with self-optimizing Intelligent Cascade Control (ICC), Integrated Programmer (6 profiles, up to 60 steps), 4-line interactive LCD display, an operating range to 250°C, pumping speed up to 20 Lpm, an RS-232/485 interface, and an external port for a Pt-100 sensor.

Specifications

Temperature Range: (with built-in counter-cooling option)
Standard model: 20°C to 100°C
Elite model: 20°C to 200°C
Ultra model: 20°C to 250°C
Temperature Stability:
Standard model: ±0.03°C Elite and Ultra models: ±0.01°C

K33213 Constant Temperature Circulating Bath

Ordering Information

Catalog No.	Model	Electrical Requirements	Bath Capacity	Working Dimensions lxwxh,in.(cm)	Dimensions lxwxh,in.(cm)	Shipping Information
K33209	Standard	115V 60Hz, 8.7A	3-4.5 liter (0.8-1.2 gal)	6x6x6 (15.2x15.2x15.2)	7x13x14 (17.8x33x35.6)	13 lbs (6kg)
K33210		230V 50Hz, 8.7A				
K33211	Elite	115V 60Hz, 8.7A	3-4.5 liter (0.8-1.2 gal)	6x5x6 (15.2x12.7x15.2)	8x15x16 (20.3x38.1x40.6)	20 lbs (9.1kg)
K33212		230V 50Hz, 8.7A				
K33213	Ultra	115V 60Hz, 8.7A	3-4.5 liter (0.8-1.2 gal)	5.9x5.1x5.9 (15x13x15)	8x15x16 (37.5x27.6x39.4)	26 lbs (11.8kg)
K33214		230V 50Hz, 8.7A				
K33215	Standard	115V 60Hz, 8.7A	7.5-12 liter (2.0-3.2 gal)	8x8.5x6 (20.3x21.6x15.2)	18x12x17 (45.7x30.5x43.2)	35 lbs (15.9kg)
K33216		230V 50Hz, 8.7A				
K33217	Elite	115V 60Hz, 8.7A	7.5-12 liter (2.0-3.2 gal)	8x8.5x6 (20.3x21.6x15.2)	18x12x17 (45.7x30.5x43.2)	35 lbs (15.9kg)
K33218		230V 50Hz, 8.7A				
K33219	Ultra	115V 60Hz, 8.7A	7.5-12 liter (2.0-3.2 gal)	8x8.5x6 (20.3x21.6x15.2)	18x12x17 (45.7x30.5x43.2)	40 lbs (18.1kg)
K33220		230V 50Hz, 8.7A				

Water in Petroleum Products & Bituminous Materials by Distillation

K31800 Metal Still

Dean & Stark Moisture Test Apparatus

- Conforms to ASTM D95 and related specifications

Consists of 400mm condenser, 10mL receiver, 1000mL flask and mounting equipment.

Ordering Information

Catalog No.	
K31830	Dean & Stark Apparatus

Test Method

Determines the water content in petroleum products, tars, emulsified asphalts and other bituminous materials by the distillation method.

Distillation Apparatus

- Conforms to ASTM D95, E123, D244 and related specifications

Consists of still, ring burner, glassware and all mounting hardware.

Specifications

Conforms to the specifications of:

ASTM D95, E123, D244, D370*; AASHTO T55, T59; API MPMS Ch. 10.5; IP 74, 291; FTM 791-3001; ISO 3733; NF T 60-113

*requires different glassware–information is available upon request.

Shipping Information

K31800: Shipping Weight: 10 lbs (4.5kg)
Dimensions: 1.3 Cu. ft.

K31810/K31820: Shipping Weight: 18 lbs (8.2kg)
Dimensions: 2.8 Cu. ft.

Ordering Information

Catalog No.		Order Qty
K31800	Metal Still Plated brass and copper, with lid and clamp assembly, gasket and O-ring seal.	1
K31910	Ring Burner, 5" (12.7cm) dia.	1
K31810	Glassware Set Includes 400mL condenser, 10mL and 25mL receiving traps	1
K31820	Mounting Equipment Consists of stand and connecting hardware	

General Purpose Heater

Utility Heater

- For general laboratory applications
- Precise, reproducible settings
- 750 or 1250W nichrome heater option
- Accepts flat bottom and round bottom beakers and flasks

Variable control electric heater designed for efficient, reproducible heating of flat bottom and round bottom beakers and flasks. Electronic unit control with reference dial permits fine temperature adjustment and accurate repeatable settings. Includes porcelain refractory heater with nichrome element (750 or 1250W) and refractory support plate that reverses to accept different size beakers and flasks. Polished stainless steel housing has cooling vents and two dovetail clamps to accommodate accessory support rod. Line switch and 6ft. (1.8m) three-conductor line cord and plug are included.

Dimensions lxwxh,in.(cm)
5x5x10 (12.7x12.7x25.4)
Net Weight: 4½ lbs (2.0kg)

Shipping Information
Shipping Weight: 8 lbs (3.6 kg)
Dimensions: 1.5 Cu. ft.

Ordering Information

Catalog No.	
K42000	Utility Heater, 115V 50/60Hz, 750W
K42001	Utility Heater, 115V 50/60Hz, 1250W
K42090	Utility Heater, 230V 50/60Hz, 750W
K42091	Utility Heater, 230V 50/60Hz, 1250W

K42000 General Purpose Utility Heater

Refractive Index of Petroleum Products

Test Method

Refractive index is a fundamental physical property that is used in conjunction with other properties to characterize pure hydrocarbons and their mixtures. It is a useful property for concentration measurements, purity determinations and chemical identification.

Automatic Petroleum Refractometer

- Conforms to ASTM D1218, D1747 and D5006 test specifications
- Electronic heating and cooling Peltier system eliminates the need for a circulating water bath
- Automated and precise refractive index measurements
- Rugged sapphire prism
- Designed for samples ranging from clear to highly colored, dark and opaque
- Clear graphical LCD display with on-screen instructions and full menu operation
- Multipoint calibration routines maximize accuracy
- RS232C and centronics communication ports

The Koehler Automatic Refractometer uses precision optics and superior image analysis to extend the repeatability and accuracy of refractive index measurements for petroleum products. Subjectivity is removed from tests results because no manual activities such as aligning shadowlines or reading analog scales are necessary. Opaque hydrocarbons present no problem for this unit which uses reflected light measurement technology as opposed to manual refractometers which are of the transmission type. The dual temperature control system and flat, easy clean sample area make the instrument ideal for viscous or sticky samples.

Three models are available. Model K27500 conforms to ASTM D1218 (maximum temperature 30ºC) and measures to the fourth decimal place refractive index or tenth place in percent solids. Models K27550 and K27560 conform to ASTM D1218 and D1747 (maximum temperature 100ºC) and measures to the fifth decimal place refractive index or one hundredth place in percent solids. The K27550 also has a built in data storage system with secure electronic signature recording.

The refractometer incorporates numerous innovations designed to improve the accuracy of petroleum product testing. A 589 nanometer filter gives true Sodium D-Line refractive index readings. The large graphical LCD is easy to read and provides complete sample analysis documentation including the reading, temperature and scale name of the screen.

Set-up, diagnostic and calibration routines are displayed with easy to follow step-by-step instructions. User-developed customer calibration curves may be programmed allowing automatic temperature correction and direct percent concentration, percent reaction completion, etc. This unit has been used successfully throughout the petrochemical industry.

Ordering Information

Catalog No.	
K27500	Automatic Petroleum Refractometer for D1218 110-240V 50/60Hz
K27550	Automatic Petroleum Refractometer for D1218 and D1747 110-240V 50/60Hz Includes data storage
K27560	Automatic Petroleum Refractometer for D1218 and D1747 110-240V 50/60Hz

Accessories

K27504	Calibration Fluid, Certificate of NIST traceability included.
K27505	Refractometer Communication Software Package, with real-time data export into Microsoft® Excel.

K27550 Automatic Refractometer

Specifications

Measurement Scales:
- Refractive Index (RI)
- BRIX (% sucrose)
- Temperature Corrected RI
- Temperature Corrected BRIX
- Ten User-Programmable Scales

Illumination: 589nm light emitting diode with interference filter (estimated life: 100,000 hrs)

Range:
- Dissolved Solids: 0 to 95% solids
- Refractive Index: 1.32000 to 1.70000nD for K27500
- Refractive Index: 1.29000 to 1.70000nD for K27550 and K27560 (nD - Sodium D-Line Refractive Index)

Readability:
- Standard Mode: 0.1% Solids 0.0001nD
- Extended Mode: 0.01% Solids 0.00001nD

Precision:
- Standard Mode: ±0.1% Solids ± 0.0001nD for K27500
- Standard Mode: ±0.02% Solids ± 0.00002nD for K27550 and K27560
- Extended Display Mode: Refractive Index Standard Oils ± 0.00002 Typical clear aqueous samples, % Solids Temperature Compensated, as sucrose ±0.02%

Calibration Fluid: refractive index standard oil, NIST traceable nominal value 1.495 RI, 67.61 BRIX

Sample Types: Transparent, translucent or opaque

Prism Assembly: Stainless steel, synthetic sapphire sealed with solvent-resistant epoxy

Calibration:
- 1 point - Water only
- 2 point - Water and refractive index or Brix standard

Dimensions lxwxh,in.(cm)

15½x10x4½ (39½x25½x11½)

Net Weight: 23 lbs (10½kg)

Shipping Information

Shipping Weight: 30 lbs (14kg)

Dimensions: 5 Cu. ft.

Koehler INSTRUMENT COMPANY, INC.

Remaining Useful Life Evaluation for Oil Condition Monitoring

Test Method

The portable Remaining Useful Life Evaluation Routine (RULER®) instrument measures the oxidative resistance levels of mineral and synthetic hydrocarbon oils, ester-based and biodegradable oils. Utilizing voltammetric techniques, the RULER® quantitatively analyzes the relative concentrations of antioxidants in new and used oils in order to monitor the depletion rates of the antioxidant protection package in the oil. The RULER® can be used proactively in order to determine proper oil change intervals and to extend oil change intervals through timely antioxidant additive replenishments. In addition, the RULER® can be used to quantify antioxidant levels of incoming and stored oil supplies and to detect abnormal operating conditions prior to equipment failure signalled by abrupt antioxidant depletion rates.

Remaining Useful Life Evaluation Routine (RULER®)

- *Patented* electrochemical measurement technique
- Conforms to ASTM D6810 and D6971
- Compact and completely portable hand-held unit
- Windows® CE-based simple touch screen operation
- Durable for use in harsh and industrial environments
- 320 x 240 pixel LCD backlit touch screen with automatic contrast
- Stores over 100 tests in memory
- Quick data communication and downloading laptop and desktop computers
- Integrated charge status/low-battery indicator with intelligent fast charge
- Long-life lithium-ion battery with power backup

The RULER® Instrument

The *patented* RULER® technology is a portable oil analysis instrument that quickly measures the levels of antioxidants in petroleum- and synthetic-based oils, greases, and industrial fluids. Designed to provide rapid and accurate evaluations of lubricant oxidation stability and remaining antioxidant concentration, the RULER® is ideal for field testing, maintenance facilities, and oil analysis laboratories as part of a proactive oil condition monitoring program.

The Role of Antioxidants

The antioxidants added to lubricants are vital to fluid integrity and are specially formulated for each type of application, accounting for the various exposures to heat, atmospheric oxygen, and water. Under normal machine operating conditions, radical oxidation would typically degrade any lubricant without a protective additive package. This could result in sludge and deposit formation, filter blockages, oil thickening, and an increase in oil acidity. The antioxidants present in the additive package will significantly limit oil degradation from occurring but will be depleted in the process. Therefore, it is imperative to know the status of the antioxidants in oils being used in service.

Conventional Measurement Techniques

Many conventional laboratory techniques such as kinematic viscosity, total acid number (TAN), infrared (IR) data, and wear metal analysis are used for measuring the extent of oil degradation. These techniques only begin to show significant changes in the physical and chemical properties of the oils when a majority of the antioxidants have been depleted and the oil has begun to substantially degrade, approaching the end of its useful life. This is a point where machine wear and failure may become a severe problem. However, to ensure that a lubricant is not used past the end of its useful life, periodic oil changes are inherently conservative which results in discarding lubricant that is still suitable for use.

Remaining Useful Life Evaluation Routine (RULER®)

The RULER® Measurement Technology

The RULER® instrument quantitatively determines the remaining utility of the lubricant by measuring the remaining concentrations of the antioxidants. The rate of antioxidant depletion over time can be monitored and used to predict proper oil change intervals as well as detect abnormal equipment operation prior to machine breakdown. These important assessments can be easily made by field personnel from the data acquired and analyzed by the RULER® instrument. The results are then presented directly on the touch screen. In addition, the RULER® Data Management Software (R-DMS®) system, which is part of the RULER® package, enhances this monitoring process and can be utilized on a desktop or laptop computer.

The measurement principal of the RULER® is based upon linear voltammetry, where this *patented* electrochemistry technique can evaluate a wide range of antioxidants without any interference from water, fuel, soot, dirt, metal, silt, or other contaminants. The analysis of an oil sample requires the addition of less than 0.5 mL of oil to an electrolytic test solution and insertion of the RULER® probe into the solution. The instrument applies a voltage ramp across the three-electrode sensing system in the probe. At specific voltage values, the antioxidants will become chemically excited and create an oxidation current that is recorded by the instrument. A plot of oxidation current versus voltage, known as a voltammagram, is displayed on the touch screen. The results can then be readily analyzed using the RULER® instrument software and interpreted by the field operator to determine if any immediate maintenance action is necessary or to plan for the next appropriate oil change interval.

The RULER® Data Management Software (R-DMS®)

Utilizing the RULER® Data Management Software (R-DMS®) on a desktop or laptop computer, the resulting data for each test site can be easily tracked over time, enabling the user to identify normal trends for any given piece of equipment. Variations from these trends can be indicative of changes in system operating conditions causing the accelerated oxidation of the lubricant. The R-DMS® software package can maintain a large database of test results, display multiple test results, export data to other formats, and incorporate trending data from other techniques such as viscosity, acid number, infrared (IR) data, and wear metal analysis to provide a complete condition monitoring package. Therefore, with complete information about lubricant quality, determinations can be easily made regarding oil change intervals or additive reinforcement to extend the life of the lubricant.

Remaining Useful Life Evaluation for Oil Condition Monitoring

The RULER® Test Solutions

The *patented* test solutions formulated specifically for RULER® analysis optimize the measurement of specific antioxidants in any given class of oils. These RULER® test solutions are provided in 7mL glass vials which attach easily to the RULER® test probe, have been identified by different colored caps, and are convenient for field and remote testing. Each vial contains 5mL of a specific test solution and 1g of specially prepared sand. After an oil sample is added to the test solution and the vial is shaken, the oil and debris will adhere to the sand and the antioxidants will remain in the solution for RULER® analysis. The shelf life of the RULER® solutions is at least one year from the date of manufacture.

The RULER® test solutions are available in four main classes: **red**, **green**, **blue**, and **yellow**. The **red** solutions have been designed for aviation oil applications, which includes ester-based turbine oils. The **green** solutions have been designed for general applications, which include phosphate ester-based oils, gear, compressor and hydraulic oils, greases, and transformer oils. The **blue** solutions have been designed for combustion engine applications, which include gear oils, gasoline and diesel crankcase oils, and marine oils. The **yellow** solutions have been designed for rust and oxidation applications, which include mineral-based steam and gas turbine oils, phosphate ester-based oils, gear oils, compressor and hydraulic oils, gasoline and diesel crankcase oils, marine oils, greases, and transformer oils. The **black** solutions are for RULER® Acid Number (RAN).

Specifications

CE certified
Communication Ports:
  Standard RS-232 port
Operating Temperature Range:
  –30°C to +50°C
  –22°F to +122°F
Power Supply:
  Rechargeable lithium-ion battery pack
  Rechargeable lithium-manganese backup battery pack
Electrical Requirements:
  120V 50/60Hz
  220V 50/60Hz

Included Accessories

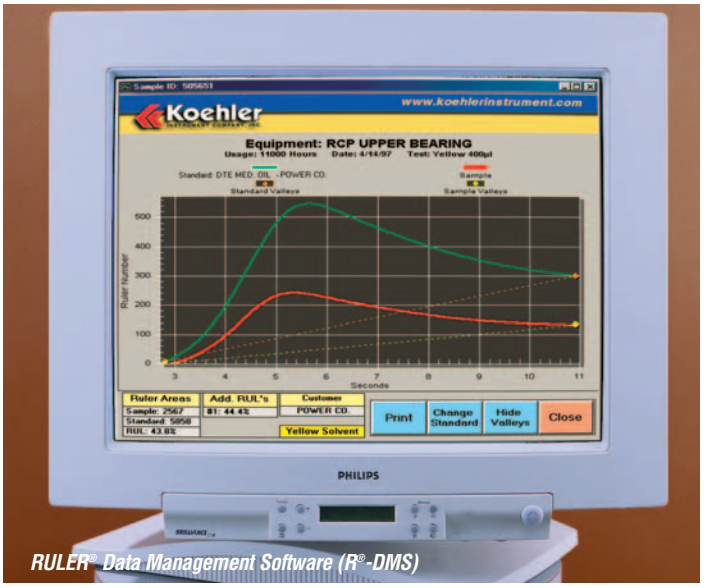
Cable and Communication Software
R-DMS® Software Package (RULER® Data Management Software)
RULER® Probe
Carrying Case for RULER® instrument and accessories
Micropipettor with disposable tips
Alcohol pads
Tissue Wipes
Instruction Manual

Dimensions: lxwxh,in.(cm)

  24.8x10.4x6.1 (9.75x4.1x2.4)
Net Weight: 1.9 lbs (0.85kg)

Shipping Information

Shipping Weight: 10 lbs (4.5kg)
Dimensions: 2 Cu. ft.



RULER® Data Management Software (R®-DMS)

Ordering Information

Catalog No.		Order Qty
RULER® Instrument		
K320S-200	RULER® Instrument, 115V 50/60Hz	1
K320S-290	RULER® Instrument, 220V 50/60Hz	

Accessories

RULER® Test Solutions - Vials

One case of RULER® test solution vials consists of 144 glass vials filled with 1g of sand and 5mL of the test solution. Choose from the following solutions based upon your application. Please contact Koehler Customer Service with any questions about ordering the test solutions.

K131-144	Red - Aviation Applications	1
K132-144	Green - General Applications	
K133-144	Blue - Combustion Engine Applications	
K134-144	Yellow - Rust and Oxidation Applications	
K137-144	Black - RAN	

RULER® Test Solutions - Bottles

The RULER® test solutions are also available in 500mL bottles. Glass vials filled with 1g of sand are also needed to perform the proper analysis. Choose from the following solutions based upon your application. Please contact Koehler Customer Service with any questions about ordering the test solutions.

K131-500	Red - Aviation Applications	1
K132-500	Green - General Applications	
K133-500	Blue - Combustion Engine Applications	
K134-500	Yellow - Rust and Oxidation Applications	
K137-250	Black - RAN 250mL bottle	
K144SW	Glass vials with sand, box of 200	1
K144SB	Glass vials for RAN, box of 100	

Optional Accessories

K144C	Alcohol pads, 1000 individually sealed pads	1
K115	Tissue wipes, box of 300	1
K120-100T	Adjustable Multirange Micropipettor 20, 25, 50, 100µL	1
K120-500T	Adjustable Multirange Micropipettor 200, 250, 300, 500µL	
K121-100T	Pipettor Tips for K120-100T	1
K121-500T	Pipettor Tips for K120-500T	

Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter

K88800 Automatic Calorimeter

Test Method

Heat of combustion is determined in this test method by burning a weighed sample in an oxygen bomb calorimeter under controlled conditions. The heat of combustion is computed from temperature observations before, during and after combustion with proper allowances for thermochemical and heat transfer corrections. Either isothermal or adiabatic calorimeter jackets can be used.

Automatic Calorimeter

The automatic calorimeter is the latest system for determining gross calorific values of liquids and solid fuels. A higher level of automation with extremely simple handling characterizes this device.

In addition to the Isoperibolic measurement procedure, a Dynamic (reduced-time) mode is also available for the user. Different working temperatures can be selected for both procedures based on the temperature of the connected water.

To provide a supply of cooling water, the calorimeter can be connected to a standard thermostat or an appropriate permanently installed water connection, with a connection valve. The unit is equipped with a very convenient operating panel through which operation of the device takes place. The graphical display with active back lighting displays the appropriate status messages. The temporal course of a measurement that has been started and all current parameters of the weighed in sample can be constantly monitored and are arranged to be clearly visible.

Connections for analysis scale, printer, sample rack for identifying and managing samples are already integrated into the basic device. The network connection and the special configuration for data exchange can be implemented at any time with LIMS.

In combination with special halogen-resistant decomposition vessels quantitative decompositions can be performed to determine halogen and sulfur content.

Ordering Information

Catalog No.	
K88800	Automatic Calorimeter, 115V 60Hz
K88890	Automatic Calorimeter, 220V 50Hz

Accessories

K88800-1	Cooling water supply unit, 115V 60Hz
K88890-1	Cooling water supply unit, 220V 50Hz
K88800-2	Pressure Gauge, Oxygen To reduce the pressure of the oxygen cylinder to 30 bar
K88800-3	Standard Decomposition Vessel
K88800-4	Decomposition Vessel, Halogen Resistant For quantitative decomposition determine halogen and sulfur content
K88800-5	Connection valve Required for permanently installed water connection

Specifications

Conforms to the specifications of:
ASTM D240; D4809; D5865; D1989; D5468; E711; ISO 1928; DIN 51900; BS1016
Measurement range: 40,000 J
Measuring mode: Isoperibolic 25°C; Isoperibolic 30°C; Dynamic 25°C; Dynamic 30°C
Isoperibolic Measuring Time: Approximately 22 min
Dynamic Measuring Time: Approximately 7 min
Oxygen Operating Pressure: 30 bar
Cooling Medium: Water via line, flow through quantity 60 + 10 liters / hour
Water Operating Pressure: 1 – 1.5 bar max.
Water Test Pressure: 10 bar
Interfaces: Serial (RS232); Parallel; Keyboard; Sample rack; External monitor

Dimensions lxwxh,in.(cm)
17½x17¾x19¾ (440x450x500)
Net Weight: 66 lbs (30 kg)

Oil Insyte In-Line Continuous Monitoring System

The Oil Insyte Continuous Monitoring System with in-line sensing capability is ideally suited to measure additive package performance and accelerate development of new oil formulations in gasoline and diesel engines. Measuring the leading indicators of oil wear in real-time at temperatures up to 150˚C under GF-4 or PC-10 like conditions ensure compliance with tougher emission standards and fuel economy requirements. A unique operating methodology that does not require calibration and is independent of an oil's viscosity & composition provides a common scale for easy side-by-side comparison of results taken months (or even years) apart and assigned a relative order of performance.

An Oxidation System independently measures additive depletion and oxidation for ensuring maximum lubricant performance in gasoline engines by examining the interdependence between the two. A Soot System measures soot contamination for measuring additive package performance in diesel engines by determining the amount of free soot (vs. dispersant contained soot) present in the oil.

Designed to fit in test facility engines, each system consists of a disposable sensing element, a mechanical interface (that secures to the oil reservoir) and a signal conditioning unit with an easy to read LCD that displays the condition of the oil. Values for oxidation, additive depletion, and temperature are displayed on the Oxidation system. Values for soot and temperature are displayed on the Soot System.

Dimension & Operating Limits

Sensor Element
HxWxD: 3⅛"x ⅛"x 2¾"
(7.9x.15x6.98 cm)
Operating temperature limits
(Soot System): +10˚ to 150˚C ± 5%
Operating temperature limits
(Oxidation System):
+70˚ to 150˚C ±5%
Functional temperature limits
(Soot & Oxidation Systems):
-50˚ to 150˚C ±5%
Weight: 5.3 g

Conditioning Unit

120V AC Power Supply
15' (4.57 m) sensor signal cable
HxWxD: 3½"x 3¼"x 6"
(8.89x8.25x15.25 cm)
Weight: 356 g

Mechanical Interface

Thread: ½" x 20" NPT;
Overall length: 2¾"
Internal depth: 1¾"
O-ring: Viton
Weight: 58 g

Specifications

Soot System

Soot[1]: ±1% @ 150˚C in diesel oils

[1] Values for soot are optimized for oil measuring 0-10% soot, by weight. Repeatability is represented as an absolute value, i.e., a sensor reading of 10% has a repeatability range of 9 – 11%. Soot determination depends on the oil's percent saturated relative contamination (SRC), i.e., "free soot". Minimum levels of detection can vary with the composition and the additive package of the oil.

Oxidation System

Oxidation[2]: ±15% @ 150˚C in automotive oils
Additive depletion[3]: ±5% @ 150˚C in automotive oils

[2] Values for oxidation are optimized for oils measuring between 10 – 50 OD/cm by infrared (IR) spectroscopy where OD is defined in units of optical density and 25 OD/cm is considered the oil change point for automotive oils. Repeatability is represented as an absolute value, i.e., a sensor reading of 8.0 has a repeatability range of 6.8 – 9.2. Minimum levels of detection can vary with the composition and additive package of the oil.

[3]Values for additive depletion (conductivity) are optimized for oil measuring between 175 – 225 pmho / cm @ 25˚C by a dielectric analyzer. Repeatability is represented as an absolute value, i.e., a sensor reading of 7.0 has a repeatability range of 6.65 – 7.35. Minimum levels of detection can vary with the oil composition and additive package of the oil.

Ordering Information	
Catalog No.	
K32100	Complete Oil Insyte Oxidation System
K32105	Complete Oil Insyte Soot System

Screening Fuels in Soils

Test Method

A sample of soil is extracted with isopropyl alcohol, and the extract is filtered. The ultraviolet absorbance of the extract is measured at 254 nm. If the contaminant fuel is available for calibration, the approximate concentration of contamination is calculated. If the contaminant fuel type is known, but the contaminant fuel is not available for calibration, an estimate of the contaminant concentration is determined using average response factors. If the nature of the contaminant fuel is not known, the absorbance value is used to indicate the presence or absence of fuel contamination. Calcium oxide is added to the soil as a conditioning agent to minimize interferences from humid materials and moisture present in the soil. Particulate interferences are removed by passing the extract through a filter.

Diesel Dog Soil Test Kit

- Utilizes ultraviolet photometer for detection of heavier fuels
- Works with wet or dry soils
- Provides accurate test results regardless of operating temperature
- Self-contained portable kit

The Diesel Dog Soil Test Kit combines advanced technology with a new method to detect and measure fuel contamination in soils, bringing you an easy, safe and economical way to analyze samples in the field. The simple testing procedure utilizes isopropyl alcohol rather than ozone-depleting chlorofluorocarbons for soil extraction. The extract is then placed in the photometer and measures the concentration of the fuel at 254nm. The Diesel Dog Soil Test Kit is specially designed to test for heavier fuels. It uses a new method approved by ASTM making it useful for federal compliance activities. The Diesel Dog Soil Test Kit can be used by anyone who needs to map ground contamination or guide cleanup activities, such as environmental contractors, consultants, and laboratories conducting field analyses. Other users are gas and electric utilities, emergency response teams, and environmental agencies. The kit is designed and constructed for use in tank farms, refineries, oil production fields, railroad yards, manufactured gas sites, automotive salvage yards, and underground storage and heating oil tank sites.

Specifications

Conforms to the specifications of: ASTM D583

Ordering Information	
Catalog No.	
K47150	Diesel Dog Soil Test Kit

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.

Aniline Point and Mixed Aniline Point of Petroleum Products and Hydrocarbon Solvents ..... Pages 42-43

ASTM D611; IP 2, ISO 2977; DIN 51775; FTM 791-3601

Pipets, 10mL and 5mL
Laboratory Balance
Oven
Rubber Suction Bulb
Safety Goggles
Plastic Gloves
Aniline
Calcium Sulfate or Sodium Sulfate, anhydrous
n-Heptane
Air Supply (for Automatic Aniline Apparatus)

Saybolt Color of Petroleum Products ..... Pages 44, 46-47

ASTM D156; DIN 51411; FTM 791-101

Acetone or other Solvent
Soap
Qualitative Filter Papers
Distilled Water

ASTM Color of Petroleum Products (ASTM Color Scale) ..... Pages 45-47

ASTM D1500; IP 196; ISO 2049; FTM 791-102

Solvent Kerosene (for dark samples)
Distilled Water

Distillation of Petroleum Products at Reduced Pressures ..... Pages 53-54

ASTM D1160

Toluene
Cyclohexane
n-Tetradecane
1L Beaker
Boiling Chips
n-Hexadecane
Nitrogen
Balance
Air or Carbon Dioxide Supply
Calcium Chloride
Silicone Fluids

Sulfur in Liquefied Petroleum Gases (Oxy-Hydrogen Burner) ..... Page 58

ASTM D2784

Oxygen
Nitrogen
Acetone
Hydrogen Peroxide
Methylene Blue
Alcohol
Thorin
Perchloric Acid
Spectrophotometer
Sodium Hydroxide
Low Sulfur Acetone
Safety Shield
Hydrogen
Sulfuric Acid
Isopropanol
Glycerin
Vacuum Source
Distilled Water
Carbon Dioxide
Barium Chloride Dihydrate
Denatured Ethyl Alcohol
Hydrochloric Acid
Barium Perchlorate
Fleisher's Methyl Purple Indicator

Traces of Volatile Chlorides in Butane-Butene Mixtures ..... Page 58

ASTM D2384

Mercuric Thiocyanate
Potassium Nitrate
Saturated Calomel Electrolyte
Mercury-Calomel Mixture
Silver Nitrate
Gelatin
Acetone
Hydrochloric Acid
Perchloric Acid
Agar Powder
Nitrogen
Nitric Acid
Iron Wire
Hydrogen
Hydrogen Peroxide
Bromthymol Blue Indicator
Sodium Carbonate
Titration Equipment
Oxygen
Vacuum Source

Ramsbottom Carbon Residue of Petroleum Products ..... Page 59

ASTM D524; IP 14; ISO 4262; FTM 791-5002

Desiccator
Strainer (100-mesh)
Analytical Balance
Calcium Chloride
Syringe

Sediment in Crude Oils and Fuel Oils by the Extraction Method ..... Page 61

ASTM D473; IP 53; ISO 3735; DIN 51789; FTM 791-3002

Desiccator
Toluene
Analytical Balance

Rust Protection by Metal Preservatives in the Humidity Cabinet ..... Page 65

ASTM D1748; FTM 791-5310

Silica Sand
Petroleum Naphtha
Precipitation Naphtha
Methyl Alcohol
Air Supply
Water Supply

Freezing Point of Aqueous Engine Coolant Solution ..... Page 68

ASTM D1177

Glass Wool
Solid Carbon Dioxide
Liquid Nitrogen

Fuels

Test Methods	Page
Oxidation Stability of Gasoline (Induction Period Method) ASTM D525, D873, D5304; IP 40, 138; ISO 7536 DIN 51799, 51780; FTM 791-3352, 791-3354	**80-84**
Oxidation Stability of Aviation Fuels (Potential Residue Method) ASTM D873; IP 138; DIN 51799; FTM 791-3354	**80-84**
Assessing Distillate Fuel Storage by Oxygen Overpressure ASTM D5304	**85**
Existent Gum in Fuels by Jet Evaporation ASTM D381; IP 131; ISO 6246; DIN 51784; FTM 791-3302	**86-87**
Dew Point Apparatus	**88**
Copper Strip Corrosion by Liquefied Petroleum (LP) Gases ASTM D1838; GPA 2140; ISO 6251	**89**
Copper Corrosion From Petroleum Products by the Copper Strip Tarnish Test ASTM D130, D6074, D6158; FSPT DT-28-65; IP 154; ISO 2160; DIN 51759; FTM 791-5325	**90-91**
Vapor Pressure of Petroleum Products (Reid Method) ASTM D323; D1267; GPA 2140; IP 69,161; ISO 3007, 4256; DIN 51616; 51754; FTM 791-1201	**92-94**
Vapor Pressure of Liquefied Petroleum (LP) Gases (LP-Gas Method) ASTM D323, D1267; GPA 2140; IP 69,161; ISO 3007,4256; DIN 51616, 51754; FTM 791-1201	**92-94**
Wax Appearance Point of Distillate Fuels ASTM D3117	**94**
Smoke Point of Aviation Turbine Fuels ASTM D1322; ISO 3014; IP 57; DIN 51406; FTM 791-2107	**95**
Freezing Point of Aviation Fuels ASTM D2386; IP 16; ISO 3013; DIN 51421; FTM 791-1411	**96**
Automated Freezing Point of Aviation Fuels ASTM D2386; IP 16; ISO 3013	**97**

Test Methods	Page
Antirust Properties of Petroleum Products Pipeline Cargoes NACE TM 0172; ASTM D665, D6158, D3603; IP 135; ISO 7120; DIN 51585; FTM 791-4011	**98**
Silver Corrosion by Aviation Turbine Fuels IP 227; ASTM D130, D6074, D6158; FSPT DT-28-65; IP 154; ISO 2160; DIN 51759; FTM 791-5325	**99**
Cold Filter Plugging Point of Distillate Fuels ASTM D6371; IP 309; DIN 51428	**100**
Automated Cold Filter Plugging Point of Distillate Fuels ASTM D6371; IP 309; EN 116	**101**
Portable Octane Analyzer for Unleaded Gasolines ASTM D2699, D2700	**102**
Density or Relative Density of Light Hydrocarbons by Pressure Thermohydrometer ASTM D1657; GPA 2140; IP 235; ISO 3993	**103**
Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Absorption ASTM D1319; IP 156	**104**
Volatility of Liquefied Petroleum (LP) Gases ASTM D1837, D2158; GPA 2140; ISO 13757	**105**
Residues in Liquefied Petroleum (LP) Gases ASTM D2158; GPA 2140	**105**

For information on additional testing methods for fuels:

–Cloud Point and Pour Point of Petroleum Oils
–please refer to pages 132-133
–Oxidation Stability of Distillate Fuel Oil (Accelerated Method)
–please refer to pages 120-122
–Please refer to the Viscosity, Flash Point and General Tests Sections
–Additional test methods are available upon request
–please call or write for information

Oxidation Stability of Gasoline and Aviation Fuels

Oxidation Stability of Gasoline (Induction Period Method)
Oxidation Stability of Aviation Fuels (Potential Residue Method)

Test Method

Provides an indication of the tendency of gasoline and aviation fuels to form gum in storage. The sample is oxidized inside a stainless steel pressure vessel initially charged with oxygen at 100psi (689kPa) and heated in a boiling water bath. The amount of time required for a specified drop in pressure (gasoline) or the amount of gum and precipitate formed after a specific aging period (aviation fuels) is determined.

Oxidation Stability Test Apparatus

- Conforms to ASTM D525, D873, ISO 7536 and related specifications
- Oxidata™ Pressure Measurement System
- Available in two, four or six-unit configurations
- Choice of water or solid block heating baths
- Oxidation pressure vessel incorporates burst disk assembly

Consists of Oxidation Pressure Vessel, Pressure Measurement Equipment, Oxidation Bath and Accessories.

Ordering Information

Oxidation Pressure Vessel	*page 80*
Oxidation Baths	*pages 81-82*
Pressure Measurement Equipment	*pages 83-84*
Accessories	*pages 81-82*

Oxidata™ Pressure Measurement System

For Oxidata™ specifications and ordering information refer to pages 83-84.

K10500 Oxidation Pressure Vessel

Oxidation Pressure Vessel

Precision machined stainless steel pressure vessel includes threaded body; lid; stem with filler rod and mounting flange; needle valve for purging, pressurizing and exhausting pressure vessel with oxygen; and burst disk assembly. Pressure vessel interior and inside of stem have a high polish to facilitate cleaning and prevent corrosion. Stainless steel burst disk ruptures at 223psi (1537kPa) to prevent unsafe pressure build-up inside pressure vessel. Octagonal sections on the pressure vessel and lid permit tight closure with wrench. Includes buna-N gaskets. See Accessories on pages 81-82 for available rupture disk assembly retrofit for existing pressure vessels. Can also be used as a pressure vessel in ASTM D5304 “Standard Test Method for Assessing Distillate Fuel Storage Stability by Oxygen Overpressure”.

Ordering Information

Catalog No.	
K10500	Oxidation Pressure Vessel

Oxidation Stability of Gasoline and Aviation Fuels

Solid Block Oxidation Baths

- Solid block baths conforming to ASTM and related specifications. Constant temperature baths for heating K10500 Oxidation Pressure Vessels in accordance with ASTM specifications.

Solid Block Baths–Insulated aluminum block baths available in two or four-unit capacity. Baths feature microprocessor temperature control with built-in overtemperature protection and dual LED displays for setpoint and actual temperature values in °C/°F format. The solid block design offers operating advantages over the boiling water bath, and meets temperature control and other requirements of ASTM and related methods. It should be noted, however, that many applicable specifications for this test method call for a liquid bath medium. Housed in an insulated steel cabinet with chemical-resistant polyurethane enamel finish. Includes lids for pressure vessel ports. Order thermometer separately.

Communications software (RS232, etc.) ramp-to-set and other enhanced features are available on the solid block and 4-6 place liquid baths as extra cost options. Contact your Koehler representative for information.

Specifications

Conforms to the specifications of: ASTM D525, D873; IP 40, IP 138; ISO 7536; DIN 51780, 51799; FTM 791-3352, 791-3354; NF M 07-012, 07-013
Maximum Temperature:
Solid Block Baths: 250°F (121°C)

Solid block baths meet temperature control and other requirements of ASTM and related methods. While the aluminum block design offers operating advantages over the standard boiling water bath, it should be noted that many applicable specifications for this test call for a liquid bath medium. Please refer to the test method for the specific requirements.

Ordering Information

Type	Catalog No.		Electrical Requirements	Heater Range	Dimensions lxwxh,in.(cm)
Solid Block	**K10401**	2 vessels	115V 50/60Hz 12A	0-1300W	15x10x17 (38x25x43)
	K10491		220-240V 50/60Hz 6A		
	K10403	4 vessels	115V 50/60Hz 22A	0-2500W	24x10x17 (61x25x43)
	K10493		220-240V 50/60Hz 11A		

Software compatible, inquire with Koehler Customer Service.

K10491 Solid Block Oxidation Bath

Ordering Information

Catalog No.	
	Accessories
K10540	Glass Sample Container and Cover with pour out spout
K10510	Gasket. Replacement composition gasket for K10500 Oxidation Pressure Vessel
K10551	Pressure Line. For pressurizing Oxidation Pressure Vessel. 6 ft. (1.83m) long, with quick release coupling for needle valve on pressure vessel and threaded fitting for oxygen tank
K10556	Oxygen Manifold Pressure Relief System Connects to oxygen source to prevent overcharging of vessel. Equipped with relief valve to vent at 125psi and 300 series stainless steel 150psi burst disk assembly. Constructed from 300 series stainless steel. Cleaned for oxygen service
K10520	Wrench. For tightening seal on Oxidation Pressure Vessel
K10530	Table Socket. Installs in benchtop to aid in tightening seal on Oxidation Pressure Vessel
K10560	Bronze Tubing For connecting pressure recorder to vessel. Flexible seamless helical tubing with protective armor braid and connections. 5 ft (1.52m) long
K10525	Burst Disk Assembly Retrofit kit for Oxidation Pressure Vessel without burst disk assembly
250-000-22F	ASTM 22F Thermometer Range: 204 to 218°F
250-000-22C	ASTM 22C Thermometer Range: 95 to 103°C

Oxidation Stability of Gasoline and Aviation Fuels

K10404 Liquid Oxidation Bath with K10500 Pressure Vessels

Ordering Information

Catalog No.	
	Accessories
K10540	Glass Sample Container and Cover with pour out spout
K10510	Gasket. Replacement composition gasket for K10500 Oxidation Pressure Vessel
K10551	Pressure Line. For pressurizing Oxidation Pressure Vessel. 6 ft. (1.83m) long, with quick release coupling for needle valve on pressure vessel and threaded fitting for oxygen tank
K10556	Oxygen Manifold Pressure Relief System Connects to oxygen source to prevent overcharging of vessel. Equipped with relief valve to vent at 125psi and 300 series stainless steel 150psi burst disk assembly. Constructed from 300 series stainless steel. Cleaned for oxygen service
K10520	Wrench. For tightening seal on Oxidation Pressure Vessel
K10530	Table Socket. Installs in benchtop to aid in tightening seal on Oxidation Pressure Vessel
K10560	Bronze Tubing For connecting pressure recorder to vessel. Flexible seamless helical tubing with protective armor braid and connections. 5 ft (1.52m) long
K10525	Burst Disk Assembly Retrofit kit for Oxidation Pressure Vessel without burst disk assembly
250-000-22F	ASTM 22F Thermometer Range: 204 to 218°F
250-000-22C	ASTM 22C Thermometer Range: 95 to 103°C

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

Water/Liquid Oxidation Baths

- Water/liquid baths conforming to ASTM and related specifications. Constant temperature baths for heating K10500 Oxidation Pressure Vessels in accordance with ASTM specifications.

Water/Liquid Baths–Two different models, both equipped with low liquid-level controllers in accordance with the latest ASTM specifications. Two-unit analog controlled water bath can be flush mounted in a table top if desired, and is equipped with an overflow standpipe/drain to maintain the proper depth when the pressure vessels are inserted, and a plated brass reflux condenser to minimize evaporation loss.

The four-six unit model can be used with water or oil as a bath medium, and has microprocessor temperature control that provides quick temperature stabilization without overshoot. Dual LED displays provide setpoint and actual temperature values in °C/°F format. A built-in overtemperature control circuit interrupts power should the bath temperature exceed a programmed cut-off point. Both models feature double-wall insulated construction with stainless steel tanks, support racks and port covers. Order thermometer separately. *The 4-6 unit model can be ordered with interchangeable racks for performing the ASTM D942, ASTM D323 and D1298 test methods–please contact your Koehler representative for additional information.*

Communications software (RS232, etc.) ramp-to-set and other enhanced features are available on the solid block and 4-6 place liquid baths as extra cost options. Contact your Koehler representative for information.

Specifications

Conforms to the specifications of: ASTM D525, D873; IP 40, IP 138; ISO 7536; DIN 51780, 51799; FTM 791-3352, 791-3354; NF M 07-012, 07-013

Maximum Temperature:

2 Unit Water/Liquid Bath: boiling water

4-6 Unit Water/Liquid Bath: 250°F (121°C)

Solid block baths meet temperature control and other requirements of ASTM and related methods. While the aluminum block design offers operating advantages over the standard boiling water bath, it should be noted that many applicable specifications for this test call for a liquid bath medium. Please refer to the test method for the specific requirements.

Ordering Information

Type	Catalog No.		Electrical Requirements	Heater Range	Dimensions lxwxh,in.(cm)
Water	**K10400** Analog	2 vessels	115V 50/60Hz 17.3A	0-2000W	24x14x24 (61x36x61)
	K10402 Analog		220-240V 50/60Hz 9.0A		
	K10404 Digital	4-6 vessels	220-240V 50/60Hz 18.1A	0-3000W	24x14x29½ (61x36x75)

Oxidation Stability of Gasoline and Aviation Fuels

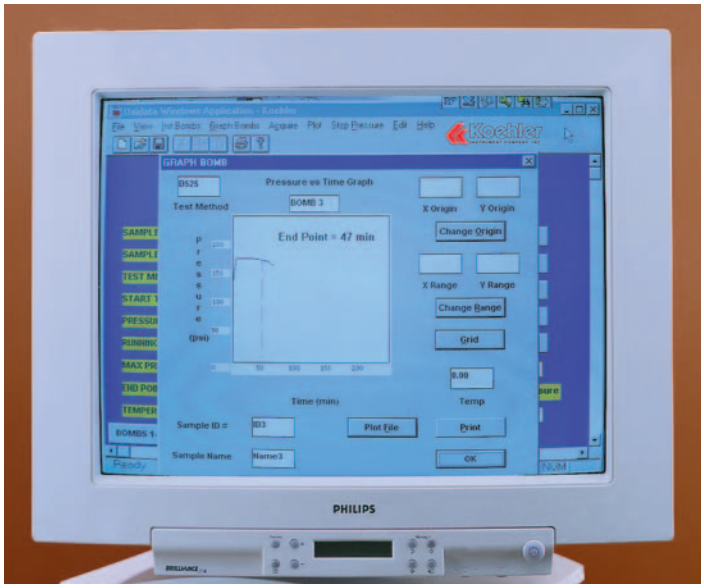
Oxidata™ Pressure Measurement Systems

- Electronic pressure measurement systems exclusively designed for ASTM oxidation test methods
- Powerful Oxidata™ software for Windows® environments
- Monitors up to twelve pressure and four temperature channels
- Automatic end-point detection
- Real-time average bath temperature display
- **Can be installed to most manufacturer's fuels oxidation test apparatus**

Complete electronic measurement systems for plotting pressure versus time and temperature in oxidation testing of fuels. Each system includes transducers, multiplexer, data acquisition card, software, and mounting and connecting hardware. Systems are available in two, three and four pressure vessel configurations, and additional channels can be added for up to a total of twelve pressure and four temperature channels.

Koehler's pressure measurement systems for fuels oxidation testing features Oxidata™, a high accuracy pressure measurement software package designed exclusively for ASTM oxidation test methods. Designed to run in a Windows® 2000 or Windows XP environment, Oxidata™ monitors up to twelve samples simultaneously, with graphical or tabular display of results. Each channel can be independently configured for any of the applicable ASTM standard test methods without compromising the independence or accuracy of the other channels. Independent start and stop times and user programmable end points add even greater flexibility.

The software plots your data on screen on line, real time, and automatically saves your data on disk or to the hard drive during the test to prevent loss of valuable data. Multiple display options include the ability to view the status of all twelve pressure channels on screen simultaneously and then click on any one channel for a graph display; or to view four channels in graphical format simultaneously. Powerful program features allow you to change axes, have colored plot lines and zoom in on a specific plot sector to view data in greater detail.



Oxidata™ software automatically detects the break point and induction period.

Oxidata™ Features and Specifications

- On line, real time monitoring of up to twelve samples simultaneously –results plot directly to the screen for instant monitoring or printout of results
- Automatic detection and reporting of break point and induction period
- Invalid test indication when a pressure leak is detected
- Menu options for fuels oxidation testing and other ASTM oxidation tests
- Programmable automatic end point detection with graphical and tabular representation
- Each channel can be configured and operated independently with different start/stop times and different ASTM test methods
- Zoom in feature allows for magnification of any plot sector on any channel for a more detailed study
- Monitors and reports temperatures of as many as twelve pressure vessels simultaneously using accessory RTD's, and calculates and displays average temperature for each bath
- Exports data to spreadsheet programs such as Microsoft Excel®, Lotus 1-2-3® etc.
- Temperature and pressure calibration capability
- Data is saved directly to the disk or hard drive during testing to prevent loss of valuable data
- Operates in Windows® 2000 and Windows XP environments

Included Accessories (for the pressure measurement systems)

Transducers (connects directly to pressure vessel)
USB interface
Multiplexer
Oxidata™ software
RTD probe assembly (1)
Connecting cables and hardware

Computer Requirements

Processor: Intel® Pentium II or similar (minimum)
Memory (RAM): 256MB or higher
Speed: 500 MHz or higher
Windows® 2000 or higher
Disk Space: 15 MB free space (minimum)
Communications Port: One USB port
Other Software: Microsoft® Excel (97 or above)
One RS232 port for temperature controller (optional)

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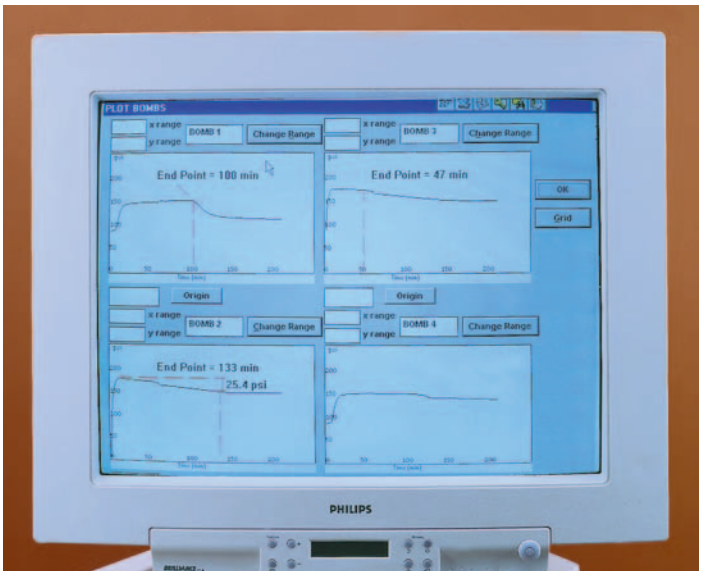
Oxidation Stability of Gasoline and Aviation Fuels



Real-time plot screens display pressure versus time for up to twelve samples simultaneously (four different test methods shown).

Ordering Information

Catalog No.

The ordering information below is for installation to existing Koehler equipment. For other makes of equipment, a few basic hardware items may also be required –please contact your Koehler representative for assistance.

Oxidata™ Pressure Measurement System for Fuels Oxidation

K10504-XP	2-Unit System, 115V 60Hz
K10594-XP	2-Unit System, 220-240V 50/60Hz
K10505-XP	4-Unit System, 115V 60Hz
K10595-XP	4-Unit System, 220-240V 50/60Hz
K10506-XP	6-Unit System, 115V 60Hz
K10596-XP	6-Unit System, 220-240V 50/60Hz

Accessories

K10504-0-1	Transducer
K70519	RTD Kit, for monitoring the temperature of an additional bath

Mechanical Pressure Measuring and Recording Equipment

- One-pen or two-pen mechanical recorders
- Pressure gauge for aviation fuel tests

Mechanical Recorders—Spring-wound circular chart recorder measures pressure inside oxidation pressure vessel for break point and induction period determinations on gasoline. Housed in a steel case suitable for wall mounting. Order accessory bronze tubing for connection to oxidation pressure vessel. Suitable for oxygen service. Includes 100 24-hour charts.

Pressure Gauge for Aviation Fuel Tests—Suitable for testing of aviation fuels according to ASTM D873. Range 0-200psi. Suitable for oxygen service.

Ordering Information

Catalog No.

Mechanical Recorders

K10570	One-Pen Recorder
K10580	Two-Pen Recorder

Pressure Gauge for Aviation Fuel Tests

K10590	Pressure Gauge

Accessories

308-000-005	Recorder Charts Pack of 100
308-001-02R	Recorder Cartridge Pen, Red (for use with K10570 Recorder)
308-001-02B	Recorder Cartridge Pen, Blue (for use with K10570 and K10580 Recorders)
308-001-L2R	Recorder Cartridge Pen, Long Red (for use with K10580 Recorder)

Assessing Distillate Fuel Storage Stability by Oxygen Overpressure

Test Method

Used for assessing potential storage stability of middle distillate fuels, including fuels with or without stabilizer additives, and freshly refined or previously stored fuels. The sample is aged in a pressurized vessel at constant temperature for 16 hours and, after cooling, the total amount of insoluble products is determined gravimetrically.

Pressure Vessel

- Conforms to the specification of ASTM D5304
- Four unit and six unit models

Stainless steel pressure vessels accommodate multiple sample containers for determining storage stability of fuels by the oxygen overpressure method. Vessels meet all applicable ASME and ASTM safety requirements for construction and working pressure and maximum operating temperature and are equipped with pressure safety valves factory present at 200psi (1,332kpa). Included with each model are a collapsible glassware rack that installs and removes easily for cleaning, oxygen inlet and outlet valves with quick disconnect fittings and charging hose, pressure gauge and wide-mouth closure with viton O-ring seal.

Specifications

Conforms to the specifications of:
ASTM D5304
Capacity: Four or six sample containers
Construction: 316 stainless steel, in accordance with ASME specifications
Working Pressure at 90˚C: Exceeds ASTM requirements
Safety Relief Valve Setting: 200psi (1,332kPa)
Pressure Gauge: 0-200psi

Included Accessories

Glassware rack, hinged, for four or six sample containers
Charging Hole with pressure tight crimp and quick disconnect

Dimensions:

K10600: 8½" high by 9½" round
Net Weight: 14 lbs (6.4kg)
K10601: 15½" high by 9½" round
Net Weight: 17 lbs (8kg)

Shipping Information:

K10600:
Shipping Weight: 17 lbs (8kg)
Dimensions: 2.6 Cu. Ft.
K10601:
Shipping Weight: 22 lbs (10kg)
Dimensions: 3.5 Cu. Ft.

K10600 Pressure Vessel, 4 Unit

Ordering Information

Catalog No.		Order Qty
K10600	Pressure Vessel, 4 Unit	1
K10601	Pressure Vessel, 6 Unit	
	Accessories	
K10540	Sample Container with lid	

Existent Gum in Fuels by Jet Evaporation

Test Method

Gum formed during fuel storage can deposit on induction system surfaces, intake valves, stems and guides. To test for gum content, a 50mL sample is evaporated in an aluminum block bath for a specified period under controlled conditions of temperature and flow of air (aviation and motor gasolines) or steam (aircraft turbine fuel).

Existent Gum Test Apparatus

Evaporates aircraft turbine fuel and motor and aviation gasoline samples under controlled conditions in accordance with ASTM specifications. Consists of a high temperature evaporation bath with 100mL test beakers and, for aircraft turbine fuels, a steam generator and steam superheater.

Evaporation Baths

- Conforming to ASTM D381 and related specifications
- Choice of three-unit and six-unit models
- Available with built-in steam superheater
- Microprocessor programmable high accuracy temperature control
- Built-in pressure regulators and air flowmeters

Electrically heated baths for determining existent gum in aircraft turbine fuels by steam-jet evaporation and in motor and aviation gasolines by air-jet evaporation. Fully insulated, aluminum block design assures safe, efficient high temperature operation. Equipped with air/steam pressure regulator with gauge and a flowmeter for adjusting air flow per ASTM specifications. Stainless steel jets deliver air or steam flow to the test wells through removable brass conical adapters. Microprocessor PID control provides quick temperature stabilization without overshoot, and the bath is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.*

Model K33800 with Built-in Superheater–Six-unit bath with a built-in thermostatically controlled superheater which delivers dried steam to the bath inlet for steam-jet method testing of aircraft turbine fuels. Has digital-indicating solid state bath temperature control with digital setpoint and display.

Model K33700–Six-unit bath without built-in superheater.

Model K33780–Three-unit bath without built-in superheater. All controls are housed in the bath cabinet.

Ordering Information

Catalog No.	
K33800	Existent Gum Evaporation Bath, 6-Unit with Superheater, 220-240V 50/60Hz
K33700	Existent Gum Evaporation Bath, 6-Unit, 220-240V 50/60Hz
K33780	Existent Gum Evaporation Bath, 3-Unit, 115V 50/60Hz
K33781	Existent Gum Evaporation Bath, 3-Unit, 220-240V 50/60Hz

Software compatible, inquire with Koehler Customer Service.

K33700 Existent Gum Evaporation Bath

Specifications

Conforms to the specifications of: ASTM D381; IP 131; ISO 6246; DIN 51784; FTM 791-3302; NF M 07-004
Testing Capacity:
K33800 and K33700: 6 sample beakers
K33780 and K33781: 3 sample beakers
Maximum Temperature: 475°F (246°C)
Temperature Control Stability: ±1°F (±0.5°C)
Bath Configuration: machined aluminum block with multiple cartridge heaters
Heater Range:
K33800 and K33700: 0-3000W
K33780 and K33781: 0-1500W
Superheater: (Model K33800 only)
Superheating chamber and condensate trap constructed of stainless steel
Solid state thermoregulator (0-550°F) Heater Range: 0-1500W
Electrical Requirements:
K33700: 220-240V 50/60Hz, Single Phase, 13.6A
K33800: 220-240V 50/60Hz, Single Phase, 20.4A
K33780: 115V 50/60Hz, Single Phase, 13.0A
K33781: 220-240V 50/60Hz, Single Phase, 6.8A

Included Accessories

Conical Brass Adapters for air/steam jets

Dimensions lxwxh,in.(cm)

K33800: 32½x20x20 (83x51x51)
K33780: 32½x11x19 (83x28x48)
K33700: Bath: 28x20x16 (71x51x41)
Control Cabinet: 9x8x6½ (23x20x17)
Net Weight:
K33800: 230 lbs (104.3kg)
K33780: 85 lbs (38.6kg)
K33700: 203 lbs (92.1kg)

Shipping Information

K33800
Shipping Weight: 313 lbs (142kg)
Dimensions: 17.2 Cu. ft.
K33780
Shipping Weight: 140 lbs (63.5kg)
Dimensions: 8.3 Cu. ft.
K33700
Shipping Weight: 271 lbs (123kg)
Dimensions: 13.7 Cu. ft.

Existent Gum in Fuels by Jet Evaporation

Steam Generator

- For steam-jet method testing of aircraft turbine fuels
- Meets output requirements of three-unit and six-unit evaporation baths
- Electrically heated for clean, efficient operation and ease of installation
- Meets applicable ASME, NEC standards; UL listed, CSA approved

Electrically heated boiler provides instantaneous and reserve steam capacity for steam-jet evaporation tests. Easy to install and operate; electrical heating eliminates the need for on-site fuel combustion. Requires only a water feed source and electrical hook-up. Ruggedly constructed, with long life industrial grade incoloy heating element. Includes a full range of safety features: automatic water level control and low water cut-off; steam safety valve; high-limit pressure cut-out with manual reset; steam pressure gauge.

Specifications

Output: 54.1 lbs steam/hr at 212°F
Bhp Rating: 1.83
kW Rating: 18

Dimensions lxwxh,in.(cm)

20x28x36 (51x71x91)
Net Weight: 185 lbs (83.9kg)

Shipping Information

Shipping Weight: 200 lbs (91kg)
Dimensions: 18 Cu. ft.

Ordering Information

Catalog No.	
K33850/208601	Steam Boiler, 208V 60Hz, Single Phase, 87A
K33850/208603	Steam Boiler, 208V 60Hz, Three Phase, 50A
K33850/240601	Steam Boiler, 240V 60Hz, Single Phase, 75A
K33850/240603	Steam Boiler, 240V 60Hz, Three Phase, 43A
K33850/380603	Steam Boiler, 380V 50/60Hz, Three Phase, 27A
K33850/415503	Steam Boiler, 415V 50Hz, Three Phase, 25A
K33850/480503	Steam Boiler, 480V 60Hz, Three Phase, 22A

Other electrical configurations for the Steam Boiler are available. Please inquire with Koehler Customer Service for additional information.

K33810 Steam Superheater

Accessories

Catalog No.		Order Qty
K33710	Sample Beaker, 100mL spun copper, 50x78mm	6
332-002-017	Sample Beaker, Pyrex™, 100mL	
250-000-03F	ASTM 3F Thermometer Range: 20 to 760°F	2
250-000-03C	ASTM 3C Thermometer Range: –5 to +400°C	
K33810	Steam Superheater Provides dry superheated steam for evaporation baths not equipped with a built-in superheater. Use together with an outside steam source for steam-jet method testing of aircraft turbine fuels. Superheating chamber and condensate trap are constructed entirely of stainless steel. Solid state temperature controller adjusts between 0-550°F. Equipped with steam inlet and outlet connections and condensate drain valve. Steel exterior has a chemical resistant polyurethane enamel finish. Dimensions 5x27x9½" (13x70x24cm). Shipping Weight: 23 lbs (10.4kg) 220-240V 50/60Hz, Single Phase, 6.8A	

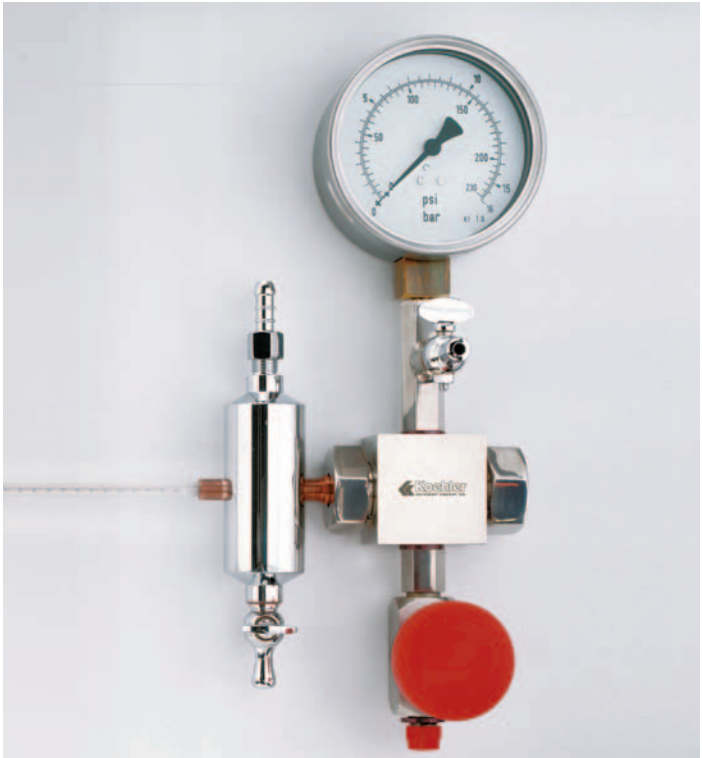
Test Apparatus for Steam Jet Method

Ordering Information

Catalog No.		Order Qty
K33800	Existent Gum Evaporation Bath	1
K33850 Series	Steam Boiler	1
K33710	Sample Beaker (or 332-002-017)	6
250-000-03F	ASTM 3F Thermometer. Range: +20 to +215°F	2
250-000-03C	ASTM 3C Thermometer. Range: –5 to +400°C	

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

Water Vapor Content by Measurement of Dew Point Temperature



K32230 Dew Point Apparatus with K32232 Gauge and ASTM 33C Thermometer

Ordering Information

Catalog No.		Order Qty
K32230	Dew Point Apparatus	1
	Accessories	
K32231	Pressure Gauge, 0 to 23 psi	1
K32232	Pressure Gauge, 0 to 230 psi	
K32233	Pressure Gauge, 0 to 2300 psi	
250-000-33F	ASTM 33F Thermometer, range: –36.5 to +107.5°F	1
250-000-33C	ASTM 33C Thermometer, range: –38 to +42°C	
250-000-114F	ASTM 114F Thermometer, range: –112 to +70°F	1
250-000-114C	ASTM 114C Thermometer, range: –80 to +20°C	

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

Test Method

Determines the water vapor content of gaseous fuels by measurement of the dew point temperature, followed by calculation of the water vapor content.

Dew Point Apparatus

- Rugged construction
- Stainless steel sample chamber with incorporated “target mirror”

The Dew Point Apparatus consists of a closed stainless steel dew point chamber containing a highly polished stainless steel “target mirror” and sample inlet and outlet control valves. The chamber is chilled by refrigerant following through the outer cooling jacket, preventing any refrigerant contact with the test sample. The thermometer is inserted into the mirror support structure, providing the temperature of the “target mirror.” As the sample flows in the chamber and is deflected across the surface of the mirror, the temperature at which condensation collects on the mirror is recorded as the dew point of the sample.

Specifications

Conforms to the specifications of:
ASTM D1142; GPA

Dimensions lxwxh,in.(cm)

3½x6x12¾ (9x15x32.5)
Net Weight: 6½ lbs (3kg)

Shipping Information

Shipping Weight: 11 lbs (5kg)
Dimensions: 2.5 Cu. ft.

Copper Strip Corrosion by Liquefied Petroleum (LP) Gases

Test Method

Tests the corrosiveness of LPG to copper by immersion of a polished test strip in the sample inside a test cylinder at elevated temperature. After one hour the test strip is removed and compared against the ASTM Copper Strip Corrosion Standards.

LPG Copper Strip Corrosion Test Apparatus

- Conforms to ASTM D1838 and related specifications
- Four-sample testing capability

Consists of LPG Corrosion Test Cylinders, Water Bath, Copper Strips, Polishing Materials and the ASTM Copper Strip Corrosion Test Standards.

LPG Corrosion Test Cylinders–Stainless steel cylinder with ¼" needle valves for purging and admitting LPG samples. Dip tube with hook suspends copper strip in sample. Knurled, threaded cap with O-ring gasket hand tightens to a positive seal. Withstands hydrostatic test pressure of 1000 psig (6895kPa).

LPG Corrosion Test Water Bath–Thermostatically controlled water bath submerges four LPG Corrosion Test Cylinders in an upright position. Controls temperature at 100 ±1°F (37.8 ±0.5°C) per ASTM specifications. Soxhlet reflux condenser and constant water level device maintain proper working depth. Polished stainless steel inner wall and powder coated steel outer wall construction. Fully insulated.

Ordering Information

Catalog No.		Order Qty
K40000	LPG Corrosion Test Cylinder	4
K39900	LPG Corrosion Test Water Bath, 115V 50/60Hz	1
K39990	LPG Corrosion Test Water Bath, 220-240V 50/60Hz	

Accessories

K40200	Copper Strip for LPG 12.5x1.5-3.0x75mm with 3.2mm hole per ASTM specifications	4
K40100	Connecting Tubing Sulfur-free plastic-lined tubing for connection of test cylinder valve to sample source. With ¼" stainless steel and aluminum connectors. 24" long	1
K25100	ASTM Copper Strip Corrosion Test Standards Colored reproductions of tarnished strips encased in a plastic plaque.	1
380-240-001	Silicone Carbide Paper, 240-grit For polishing copper strips prior to testing. Pack of 50 sheets	1
380-150-000	Silicone Carbide Grain, 150-grit For final polishing of copper strips prior to testing. 1 lb package	1
380-150-001	Silicone Carbide Paper, 150-grit For polishing copper strips prior to testing. Pack of 50 sheets	1
K25000	Polishing Vise Holds copper strip firmly in place without marring the edges. Stainless steel, mounted on a composition base	1
K25090	Multi-Strip Polishing Vise Similar to K25000 but capable of holding four strips at a time	
250-000-12F	ASTM 12F Thermometer. Range: –5 to +215°F	1
250-000-12C	ASTM 12C Thermometer. Range: –20 to +102°C	

K39900 LPG Corrosion Test Bath

K40000 LPG Corrosion Test Cylinder

Specifications

Conforms to the specifications of:
ASTM D1838; GPA 2140; ISO 6251
Water Bath Specifications:
Capacity: four (4) LPG Corrosion Test Cylinders
Maximum Temperature: 221°F (105°C)
Temperature Control Stability: ±1°F (±0.5°C)
Heater Range: 0-750W
Bath Medium: 3.8 gal (14.4L) Water
Electrical Requirements:
115V 50/60Hz, Single Phase, 6.5A
220-240V 50/60Hz, Single Phase, 3.4A

Shipping Information

Shipping Weight: 27 lbs (12.2kg)
Dimensions: 5.3 Cu. ft.

Dimensions lxwxh,in.(cm)

12x10x24 (30x25x61)
Net Weight: 19 lbs (8.6kg)

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

Koehler INSTRUMENT COMPANY, INC.

Copper Corrosion from Petroleum Products

Test Method

The Copper Strip Tarnish Test assesses the relative degree of corrosivity of petroleum products, including aviation fuels, automotive gasoline, natural gasoline, solvents, kerosene, diesel fuel, distillate fuel oil, lubricating oil and other products. A polished copper strip is immersed in 30mL of sample at elevated temperature. After the test period, the strip is examined for evidence of corrosion and a classification number from 1-4 is assigned based on a comparison with the ASTM Copper Strip Corrosion Standards. For aviation fuels and natural gasoline the sample tube is placed inside a stainless steel bomb during testing.

Test Bomb Baths

Thermostatically controlled water bath immerses Copper Strip Corrosion Test Bombs at the required depth per ASTM specifications. Use for testing aviation gasoline, aviation turbine fuel and natural gasoline. Fully insulated, double-wall stainless steel construction. Soxhlet reflux condenser and constant water level device maintain proper working depth. Choice of four-bomb and eight-bomb models. Optional removable test tube rack converts four-bomb model for testing of products not requiring corrosion bomb.

Specifications: Conforms to the specifications of: ASTM D130; IP 154 FSPT DT-28-65; ISO 2160; DIN 51759; FTM 791-5325; NF M 07-015
Testing Capacity:
K25310/K25319: four (4) copper strip corrosion test bombs
K25320/K25329*: eight (8) copper strip corrosion test bombs
**or sixteen (16) test tubes with optional test rack (Catalog No. K25309) installed*
Maximum Temperature: 221°F (105°C)
Temperature Control Stability: ±1°F (± 0.5°C)
Heater Range: 0-750W
Bath Medium: 5 gal (18.9L) water
Electrical Requirements: 115V 60Hz, Single Phase, 7.5A
220-240V 50/60Hz, Single Phase, 4A
Temperature Control: Analog

Included Accessories

Rubber Stoppers for bomb openings (4)

Dimensions: lxwxh,in.(cm)
4-bomb model: 12x10x21 (30x25x53)
8-bomb model: 16x11½x21 (41x29x54)
Net Weight:
4-bomb model: 18½ lbs (8.4kg)
8-bomb model: 24 lbs (10.9kg)

Shipping Information

Shipping Weight:
4-bomb model: 41 lbs (18.6kg)
8-bomb model: 45 lbs (20.4kg)
Dimensions:
4-bomb model: 5.3 Cu. ft.
8-bomb model: 5.5 Cu. ft.

Ordering Information

Catalog No.	
K25310	Bath for Copper Strip Corrosion Test Bombs, 4-Unit, 115V 50/60Hz
K25319	Bath for Copper Strip Corrosion Test Bombs, 4-Unit, 220-240V 50/60Hz
K25320	Bath for Copper Strip Corrosion Test Bombs, 8-Unit, 115V 50/60Hz
K25329	Bath for Copper Strip Corrosion Test Bombs, 8-unit, 220-240V 50/60Hz
K25309	Optional Test Tube Rack for 8-Bomb Bath

Please refer to page 99 for photograph of K25310 Series Corrosion Baths.

K25330 Copper Strip Test Tube Bath with 332-004-004 Test Jars

Test Tube Bath

Constant temperature bath immerses 16 test tubes for copper strip tarnish tests of products not requiring a test bomb, including: diesel fuel, fuel oil, automotive gasoline, Stoddard solvent, kerosene and lubricating oil. Microprocessor temperature controller has °C/°F switchable digital setpoint and display. Operator and equipment are protected by an overtemperature control circuit which automatically interrupts power to the unit should bath temperature exceed a programmed cut-off point. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* Welded stainless steel inner wall and powder coated steel outer wall construction with built-in support rack. Fully insulated.

Specifications

Conforms to the specifications of: ASTM D130, D6074, D6158; FSPT DT-28-65; IP 154; ISO 2160; DIN 51759; FTM 791-5325; NF M 07-015
Capacity: 16 test tubes
Maximum Temperature: 190°C (374°F)
Temperature Control Stability: ±1°C (±2°F)
Heater Range: 0-750W
Bath Medium: 5 gal (18.9L) water or high temperature heater transfer fluid
Electrical Requirements: 115V 50/60Hz, Single Phase, 7.5A
220-240V 50/60Hz, Single Phase, 4A
Temperature Control: Digital

Dimensions: lxwxh,in.(cm)
15½x12½x14 (39x32x36)
Net Weight: 27 lbs (12.2kg)

Shipping Information

Shipping Weight: 45 lbs (20.4kg)
Dimensions: 12.8 Cu. ft.

Ordering Information

Catalog No.	
K25330	Copper Strip Test Tube Bath, 115V 50/60Hz
K25339	Copper Strip Test Tube Bath, 220-240V 50/60Hz
K25312	Vented Cork (16)
K25330-8B	Optional test Bomb Rack

Software compatible, inquire with Koehler Customer Service.

Copper Corrosion from Petroleum Products

Copper Strip Corrosion Test Bomb

- For aviation fuels and natural gasoline

Precision machined stainless steel bomb inserts in copper corrosion bath for testing aviation fuels and natural gasoline. Withstands test pressure of 100psi (689kPa) per specifications. Threaded cap with O-ring gasket and knurled circumference tightens by hand to a positive seal. A ⅛" groove in the bomb threads permits safe, gradual release of pressure when opening the bomb.

Specifications

Conforms to the specifications of:
ASTM D130, D6074, D6158; IP 154; ISO 2160; DIN 51759; FTM 791-5325; NF M 07-015
Net Weight: 1 lb (.45kg)

Shipping Information:

Shipping Weight: 2 lbs (.91kg)

Ordering Information

Catalog No.	
K25200	Copper Strip Corrosion Test Bomb

Accessories

K25080	Copper Test Strip 12.5x1.5-3.0mm x 75mm to ASTM specifications
332-004-004	Test Tube 25 x 150mm
332-004-002	Viewing Test Tube Protects copper strip during inspection or storage
K25100	ASTM Copper Strip Corrosion Standards Colored reproductions of tarnished strips encased in a plastic plaque
380-150-001	Silicone Carbide Paper, 150-grit For polishing of copper strips prior to testing. Pack of 50 sheets.
380-240-001	Silicone Carbide Paper, 240-grit For polishing of copper strips prior to testing - Pack of 50 sheets
380-150-000	Silicone Carbide Grain, 150-grit For final polishing of copper strips prior to testing - 1 lb package
K25000	Polishing Vise Holds copper strip firmly in place without marring the edges. Stainless steel, mounted on a composition base
K25090	Multi-Strip Polishing Vise Similar to K25000 but capable of holding four strips at a time
250-000-12F	ASTM 12F Thermometer. Range: –5 to +215°F
250-000-12C	ASTM 12C Thermometer. Range: –20 to +102°C

Silver Corrosion Test

Please refer to page 99 for information.

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

Test Apparatus for Aviation Fuels and Natural Gasoline

Catalog No.		Order Qty
K25310	Bath for Copper Strip Corrosion Test Bombs, 115V	1
K25319	Bath for Copper Strip Corrosion Test Bombs, 220-240V	
K25200	Copper Strip Corrosion Test Bomb	4
K25080	Copper Strips	4
332-004-004	Test Tube	4
332-004-002	Viewing Test Tube	4
K25100	ASTM Copper Strip Corrosion Standard	1
380-240-001	Silicone Carbide Paper, 240-grit	1
380-150-001	Silicone Carbide Paper, 150-grit	1
380-150-000	Silicone Carbide Grain, 150-grit	1
K25000	Polishing Vise	1
250-000-12F	ASTM 12F Thermometer	1
250-000-12C	ASTM 12C Thermometer	

Test Apparatus for Diesel Fuel, Fuel Oil, Automotive Gasoline, Stoddard Solvent, Kerosene and Lubricating Oil

Catalog No.		Order Qty
K25330	Copper Strip Test Tube Bath, 115V (or K25339 Bath, 220-240V)	1
K25080	Copper Strips	16
332-004-004	Test Tube	16
332-004-002	Viewing Test Tube	16
K25100	ASTM Copper Strip Corrosion Standard	1
380-240-001	Silicone Carbide Paper 240-grit	1
380-150-001	Silicone Carbide Paper, 150-grit	1
380-150-000	Silicone Carbide Grain, 150-grit	1
K25090	Multi-Strip Polishing Vise	1
250-000-12F	ASTM 12F Thermometer	1
250-000-12C	ASTM 12C Thermometer	

K25200 Copper Strip Corrosion Bomb with K25100 and K25080

Vapor Pressure of Petroleum Products and LP Gases

Vapor Pressure of Petroleum Products (Reid Method) and Liquefied Petroleum Gases (LPG Method)

Test Method

Vapor pressure is a critical factor in the handling and performance of liquid petroleum and liquefied petroleum gas (LPG) products. The vapor pressure of automotive gasolines is subject to governmental regulation for pollution control purposes.

Reid Vapor Pressure Cylinders

- Conform to ASTM D323, D1267 and related specifications
- One-opening and two-opening types

Polished stainless steel test cylinders for vapor pressure tests of liquid petroleum products, volatile crude oil and liquefied petroleum gas (LPG). Consists of upper chamber and lower chamber in required 4:1 volume ratio. O-ring gaskets provide tight seal between chambers and at gauge coupling. One-opening type is for gasoline and other products having a Reid Vapor Pressure below 26psi (180kPa). Two-opening type is for liquid products having a Reid Vapor Pressure above 26psi (ASTM D323) and for LPG (ASTM D1267). Lower chamber of two-opening apparatus includes straight-through ball valve and ¼" needle valve. For LPG testing, order two-opening type apparatus and accessory bleeder valve assembly.

Specifications:

Conforms to the specifications of: ASTM D323, D1267; GPA 2140; IP 69, 161; ISO 3007, 4256; DIN 51616, 51754; FTM 791-1201

Hydrostatic Test (two-opening type): Withstands 1000psi (6894kPa) gauge hydrostatic pressure per ASTM D1267 specifications

Included Accessories

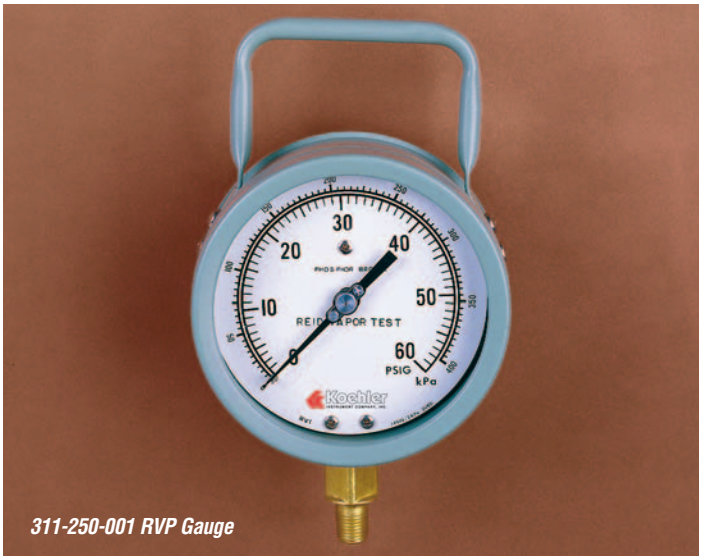
Threaded ⅛" Gauge Coupling
O-ring Seals (2)

Shipping Information

Shipping Weight: 7 lbs (3.2kg)

Ordering Information

Catalog No.	
K11500	Reid Vapor Pressure Cylinder, One-Opening Type
K11201	Reid Vapor Pressure Cylinder Two-Opening Type
K11202	Bleeder Valve Assembly for LPG tests for K11201 test cylinder



311-250-001 RVP Gauge


K11500 *K11201*

Reid Vapor Pressure Gauges

- Conforming to ASTM D323, D1267 and related specifications
- Dual psi/kPa scale on a 4½" diameter dial
- Accurate to within 0.5% of scale range
- Micrometer adjustable pointer

Ruggedly constructed Bourdon type gauge designed especially for the Reid Vapor Pressure test. Heavy duty rotary brushed stainless steel movement. Lightweight aluminum case with corrosion-resistant finish and heavy duty brass non-sparking handle. Includes blow-out disc and ¼" NPT male thread connection.

Ordering Information

Catalog No.	Range psi/kPa	Figure Intervals psi/kPa	Interval Graduations psi/kPa
311-005-002	0-5psi*	0.5psi*	0.05psi*
311-015-002	0-15/0-100	1.0/10	0.1/1.0
311-030-002	0-30/0-200	5.0/20	0.5/2.0
311-060-002	0-60/400	5.0/50	0.2/2.5
311-100-002	0-100/700	10/50	0.5/2.5
311-250-001	0-250/1750	25/100	1.0/20
311-600-003	0-600/4200	50/250	2.0/25

**0-5psi gauge does not have a kPa scale.*

Vapor Pressure of Petroleum Products and LP Gases

Wireless Reid Vapor Pressure Data Acquisition System

Windows®-based electronic pressure measurement software designed for ASTM Reid Vapor Pressure test methods. Monitors up to eight pressure vessel channels, graphing pressure and RVP data in real-time for each channel. Each channel can be run independently and configured for the pressure ranges of 0-50, 0-200, and 0-1000 psi. Pressure values can be reported in psi or kPa. Software automatically exports results into Microsoft® Excel for data analysis and storage.

Ordering Information

Catalog No.		Order Qty
K11401	RVP Data Acquisition System, 115V 50/60 Hz	1
K11491	RVP Data Acquisition System, 230V 50/60 Hz *Includes software, data acquisition card, and multiplexer box. Requires one pressure transducer for each pressure vessel.*	
K11404-50	RVP Pressure Transducer, 0-50 psi	1-8
K11404-200	RVP Pressure Transducer, 0-200 psi	1-8
K11404-1000	RVP Pressure Transducer, 0-1000 psi	1-8

4 Unit Reid Vapor Pressure Bath

- Conforms to ASTM D323, D1267 and related specifications
- Free standing or flush-mount benchtop installation
- Microprocessor programmable high accuracy temperature control

Constant temperature water baths designed for Reid Vapor Pressure determinations of liquid petroleum products and liquefied petroleum gases (LPG). Immerses vapor pressure apparatus at the proper depth per ASTM specifications. Controls bath temperature with ±0.2°F (±0.1°C) precision. Microprocessor PID control provides quick temperature stabilization without overshoot, and the bath is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. Double-wall construction with fiberglass insulated stainless steel tank. A sturdy 1" (25mm) flange permits flush-mount benchtop installation for easy access to the bath interior. Built-in holders suspend test cylinders at the required depth. Equipped with overflow stand pipe/drain.

Specifications

Conforms to the specifications of:
ASTM D323, D1267; GPA 2140; IP 69, 161; ISO 3007, 4256; DIN 51616, 51754; FTM 791-1201; NF M 07-007, 41-010
Capacity: 1 to 4 vapor pressure apparatus, one- or two-opening type
Temperature Control Stability: ±0.2°F (±0.1°C)
Maximum Temperature: 212°F (100°C)
Bath Medium: 13.7 gal (51.9L) water
Electrical Requirements:
115V 50/60Hz, Single Phase, 18.8A
220-240V 50/60Hz, Single Phase, 9.4A

Dimensions lxwxh,in.(cm)
15x15x36 (38.1x38.1x91.5)
Net Weight: 67 lbs (30.4kg)

Shipping Information
Shipping Weight: 105 lbs (47.7kg)
Dimensions: 14 Cu. ft.

Ordering Information

Catalog No.	
K11450	Reid Vapor Pressure Bath, 4-Unit, 115V 50/60Hz
K11459	Reid Vapor Pressure Bath, 4-Unit, 220-240V 50/60Hz

Photograph, thermometers, and additional accessories for Reid Vapor Pressure testing appear on page 94.

Reid Vapor Pressure Data Acquisition System

21-Unit Reid Vapor Pressure Bath

- Conforms to ASTM D323, 1267 and related specifications
- Digital electronic temperature control
- Automatic water level control maintains proper immersion depth

Constant temperature water bath immerses twenty-one test cylinders for vapor pressure tests on liquid products and liquefied petroleum gas (LPG). Electronic level control automatically maintains the proper immersion depth per ASTM specifications. Heating system employs a 6kW stainless steel heat exchanger with a heavy duty circulating pump to provide rapid heat-up, even heat distribution and ease of servicing. Convenient digital setpoint and display permits rapid selection of any bath liquid temperature within the operating range. A built-in overtemperature limit control protects against accidental overheating. Bath interior and internal components are constructed of heavy gauge stainless steel. Control panel is shielded by a hinged acrylic cover. Includes sturdy angle-iron base with corrosion resistant polyurethane finish. Order pressure gauges and cylinders separately.

Specifications

Conforms to the specifications of: ASTM D323, D1267; GPA 2140; IP 69, 161; ISO 3007, 4256; DIN 51616, 51754; FTM 791-1201
Testing Capacity: 21 vapor pressure test cylinders
Temperature Range: 212°F (100°C)
Temperature Control Stability: ±0.2°F (±0.1°C)
Heater Range: 0-6000W
Bath Medium: 58 gal (219.5L) water
Electrical Requirements:
220-240V 50Hz, Single Phase, 28A
220-240V 60Hz, Single Phase, 28A

Dimensions lxwxh,in.(cm)
Overall: 48x22x36 (122x56x91)

Ordering Information

Catalog No.	
K11415	Reid Vapor Pressure Bath, 21-Unit, 220-240V 50Hz
K11416	Reid Vapor Pressure Bath, 21-Unit, 220-240V 60Hz

Vapor Pressure of Petroleum Products and LP Gases


K11459 Reid Vapor Pressure Bath

Test apparatus for liquid products (ASTM D323) requires:
Test Cylinders, one or two-opening type
Pressure Gauges
Constant Temperature Bath
Bath Thermometer
Transfer Connection
Manometer
Manometer Adapter
On-line version of this product is available. Please contact Koehler Customer Service for additional information.

Ordering Information

Catalog No.	
250-000-18F	ASTM 18F Thermometer Range: 94 to 108°F
250-000-18C	ASTM 18C Thermometer Range: 34 to 42°C
250-000-65F	ASTM 65F Thermometer Range: 122 to 176°F
250-000-65C	ASTM 65C Thermometer Range: 50 to 80°C
K11810	Transfer Connection Consists of threaded brass cap, delivery tube and sampling tube. Use for removing liquid from the sample container in accordance with ASTM specifications
371-000-002	Mercury Manometer Graduated in cm (1mm div.) and inches (0.1" div.). For checking pressure gauge reading of up to 15psi
K112B-1-0-12	Manometer Adapter Attaches to pressure gauge for checking with mercury manometer
AS568-210	O-ring Seal For coupling between air and gas chambers on K11500 and K11201 vapor pressure bombs
AS568-113	O-ring Seal For gauge and bleeder valve assembly connections on K11500 and K11201 vapor pressure bombs
K40100	Flexible Tubing Sulfur-free plastic lined tubing with ¼" stainless steel and aluminum connectors. For charging LPG test cylinder.

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

Test apparatus for liquefied petroleum gases (ASTM D1267) requires:
Test Cylinders, two-opening type
Bleeder Valve Assemblies
Pressure Gauges
Constant Temperature Bath
Bath Thermometer
Flexible Tubing

Wax Appearance Point of Distillate Fuels

Test Method

Detects the formation of wax crystals in burner fuels, diesel fuels and turbine engine fuels at low temperatures. The sample is cooled at a specified rate while being agitated. The temperature at which wax first appears is the wax appearance point.

Wax Appearance Point Apparatus

- Conforms to ASTM D3117 specifications

For detection of separated solids in burner fuels, diesel fuels and turbine engine fuels. Similar to K29700 Freezing Point Apparatus. Includes jacketed sample tube, motorized stirrer assembly, outer vacuum flask, clamps and stand.

Ordering Information

Catalog No.		Order Qty
K29760	Wax Appearance Point Apparatus, 115V 60Hz	1
K29768	Wax Appearance Point Apparatus, 220-240V 50Hz	
K29769	Wax Appearance Point Apparatus, 220-240V 60Hz	
250-000-06F	ASTM 6F Thermometer. Range: –112 to +70°F	1
250-000-06C	ASTM 6C Thermometer. Range: –80 to +20°C	

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

Smoke Point of Kerosene and Aviation Turbine Fuel

Test Method

Smoke point is an indicator of the combustion qualities of aviation turbine fuels and kerosene. The fuel sample is burned in the Smoke Point Lamp, and the maximum flame height obtainable without smoking is measured.

Smoke Point Lamp

• Conforms to ASTM D1322 and related specifications

Burns fuel samples under controlled conditions for smoke point determinations of aviation turbine fuels and similar products. Consists of brass lamp body with chimney; gallery; 0-50mm black glass scale with white markings; brass plated door with curved glass window; candle socket; and plated brass candle with wick tube and air vent. Mounted on a cast iron base with aluminum support rod.

Ordering Information

Catalog No.		Order Qty
K27000	Smoke Point Lamp	1
	Accessories	
K27021	Extracted Cotton Wicks Prepared in accordance with ASTM D1322 (7.2) requirements. Packed in a sealed tube with desiccant. Case of 12	
K27020	Cotton Wicks, pack of 12	
K27050	Sighting Device Installs on chimney of Smoke Point Lamp. Eliminates parallax	1
K27060	Wick Insertion Tool Facilitates insertion of cotton wick into wick tube	1
K27065	Wick Trimmer Use together with K27060 Insertion Tool to place wick at the correct height in the wick tube, free of twists and frayed ends.	1
K27010	Interchangeable Candle	

K27000 Smoke Point Apparatus with K27050 Sighting Device and K27060 Wick Insertion Tool

Specifications

Conforms to the specifications of:
ASTM D1322; ISO 3014; IP 57;
DIN 51406; FTM 791-2107; NF M 07-028

Included Accessories

Cotton Wicks, non-extracted (6)

Dimensions dia.xh,in.(cm)

7x18½ (18x47)
Net Weight: 10 lbs (4.5kg)

Shipping Information

Shipping Weight: 16 lbs (7.3kg)
Dimensions: 5 Cu. ft.

Freezing Point of Aviation Fuels

K29790 Freezing Point Bath with Freezing Point Apparatus and Stirrer

Ordering Information

Catalog No.		Order Qty
K29790	Refrigerated Freezing Point Bath 115V 60Hz, Single Phase, 18.3A	1
K29795	Refrigerated Freezing Point Bath 220-240V 50Hz, Single Phase, 10.0A	
K29796	Refrigerated Freezing Point Bath 220-240V 60Hz, Single Phase, 10.0A	
K29700	Freezing Point Apparatus, ASTM D2386	1
K29750-1-7	Stirrer Motor, 115V 60Hz	1
K29758-0-7	Stirrer Motor, 220-240V 50Hz	
K29759-1-7	Stirrer Motor, 220-240V 60Hz	
	Accessories	
250-000-114C	ASTM 114C Thermometer. Range: –80 to +20°C	1
K29720	Moistureproof Collar, Type A Use in place of brass packing gland to prevent condensation of moisture.	
K29721	Moistureproof Collar, Type B Use to prevent condensation.	

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

Software compatible, inquire with Koehler Customer Service.

Test Method

The freezing point of an aviation fuel is the lowest temperature at which the fuel remains free of solid hydrocarbon crystals that can restrict the flow of fuel. The temperature of the fuel in the aircraft tank normally falls during flight depending upon aircraft speed, altitude, and flight duration. The freezing point of the fuel must be lower than the minimum operational tank temperature. The test determines the temperature below which solid hydrocarbon crystals form in aviation fuels. The sample is cooled with continuous stirring in a Dewar-type sample tube until crystals appear.

Refrigerated Freezing Point Bath

- Improved design with enhanced performance and safety features
- Operating range to –100°F (–73°C)
- Microprocessor PID digital temperature control
- Dual digital displays show setpoint and actual bath temperature
- Selectable temperature scale – Fahrenheit or Celsius
- Conforms to ASTM D2386 and related specifications

Redesigned constant temperature bath for freezing point determinations on fuel samples at temperatures as low as –100°F (–73°C). Accommodates K29700 Freezing Point Apparatus and accessory stirrer. Microprocessor PID circuitry provides precise, reliable temperature control within ASTM specified tolerances. Simple push button controls and dual digital displays permit easy setting and monitoring of bath temperature. Bath medium is contained in a clear, evacuated Dewar flask, and glare-free fluorescent backlighting provides excellent visibility when working with the freezing point samples. Air-cooled hermetic compressors provide efficient operation with the use of CFC-free refrigerants. Temperature control uniformity is assured by means of a motorized stirrer which provides complete circulation without turbulence. Cabinet construction is polyester-epoxy finished steel with a chemical-resistant composite top surface. Working (top) surface includes port and mounting plate for K29700 Freezing Point Apparatus and accessory stirrer. Bath rests on adjustable leveling feet.

Specifications

Conforms to the specifications of:
ASTM D2386; IP 16; ISO 3013; DIN 51421; FTM 791-1411; NF M 07-048

Temperature Range: Ambient to –100°F (–73°C)
Temperature Control Accuracy and Uniformity: Exceeds ASTM requirements throughout the operating range
Display: 0.1°C/°F resolution

Electrical Requirements:

115V, 60Hz, Single Phase, 18.3A
220-240V, 50Hz, Single Phase, 10.0A
220-240V, 60Hz, Single Phase, 10.0A

Dimensions lxwxh,in.(cm)

35x26x31 (89x66x78.75)
Net Weight: 259 lbs (117.75kg)

Shipping Information

Shipping Weight: 373 lbs (169.5kg)
Dimensions: 23¾ Cu. ft.

Automated Freezing Point of Aviation Fuels

Automated Freezing Point System

- Conforms to ASTM D2386 and related specifications
- Direct cooling system eliminates the need for solvent cooling baths
- One-stage cooling system provides temperatures as low as –35°C and a two-stage cooling system down to –80°C
- Single start/stop push button makes system simple to use
- Minimal installation required to set-up software and instrumentation

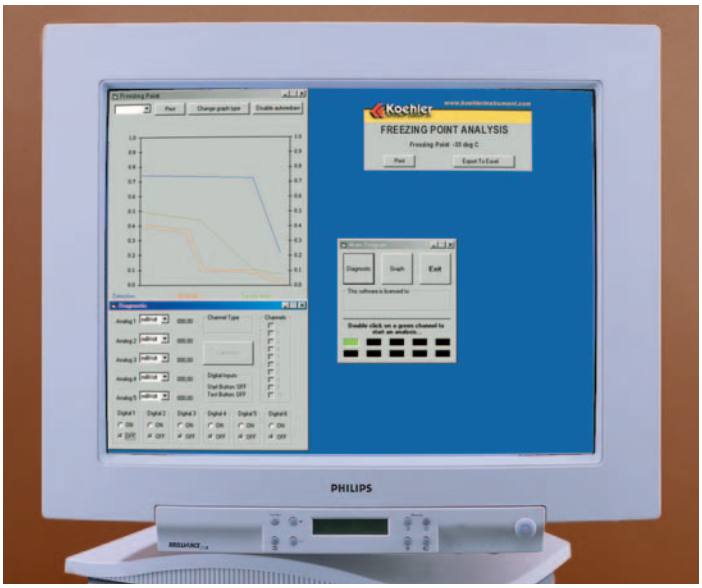
Freezing Point Detection–The freezing point detection system provides automated sample testing with the accuracy and repeatability in accordance with ASTM D2386 and related international test methods. The sample is cooled in the test chamber with constantly stirring. The sophisticated dynamic measurement system emits a light pulse every 0.5°C from a coaxial fiber optic cable positioned above the test sample. The light pulse is then reflected off the silvered-bottom test jar to an optical sensor. The advanced software package analyzes the response of the light pulse. The initial appearance of crystallization is monitored by light scattering. The sample is then warmed up, and the temperature at which the hydrocarbon crystals disappear is recorded as the freezing point. All clear and transparent fuels are readily measured by the detection system, regardless of sample color.

Advanced Software Package–The Windows®-based software package can control either a stand-alone system or provides multiple analyzer networking with a single network control station. All analytical parameters are graphed and displayed in real-time as well as recorded in Microsoft® Excel file format. The software monitors the operation and performance of all the analyzer components for proper data measurement, including the solenoid valves, cooling system, other moving parts, as well as the Pt-100 temperature probes and the pressure sensors. The calibration curves for each probes and sensors are displayed individually and saved to the hard disk with date and time of test.

Cooling System–For various user applications, the automated freezing point system is available with either one-stage cooling for temperatures as low as –35°C or two-stage cooling for temperatures as low as –80°C. The direct cooling system requires no solvent cooling bath and thus eliminates operator exposure to solvents used in standard cooling systems. The direct system is capable of rapid cooling, approaching –80°C bath temperatures in approximately 15 minutes, and utilizes less electricity than in standard cooling systems. The rapid cooling feature combined with a consistent cooling profile system provides repeatable results with high test reproducibility.

Multiple Configuration System–These automated sample cooling and physical property measurement systems can be configured with up to six test positions with one of five possible test heads at each position: cloud point, pour point, cloud & pour point, freezing point, and cold filter plugging point. Standard and customized multiple configuration systems are readily available. Please refer to pages 101 and 133 about cloud point, pour point, and cold filter plugging point product descriptions. *Please inquire with Koehler Customer Service about product specifications and ordering information.*

KLA-35 Auto Cloud/Pour Point and Freezing Point System



Advanced Software Package for Data Management

Specifications

Conforms to the freezing point specifications of:
ASTM D2386; IP 16; ISO 3013
Electrical Requirements:
115V 60Hz, Single Phase
220V 50Hz, Single Phase

Dimensions lxwxh,in.(cm)
For KLA-5:
26x24x31.5 (66x60x80)
Net Weight: 132 lbs (60kg)

Included Accessories

Internal built-in direct refrigeration system
One- or two-stage cooling system
Interface Cells
Operating Software
Acquisition Board
Cord Cable without plug
Interface Cables
Test Jars

Ordering Information

Catalog No.	
KLA-5	Automatic Freezing Point System (one-head unit) Single stage (to –35°C)
KLA-5/2	Automatic Freezing Point System (one-head unit) Double Stage (to –80°C)

*Please specify voltage and cooling requirements when ordering. You may order a multiple configuration system (any combination of freezing point, cloud and cloud/pour point, and cold filter plugging point) with up to six heads. Please specify each measurement head with its associated catalog number using the sequential number combination. A two-head freezing point system would be **KLA-55**. A two-head cloud point and cloud/pour point system would be **KLA-13**, and a three-head cloud point, pour point and freezing point system would be **KLA-125**.*

PC Configuration–Operation of the software package requires the use of a PC, which should be ordered separately. *Please inquire with Koehler Customer Service if assistance is needed in procuring a PC.* The PC should have the following minimum requirements: Pentium III 800 MHz processor, 128 MB RAM, 2 GB hard drive, CD-ROM, Windows® operating system, Microsoft® Excel, Windows® keyboard, monitor, mouse, graphic and video cards.

On line version of this product is available. Please contact Koehler Customer Service for additional information.

Koehler INSTRUMENT COMPANY, INC.

Antirust Properties of Petroleum Products Pipeline Cargoes

K30160NACE Rust Preventing Characteristics Bath

Specifications

Conforms to the specifications of:
NACE TM-01-72; ASTM D665*, D6158, D3603*;
IP 135; ISO 7120; DIN 51585; FTM 791-4011; NF T 60-151
Testing Capacity: Six (6) 400mL sample beakers
Maximum Temperature: 104°C (220°F)
Temperature Control Stability: ±0.5°C (±1°F)
Heater Range: 0-1500W
Drive Motor: explosion proof ball bearing type
Bath Medium: 11 gal (41.6L) white technical oil
Electrical Requirements:
115V 60Hz, Single Phase,13.0A
220-240V 50Hz, Single Phase, 6.8A
220-240V 60Hz, Single Phase, 6.8A

Included Accessories

Steel Test Specimens (6)
Type 2 Plastic Specimen Holders (6)
Plastic Beaker Covers (6)

Dimensions lxwxh,in.(cm)

32¾x14¼x27 (83x36x69)
Net Weight: 79 lbs (35.8kg)

Shipping Information

Shipping Weight: 150 lbs (68.0kg)
Dimensions: 16.2 Cu. ft.

This equipment has been modified for safe operation when testing volatile petroleum products in accordance with NACE Standard Test Method TM-01-72.

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

Software compatible, inquire with Koehler Customer Service.

Test Method

Used to control corrosion in product pipelines caused by moisture condensed from gasoline and distillate fuels. Antirust properties are determined by immersing a polished steel test specimen in a stirred mixture of the sample and distilled water held at constant temperature.

Rust Preventing Characteristics Oil Bath

- Conforms to NACE TM-01-72, ASTM D665* and D3603* specifications
- Accommodates six sample beakers
- Microprocessor temperature control with digital display and overtemperature protection

Six-place constant temperature bath with stirrers for rust preventing characteristics tests. Stirs sample-water mixtures at 1000rpm and controls temperature with ±0.5°C (±1°F) stability. Immerses test beakers at the proper depth per NACE specifications. Microprocessor temperature control has °C/°F switchable digital setpoint and display. Operator and equipment are protected by an overtemperature control circuit which automatically interrupts power to the unit should bath temperature exceed a programmed cut-off point. Stainless steel stirrer paddles are driven at 1000rpm by an improved pulley drive-roller bearing arrangement. Paddles move to a raised position for placement of sample beakers in the bath. Stainless steel bath includes perforated support shelf for beakers and cover plate. Long lasting polyester drive belt improves reliability. Drive train components are protected by a removable steel guard. All exterior surfaces have stainless steel or chemical resistant polyurethane enamel finishes.

**To order this equipment for ASTM and equivalent test methods, please turn to page 128.*

Ordering Information

Catalog No.		Order Qty
Rust Preventing Characteristics Oil Bath		1
K30160NACE	Rust Preventing Characteristics Oil Bath, 115V 60Hz	
K30165NACE	Rust Preventing Characteristics Oil Bath, 220-240V 50Hz	
K30166NACE	Rust Preventing Characteristics Oil Bath, 220-240V 60Hz	
Accessories		
332-002-007	Test Beaker, 400mL, for NACE TM-01-72	6
250-000-09F	ASTM 9F Thermometer Range: 20 to 230°F	7
250-000-09C	ASTM 9C Thermometer Range: –5 to +110°C	
K30130	Chuck for polishing test specimens Includes locknut and shaft for mounting on accessory drive motor	1
K30150	Drive Motor Drives K30130 Chuck. Mounted on base. 115V 60Hz	1
380-100-001	Silicone Carbide Cloth, 100 grit For preliminary grinding and final polishing of test specimens. Pack of 50	1
Test Specimens		
K30110	Steel Test Specimens for ASTM D665/ NACE TM-01-72. Machined to ASTM/NACE specifications. Without holder	
K30100	Test Specimen with Type 2 PMMA Holder for ASTM D665/NACE TM-01-72	
K30101	Test Specimen with Type 2 PTFE Holder	

Silver Corrosion by Aviation Turbine Fuels

Test Method

Tests the corrosiveness of aviation turbine fuels towards silver. A polished silver strip is immersed in a fuel sample at elevated temperature. After a specified test period, the strip is removed from the sample, washed and evaluated for corrosion.

Water Bath for Silver Corrosion

- Conforms to IP 227 specifications
- Six sample capability

Fully insulated, thermostatically controlled water bath with constant water level device. Use together with K25370 Bath Conversion Kit to immerse six 350mL test tubes for silver strip corrosion tests. Stainless steel inner wall and powder coated steel outer wall construction.

Ordering Information

Catalog No.		Order Qty
K25310	Water Bath, 115V 50/60Hz	1
K25319	Water Bath, 220-240V 50/60Hz	
K25370	Bath Conversion Kit for IP 227	1
	Accessories	
K25360	Glassware Set for IP 227 Includes cold-finger condenser, glass cradle and 350mL test tube	6
K25280	Silver Test Strip Conforming to IP 227 specifications	6
K25282	ASTM D3241-IP 323 Color Standard	1
250-000-12C	ASTM 12C Thermometer Range: –20 to +102°C	
K25000	Polishing Vise Holds silver strip firmly in place without marring the edges. Stainless steel, mounted on a composition base	I
380-240-001	Silicone Carbide Paper, 240-grit For final polishing of strips prior to testing. Pack of 50 sheets	1
380-150-001	Silicone Carbide Paper, 150-grit For polishing strips prior to testing. Pack of 50 sheets	1
380-150-000	Silicone Carbide Grain, 150-grit For polishing ends and sides of strips prior to testing. 1 lb package	1
	Additional Accessories for D4814	
K25200	Copper Strip Corrosion Test Bomb	4
332-004-004	Test Tube	4

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

K25310 Constant Temperature Bath

Specifications

Conforms to the specifications of:
IP 227; ASTM D130, D4814, D6074, D6158; FSPT DT-28-65; IP 154; ISO 2160; DIN 51759; FTM 791-5325
Testing Capacity: 6 samples for silver strip corrosion testing
Maximum Temperature: 221°F (105°C)
Temperature Control Stability: ±1°F (±0.5°C)
Heater Range: 0-750W
Bath Medium: 5 gal (18.9L) water
Electrical Requirements:
115V 50/60Hz, Single Phase, 7.5A
220-240V 50/60Hz, Single Phase, 4A
Temperature Control: Analog

Shipping Information

Shipping Weight: 29 lbs (13.2kg)
Dimensions: 5.3 Cu. ft.

Cold Filter Plugging Point of Distillate Fuels

K45950 Cold Filter Plugging Point Bath

Ordering Information

Catalog No.		Order Qty
Cold Filter Plugging Point Apparatus		1
K45900	Cold Filter Plugging Point Apparatus	
Vacuum System		
K45920	Vacuum System	1
Cooling Bath		
K45950	Mechanically Refrigerated Cold Filter Plugging Point Bath, 115V 60Hz	1
K45995	Mechanically Refrigerated Cold Filter Plugging Point Bath, 220-240V 50Hz	
K45910	Cooling Bath (Dry Ice Model)	
	Accessories	
250-000-05C	ASTM 5C Thermometer Range: –38 to +50°C	1
250-000-06C	ASTM 6C Thermometer Range: –80 to +20°C	

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

Software compatible, inquire with Koehler Customer Service.

Test Method

Determines the low temperature flow characteristics of automotive diesel fuels and gas oils, including samples with flow improving additives, by measuring the temperature at which the sample ceases to flow through a wire mesh filter under standard test conditions.

Cold Filter Plugging Point Test Equipment

- Conforms to ASTM D6371, IP 309 and DIN 51428 specifications
- Choice of mechanically refrigerated or dry ice cooled bath

Consists of Cold Filter Plugging Point Apparatus, Vacuum System and Cooling Bath.

Cold Filter Plugging Point Apparatus–Includes Pyrex™ test jar with graduation, brass jacket with plastic support ring, plastic stopper, plastic insulating ring and spacer, pipette and brass filter unit with stainless steel fine wire mesh screen.

Vacuum System–Connects to Cold Filter Plugging Point Apparatus to draw sample through filter screen. Consists of U-tube Manometer (without mercury), three-way stopcock, air vent tube, cork stopper with elbows, and large glass bottle. Vacuum pump is not included.

Cooling Baths–Choice of mechanically refrigerated or dry-ice cooled baths. Mechanically refrigerated model utilizes a cascade hermetic cooling system to attain temperatures as low as –90°F (–68°C). Cold Filter Plugging Point Apparatus inserts in composition top plate of bath. Insulated stainless steel tank and polished stainless steel cabinet.

Dry-ice model includes insulated copper interior and steel exterior with corrosion resistant polyurethane enamel finish. Composition top plate suspends Cold Filter Plugging Point Apparatus in freezing mixture at the required depth. Handles on exterior permit easy emptying of freezing mixture. Supplied with thermometer holder.

Specifications

Conforms to the specifications of:
ASTM D6371; IP 309; DIN 51428
Electrical Requirements:
Mechanically Refrigerated Baths
115V 60Hz, Single Phase, 6A
220-240V 50Hz, Single Phase, 3A

Dimensions*in.(cm):

Refrigerated Model (lxwxh):
35x26x31 (89x66x78.75)
Net Weight: 259 lbs (117.75kg)
Dry-Ice Model (dia.xh):
12x12 (30x30)
*Cooling Bath

Shipping Information

Shipping Weight:
Refrigerated Model: 373 lbs (169.5kg)
Dry-Ice Model: 19 lbs (8.6kg)
Dimensions:
Refrigerated Model: 23¾ Cu. ft.
Dry-Ice Model: 3 Cu. ft.

Automated Cold Filter Plugging Point of Distillate Fuels

Automated Cold Filter Plugging Point System

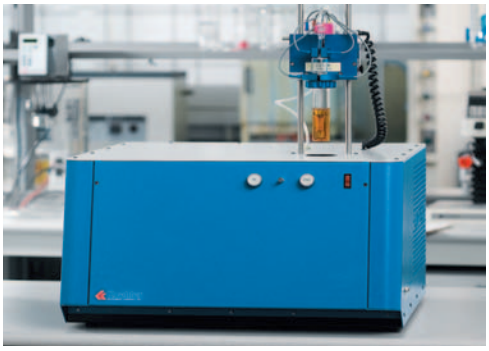
- Conforms to ASTM D6371 and related specifications
- Direct cooling system eliminates the need for solvent cooling baths
- One-stage cooling system provides temperatures as low as –35°C and a two-stage cooling system down to –80°C
- Single start/stop push button makes system simple to use
- Minimal installation required to set-up software and instrumentation

Cold Filter Plugging Point Detection–The cold filter plugging point detection system provides automated sample testing with the accuracy and repeatability in accordance with ASTM D6371 and related international test methods. The sample is cooled according to the pre-selected temperature profile. A 20 mbar vacuum is applied at specific intervals to the sample across a 45 micron mesh filter into the aspiration glass cell assembly. If it takes more than 60 seconds for the sample to reach the upper barrier detector or more than 60 seconds to return below the detector upon release, then the test is completed and the cold filter plugging point has been reached.

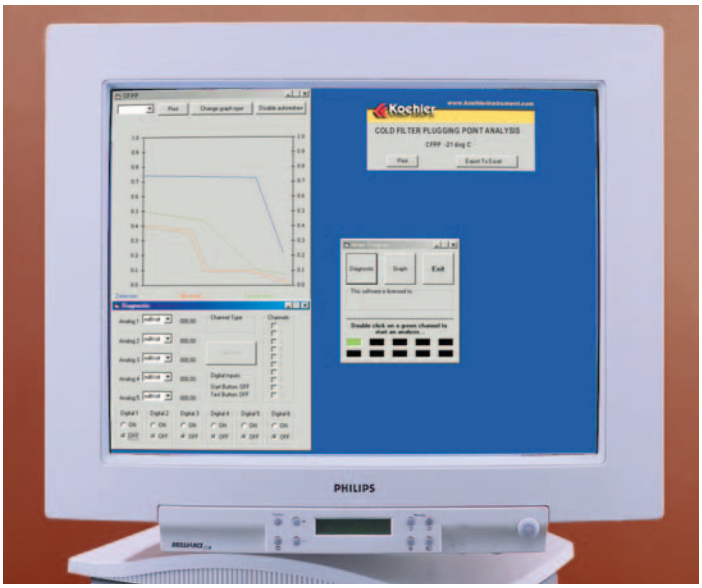
Advanced Software Package–The Windows®-based software package can control either a stand-alone system or provides multiple analyzer networking with a single network control station. All analytical parameters are graphed and displayed in real-time as well as recorded in Microsoft® Excel file format. The software monitors the operation and performance of all the analyzer components for proper data measurement, including the solenoid valves, cooling system, other moving parts, as well as the Pt-100 temperature probes and the pressure sensors. The calibration curves for each probes and sensors are displayed individually and saved to the hard disk with date and time of test.

Cooling System–For various user applications, the automated cold filter plugging point system is available with either one-stage cooling for temperatures as low as –35°C or two-stage cooling for temperatures as low as –80°C. The direct cooling system requires no solvent cooling bath and thus eliminates operator exposure to solvents used in standard cooling systems. The direct system is capable of rapid cooling, approaching –80°C bath temperatures in approximately 15 minutes, and utilizes less electricity than in standard cooling systems. The rapid cooling feature combined with a consistent cooling profile system provides repeatable results with high test reproducibility.

Multiple Configuration System–These automated sample cooling and physical property measurement systems can be configured with up to six test positions with one of five possible test heads at each position: cloud point, pour point, cloud & pour point, freezing point, and cold filter plugging point. Standard and customized multiple configuration systems are readily available. Please refer to pages 97 and 133 about cloud point, pour point, and freezing point product descriptions. *Please inquire with Koehler Customer Service about product specifications and ordering information.*



KLA-4 Cold Filter Plugging Point Bath



Advanced Software Package for Data Management

Specifications

Conforms to the cold filter plugging point specifications of:
ASTM D6371; IP 309; EN 116
Electrical Requirements:
115V 60Hz, Single Phase
220V 50Hz, Single Phase

Dimensions lxwxh,in.(cm)
for KLA-4:
26x24x31.5 (66x60x80)
Net Weight: 132 lbs (60kg)

Included Accessories

Internal built-in direct refrigeration system
One- or two-stage cooling system
Interface Cells
Operating Software
Acquisition Board
Cord Cable without plug
Interface Cables
Test Jars

Ordering Information

Catalog No.	
KLA-4	Automatic Cold Filter Plugging Point System (one-head unit), single stage (to –35°C)
KLA-4/2	Automatic Cold Filter Plugging Point System, (one-head unit), two-stage (to –80°C)
KLA-4-VPS	Vacuum System for Cold Filter Plugging Point

Please specify voltage and cooling requirements when ordering.

You may order a multiple configuration system (any combination of freezing point, cloud and cloud/pour point, and cold filter plugging point) with up to six heads. Please specify each measurement head with its associated catalog number using the sequential number combination. A two-head cold filter plugging point system would be ***KLA-44.*** *A two-head cloud point and cloud/pour point system would be* ***KLA-13****, and a three-head cloud point, pour point and cold filter plugging point would be* ***KLA-124****.*

PC Configuration–Operation of the software package requires the use of a PC, which should be ordered separately. *Please inquire with Koehler Customer Service if assistance is needed in procuring a PC.* The PC should have the following minimum requirements: Pentium III 800 MHz processor, 128 MB RAM, 2GB hard drive, CD-ROM, Windows® 95/98 operating system, Microsoft® Excel, keyboard, monitor, mouse, graphic and video cards.

On line version of this product is available. Please contact Koehler Customer Service for additional information.

Koehler INSTRUMENT COMPANY, INC.

Octane Analyzer For Unleaded Gasolines

Test Method

Determines the Pump Octane Number (AKI), Research Octane Number (RON), and Motor Octane Number (MON) of unleaded gasolines, and Cetane Number for diesel fuels.

Portable Octane Analyzer

- Test results equivalent to ASTM D2699 and D2700 test methods
- Measures all grades of unleaded gasoline
- Test results equivalent to ASTM D613 for Cetane Number of diesel fuels (Optional with K88612)
- Displays results in 20 seconds
- Directly measures octane number for {(R+M)}/2, RON and MON
- Optional feature for cetane number determination of diesel fuels
- Includes RS-232 output, built-in printer and LCD display
- Results traceable to official knock engine laboratory
- GPS model available for use with GPS locator accessory

Measures octane number via near-infrared (NIR) transmission spectroscopy utilizing 14 near-infrared emitting diodes with narrow bandpass filters, a silicon detector system, and a fully integrated microprocessor. Simple octane number determination requires three easy steps: sampling a background signal, acquiring two absorption spectra of the gas sample, and then acquiring a second background signal. Analyzer is pre-calibrated for unleaded gasoline and ethanol-blended fuels, and can be calibrated for up to eight additional fuel types.

The analyzer is small, lightweight, and operates on "AA" batteries or AC. Before each reading, the unit standardizes itself to assure accuracy. The octane number is printed with time and date on the built-in printer. All data can be downloaded via the RS232 port to an external computer.

Specifications

Accuracy and repeatability equivalent to ASTM approved CFR engines test methods (ASTM D2699, D2700)
Sample Holder: Sealed, cubical glass container (75mm optical path length)
Sample Volume: 8 Ounces (approx. 225 mL)
Precalibrated for unleaded gasoline & ethanol-blended fuels. (Analyzer can be calibrated for up to 8 additional fuel types.)
Battery operated (6 AA batteries)

Included Accessories

IBM Compatible Software
RS232 Cable
Aluminum Carrying Case
5 Rolls of paper
3 Sample Holders
Light Cover
6 AA Batteries
6 Sample Holder Labels

Dimensions lxwxh,in. (cm)

13½x4½x2½ (34x11½x6¼)
Net Weight: 12 lbs (5.5kg)

Shipping Information

23x17x8½ (58½x43¼x22)
Shipping weight: 25 lbs (11.5kg)

K88600 Portable Octane Analyzer

Ordering Information

Catalog No.	
K88600	Portable Octane Analyzer
K88600-GPS	Portable Octane Analyzer GPS Model Requires GPS Locator Feature

Accessories

K88601	Printer Paper, 10 Rolls
K88603	Sample Holder (additional)
K88604	Sample Holder (Box of 12)
K88605	Light Shield
K88606	RS232 Cable
K88607	Aluminum Sample Carrying Case w/12 Sample Holders
K88608	Sample Holder Lids, 12
K88609	Sample Holder Labels, 6
K88610	25 Sample Memory

Optional Features

K88612	Cetane Number
K88602	Additional Fuel Calibration
K88613	GPS Locator (for K88600-GPS model only)

Density/Relative Density of Light Hydrocarbons by Pressure Thermohydrometer

Test Method

Density and relative density measurements of light hydrocarbons, including LPG, are used for transportation, storage and regulatory purposes. The measurement is made by floating a thermohydrometer in a sample that has been introduced into a pressure cylinder.

Pressure Hydrometer Cylinder

- Conforms to ASTM D1657 and related specifications
- Built-in safety relief valve

Transparent plastic cylinder mounted between machined aluminum end plates and surrounded by stainless steel safety guard. Use together with ASTM 310H Thermohydrometer to determine density or relative density of LPG and light hydrocarbons. Equipped with inlet, outlet and vapor vent valves for admitting sample and purging cylinder. End plates have positive sealing buna-N O-rings and are joined by sturdy steel support rods. Top plate detaches easily without tools for insertion or removal of thermohydrometer. Safety relief valve prevents unsafe pressure build-up inside cylinder. Mounted on a finished steel base.

Specifications

Conforms to the specifications of:
ASTM D1657; GPA 2140;
IP 235; IS0 3993; NF M 41-008
Safety relief valve: 200psi (1.4MPa)

Dimensions dia.xh,in.(cm)

8¼x23¾ (21x60)
Net Weight: 5 lbs (2.3kg)

Ordering Information

Catalog No.	
K26150	Pressure Hydrometer Cylinder
	Accessories
251-000-001	ASTM 101H Thermohydrometer Nominal Relative Density Range: 0.500 to 0.650 Standard Temperature, °F: 60/60 Temperature Range, °F: 30 to 90
251-000-004	ASTM 310H Thermohydrometer Density Range kg/m^3: 500-650 Standard Temperature, °C: 15 Temperature Range, °C: 0 to 35

K26150 Pressure Hydrometer Cylinder

Constant Temperature Water Bath

- Conforms to ASTM D1657 and related specifications
- Mechanically refrigerated for convenient sub-ambient temperature operation

Immerses two Pressure Hydrometer Cylinders at 60°F (15°C) for density and relative density determinations of LPG and other light hydrocarbons. Mechanically refrigerated cooling system maintains sub-ambient temperature. Thermistor activated solid state temperature controller and 750W copper immersion heater maintain bath temperature with ±0.5°F (±0.2°C) stability. A 1/20 hp ball bearing stirrer circulates the bath medium to assure temperature uniformity. Stainless steel tank is fiberglass insulated. Equipped with overflow standpipe/drain. Steel exterior has a durable polyurethane enamel finish.

Specifications

Conforms to the specifications of: ASTM D1657; IP 235; ISO 3993
Controller Sensitivity: ±0.5°F (±0.2°C)
Capacity: two (2) K26150 cylinders
Electrical Requirements:
115V 60Hz, Single Phase, 12.5A
220-240V 50 or 60Hz, Single Phase, 6.4A

Dimensions lxwxh,in.(cm)

Bath interior: 12x18x22(30x46x56)
Overall: 18x20x49 (46x51x124)
Net Weight: 158 lbs (71.7kg)

Shipping Information

Shipping Weight: 186 lbs (84.4kg)
Dimensions: 15.4 Cu. ft.

Ordering Information

Catalog No.	
K25900	Constant Temperature Water Bath, 115V 60Hz
K25990	Constant Temperature Water Bath, 220-240V 60Hz
K25995	Constant Temperature Water Bath, 220-240V 50Hz
	Accessories
250-000-12F	ASTM 12F Thermometer. Range –5 to +215°F
250-000-12C	ASTM 12C Thermometer. Range –20 to +102°C

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

Koehler INSTRUMENT COMPANY, INC.

Hydrocarbon Types in Liquid Petroleum Products

K41506 Fluorescent Indicator Absorption Apparatus

Specifications

Conforms to the specifications of:
ASTM D1319; IP 156; NF M 07-024

Included Accessories

Syringe, 1mL	Ball-and-Socket Joint Clamps
Bottles (2)	Mounting Brackets (2)
O-Rings	Vertical UV lamp
	Integrated Electric Vibration

Dimensions lxwxh,in. (cm)

8x26x82 (20x66x208)
Net Weight: 100 lbs (45.5kg)

Shipping Information

Shipping Weight: 121 lbs (55kg)
Dimensions: 12 Cu. ft.

Test Method

Determines saturates, olefins and aromatics in petroleum fractions that distill below 315˚C.

Fluorescent Indicator Absorption Apparatus

- Conforms to ASTM D1319 specifications
- Quick connections for columns for faster set-up and analysis
- Integrated vibration system for dry silica gel packing
- Vertically mounted UV lamp on independent stand
- Two, four, or six column models available

A complete system for conducting FIA analyses of a single or up to six samples simultaneously. Each system is complete with an upper multi-position air pressure manifold with independently-operated gauges, pressure regulators and ball O-ring joints allowing for individual pressure control at each column. Each pressure regulator may be set at any point from 0-15 psi and will maintain the set pressure regardless of changes in back pressure. An integral pressure gauge on each station continuously registers the active pressure on each column. The ball O-ring connection system connects the pressure regulators to the upper columns, and the proper seal is achieved by applying moderate clamping pressure of stainless steel clamps without utilizing any grease. Convenient O-ring compression type fittings simplify the connection of the analyzer tubes (3mm OD x 1200mm) to the upper columns. The internal geometry of the fittings is optimized for transition between tubing diameters, and a simple twist of the connection fitting releases the analyzer tube. O-ring compression type fittings are also used to cap the end of each analyzer tube with the column support tips. The tips contain an internal porous polyethylene disc in order to support the silica gel packing in each analyzer tube. An integrated electric vibration system is mounted to the upper chassis so that the columns can be vibrated to facilitate the dry gel packing procedure, and features an on/off and amplitude selector switch. The complete unit also includes a 1mL syringe with 4" needle, two gel bottles for pouring silica gel, extra O-rings, stainless steel ball-and-socket joint clamps, and two mounting brackets with screws for stabilizing chassis.

Ordering Information

Catalog No.	
K41502	Fluorescent Indicator Absorption Apparatus, Two-Position, 115V 50/60Hz
K41592	Fluorescent Indicator Absorption Apparatus, Two-Position, 230V 50/60Hz
K41504	Fluorescent Indicator Absorption Apparatus, Four-Position, 115V 50/60Hz
K41594	Fluorescent Indicator Absorption Apparatus, Four-Position, 230V 50/60Hz
K41506	Fluorescent Indicator Absorption Apparatus, Six-Position, 115V 50/60Hz
K41596	Fluorescent Indicator Absorption Apparatus, Six-Position, 230V 50/60Hz

Accessories

K41500-4	Silica Gel, 500 Gram Amber Bottle
K41500-5	Silica Gel, Dried, 40 Gram Bottle
K41577	Handheld UV Lamp Specify 115V or 230V when ordering

Volatility and Residues in Liquefied Petroleum (LP) Gases

Volatility of Liquefied Petroleum (LP) Gases
Residues in Liquefied Petroleum (LP) Gases

Test Method

The volatility of liquefied petroleum (LP) gases is determined by allowing a precooled sample to weather under specified conditions and observing the temperature when 95% has evaporated. Residues in LP gases are determined by weathering of a precooled sample and determination of the volume remaining at 100°F (37.8°C).

Precooling Apparatus

- Conforms to ASTM and GPA specifications

Consists of brass cooling vessel with built-in 20 ft. (6m) copper cooling coil. Includes compression fittings and ⅛" needle valve at the downstream end.

Ordering Information

Catalog No.	
K48100	Precooling Apparatus
	Accessories
332-010-001	Weathering Tube, 100mL
339-000-001	Stand, for weathering tube
337-000-002	Clamp, for weathering tube
338-000-001	Clamp Holder
362-001-001	Syringe, 1mL (ASTM D2158)
K481-0-5	Needle, 8"/203mm (ASTM D2158)
250-000-99F	ASTM 99F Thermometer, Range: –55 to +41°F
250-000-05F	ASTM 5F Thermometer, Range: –36 to +120°F
250-000-05C	ASTM 5C Thermometer, Range: –38 to +50°C
250-000-57F	ASTM 57F Thermometer, Range: –4 to +122°F
250-000-57C	ASTM 57C Thermometer, Range: –20 to +50°C

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

K48100 Precooling Apparatus

Specifications

Conforms to the specifications of: ASTM D1837; D2158; GPA 2140; ISO 13757

Dimensions: *dia.xh,in.(cm) 3x11¾ (7.6x29.9)
*Cooling Vessel

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.

Oxidation Stability of Gasoline (Induction Period Method) ..... Pages 80-84

ASTM D525; IP 40; DIN 51780; FTM 791-3352

Corrosion Resistant Steel Forceps
Oven
Distilled Water
Chromic Acid or equivalent detergent cleaning solution
Toluene
Acetone
Oxygen

Oxidation Stability of Aviation Fuels (Potential Residue Method) ..... Pages 80-84

ASTM D873; IP 138; DIN 51799; FTM 791-3354

Corrosion Resistant Steel Forceps
Drying Oven
Filtering Crucible
Oxygen
Toluene
Distilled Water
Acetone

Existent Gum in Fuels by Jet Evaporation ..... Page 86-87

ASTM D381; IP 131; ISO 6246; DIN 51784; FTM 791-3302

Analytical Balance
Desiccator
Filtering Funnel, Sintered Glass
n-Heptane
Air Supply (for Air-Intake Method)
Toluene
Acetone
Graduated Cylinder
Chromic Acid or equivalent detergent cleaning solution
Distilled Water
Oven

Copper Strip Corrosion by Liquefied Petroleum (LP) Gases ..... Page 89

ASTM D1838; GPA 2140; ISO 6251

Acetone
2,2,4-Trimethylpentane
Cotton Wool

Copper Corrosion From Petroleum Products by the Copper Strip Tarnish Test ..... Pages 90-91

ASTM D130; FSPT DT-28-65; IP 154; ISO 2160; DIN 51759; FTM 791-5325

Filter Paper
Cotton Wool
Isooctane or volatile, sulfur-free hydrocarbon solvent
Stainless Steel Forceps
Stoddard Solvent
Kerosene

Vapor Pressure of Petroleum Products (Reid Method) .... Pages 92-94

ASTM D323, D1267; GPA 2140; IP 69, 161; ISO 3007, 4256; DIN 51616, 51754; FTM 791-1201

Dead-Weight Tester
Petroleum Naphta
Acetone
Air Supply

Wax Appearance Point of Distillate Fuels ..... Page 94

ASTM D3117

Isopropanol
Solid Carbon Dioxide
Liquid Nitrogen

Freezing Point of Aviation Fuels ..... Page 96-97

ASTM D2386; IP 16; ISO 3013; DIN 51421; FTM 791-1411

Ethanol
Methanol
Solid Carbon Dioxide
Liquid Nitrogen
Acetone
Isopropanol

Silver Corrosion by Aviation Turbine Fuels ..... Page 99

IP227; ASTM D130; FSPT DT-28-65; IP 154; ISO 2160, DIN 51759; FTM 791-5325

2,2,4-Trimethylpentane
Ashless Filter Paper
Stainless Steel Forceps
Cotton Wool

Antirust Properties of Petroleum Products Pipeline Cargoes ..... Page 98

NACE TM-0172

Naphtha or Acetone
Chromic Acid

Cold Filter Plugging Point of Distillate Fuels ..... Pages 100-101

ASTM D6371; IP 309; DIN 51428

Heptane
Lintless Filter Paper
Vacuum Pump

Lubricating Oils

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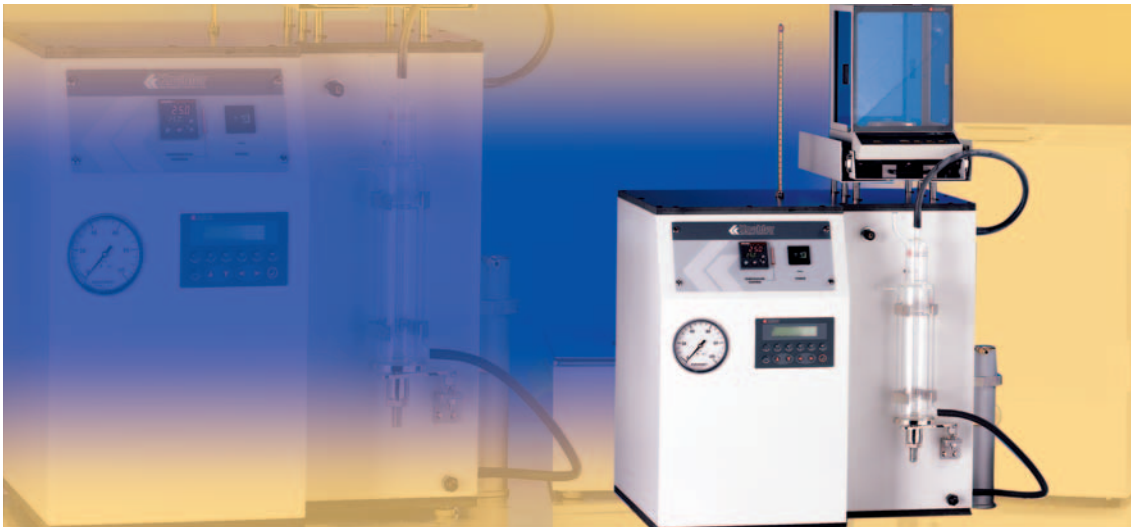
For information on additional test methods for Lubricating Oils:

–Evaporation Loss of Lubricating Greases and Oils
–please refer to pages 148-149
–Estimating Apparent Vapor Pressures and Molecular Weights of Lubricating Oils
–please refer to pages 92-94
–Please refer to the Viscosity, Flash Point and General Tests Sections
–Additional test methods are available upon request
–please call or write for information.



Foaming Characteristics of Lubricating Oils

Test Method

Foaming of lubricating oils in applications involving turbulence, high speed gearing or high volume pumping can cause inadequate lubrication, cavitation, overflow and premature oxidation. The sample is blown with a controlled volume of air at different specified temperatures, including a newer high temperature test at 150°C. The resultant foam is measured at the end of each aeration period and at different intervals afterward. In the high temperature test, the amount of time required for the foam to collapse to "0" after the aeration period is also measured.

Foaming Characteristics Test Baths

- Dual-twin models for standard foaming characteristics tests
- High temperature liquid bath for 'Sequence IV' tests
- Automatic time sequence models for both tests
- Custom configurations for specialized applications

Dual Twin Foaming Characteristics Test Apparatus–Performs two tests at 75°F (24°C) and two tests at 200°F (93.5°C). Consists of two 12x18" (30.5x45.7cm) constant temperature baths with 1000mL test cylinders, certified diffusers, air delivery tubes, and flowmeters (94mL/min.) for each sample. Baths are equipped with microprocessor temperature controls, copper immersion heaters and ⅕₀hp circulation stirrers to maintain temperature uniformity of ±1°F (±0.5°C). Microprocessor PID control provides quick temperature stabilization without overshoot and the bath is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. Test cylinders are held securely in place by quick-locking cams in the bath cover assembly. A separate stainless steel support rack is provided to hold the test cylinders after removal from the bath. Cold bath (24°C) has built-in coils for circulating exit air from the high temperature test cylinders prior to passing to a volume meter, and a separate coil for circulating cooling water or refrigerant when the ambient temperature exceeds the test temperature. Supplied with rubber stoppers and glass air outlet tubes for each cylinder. Bath controls are enclosed in a finished steel base with chemical resistant polyurethane enamel finish. *Communications software as seen on page 110 (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.*

FTM 791-3213 Aircraft Lubricants Test–Employs more severe conditions –smaller sample, increased air flow, longer aeration period–to test the foaming characteristics of aircraft-turbine lubricants. All models are available on special order for FTM 791-3213 testing. Please call or write for specifications and ordering information.

Specifications

Conforms to the specifications of:
ASTM D892; IP 146; DIN 51566; FTM 791-3211, 791-3213*; NF T 60-129
Temperature Control:
Digital Setpoint and Displays °C/°F switchable
Built-in Overtemperature Cut-off Protection

Included Accessories

Test Cylinders, 1000mL (4)
Diffuser Stones, calibrated and certified (4)
Air Delivery Tube Assemblies (4)
Air Outlet Tubes (4)
Rubber Stoppers (4)
Bath Jars (2)
Support Rack (1)

**Requires modifications to standard equipment.*

This equipment is available with a digital-indicating mass flow controller in place of the standard flowmeter. Please call or write for specifications and/or ordering information.

Digital Flowmeter option is available for this unit.

Software compatible, inquire with Koehler Customer Service.

K43041 Sequence IV Liquid Foaming Characteristics Apparatus

High Temperature 'Sequence IV' Liquid Foam Test Bath–For two tests at 150°C with a flow rate of 200mL/min. in accordance with ASTM D6082 specifications. Consists of a constant temperature bath with 1000mL test cylinders, certified diffusers, air delivery tubes and flowmeters. Microprocessor PID control provides quick temperature stabilization without overshoot and the bath is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. Quick response copper immersion heaters provide efficient high temperature operation, and a stirrer unit provides complete circulation for temperature uniformity of better than ±1°F (±0.5°C). Locking cams hold the test cylinders in a vertical position, and a separate rack is provided to hold the cylinders after removal from the bath. For operator safety, an acrylic heat shield surrounds the Pyrex™ bath jar. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.*

Specifications

Conforms to the specifications of: ASTM D6082
Temperature Control:
Digital Setpoint and Displays °C/°F switchable
Built-in Overtemperature Cut-off Protection

Included Accessories

Test Cylinders, 1000mL (2)
Diffuser Stones, calibrated and certified (2)
Air Delivery Tube Assemblies (2)
Air Outlet Tube (2)
Bath Jar (1)
Support Rack (1)
Rubber Stoppers (2)

Foaming Characteristics of Lubricating Oils

Ordering Information

Model	Catalog No.	Electrical Requirements	Bath Temperature	Air Flow Rate	Bath Capacity	Dimensions lxwxh,in.(cm)	Shipping Information
Dual-Twin	K43002	115V 50/60Hz 15.6A	24°C (75°F) and 93.5°C (200°F) (Operator variable)	94mL/min	9 gal (38.5L) each bath	32¼x15x31¼ (82x38x79.4) Net Weight: 108 lbs (49kg)	Shipping Wgt. 217 lbs (98.4kg) Dimensions 29.6 Cu. ft.
	K43092	220-240V 50/60Hz 8.1A					
Automatic Time Sequence	K43003	115V 50/60Hz 16A				32¼x15x31¼ (82x38x79.4) Net Weight: 118 lbs (53.5kg)	Shipping Wgt. 227 lbs (103kg) Dimensions: 33 Cu. ft.
	K43093	220-240V 50/60Hz 8A					
Sequence IV Liquid	K43041	115V 50/60Hz 14A	150°C (302°F) (Operator variable)	200mL/min	9 gal (38.5L)	16¾x15x31¼ (42.5x38x79.4) Net Weight: 62 lbs (28.1kg)	Shipping Wgt. 89 lbs (40.4kg) Dimensions 16.3 Cu. ft.
	K43049	220-240V 50/60Hz 7A					

K43092 Dual-Twin Foaming Characteristics Apparatus

D892 and D6082 Dual Twin Foaming Characteristics Test Apparatus–For four tests in accordance with control ASTM D6082 and ASTM D892 specifications. Heated liquid bath features digital temperature control and an operating range to 150°C with four flowmeters to maintain the required flow rate of 94 and 200mL/min to the air diffusers. Requires the use of an external chiller to perform the Sequence I and III tests at 24°C.

Specifications

Conforms to the specifications of:
ASTM D892, D6082; IP 146; DIN 51566; FTM 791-3211; NF T 60-129
Temperature Control:
Digital Setpoint and Displays °C/°F switchable
Built-in Overtemperature Cut-off Protection

Included Accessories

Test Cylinders, 1000mL (4)
Diffuser Stones, calibrated and certified (4)
Air Delivery Tube Assemblies (4)
Air Outlet Tubes (4)
Rubber Stoppers (4)
Bath Jars (2)
Support Rack (1)

Accessories and Additional Ordering Information

For a complete listing of accessories and information on ordering a complete package for ASTM D892 and/or D6082 testing, please turn to page 110.

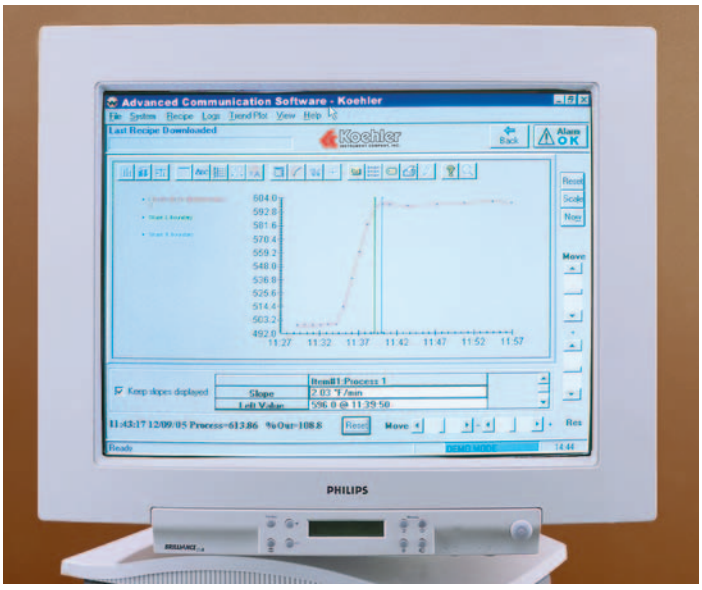
Ordering Information

Model	Catalog No.	Electrical Requirements	Bath Temperature	Air Flow Rate	Bath Capacity	Dimensions lxwxh,in.(cm)	Shipping Information
D892/D6082 Dual Twin	K43005	115V 50/60Hz 15.6A	150°C (302°F) (Operator variable)	94mL/min and 200mL/min	9 gal (38.5L) each	32¼x15x31¼ (82x38x79.4) Net Weight: 108 lbs (49kg)	Shipping Wgt. 217 lbs (98.4kg) Dimensions: 29.6 Cu. ft.
	K43095	220-240V 50/60Hz 8.1A					

Digital Flowmeter option is available for this unit.

Software compatible, inquire with Koehler Customer Service.

Foaming Characteristics of Lubricating Oils



Advanced Communications Software Package for Data Management

Test apparatus for ASTM D892 Sequence I, II and III

Catalog No.		Order Qty
K43002	Dual Twin Foam Test Apparatus (or K43003 Automatic Time Sequence Model)	1
387-115-001	Air Pump	1
K43025	Diffuser Stone Test Apparatus	1
250-000-12F	ASTM 12F Thermometer (or 250-000-12C ASTM 12C Thermometer)	2
K43026	Wet Test Gas Meter (not required for Alternative Procedure)	1
332-005-005	Drying Tower	1
K23425	Acrylic Heat Shield (optional)	1

Test apparatus for ASTM D6082 Sequence IV

Catalog No.		Order Qty
K43041	Sequence IV Foam Test Bath	1
K43025	Diffuser Stone Test Apparatus	1
K43026	Wet Test Gas Meter	1
332-005-005	Drying Tower	1
K23425	Acrylic Heat Shield (optional)	1
387-115-001	Air Pump	1
250-000-41C	ASTM 41C Thermometer	1

Test apparatus for ASTM D892 and D6082

Catalog No.		Order Qty
K43005	D892 and D6082 Dual Twin Foam Test Apparatus	1
K43025	Diffuser Stone Test Apparatus	1
K43026	Wet Test Gas Meter	1
332-005-005	Drying Tower	1
K23425	Acrylic Heat Shield (optional)	1
387-115-001	Air Pump	1
250-000-12F	ASTM 12F Thermometer (or 250-000-12C ASTM 12C Thermometer)	2
250-000-41C	ASTM 41C Thermometer	2

Accessories

Catalog No.	
387-115-001	Air Pump, oil-less. Delivers 100% oil-free air. 115V 50/60Hz
387-230-001	Air Pump, oil-less. 220-240V 50/60Hz
K43026	Wet Test Gas Meter For volume measurements of air leaving the test cylinders. **Note:** One meter is required for each test cylinder. Not required for the 'Alternative Procedure' - Section 9.1.
332-005-005	Drying Tower. 300mm
K43025	Diffuser Stone Test Apparatus For maximum pore diameter and permeability tests on diffuser stones. Consists of 90cm manometer, 500mL flask, flowmeter, graduate, delivery tube assembly and control valve.
K33031	Refrigerated Recirculator Use with foam test baths for 24°C tests (Sequence I and III). Microprocessor based digital control and quiet running compressor provide reliable operation and accurate control within ±0.5°C. For complete specifications, please contact Koehler Customer Service. 115V 60Hz, 8A
K33032	Refrigerated Recirculator, 220-240V 50Hz, 4A
250-000-12F	ASTM 12F Thermometer. Range: –5 to +215°F
250-000-12C	ASTM 12C Thermometer. Range: –20 to +102°C
250-000-41C	ASTM 41C Thermometer. Range: 98 to 152°C
K23425	Acrylic Heat Shield, with base For high temperature bath on Dual-Twin Foam Test Apparatus.
344-100-01C	Certified Diffuser Stone. Calibrated and certified for compliance with ASTM specifications for pore diameter and permeability
344-100-001	Diffuser Stone, non-calibrated
344-005-001	Stainless Steel 'Mott' Diffuser
344-005-01C	Stainless Steel 'Mott' Diffuser Certified
K43012	Test Cylinder Replacement 1000mL cylinder. Includes retaining ring.

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

Water Separability of Petroleum Oils and Synthetic Fluids

Test Method

The ability of a lubricating oil to separate from water and resist emulsification is an important performance characteristic for applications involving water contamination and turbulence. Water separability is determined by stirring equal volumes of water and sample together at a controlled temperature to form an emulsion and observing the time required for separation of the emulsion to occur. This method is suitable for petroleum oils and synthetic fluids.

Water Separability Tester

- Tests emulsion characteristics of lubricating oils
- Seven sample capacity
- Movable digital stirrer with microprocessor control incorporates advanced features for flexibility and ease of operation
- Clear, illuminated heating bath provides excellent visibility
- Microprocessor temperature control with digital display and built-in protection against overtemperature and low liquid level hazards
- Conforms to ASTM, ISO and related standards for water separability testing
- Optional sensor for direct measurement of sample temperature
- With built in drain for convenient draining of bath medium

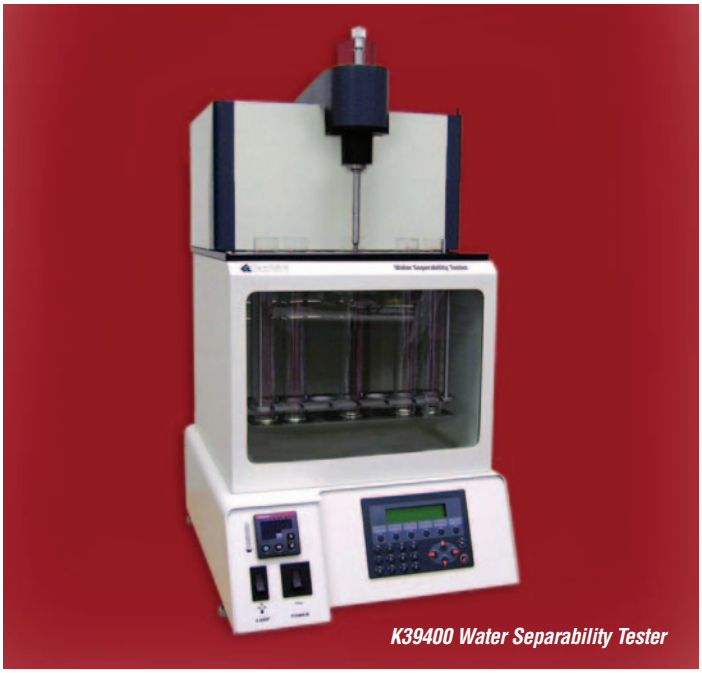
Seven-sample Water Separability Tester provides full visibility and microprocessor control of all functions for simplified, accurate testing of up to seven samples at a time. Use for specification of new oils and monitoring of in-service petroleum oils and synthetic fluids.

Seven position heating bath–A full visibility bath immerses seven 100mL cylinders at the proper depth per ASTM and ISO specifications. Sample cylinders are held securely in place by stainless steel supports inside the bath. A microprocessor based heater controls bath operating controls bath fluid temperature with greater than ±1˚C accuracy and stability throughout the operating range of 25˚C to 84˚C. Large LED readouts display setpoint and actual temperatures in Celsius or Fahrenheit scale at the operator's option. For most samples, ASTM/ISO sample temperatures of 54˚C and 82˚C are attained within 10 minutes after placement of the test cylinders into the stabilized bath. Clear polycarbonate tank has backlighting for excellent visibility when viewing emulsion separations in the test cylinders. Cut-off circuits for low water level and over-temperature conditions provide protection in the event of equipment malfunction. Easy removal of top plate for filling or cleaning the bath. Polycarbonate jar is encased in a Polyester-Epoxy finished steel housing with a protective distortion-free viewing window and a solid foundation.

Microprocessor sample stirrer–To avoid sample movement, the sample stirrer housing pivots to each test position in the bath and locks securely in place at the required position in relation to the 100mL sample cylinder. The digital stirrer offers complete flexibility for test duration and stirring speed at the push of a button. Operating speed and count down time are prominently displayed on a large backlit LCD panel. A wide operating range of 0-2000rpm permits in-house customized testing with ±1rpm accuracy, and the operator may select a stirring time of up to 99.99 minutes. At the end of the selected interval, the stirrer automatically shuts off and alerts the operator with audible and visual signals that the settling period has commenced. For added convenience, all test parameters are stored in memory and repeated in subsequent tests until they are changed by the operator. Engaging the stirrer mechanism is visible to the operator and housed in a clear tube for added safety.

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

Software compatible, inquire with Koehler Customer Service.



K39400 Water Separability Tester

Specifications

Conforms to the specifications of: ASTM D1401, D6074, D6158; ISO 6614; DIN 51599; FTM 791-3201; NF T 60-125
Stirrer Range: 0-2000rpm
Accuracy: ±1.0rpm
Drive: 1/10hp (75W), high torque
Bath Temperature Range: 25˚C to 84˚C
Control Stability: ±0.05˚C
Capacity: seven (7) 100mL graduated cylinders
Construction: Clear polycarbonate tank 10"x11.25"x9.5" (25.5x28x24cm)
Medium: Water or white technical oil
Medium Capacity: 15.15L (4 gal)
Electrical Requirements:
115V, 50/60Hz, Single Phase, 12A
220-240V 50/60 Hz, Single Phase, 12A

Dimensions lxwxh, in.(cm)
20.75x15.25x29.5
(52.7x38.75x 74.9)

Included Accessories
Seven 100mL Cylinders

Ordering Information

Catalog No.		Order Qty
K39400	Water Separability Tester, 115V 60Hz	1
K39495	Water Separability Tester, 230V 50Hz	
K39496	Water Separability Tester, 230V 60Hz	
	Accessories	
332-002-018	Cylinder 100mL, graduated from 5 to 100mL with 1.0mL divisions	
250-000-19F	ASTM 19F Thermometer. Range: 120 to 134°F	1
250-000-19C	ASTM 19C Thermometer. Range: 49 to 57°C	
250-000-21F	ASTM 21F Thermometer. Range: 174 to 188°F	1
250-000-21C	ASTM 21C Thermometer. Range: 79 to 87°C	
K39252	PTFE Policeman	7
K39251	Test Tube Rack	1

Demulsibility Characteristics of Lubricating Oils

K39190 Demulsibility Bath With Stirrers and Funnels

Accessories

Catalog No.		Order Qty
K39120	Separatory Funnel With 0-500mL graduations. Meets ASTM specifications.	2
K39130	Solvent Tank. Immerses stirrer assembly for convenient cleaning after testing.	1
K39140	Forced Warm Air Dryer, 115V 50/60Hz High output 1400W dryer and brass cylinder mounted on a sturdy base. Rapidly dries stirrer assembly after cleaning.	
K39149	Forced Warm Air Dryer, 220-240V 50/60Hz	1
K39150	Sampling Gauge and Centering Device Per Fig. X1 of ASTM D2711. Aids in accurately obtaining 50mL samples from separatory funnels for the 'percent water in oil' determination.	1
360-000-003	Digital Tachometer Hand held non-contact LCD tachometer takes measurements up to 3 ft away with ±1rpm accuracy. Supplied with four 1.5V AA batteries.	1
250-000-09F	ASTM 9F Thermometer Range: 20 to 230°F	1
250-000-09C	ASTM 9C Thermometer Range: –5 to +110°C	
K39170	Conditioning Bath, 115V 50/60Hz Constant temperature water bath holds 8 separatory funnels in two removable 4-unit racks for conditioning prior to testing in Demulsibility Apparatus. Includes microprocessor digital temperature control, automatic water level control and gabled cover.	1
K39179	Conditioning Bath, 220-240V 50/60Hz	

Test Method

Tests the ability of medium to high viscosity oils to separate from water when water contamination and turbulence are encountered. The sample is stirred together with distilled water for 5 min. at constant temperature. After a specified settling period, the degree of separation is measured by volume and the percentage of water in oil is determined. For lighter oils and synthetic fluids, the ASTM D1401 Water Separability Test is used.

Demulsibility Apparatus

- Conforms to the specifications of ASTM D2711 and DIN 51353
- Variable stirrer speed
- Choice of digital or analog bath models

Stirrer–Complete stirrer assembly per Fig. 1 and 2 of ASTM D2711, including variable high speed drive motor, stainless steel propeller shaft, top, center and bottom bearings, and steel motor housing with positioning plate. Entire assembly mounts vertically in K39190/K39199 Constant Temperature Bath. Built-in tachometer disc allows for precise stirrer speed adjustment.

Constant Temperature Baths–Standard model holds two K39103 Stirrers and two K39120 Separatory Funnels in proper alignment for demulsibility characteristics testing. Stirrers mount securely on a stainless steel support plate having brackets for testing and drainage positions. Separate motor speed controls are provided for each stirrer. All wetted parts are constructed of stainless steel.

Microprocessor digital temperature control with dual LED displays for setpoint and actual temperatures and an illuminated bath interior with window for viewing sample cylinders. Digital LED speed control is provided for each stirrer.

Specifications

Conforms to the specifications of: ASTM D2711, DIN 51353
Capacity: Two (2) sample-water mixtures
Maximum Temperature: 212°F (100°C)
Temperature Control: Microprocessor digital control with LED display
Bath Medium: 9 gal (38.5L) water

Dimensions: WxDxH in (cm)
15¼x15x37 (39x38x94)
Net Weight: 72 lbs (32.6kg)

Shipping Information
Shipping Weight 133 lbs (60.3kg)
Dimensions: 25.4 Cu. ft.

Ordering Information

Catalog No.		Order Qty
K39190	Demulsibility Bath, 115V, 50/60Hz	1
K39199	Demulsibility Bath, 220-240V, 50/60Hz	
K39103	Stirrer, 115V, 50/60Hz** **Suitable for use with K39190 & K39199	2

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

Software compatible, inquire with Koehler Customer Service.

Air Release Properties of Petroleum Oils

K88500 Air Release Value Apparatus

Test Method

The ability of a turbine, hydraulic, or lubricating oil to separate entrained air is a key performance characteristic in applications where agitation causes a dispersion of air bubbles in the oil. To determine air release properties, the sample is heated to a specified test temperature and blown with compressed air. After the air flow is stopped, the time required for the air entrained in the oil to reduce in volume to 0.2% is the air bubble separation time.

Air Release Value Apparatus

- Conforms to ASTM D3427, IP 313 and related specifications
- High accuracy temperature control with digital setpoint and display
- Digital control panel leads user from start to finish of test operation
- Automatic calculation of final sample density for determination of air release value
- Redundant overtemperature protection circuitry assures safe operation

The Koehler Air Release Value Apparatus consists of a test vessel and air flow control equipment for delivering heated air at the specified flow rate to a lubricating oil sample maintained at constant temperature. Microprocessor-based control panel guides user from start to finish of test operation and provides density calculation and timing operation for measuring the air release value of the test sample. The system includes drying oven for warming test oil at temperatures of up to 100°C; circulating bath with digital temperature controller and air bath for sinker; non-pulsating air pump; compressed air heater with digital temperature controller, overtemperature and overpressure protection circuitry; pressure gauge; thermometer. Optional Windows® software automatically measures the time for air release. Jacketed sample tube with air inlet and outlet tubes and baffle plate is ordered separately.

Specifications

Conforms to the specifications of:
ASTM D3427; IP 313; DIN 51381; NF E 48-614
Temperature Range:
ambient to 75°C (167°F)
Electrical Requirements:
115V 60Hz, 3.0A
230V 50Hz, 1.5A
230V 60Hz, 1.5A

Dimensions lxwxh,in.(cm)
24x28x38¼ (61x71x97)
(Air Release Value Apparatus only)

Net Weight for complete system:
225 lbs (103kg)

Included Accessories

ASTM 12C Thermometer
Sinkers, 5mL and 10mL
Drying oven
Pressure gauge
Circulating Bath
Air Bath for Sinker
Balance
Platinum Wire

Shipping Information

Shipping Weight for complete system:
300 lbs (136kg)
Dimensions: 50.7 Cu. ft.

Ordering Information

Catalog No.		Order Qty
K88500	Air Release Value Apparatus, 115V 60Hz	1
K88501	Air Release Value Apparatus, 230V 50Hz	
K88502	Air Release Value Apparatus, 230V 60Hz	
	Accessories	
K88500-1	Jacketed Test Vessel	1

Software compatible, inquire with Koehler Customer Service.

Koehler INSTRUMENT COMPANY, INC.

Oxidation Stability – RPVOT & TFOUT

Oxidation Stability of Steam Turbine Oils by Rotating Pressure Vessel (Bomb)
Oxidation Stability of Inhibited Mineral Insulating Oil by Rotating Pressure Vessel (Bomb)
Oxidation Stability of Gasoline Automotive Engine Oils by Thin Film Oxidation Uptake (TFOUT)

Test Method

The RPVOT (RBOT) procedure employs severe oxidation conditions to rapidly determine oxidation stability. Suitable for both new and in-service oils, the RPVOT (RBOT) method is applicable to many types of petroleum oils. The sample is oxidized in the presence of water and a copper catalyst in a stainless steel pressure vessel under an initial pressure of 90psi (620kPa). Pressure inside the vessel is recorded electronically or mechanically while the vessel is rotated at 100rpm at constant temperature, and the amount of time required for a specified drop in pressure is the oxidation stability of the sample. A variation of the RPVOT (RBOT) method is the "Thin Film Oxidation Uptake Test" (TFOUT) for gasoline automotive engine oils.

RPVOT (RBOT) Test Apparatus

- 2, 3 and 4-unit systems
- Oxidata™ Pressure Measurement System
- Conforms to ASTM D2112, D2272 and IP 229 specifications for RPVOT (RBOT) testing
- Conforms to ASTM D4742 specifications for TFOUT testing

For product specifications and ordering information:

Oxidation Pressure Vessels	*Page 114*
Oxidation Baths	*Page 116*
Beakers and Accessories	*Page 117*
Catalysts	*Page 117*
Pressure Recorder	*Page 117*
Oxidata™ Pressure Measurement System	*Page 115*
Complete Systems, 2, 3 and 4-Unit	*Page 118*

Oxidation Pressure Vessel

- Polished stainless steel construction
- Can be converted for use in the Thin Film Oxidation Uptake Test (TFOUT)

Consists of pressure vessel body, cap and stem with inlet needle valve in accordance with ASTM specifications. Vessel holds one borosilicate glass sample container between two PTFE discs. Closure ring tightens by hand to seal cap to pressure vessel body. Vessel connects to pressure recorder or rotary transducer and rotates on magnetic carriage in RBOT bath. Withstands working pressure of 500psi (3450kPa) per ASTM specifications. Stainless steel construction ensures proper rate of heat transfer. Closure ring is constructed of chrome plated steel. Includes PTFE fluorocarbon wear disc and sample container cover disc.

Ordering Information

Catalog No.	
K70000	Oxidation Pressure Vessel
K70092	Aluminum Insert Converts standard K70000 Oxidation Pressure Vessel for use in the TFOUT method

Oxidata™ Pressure Measurement System

Oxidata™ Pressure Measurement Systems

- Electronic pressure measurement systems exclusively designed for RPVOT (RBOT), TFOUT and other ASTM oxidation test methods
- Powerful Oxidata™ software for Windows® and Windows 95® environments
- Monitors up to twelve pressure and four temperature channels
- **Can be installed to most manufacturer's RPVOT(RBOT)/TFOUT test apparatus**

Complete electronic measurement systems for plotting pressure versus time and temperature in RPVOT (RBOT) and TFOUT testing. Each system includes transducers, bomb couplings, RTD probe assembly, multiplexer, data acquisition card, software, and mounting and connecting hardware. Systems are available in two, three and four pressure vessel configurations, and additional channels can be added for up to a total of twelve pressure and four temperature channels.

Koehler pressure measurement systems for RPVOT (RBOT) and TFOUT feature Oxidata™, a high accuracy pressure measurement software package designed exclusively for ASTM oxidation test methods. Designed to run in a Windows® or Windows 95® environment, Oxidata™ monitors up to twelve samples simultaneously, with graphical or tabular display of results. Each channel can be independently configured for any of the applicable ASTM standard test methods without compromising the independence or accuracy of the other channels. Independent start and stop times and user programmable end points add even greater flexibility.

The software plots your data on screen on line, real time, and automatically saves your data on disk or to the hard drive during the test to prevent loss of valuable data. Multiple display options include the ability to view the status of all twelve pressure channels on screen simultaneously and then click on any one channel for a graph display; or to view four channels in graphical format simultaneously. Powerful program features allow you to change axes, have colored plot lines and zoom in on a specific plot sector to view data in greater detail.

Oxidation Stability – RPVOT & TFOUT

Oxidata™ Features and Specifications

- On-line, real time monitoring of up to twelve samples simultaneously - results plot directly to the screen for instant monitoring or printout of results
- Menu options for RPVOT (RBOT) or TFOUT testing, as well as for other ASTM fuel and lubricant oxidation tests
- Programmable automatic end point detection with graphical and tabular representation
- Each channel can be configured and operated independently with different start/stop times and different ASTM test methods
- Zoom in feature allows for magnification of any plot sector on any channel for a more detailed study
- Monitors and reports temperatures of as many as four baths simultaneously using accessory RTD's, and calculates and displays average temperature for each bath. Exports data to spreadsheet programs such as Microsoft Excel®, Lotus 1-2-3®, etc.
- Temperature and pressure calibration capability
- Data is saved directly to the hard drive during testing to prevent loss of valuable data
- Operates in Windows® 2000 or higher
- Simple upgrade from existing Koehler data acquisition systems

Included Accessories (for the pressure measurement systems)

Rotary transducers (connects directly to bomb)
Data acquisition box with USB interface
Oxidata™ software
Multiplexer
RTD probe assembly (1)
Mounting Bracket for bath
Connecting cables and hardware

Computer Requirements

Processor: Intel® Pentium II or similar (minimum)
Memory (RAM): 256MB or higher
Speed: 500 MHz or higher
Windows® 2000 or higher
Disk Space: 15 MB free space (minimum)
Communications Port: One USB port
Other Software: Microsoft® Excel (97 or above)
One RS232 port for temperature controller (optional)

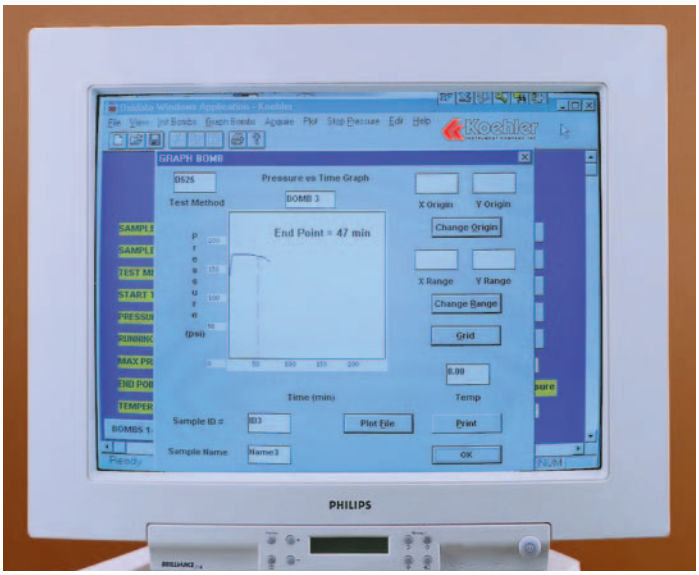
Ordering Information

The ordering information below is for installation to Koehler equipment. For other makes of equipment, a few basic hardware items may also be required - please contact your Koehler representative for assistance.

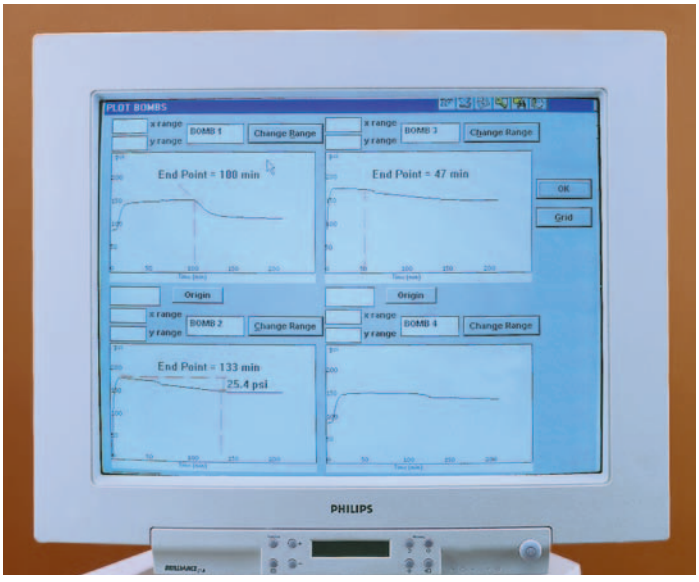
Catalog No.

RBOT/TFOUT Electronic Pressure Measurement System

K70502-XP	Two-Unit System, 115V 60Hz
K70592-XP	Two-Unit System, 220-240V 50/60Hz
K70503-XP	Three-Unit System, 115V 60Hz
K70593-XP	Three-Unit System, 220-240V 50/60Hz
K70504-XP	Four-Unit System, 115V 60Hz
K70594-XP	Four-Unit System, 220-240V 50/60Hz



Oxidata™ Software automatically calculates and displays the endpoint of RPVOT (RBOT)/TFOUT test methods (TFOUT screen shown).



Real-time plot screen displays pressure versus time for up to twelve samples simultaneously (four different test methods are shown).

Oxidata™ Retrofit Kits

To upgrade your existing Koehler electronic pressure measurement system to the Oxidata™ software, please refer to page 118.

Oxidation Stability – RPVOT & TFOUT

Oxidation Baths

- Two, three and four-pressure vessel models
- Conforming to ASTM requirements for RPVOT (RBOT) and TFOUT testing

Constant temperature bath rotates oxidation pressure vessels at 100rpm at an angle of 30° in accordance with ASTM specifications. Includes drive system and oil bath with electronic solid state temperature control. Meets ASTM requirements for heat transfer capability and temperature control precision.

A convenient carriage arrangement allows the oxidation vessels to be inserted quickly and securely in the drive system. A strong magnet holds the vessel in place while locating pins in the carriage engage the base of the vessel. PTFE guides support the pressure vessel stem for added stability. If the vessel becomes obstructed for any reason, the magnetic carriage releases it to prevent damage. A chain and sprocket drive system powered by a heavy duty capacitor start motor rotates the vessel carriages at 100rpm. Drive shafts ride on PTFE fluorocarbon bearings which provide extended service and are compatible with silicone heat transfer fluids and other types of bath oils.

Bath temperature is controlled within ASTM specified limits by an electronic solid state controller with °C/°F switchable digital setpoint and display. Overtemperature protection is provided by a built-in limit control that automatically interrupts power to the bath when bath liquid temperature exceeds 16.7°C (30°F) above the temperature setting or 177°C (350°F). Power must then be manually restored by the operator after checking the cause of the problem. Pressure vessel carriage vanes circulate the bath oil during testing to ensure temperature uniformity, and an auxiliary stirrer can be operated between tests to prevent sludging of non-silicone bath oils.

The bath interior is constructed of welded stainless steel and is fully insulated. A hinged section of the bath cover provides easy access to the vessel carriages. Vapor barriers in the cover close around the vessel stems to contain vapors from the hot bath medium. A chemical resistant polyurethane finish protects the bath exterior and control cabinet.

Specifications

Conforms to the specifications of: ASTM D2112, D2272, D4742; IP 229
Capacity: 2, 3 or 4 oxidation pressure vessels
Temperature Control:
Maximum Temperature: 200°C (392°F)
Control Stability: ±0.02°C (±0.04°F)
Heater Range:
2 and 3-pressure vessel models: 0-2750W
4-pressure vessel models: 0-3750W
Recommended Bath Medium: high temperature silicone heat transfer fluid (355-001-002 or 355-001-004—page 8)
Drive System: 100rpm positive drive transmission powered by a continuous duty ½hp ball bearing motor with built-in gear reducer

Ordering Information

Catalog No	Capacity	Electrical Requirements	Bath Capacity, gal (L)	Dimensions, lxwxh,in.(cm)	Net Weight	Shipping Weight
K70200	2 oxidation	220-240V 60Hz, 17.17A	18 (68)	28x26x33	237 lbs	356 lbs (161.5kg)
K70290	vessels	220-240V 50Hz, 17.17A		(71x66x84)	(107.5kg)	25.3 Cu. ft.
K70300	3 oxidation	220-240V 60Hz, 17.17A	25 (95)	37x26x33	284 lbs	416 lbs (188.7kg)
K70390	vessels	220-240V 50Hz, 17.17A		(94x66x84)	(129kg)	32 Cu. ft.
K70400	4 oxidation	220-240V 60Hz, 21.5A	32 (121)	46x26x33	375 lbs	542 lbs (245.9kg)
K70490	vessels	220-240V 50Hz, 21.5A		(117x66x84)	(170kg)	40.3 Cu. ft.

Bath Thermometers

- For verifying bath temperature in accordance with ASTM and IP test method specifications

Ordering Information

Catalog No.	
250-001-37C	IP 37C Thermometer. Range: 144 to 156°C For RPVOT (RBOT) method.
250-000-96C	ASTM 96C Thermometer. Range: 120 to 150°C For ASTM D2112 method.
250-000-100C	ASTM 100C Thermometer. Range: 145 to 205°C For TFOUT method.

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

Oxidation Stability – RPVOT & TFOUT

Oxidation Pressure Vessel Accessories

- Sample beakers for RBOT and TFOUT methods
- Oxygen charging accessories

Ordering Information

Catalog No.

Sample Beakers

K70040 RPVOT (RBOT) Sample Beaker
Borosilicate glass, 175mL
Meets ASTM D2112, D2272 specifications

K70091 TFOUT Sample Container
Borosilicate glass. Meets ASTM D4742 specifications

Oxygen Charging Accessories

K70080 Charging Hose. 6 ft (1.8m), with connections

K70081 Quick Connect Coupling, for charging hose

K70083 Quick Connect Couplings, for oxidation pressure vessel

K70013 Oxygen Pressure Regulator

Oxidation Pressure Vessel Accessories

K70050 Silicone O-ring
Replacement seal for pressure vessel lid-body connection

K70049 Sample Beaker Cover (PTFE disk)

K70048 TFOUT Sample Beaker Cover (PTFE disk)

K70000-03008 Spring. Inserts in pressure vessel to hold RPVOT (RBOT) beaker and cover in place

K700-0-3A Spring. Inserts in pressure vessel to hold TFOUT container and cover in place

Pressure Recorder

- Conforms to ASTM D2112, D2272, D4742 and IP 229 specifications
  Records pressure inside oxidation bomb on 24-hour charts. Range 0 to 200psi, accurate to within 2% of scale range, 24-hour spring wound chart movement. Housed in a finished metal case. Includes cartridge pen.

Ordering Information

Catalog No.

K70010/24 Pressure Recorder, 24-hour

Accessories

K70018 Replacement Cartridge Pen

308-000-004 Recorder Chart, 24-hour
Box of 60 charts

Oxidata™ pressure measurement equipment is now available for the RPVOT (RBOT) and TFOUT Methods. *Please refer to page 115.*

Pressure Vessel Support Racks

- For convenient handling of oxidation pressure vessel during assembly and disassembly

Securely holds vessel-recorder assembly in an upright position. Convenient for assembling and disassembling vessel. Equipped with drainage trough for bath oil remaining on the vessel exterior after testing.

Ordering Information

Catalog No.

K70017 Pressure Vessel Support Rack, 2-Unit

K70011 Pressure Vessel Support Rack, 3-Unit

K70012 Pressure Vessel Support Rack, 4-Unit

Catalysts

- For Rotating Pressure Vessel Oxidation Test (RPVOT)
- For Thin Film Oxidation Uptake Test (TFOUT)

Ordering Information

Catalog No.

Copper Catalyst for RPVOT (RBOT) Method

K70030 Copper Catalyst Coil
Prepared in accordance with ASTM specifications and packed in a sealed glass container with nitrogen atmosphere. Ready to use.

K70090 Copper Catalyst Wire
1.63mm electrolytic copper wire in 500 ft (152m) lengths.

K70002 Winding Mandrel
Machined aluminum mandrel for winding copper wire into coils meeting ASTM specifications.
Mounts on K70003/K70004 Drive Unit

K70003 Drive Unit for Winding Mandrel
Slow speed gear motor mounted on a sturdy base. Facilitates coil winding procedure. 115V

K70004 Drive Unit for Winding Mandrel
Similar to K70003 but for operation on 220-240V

Catalyst Package for TFOUT Method

K70095 Catalyst Package B
For simulating IIIE engine test.
Includes 3 catalyst packages

Oxygen Stand Assembly

K70401 Oxidation Stand Assembly
For K70400 & K70490

Oxidation – RPVOT & TFOUT

2 Unit RBOT System:

K70200	Oxidation Bath (or K70290)
K70000	Oxidation Pressure Vessel (2)
K70502	Oxidata™ Pressure Measurement System (or K70592)
K70002	Winding Mandrel
K70003	Drive Unit (or K70004)
K70017	Pressure Vessel Support Rack
250-001-37C	IP 37C Bath Thermometer
K70080	Charging Hose
K70081	Quick Connect Coupling for charging hose
K70083	Quick Connect Coupling for oxidation pressure vessel (2)
K70013	Oxygen Pressure Regulator
K70030	Copper Catalyst Coils
K70090	Copper Catalyst Wire, 500 ft.
K70040	Sample Container
K70050	Silicone O-ring

} Order sufficient quantity to meet anticipated testing requirements.

3-Unit RBOT System:

K70300	Oxidation Bath (or K70390)
K70000	Oxidation Pressure Vessel (3)
K70503	Oxidata™ Pressure Measurement System (or K70593)
K70002	Winding Mandrel
K70003	Drive Unit (or K70004)
K70011	Pressure Vessel Support Rack
250-001-37C	IP 37C Thermometer
K70080	Charging Hose
K70081	Quick Connect Coupling for charging hose
K70083	Quick Connect Coupling for oxidation pressure vessel (3)
K70013	Oxygen Pressure Regulator
K70030	Copper Catalyst Coils
K70090	Copper Catalyst Wire, 500 ft.
K70040	Sample container
K70050	Silicone O-ring

} Order sufficient quantity to meet anticipated testing requirements.

4-Unit RBOT System:

K70400	Oxidation Bath (or K70490)
K70000	Oxidation Pressure Vessel (4)
K70504	Oxidata™ Pressure Measurement System (or K70594)
K70401	Oxidation Stand Assembly, 4-Unit RBOT
K70002	Winding Mandrel
K70003	Drive Unit (or K70004)
K70012	Pressure Vessel Support Rack
250-001-37C	IP 37C Thermometer
K70080	Charging Hose
K70081	Quick Connect Coupling for charging hose
K70083	Quick Connect Coupling for oxidation pressure vessel (4)
K70013	Oxygen Pressure Regulator
K70030	Copper Catalyst Coil
K70090	Copper Catalyst Wire, 500 ft.
K70040	Sample Container
K70050	Silicone O-ring

} Order sufficient quantity to meet anticipated testing requirements.

For TFOUT testing, make the following substitutions:

K70091	Sample Beaker (replaces K70040)
K70092	Aluminum Insert (2, 3 or 4)
K70095	TFOUT Catalyst Package (in lieu of K70030, K70090, K70002, K70003)
250-000-100C	ASTM 100C Thermometer (replaces 250-001-37C)

Oxidata™ Retrofit Kits

To upgrade existing DOS-based Koehler electronic pressure measurement systems to the Oxidata™ system. Kits include Oxidata™ software, data acquisition card, multiplexer board, RTD probe assembly and connecting cables. Does not include rotary transducers or bath mounting bracket. *For information on upgrading other makes of equipment to the Oxidata™ system, please contact your Koehler representative.*

Ordering Information

Catalog No.	
K70502RETRO	2-Unit Oxidata™ Pressure Measurement System without Transducers, 115V 60Hz
K70592RETRO	2-Unit Oxidata™ Pressure Measurement System without Transducers, 220-240V 50/60Hz
K70503RETRO	3-Unit Oxidata™ Pressure Measurement System without Transducers, 115V 60Hz
K70593RETRO	3-Unit Oxidata™ Pressure Measurement System without Transducers, 220-240V 50/60Hz
K70504RETRO	4-Unit Oxidata™ Pressure Measurement System without Transducers, 115V 60Hz
K70594RETRO	4-Unit Oxidata™ Pressure Measurement System without Transducers, 220-240 50/60Hz

Accessories

K70500	Rotary Transducer Includes electronic transducer and rotating stainless steel housing
K70519	RTD Kit, for monitoring the temperature of an additional bath

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

Oxidation Stability and Corrosiveness of Petroleum Oils

Test Method

Various methods are available for testing the resistance to oxidation and/or the corrosiveness of lubricants, insulating oils, hydraulic oils and distillate fuel oils. The samples are subjected to a metered flow of air at elevated temperatures, sometimes in the presence of a metal catalyst. Each of the tests referenced on this page are also represented on other pages in this section of the catalog.

High Temperature Convertible Oxidation Bath

- Conforms to various ASTM, Federal and International Standards
- Removable racks hold different types of glassware for different tests
- Equipped with flowmeters or digital mass flow controls to measure and control the required flow rates
- Microprocessor digital temperature control

High temperature liquid bath for oxidation stability and corrosiveness tests at temperatures of up to 200°C. Available in different configurations for convertibility between several oxidation stability and corrosivity test methods including Cummins oxidation test. Removable rack/top plate assemblies remove and install with minimum effort to easily convert the bath between test methods. For most test methods, twelve sets of glassware can be accommodated in each rack assembly. Select flowmeters or digital mass flow control to maintain air flow at the required rates. Microprocessor PID control provides quick temperature stabilization without overshoot, and the bath is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communication software (RS232, etc.) ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.*

Specifications

Conforms to the specifications of*:
ASTM D943, D2274, D2440, D2893, D4310, D4636, D5968, D6594;
DIN 51394, 51586, 51587; FTM 791-5307, 791-5308; UOT**
*with the appropriate glassware rack and flow control equipment installed –see ordering information.
Modified versions of this equipment are available for UOT test method.
Capacity: Twelve (12) sets of glassware. For ASTM D5968, FTM 791-5307, and FTM 791-5308, only ten (10) sets of glassware.
Temperature Range: Ambient to 200°C
Temperature Control Accuracy: 0.2°F (0.1°C)
Bath Medium: Silicone heat transfer fluid
Flow Rate: As specified for ASTM or applicable specifications
Electrical Requirements:
115V 50/60 Hz, Single Phase, 27.3A
220-240V 50/60Hz, Single Phase, 14.6A

Dimensions lxwxh,in.(cm)
Bath (without glassware): 25½x24x42(65x61x107)

Shipping Information (without glassware)
Shipping Weight: 213 lbs (96.6kg)
Dimensions: 29 Cu. ft.

K12230 High Temperature Convertible Oxidation Bath

Ordering Information

Catalog No.
Please contact your Koehler representative for information on glassware racks and airflow control options prior to order placement.

K12230	High Temperature Convertible Oxidation Bath, 115V 50/60Hz
K12239	High Temperature Convertible Oxidation Bath, 220-240V 50/60Hz

Accessories

K1223-R943	Sample Rack for D943, D2274, D2892 D4310 testing
K1223-R2440	Sample Rack for D2440 testing
K1223-R4636	Sample Rack for D4636, D5968 testing
K1223-AL	Flowmeter Stand with Flowmeters for all ASTM methods listed above
K1223-3L	Flowmeter Stand with Flowmeters for D943, D2274, D2440, D4310 testing (range 3 ±0.1 L/hr)
K1223-10L	Flowmeter Stand with Flowmeters for D2893, D4636, D5968 testing (range to 10 ±0.5 L/hr)

To order glassware and other accessories please refer to the pages in this section of the catalog that correspond to the test methods that you will be following.

Digital Flowmeter option is available for this unit.

Software compatible, inquire with Koehler Customer Service.

Oxidation

Oxidation Characteristics of Inhibited Mineral Oils

Sludging and Corrosion Tendencies of Inhibited Mineral Oils

Oxidation Stability of Distillate Fuel Oil (Accelerated Method)

Oxidation Characteristics of Extreme-Pressure Lubrication Oils

Test Method

Evaluates oxidation stability by subjecting the sample to a temperature of 95°C in the presence of oxygen or dry air. For inhibited mineral oils, the sample is reacted with oxygen in the presence of water and an iron-copper catalyst.

Oxidation Stability Apparatus

- Thirty and sixty-place liquid baths for high volume testing requirements
- Eight and twelve-place liquid baths for benchtop placement
- Twelve-place solid block bath
- Conforming to ASTM and related test method specifications
- Special baths for ASTM D2893 and AOCS CD12-57 tests

For product specifications and ordering information:
30 and 60-place Oxidation Baths - page 121
Solid-Block Oxidation Bath - page 121
Oxidation Cell Glassware and Accessories - page 122
Iron-Copper Catalyst and Thermometers - page 122

Eight and Twelve-Place Oxidation Baths

- Conforming to ASTM and related test method specifications

Constant temperature baths with solid state temperature control, calibrated flowmeters and condenser water manifold for oxidation stability tests on fuels and lubricants. Individual flowmeters and control valves for each oxidation cell deliver air flow at the rate of 3L/h. Condenser water manifold has individual control valves for each cell. Microprocessor PID control provides quick temperature stabilization without overshoot, and the bath is protected by a redundant overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Display provides actual setpoint temperature values in °C/°F format. Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Double-wall insulated baths are equipped with copper immersion heaters and a ⅓₀ hp circulation stirrer. Stainless steel bath interior has a built-in support rack and overflow/drain to immerse the test cells at the required depth. Order oxidation cell glassware and accessories separately.

Dimensions lxwxh,in.(cm)
8-place model: 17½x25x42 (44x64x107)
12-place model: 25½x24x42 (65x61x107)

Shipping Information:
Shipping Weight:
8-place model: 137 lbs (62.1kg)
12-place model: 213 lbs (96.6kg)
Dimensions:
8-place model: 29 Cu. ft.
12-place model: 29 Cu. ft.

Digital Flowmeter option is available for this unit.

Software compatible, inquire with Koehler Customer Service.


K12219 Oxidation Stability Bath

Specifications

Conforms to the specifications of:
ASTM D943, D2274, D2893*, D4310, D6158; AOCS CD12-57**
DIN 51586, 51587; ISO 4263, ISO 12205; NF M 07-047; NF T 60-150
Test Capacity: 8 or 12 oxidation cells
Temperature Range: ambient to 212°F (100°C)
Temperature Control Stability: ±0.2°F (±0.1°C)
Bath Medium: white technical oil
Bath Capacity:
8-place model: 10 gal (37.8L)
12-place model: 19 gal (71.9L)
Electrical Requirements:

8-place model:	115V 50/60Hz, Single Phase, 13.0A
	220-240V 50/60Hz, Single Phase, 6.8A
12-place model:	115V 50/60Hz, Single Phase, 32.6A
	220-240V 50/60Hz, Single Phase, 17.0A

Ordering Information

Catalog No.	
K12200	Oxidation Bath, 8-Unit, 115V 50/60Hz
K12290	Oxidation Bath, 8-Unit, 220-240V 50/60Hz
K12212	Oxidation Bath, 12-Unit, 115V 50/60Hz
K12219	Oxidation Bath, 12-Unit, 220-240V 50/60Hz

**Modified versions of this equipment are available for ASTM D2893*
***"Oxidation Characteristics of Extreme Pressure Lubricating Oils" and AOCS CD12-57 "Fat Stability-Active Oxygen Method." Information will be furnished upon request.*

Oxidation

30- and 60-Place Oxidation Baths

- Convenient operation and servicing of thirty or sixty test cells
- Complete bath temperature, water level, air flow and condenser water systems

Constant temperature water baths for high volume oxidation stability applications. Provides temperature control, metered air flow and condenser water supply controls for as many as thirty or sixty cells in a single system, eliminating the need for multiple water and electrical feeds and oxygen supply tanks. Microprocessor PID control provides quick temperature stabilization without overshoot, and the bath is protected by a redundant overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Display provides actual setpoint temperature values in °C/°F format. Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. A 6 or 12kW heat exchanger with heavy duty magnetic drive circulation pump provides rapid and uniform heat transfer throughout the bath. Bath liquid depth is automatically maintained within ASTM specified tolerances by an electronic water level control system. Two banks of individually controlled flowmeters maintain the required oxygen flow rate to each test cell, and condenser water control valves for each cell are mounted on manifolds along the sides of the bath. A centrally mounted trough collects condenser waste water for convenient disposal or recirculation through an external cooling device. Bath interior is constructed of heavy gauge welded stainless steel. All components are easily accessible for servicing if required. Supplied with a sturdy finished angle-iron frame for floor standing installation. Order oxidation cell glassware and accessories separately.

Specifications

Conforms to the specifications of:
ASTM D943, D2274, D2893*, D4310, D6158; ISO 4263, 12205
AOCS CD12-57*; DIN 51586, DIN 51587; NF M 07-047; NF T 60-150
Temperature Control Stability: ±0.1°C (±0.2°F)
Oxygen Flow Rate: 3L/h to each test cell, individually controlled
Bath Capacity:
30-place model: 60 gal (227L)
60-place model: 114 gal (432L)
Electrical Requirements:
30-place model: 220-240V 50/60Hz, Single Phase, 28A
60-place model: 220-240V 50/60Hz, Single Phase, 54A
Other electrical configurations are available upon request.

Dimensions lxwxh,in.(cm)

30-place model: 43x55x52 (109x140x132)
60-place model: 43x78x52 (109x198x132)

Shipping Information

Shipping Weight:
30-place model: 892 lbs (404.6kg)
60-place model: 995 lbs (451.3kg)

Dimensions:
30-place model: 94 Cu. ft.
60-place model: 148 Cu. ft.

Ordering Information

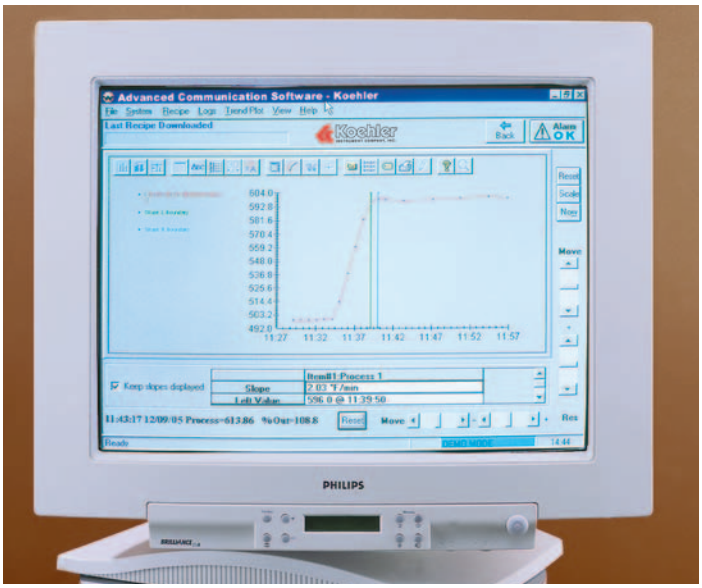
Catalog No.	
K12330	30-Place Oxidation Stability Bath, 220-240V 60Hz
K12339	30-Place Oxidation Stability Bath, 220-240V 50Hz
K12300	60-Place Oxidation Stability Bath, 220-240V 60Hz
K12395	60-Place Oxidation Stability Bath, 220-240V 50Hz

Photograph, thermometers, and additional accessories for oxidation stability testing appear on page 122.

**Modified versions of this equipment are available for ASTM D2893 "Oxidation Characteristics of Extreme Pressure Lubricating Oils" and AOCS CD12-57 "Fat Stability Active Oxygen Method." Information will be furnished upon request.*

Available option for 30- and 60-place Oxidation Baths–temperature/pressure recorder with built-in alarms for low pressure and over/under temperature. Please call or write for specifications and ordering information.

Software compatible, inquire with Koehler Customer Service.



Advanced Communications Software Package for Data Management

12-Place Solid-Block Oxidation Bath

- Accommodates twelve oxidation cells
- Microprocessor digital temperature control

Constant temperature aluminum block oxidation bath with flowmeters and condenser water manifold for twelve cells. Insulated solid block design provides efficient operation at temperatures of up to 450°F (232°C). Microprocessor temperature control unit features digital setpoint and display and built-in overtemperature protection. Includes individual flowmeters and control valves for each cell, delivering air flow at the rate of 3L/h. Condenser water manifold has individual control valves for each cell. Order oxidation cell glassware and accessories separately.

Specifications

Conforms to the specifications of:
ASTM D943, D2274, D2893*, D4310, D6158; AOCS CD12-57*;
DIN 51586, 51587; ISO 4263, 12205; NF M 07-047; NF T 60-150
Testing Capacity: 12 oxidation cells
Maximum Temperature: 450°F
Temperature Control Stability: ±0.2°F (0.1°C)
Air Flow Rate: 3L/h
Electrical Requirements: 220-240V 50/60Hz, Single Phase, 16A

Dimensions lxwxh,in.(cm)

30x10x43 (76x25x109)
Net Weight: 345 lbs (156.5kg)

Shipping Information

Shipping Weight: 440 lbs (199.6kg)
Dimensions: 12 Cu. ft.

Solid block baths meet temperature control and other requirements of ASTM and related methods. While the aluminum block design offers operating advantages over the standard oil bath, it should be noted that many applicable specifications for this test call for a liquid bath medium.

Ordering Information

Catalog No.	
K12201	12-Place Solid Block Oxidation Bath, 220-240V 50/60Hz

**Modified versions of this equipment are available for ASTM D2893 "Oxidation Characteristics of Extreme Pressure Oils" and AOCS CD12-57 "Fat Stability-Active Oxygen Method." Information will be furnished upon request.*

Digital Flowmeter option is available for this unit.

Koehler INSTRUMENT COMPANY, INC.

Oxidation

K12300 60-Place Oxidation Bath
Shown with optional pressure-temperature recorder

Oxidation Cell Glassware and Accessories

Ordering Information

Catalog No.	
K12281	Oxidation Cell Assembly for ASTM D943 and D4310 Includes oxidation cell, condenser, oxygen delivery tube, thermometer bracket, oil level indicator strip, syringe sampling tube, sampling tube holder, spacer, PTFE stopper and O-rings
K122-0-18	Oxygen Delivery Tube
K122-0-19	Oxidation Test Tube
K122-0-20	Condenser
K122-0-21	Thermometer Bracket
K122-0-22	Oil Level Indicator Strip
K122-0-23	Syringe Sampling Tube Holder
K122-0-27	PTFE Stopper
K122-0-28	Syringe Sampling Spacer
K122-0-30	Syringe Sampling Tube
AS568-009-V14	O-rings

For ASTM D2274, order one each K122-0-18 Oxygen Delivery Tube, K122-0-19 Oxidation Test Tube, and K122-0-20 Condenser for each cell.

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

Digital Flowmeter option is available for this unit.

Iron-Copper Catalyst

For ASTM D943 and D4310

Ordering Information

Catalog No.	
K12210	Catalyst Coil Low-metalloid steel wire and electrolytic copper wire wound in a double spiral conforming to ASTM specifications. Packed in a sealed glass tube with a nitrogen atmosphere. Ready for use.
K24000	Wire Coiling Mandrel Mounts on bench for winding steel and copper wire into catalyst coils meeting ASTM specifications.
K12250	Steel Wire Low metalloid steel wire, 0.0625" (1.59mm) diameter, for catalyst coils. Supplied in 1000 ft (304.8m) lengths.
K12260	Copper Wire Electrolytic copper wire, 0.064" (1.63mm) diameter, for catalyst coils. Supplied in 1000 ft (304.8m) lengths.
380-100-001	Silicone Carbide Paper Used to polish steel and copper wire prior to winding into catalyst coils. 100 grit.

Thermometers

Ordering Information

Catalog No.	
250-002-001	Oxidation Cell Thermometer Range: 80 to 100°C. For ASTM D943 and D4310.
250-000-40C	ASTM 40C Thermometer Range: 72 to 126°C. For constant temperature baths.

Oxidation Stability of Mineral Insulating Oils

K12100 Oxidation Stability Bath

Test Method

Determines oxidation stability of mineral transformer oils by measuring the amount of sludge and acid formed under prescribed accelerated aging conditions.

Oxidation Stability Bath

- Conforms to ASTM D2440 specifications
- Microprocessor temperature control with digital display and overtemperature cut-off
- Six-sample testing capacity

Constant temperature oil bath for testing oxidation stability of mineral insulating oils. Immerses six oil receptacles at the required depth per ASTM specifications at 110°C ± 0.5°C, and controls oxygen flow to each sample at the rate of 1L/h ± 0.1L/h through six independent flowmeters mounted on a common manifold. Insulated double-wall stainless steel bath has microprocessor temperature control with °C/°F switchable digital setpoint and display. Operator and equipment are protected by an overtemperature control circuit which automatically interrupts power to the unit when bath temperature exceeds a programmed cut-off point. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* Order bath thermometer drying tower and catalyst separately.

Specifications

Conforms to the specifications of:
ASTM D2440
Capacity: Six samples
Temperature Range: ambient to 260°F (127°C)
Circulator: ⅛hp impeller
Bath Capacity/Medium: 2.5 gal (9.5L) white technical oil
Electrical Requirements:
115V 50/60Hz, Single Phase, 8.1A
220-240V 50/60Hz, Single Phase, 4.2A

Included Accessories

Oil Receptacle and Head (6)

Dimensions lxwxh,in.(cm)

14x15x22 (36x38x56)
Net Weight: 31 lbs (14.1kg)

Shipping Information

Shipping Weight: 61 lbs (27.7kg)
Dimensions: 14.4 Cu. ft.

Digital Flowmeter option is available for this unit.

Software compatible, inquire with Koehler Customer Service.

Ordering Information

Catalog No.		Order Qty
K12100	Oxidation Stability Bath, 115V 50/60Hz	1
K12190	Oxidation Stability Bath, 220-240V 50/60Hz	

Accessories

K12130	Copper Catalyst Coils Sealed in a glass jar with a nitrogen atmosphere. Pack of 24 (12 sets)	1
332-005-010	Drying Tower 250mL with ground glass stopper and side tubes	1
332-005-011	Glass Filter Crucible	1
250-000-95C	ASTM 95C Thermometer Range: 100 to 130°C	1
355-001-001	White Technical Oil 1 gal container. See page 8 for specifications.	3
355-001-003	White Technical Oil 5 gal container. See page 8 for specifications.	1

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

Corrosiveness and Oxidation Stability

K35100 FTM 791-5308 Model with accessory glassware

Corrosiveness and Oxidation Stability of Hydraulic Oils, Aircraft Turbine Engine Lubricants, and Other Highly Refined Oils

Test Method

Evaluates the ability of a lubricant to resist oxidation and the formation of corrosive acid compounds by subjecting a sample to accelerated oxidation conditions in a catalytic environment. The sample is maintained at elevated temperature and subjected to a controlled air flow while in the presence of a series of test specimens made of metals commonly found in actual service conditions.

Corrosiveness and Oxidation Stability Test Apparatus

- Models for ASTM, Federal and IHC test methods
- Six-sample testing capability
- Solid aluminum block design
- Microprocessor temperature control with digital display and overtemperature protection

Constant temperature block baths for corrosivity and oxidation stability determinations on hydraulic oils, aircraft turbine lubricants, transmission fluids and other highly refined oils. Insulated aluminum block provides safe, efficient performance at operating temperatures of up to 750°F (399°C). Microprocessor temperature control has °C/°F switchable digital setpoint and display. Operator and equipment are protected by an overtemperature control circuit which automatically interrupts power to the unit should block temperature exceed a programmed cut-off point. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* Air flow is controlled at the specified rate by six individually adjustable flowmeters mounted on a common manifold. Includes inlet valve and outlet fitting for condenser water supply and support rack for glassware.

Specifications

Conforms to the specifications of:
ASTM D4636, D5968, D6594; FTM 791-5307, 791-5308;
IHC BT-10; DIN 51394
Capacity: 6 test cells
Temperature Range:125 to 750°F (51.7 to 399°C)
Temperature Control Stability: ±1°F (±0.5°C)
Air Flow Rate: ASTM D4636/FTM 791-5307: 10L/h
FTM 791-5308: 3L/h and 5L/h (dual range flowmeters)
IHC BT-10: 3L/h (50mL/min.)
Electrical Requirements: 220-240V 50/60Hz, Single Phase, 15.9A

Dimensions lxwxh,in.(cm)
32½x14½x41½ (83x37x105)
Net Weight: 271 lbs (122.9kg)

Shipping Information

Shipping Weight: 375 lbs (170.1kg)
Dimensions: 18.5 Cu. ft.

Digital Flowmeter option is available for this unit.

Software compatible, inquire with Koehler Customer Service.

Ordering Information

Catalog No.		Order Qty
Corrosivity and Oxidation Stability Test Apparatus		1
K35100	ASTM D4636, D5968 and FTM 791-5307 Model, 220-240V 50/60Hz	
K35000	FTM 791-5308 Model, 220-240V 50/60Hz	
K35300	IHC BT-10 Model, 220-240V 50/60Hz	
Thermometers		
250-000-08F	ASTM 8F Thermometer Range: 30 to 760°F	
250-000-08C	ASTM 8C Thermometer Range: –2 to +400°C	

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

Corrosiveness and Oxidation Stability

Glassware, Test Specimens and Accessories

Catalog No.		Order Qty
ASTM D4636, D5968, D6594 and FTM 791-5307		
K351-0-1	Sample Tube	6
K351-0-2	Sample Tube Head	6
K351-0-3	Air Tube	6
K351-0-4	Thermocouple Tube	6
K351-0-5	Condenser, Allihn Type	6
K351-0-7	Spacer	36
K351-0-8	PTFE Adapter	6
K351-0-13	Oil Sampling Tube (for D5968 and FTM 791-5307)	
K351-0-14	Specimen Hanger (for D6594)	
K293-0-12	Thermocouple, Type J	6
K29310	Digital Thermometer Microprocessor based digital thermocouple thermometer with ten-channel input. Monitors Type J thermocouples from sample tubes.	1
K35090	Test Panel Assembly Fixture Holds square-shaped metal specimens for tying with cord (for FTM 791-5307 and FTM 791-5308)	1
K35095	Test Panel Assembly Fixture Holds square-shaped metal specimens for tying with cord (for ASTM D5968)	1
FTM 791-5308		
K350-0-23	Test Tube	6
K350-0-24	Air Tube	6
K350-0-25	Condenser	6
K35090	Test Panel Assembly Fixture Holds square-shaped metal specimens for tying with cord.	1
IHC BT-10		
K353-0-1	Test Cell	6
K353-0-2	Condenser	6
K353-0-3	Air Tube	6
K353-0-4	Ring Rod	6

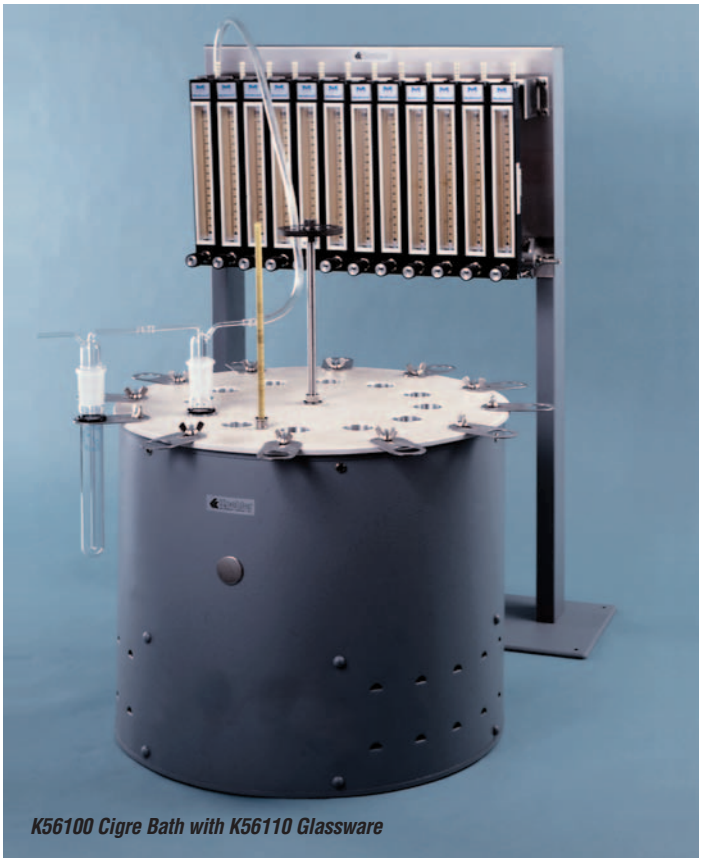
Metal Test Specimens

Catalog No.	
Washer Shaped Specimens for ASTM D4636 Standard Procedure and for FTM 791-5307	
K35110	Bronze
K35120	Mild Steel
K35130	Aluminum Alloy
K35140	Magnesium
K35150	Steel M50
K35160	Silver
K35170	Titanium
Square Shaped Specimens for ASTM D4636 Alternate Procedure and for FTM 791-5308	
K35010	Copper
K35020	Mild Carbon Steel
K35030	Aluminum Alloy
K35040	Magnesium Alloy
K35050	Cadmium Plated Steel
K35060	Silver
K35070	Solid Cadmium (non standard)
K35080	Titanium (non standard)
Square Shaped Specimens for ASTM D5968 and D6594	
K35010	Copper
K35011	Lead
K35012	Tin
K35013	Phosphor Bronze
Rectangular Shaped Specimens for IHC BT-10	
K353-0-5	Aluminum
K353-0-6	Copper
K353-0-7	Steel
K353-0-8	Brass

Polishing Materials

380-150-001 Silicone Carbide Paper, 150-grit, Pack of 50 sheets
380-240-001 Silicone Carbide Paper, 240-grit, Pack of 50 sheets
380-150-000 Silicone Carbide Grain, 150-grit, 1 lb package

Oxidation



K56100 Cigre Bath with K56110 Glassware

Ordering Information

Catalog No.		Order Qty
K56100	Oxidation Stability Apparatus 115V 50/60Hz	1
K56190	Oxidation Stability Apparatus 220-240V 50/60Hz	
K56200	Oxidation Stability Apparatus 115V 50/60Hz For IP 48 Method.	
K56290	Oxidation Stability Apparatus 220-240V 50/60Hz For IP 48 Method	

Accessories

K56110	Set of Glassware Includes one each oxidation and absorption tube. For IP 48, IP 280, IP 306, IP 307, IP 335	12
250-000-09C	ASTM 9C Thermometer Range: –5 to +110°C (equivalent to IP 15C Thermometer)	1
250-000-41C	ASTM 41C Thermometer Range: 98 to 152°C (equivalent to IP 81C Thermometer)	

A liquid bath version of this equipment to perform the proposed ASTM test for High Temperature Stability of Distillate Fuels is also available. Please contact Koehler's Customer Service for additional information.

Oxidation Stability of Inhibited Mineral Turbine Oils

Oxidation Stability of Straight Mineral Oil

Oxidation Stability of Mineral Insulating Oil

Oxidation Stability of Inhibited Mineral Insulating Oils

Oxidation Test For Lubricating Oil

Test Method

Oxidation stability is determined by exposing the sample to a measured oxygen flow at elevated temperature in the presence of metal catalysts.

Oxidation Stability Apparatus (Cigre Bath)

- Conforms to IP specifications
- Twelve-sample testing capability
- Microprocessor programmable high accuracy temperature control

Constant temperature aluminum block type bath for oxidation stability tests in accordance with the Institute of Petroleum (IP) testing methods. Accommodates twelve sets of oxidation and absorption tubes. Insulated block bath operates efficiently at temperatures of up to 200°C (392°F). Microprocessor PID control provides quick temperature stabilization without overshoot, and the bath is protected by a an overtemperature control circuit that interrupts power should block temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* A bank of twelve flowmeters on a movable stand regulates oxygen flow at 1 ±0.1L/h to each oil sample per IP specifications. Includes soap bubble flowmeter for checking oxygen flow rate.

Specifications

Conforms to the specifications of:
IP 48, IP 280, IP 306, IP 307, IP 335
Testing Capacity: Twelve samples
Temperature Range: 80 to 200°C
Temperature Uniformity: ±0.2°C
Air Flow Control:
Standard Model: 1L/h to each sample
IP 48 Model: 15L/h to each sample
Electrical Requirements:
115V 50/60Hz, Single Phase, 12.1A
220-240V 50/60Hz, Single Phase, 6.3A

Included Accessories

Soap Bubble Flowmeter

Dimensions

Bath: dia.xh,in.(cm)
17x22 (43.2x55.9)
Flowmeter Stand: lxwxh,in.(cm)
24x8x30¼ (61x20.3x76.8)
Net Weight: 186 lbs (84.4kg)

Shipping Information

Shipping Weight: 245 lbs (111.1kg)
Dimensions: 16.7 Cu. ft.

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

Digital Flowmeter option is available for this unit.

Software compatible, inquire with Koehler Customer Service.

Thermal Oxidation Stability of Automotive Gear Lubricants

Test Method

The L-60-1 Performance Test determines the deterioration of gear lubricants under severe thermal oxidation conditions. The sample lubricant is tested for 50 hours in a standardized gear box operating under a predetermined load. An elevated temperature and controlled air flow are maintained throughout the test and a copper catalyst is employed to accelerate the breakdown. At the end of the test period, various lubricant properties are determined by standard testing methods, and the weight loss of the catalyst is measured. The deposits that are formed on the gear box surfaces and the catalyst are examined and reported.

Ordering Information

Catalog No.	
K18660	L-60-1 Performance Test Apparatus, 220-240V 60Hz
K18650	L-60-1 Performance Test Apparatus, 220-240V 50Hz

Accessories

K18661	Test Kit, for one test. Includes GA34 test gear, GA50 test gear, R-14 test bearing, viton shaft seals (2), O-ring seal, copper test strips (2)
380-150-001	Silicone Carbide Paper, 150-grit (pack of 50)

L-60-1 Performance Test Apparatus

• Conforms to ASTM D5704 and STP512A L-60-1 Performance Test specifications. Performs the L-60-1 Thermal Oxidation Stability performance test for API GL-5 gear lubricant service. Consists of a standardized gear box assembly with motor drive system and digital indicating controls for all test functions.

Gear Case and Drive System

Two spur gears and a test bearing are operated inside a machined stainless steel case with removable window. The drive gear shaft is coupled to a heavy duty ball bearing motor loaded by a 45 ampere alternator. The standard L-60-1 test gear loading value of 128 watts generator output is precisely maintained by a digitally indicated load bank. All gear box components are easily accessible for cleaning.

Temperature Control

An insulated heating case with high volume blower encloses the gear box. Sample oil temperature is maintained at 325°F ± 1°F (162.8 ± 0.6°C) by a digital indicating controller with PT-RTD sensor. A built-in microprocessor based recorder produces a test oil temperature chart for reporting purposes. Overtemperature protection is provided by a separate PT-RTD-sensed controller.

Air Flow Control

A high accuracy mass flow controller with digital indication maintains air flow to the gear box at a constant 1.1L/h. The self correcting controller maintains the setpoint flow rate regardless of fluctuations in air input pressure or temperature. Test cabinet and control cabinet are finished in chemical resistant polyurethane enamel. Test cabinet has a cover for access to the gear box and a removable drive motor cover.

Specifications

Conforms to the specifications of:
- ASTM D5074; STP512A L-60-1 Performance Test (formerly CRC L-60 Test); FTM 791-2504

Controls and Monitors:
- Sample Oil Temperature: °C/°F, digital setpoint and display, user adjustable
- Overtemperature Limit Control: °F, user acceptable
- Heating Chamber Air Temperature:°C/°F
- Air Flow: L/h, digital setpoint and display, user adjustable
- Test Gear Load: Volts DC, Amps. DC, digital display, user adjustable
- Sample Oil Temperature Recorder: Programmable microprocessor based strip chart recorder with digital display, °C/°F
- Drive Motor: 1725rpm thermally protected ball bearing type
- Alternator: 45 ampere output

Electrical Requirements:
- 220-240V 60Hz, Single Phase, 15A
- 220-240V 50Hz. Single Phase, 15A

Dimensions lxwxh,in.(cm)
- Test Cabinet: 24x24x14½ (61x61x37)
- Control Cabinet: 23½x23½x17⅜ (60x60x44)

Net Weight: 330 lbs (149.7kg)

Shipping Information

Shipping Weight: 498 Lbs (225.9kg)
Dimensions: 29.2 Cu. ft.

Koehler INSTRUMENT COMPANY, INC.

Rust Preventing Characteristics

K30160 Rust Preventing Characteristics Bath

Specifications

Conforms to the specifications of:
ASTM D665, D3603, D6158; NACE TM-01-72*; IP 135; ISO 7120; DIN 51355**, DIN 51585; FTM 791-4011, 791-5315**; NF T 60-151
Testing Capacity: Six (6) 400mL sample beakers
Maximum Temperature: 104°C (220°F)
Temperature Control Stability: ±0.5°C (±1°F)
Drive Motor: ½hp induction motor
Bath Medium: 11 gal (41.6L) white technical oil
Electrical Requirements:
115V 60Hz, Single Phase, 13.0A
220-240V 50 or 60Hz, Single Phase, 6.8A

Included Accessories

ASTM D665 Models (K30160, K30165, K30166)
Steel Test Specimens (6)
Type 2 Plastic Specimen Holders (6)
Plastic Beaker Covers (6)

ASTM D3603 Models (K30161, K30167, K30168)
Horizontal Disc Test Assembly (6) consisting of:
plastic beaker cover
horizontal test specimen
vertical test specimen
fluorocarbon washer
plastic cap
stainless steel support rods and hardware

Dimensions lxwxh,in.(cm)

32¾x14¼x27 (83x36x69)
Net Weight: 79 lbs (35.8kg)

Shipping Information

Shipping Weight: 150 lbs (68kg)
Dimensions: 16.2 Cu. ft.

**Accessories for these test methods are available upon request.

Software compatible, inquire with Koehler Customer Service.

Rust Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water (Standard and Horizontal Disc Methods)

Test Method

Determines a lubricant's ability to prevent rusting of metal surfaces. Suitable for steam turbine oils, gear oils, hydraulic oils and other types of inhibited mineral oils. A steel test specimen is immersed in a heated mixture of sample oil and water which is stirred continuously during the test. After the test period the specimen is examined for rusting. The standard (ASTM D665) method uses a vertical specimen; the 'horizontal disc method' (ASTM D3603) uses both horizontal and vertical test surfaces.

Rust Preventing Characteristics Oil Bath

- Conforms to ASTM D665, D3603 and NACE TM-01-72* specifications
- Accommodates six sample beakers
- Microprocessor programmable high accuracy temperature control

Constant temperature bath with stirrers for rust preventing characteristics tests. Stirs sample-water mixtures at 1000rpm and controls temperature with ± 0.5°C (± 1°F) stability. Immerses test beakers at the proper depth per ASTM specifications.

Microprocessor PID control provides quick temperature stabilization without overshoot, and the bath is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.*

Stainless steel stirrer paddles are driven by a ball bearing type motor through an improved pulley drive-roller bearing arrangement. Paddles can be raised and lowered for placement of sample beakers in the bath. Includes test specimens, holders and beaker covers for ASTM D665 or D3603 testing (see specifications and ordering information). Stainless steel bath includes perforated support shelf for beakers and two-position cover plate that adjusts for either ASTM D665 or D3603 testing. Long-lasting polyester drive belt improves reliability. Drive train components are protected by a removable steel guard. All exterior surfaces have stainless steel or chemical resistant polyurethane enamel finishes.

Ordering Information

Catalog No.

Rust Preventing Characteristics Oil Bath

For ASTM D665

K30160	Rust Preventing Characteristics Oil Bath, 115V 60Hz
K30165	Rust Preventing Characteristics Oil Bath, 220-240V 50Hz
K30166	Rust Preventing Characteristics Oil Bath, 220-240V 60Hz

For ASTM D3603

K30161	Rust Preventing Characteristics Oil Bath, 115V 60Hz
K30167	Rust Preventing Characteristics Oil Bath, 220-240V 50Hz
K30168	Rust Preventing Characteristics Oil Bath, 220-240V 60Hz

*To order this equipment for the NACE TM-01-72 test please turn to page 98.

Rust Preventing Characteristics

K30800 Horizontal Disk Assembly

K30101 Specimen with Holder

K30130 Chuck

Accessories

Catalog No.		Order Qty
332-002-006	Test Beaker, 400mL for ASTM D665 & D3603	6
250-000-09F	ASTM 9F Thermometer Range: 20 to 230°F	7
250-000-09C	ASTM 9C Thermometer Range: –5 to +110°C	
K30130	Chuck for polishing test specimens Includes locknut and shaft for mounting on accessory drive motor.	1
K30150	Drive Motor Drives K30130 Chuck. Mounted on base. 115V 50/60Hz	1
K30180	Drive Motor Similar to K30150 but for operation on 220-240V 50Hz	
380-150-002	Aluminum Oxide Cloth, 150-grit for preliminary grinding of test specimens Pack of 50	
380-240-002	Aluminum Oxide Cloth, 240-grit for final polishing of test specimens Pack of 50	1
K30140	Auxiliary Stirrer Blade - Attaches to stirrer shaft - for testing heavier than water samples - ASTM D665. Procedure C.	

Test Specimens

Catalog No.	
K30110	Steel Test Specimen for ASTM D665 Machined to ASTM specifications. Without Holder
K30100	Test Specimen with Type 2 Plastic Holder for ASTM D665
K30119	Test Specimen with Type 1 Plastic Holder for ASTM D665
K30101	Test Specimen with Type 2 PTFE Holder
K30810	Horizontal Test Specimen for ASTM D3603
K30820	Vertical Test Specimen for ASTM D3603
K30800	Horizontal Disc Rust Test Assembly for ASTM D3603. Includes polycarbonate beaker cover, two stainless steel support rods, disc carrier and one each horizontal and vertical test specimens.

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

Corrosion of Lead by Lubricating Oils

Test Method

Measures the corrosiveness of lubricating oils to lead in the presence of a copper catalyst. Lead and copper test panels are rotated in the test lubricant under specified test conditions, and the degree of corrosion is determined by the change in weight of the lead panel.

Lead Corrosion Test Apparatus

- Conforms to FTM 791-5321 specifications
- Six-sample capacity
- Microprocessor programmable high accuracy temperature control

Constant temperature apparatus rotates copper and lead test panels in lubricant samples to determine corrosiveness to lead per FTM specifications. Panels are rotated at 600rpm in samples maintained at 163°C (325°F) and aerated at 0.94L/min. (2.0 Cu. ft./hr.).

Test panel shafts ride on ball bearing spindles driven by a 1/15hp motor. A counterbalanced support bar positions the drive shaft for testing or for mounting and removal of test panels. When the support bar is raised, a safety microswitch automatically stops the drive motor to prevent splashing of hot oil.

Fully insulated bath features double-wall stainless steel construction, with a built-in support rack to suspend test cells vertically at the proper depth. Microprocessor PID control provides quick temperature stabilization without overshoot, and the bath is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* A 1/20hp stirrer thoroughly circulates the bath medium for temperature uniformity. Redundant overtemperature protection is provided by a built-in backup thermostat. Flowmeters and valves mounted on a convenient manifold provide individual air flow control for each test cell.

Digital Flowmeter option is available for this unit.

Specifications

Conforms to the specifications of:
FTM 791-5321
Testing Capacity: 6 lubricant samples
Maximum Temperature: 199°C (390°F)
Temperature Control Stability: ±0.05°C (±0.1°F)
Air Flow Control: 0.94±0.047L/min.
(2±0.1 Cu. ft./hr) six (6) flowmeters mounted on a common manifold
Electrical Requirements:
220-240V 60Hz, Single Phase, 14.5A
220-240V 50Hz, Single Phase, 14.5A

Included Accessories

Copper Test Panels (6)
Lead Test Panels (6)
Mounting Hardware for Panels

Dimensions lxwxh,in.(cm)

39x25x47 (99x64x119)
Net Weight: 214 lbs (97kg)

Shipping Information

Shipping Weight: 330 lbs (150kg)
Dimensions: 33.5 Cu. ft.

Ordering Information

Catalog No.		Order Qty
K29900	Lead Corrosion Apparatus, 220-240V 60Hz	1
K29990	Lead Corrosion Apparatus. 220-240V 50Hz	

Accessories

K29910	Pyrex™ Sample Tube	6
250-000-16F	ASTM 16F Thermometer Range: 85 to 392°F	1
250-000-16C	ASTM 16C Thermometer Range: 30 to 200°C	
K29920	Lead Test Panels	
K29930	Copper Test Panels	

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

Stability of Lubricating Oils (Work Factor)

Test Method

Determines the stability of a lubricating oil when subjected to an endurance test in a journal bearing operated under prescribed conditions. After a 100 hour test period, the 'work factor' is computed from measured changes in viscosity, neutralization number and carbon residue.

Navy Work Factor Machine

- Conforms to FTM 791-3451 specifications

Complete apparatus for the 'Navy Work Factor' stability test for lubricating oils. Consists of bearing and journal, bearing loading device with calibrated springs, 5hp drive system with variable speed control, oil circulation system, and full instrumentation. Operates the journal bearing at 2000 or 3000rpm under a specified load. Oil system pressure is maintained at a constant 15 psig (103 gauge kPa) throughout the test. Includes digital displays of oil pressure and temperature and a built-in strip chart recorder for hard copy test reports.

Specifications

Conforms to the specifications of: FTM 791-3451.4
Electrical Requirements: 220-240V, 3 Phase, 50/60Hz, 20A

Dimensions lxwxh,in.(cm)

50x40x60 (127x102x152)
Net Weight: 1378 lbs (625.1kg)

Shipping Information

Shipping Weight: 1660 lbs (753kg)
Dimensions: 110 Cu. ft.

Ordering Information

Catalog No.		
K30000	Navy Work Factor Machine, 220-240V *Specify 50 or 60Hz when ordering*	
K30010	Replacement Test Bearing	

Copper Corrosion from Petroleum Products

Test Method

The Copper Strip Tarnish Test assesses the relative degree of corrosivity of petroleum products, including lubricating oils. A polished copper strip is immersed in 30mL of sample at elevated temperature. After the test period, the strip is examined for evidence of corrosion and a classification number from 1-4 is assigned based on a comparison with the ASTM Copper Strip Corrosion Standards.

Copper Strip Tarnish Test Apparatus

- Conforms to ASTM D130, D6074, D6158 and related specifications

The complete apparatus for the Copper Strip Tarnish Test for lubricating oils consists of:

Test Tube Bath
Copper Strips
Test Tubes
ASTM Copper Strip Corrosion Test Standard
Surface Preparation Accessories

Test Tube Bath

- Accommodates 16 test tubes
- Temperature range to 190°C (374°F)
- Microprocessor temperature control with digital display and overtemperature protection.

Constant temperature bath immerses 16 test tubes for copper strip tarnish tests of products not requiring a test bomb. Microprocessor temperature control has °C/°F switchable digital setpoint and display. Operator and equipment are protected by an overtemperature control circuit which automatically interrupts power to the unit should bath temperature exceed a programmed cut-off point. Welded stainless steel double-wall construction with built-in support rack. Fully insulated. For complete specifications, please refer to page 90.

Ordering Information

Catalog No.		Order Qty
K25330	Copper Strip Test Tube Bath, 115V 50/60Hz	1
K25339	Copper Strip Test Tube Bath, 220-240V 50/60Hz	
K25312	Vented Cork	

Accessories

K25080	Copper Test Strips 12.5x1.5-30mmx75mm to ASTM specifications	16
332-004-004	Test Tube, 25x150mm	16
332-004-002	Viewing Test Tube Protects copper strip during inspection or storage	16
K25100	ASTM Copper Strip Corrosion Standard Colored reproductions of tarnished strips encased in a plastic plaque	1
380-240-001	Silicone Carbide Paper, 240-grit. For polishing copper strips prior to testing. Package of 50 sheets	1
380-150-001	Silicone Carbide Paper, 150-grit	1
380-150-000	Silicone Carbide Grain, 150-grit. For final polishing of copper strips prior to testing. 1 lb package	1
K25000	Polishing Vise Holds copper strip firmly in place without marring the edges. Stainless steel. mounted on a composition base	1
K25090	Multi-Strip Polishing Vise. Similar to K25000 but capable of holding four strips at a time	1
250-000-12F	ASTM 12F Thermometer, Range: –5 to +215°F	1
250-000-12C	ASTM 12C Thermometer, Range: –20 to +102°C	

Bearing Compatibility of Turbine Oils

Test Method

Evaluates the in-service stability of turbine lubricants by running a sample-lubricated babbit journal bearing for an extended period at high speed under controlled conditions of load, lubricant flow and temperature. The change in various properties (viscosity, carbon residue, acidity) is measured at the end of the endurance test and the bearing is cleaned and examined for evidence of deposits, corrosion and other changes.

Bearing Compatibility Tester

- Conforms to FTM 791-3452 specifications
- Digital-indicating controls and built-in temperature recorder

Tests the bearing compatibility (lacquering, deposits, corrosion) and stability of turbine lubricants when subjected to an endurance test. Consists of bearing housing assembly with test bearing and support bearings, hydraulic loading device, oil circulation system with thermostatic and hydrostatic control, and powerful 5hp variable speed drive system. Digital LCD controls monitor oil pressure, oil temperature and spindle rpm, and a built-in strip chart recorder plots oil temperature at three different points—at the bearing housing, in-line, and in the reservoir. Equipped with overtemperature and low pressure cut-off switches and a cartridge oil filter for convenient 'flush run' operation. All components are mounted in a sturdy angle iron frame. A removable steel guard protects drive train components.

Dimensions lxwxh,in.(cm)
48x36x54 (122x91x137)
Net Weight: 1300 lbs (589.7kg)

Shipping Information
Shipping Weight: 1582 lbs (717.6kg)
Dimensions: 101.7 Cu. ft.

Specifications

Conforms to the specifications of: FTM 791-3452
Journal Drive Motor: 5hp variable speed, with digital 0-3500rpm control.
Fan cooled with thermal overload protection.
Lubricant Flow: 3.8L/min. gear pump recirculating 1.9-23L/min.
of test lubricant to support bearing and test bearing.
Digital oil pressure circulation.
Temperature Control: Sump temperature (0-500°F) with digital indication and recording of temperature at bearing housing, sump and in-line.
Bearing Load: Hydraulic loading device maintaining 1520 kPa (220 psig) on the loading bearing.
Electrical Requirements:
200-240V 50/60Hz, 3-Phase, 20A
380V 50/60Hz, 3-Phase, 12A
440V 50/60Hz, 3-Phase, 10A

Ordering Information

Catalog No.		Order Qty
K29800	Bearing Compatibility Tester *Specify electrical requirements when ordering.*	1

Accessories

K29801	Test Bearing	

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

Cloud Point and Pour Point of Petroleum Products

K46100 Refrigerated Bench Model

Ordering Information

Catalog No.

Cloud and Pour Point Chamber

K46000	Cloud and Pour Point Chamber
K46001	Cloud and Pour Point Chamber, with inlet/outlet fittings

Refrigerated Models:

K46100	Cloud and Pour Point Bath, Bench Model, 115V 60Hz
K46195	Cloud and Pour Point Bath, Bench Model, 220-240V 50Hz
K46196	Cloud and Pour Point Bath, Bench Model, 220-240V 60Hz
K46300	Cloud and Pour Point Bath, Floor Model, 115V 60Hz
K46395	Cloud and Pour Point Bath, Floor Model, 220-240V 50Hz
K46396	Cloud and Pour Point Bath, Floor Model, 220-240V 60Hz

Accessories

332-004-001	Test Jar Clear, flat bottom jar with sample height graduation
250-000-05F	ASTM 5F Thermometer, range: –36 to +120°F
250-000-05C	ASTM 5C Thermometer, range: –38 to +50°C
250-000-06F	ASTM 6F Thermometer, range: –112 to +70°F
250-000-06C	ASTM 6C Thermometer, range: –80 to +20°C
K46120	Cork Disk
AS568-219	Gasket, for test jar
K460-0-8	Thermometer Holder, for test jar
K460-1-7B	Copper Jacket

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

Custom configurations of this bath are available. Please contact Koehler Customer Service for additional information.

Software compatible, inquire with Koehler Customer Service.

Test Method

Cloud point and pour point are indicators of the lowest temperature of utility for petroleum products. The sample is periodically examined while it is being cooled in the cloud and pour point apparatus. The highest temperature at which haziness is observed (cloud point), or the lowest temperature at which movement of the oil is observed (pour point), is reported as the test result.

Cloud and Pour Point Test Equipment

- Conforms to ASTM D97, D2500 and related specifications
- Compact four-place portable chamber
- Mechanically refrigerated models with factory preset cold baths

Cloud and Pour Point Chamber–Immerses four copper test jackets in suitable freezing mixtures at the required depth per ASTM specifications. Available with inlet and outlet connections for circulating refrigerated coolant from an external source. Consists of steel exterior housing with polyurethane enamel finish and all copper interior for corrosion resistance. Removable composition top plate and ½" (13mm) cork insulation around interior aid in cold retention. Supplied with copper jackets, gaskets, disks, and thermometer holders for test jars and cooling bath. Order test jars and thermometers separately.

Mechanically Refrigerated Baths–Bench-model and floor-model test units with multiple four-jacket mechanically refrigerated baths, each factory preset at a different temperature for convenient cloud and pour point testing. Bench model has three baths, set at +30, 0, and –30°F (–1, –18 and –35°C); floor model has four baths, set at +30, 0, –30 and –60°F (–1, –18 –35 and –51°C). Each bath has a phenolic top plate with ports for thermometer and four copper test jackets. Synthetic sponge covers over each top plate and gasketed hoods over each bath prevent excessive ice accumulation around the test jackets. Cascade hermetic refrigeration system provides reliable long term service. Bath interior is made of stainless steel, cabinet is constructed of polyester-epoxy finished steel housing. Floor model rides on swivel castors. Supplied with test jackets, gaskets, disks, and thermometer holders for test jars and cooling baths.

Specifications

Conforms to the specifications of:
ASTM D97, D2500, D5853, D6074, D6158; IP 15, 219;
ISO 3015, 3016; DIN 51597; FTM 791-201; NF T 60-105
Electrical Requirements:
Model K46100 Refrigerated Bench Model:
115V 60Hz, Single Phase, 12.2A
220-240V 50/60Hz, Single Phase, 6.9A
Model K46300 Refrigerated Floor Model:
115V 60Hz, Single Phase, 17.7A
220-240V 50/60Hz, Single Phase, 9.7A

Dimensions

K46000: dia.xh,in.(cm)
10½x12 (27x30)
K46100: lxwxh,in.(cm)
30x28x35 (76x71x89)
K46300: lxwxh,in.(cm)
44x38x4 (112x97x115)
Net Weight:
K46000: 14lbs (6.3 kg)
K46100: 340lbs (155 kg)
K46300: 392lbs (178 kg)

Shipping Information

Shipping Weight:
K46000: 18 lbs (8.2 kg)
K46100: 550 lbs (250 kg)
K46300: 605 lbs (275 kg)
Dimensions:
K46000: 2.6 Cu. ft.
K46100: 14.1 Cu. ft.
K46300: 60.6 Cu. ft.

Automated Cloud Point and Pour Point of Petroleum Products

Automated Cloud Point and Pour Point System

- Conforms to ASTM D97, D2500 and related specifications
- Direct cooling system eliminates the need for solvent cooling baths
- One-stage cooling system provides temperatures as low as –35°C and a two-stage cooling system down to –80°C
- Single start/stop push button makes system simple to use
- Minimal installation required to set-up software and instrumentation

Cloud Point Detection–The cloud point detection system provides automated sample testing with the accuracy and repeatability in accordance with ASTM D2500 and related international test methods. The sophisticated dynamic measurement system emits a light pulse every 1°C from a coaxial fiber optic cable positioned above the test sample. The light pulse is then reflected off the silvered-bottom test jar to an optical sensor. The advanced software package analyzes the response of the light pulse. The initial appearance of crystallization is monitored by light scattering, signifying the cloud point of the sample. All clear and transparent oils are readily measured by the detection system, regardless of sample color.

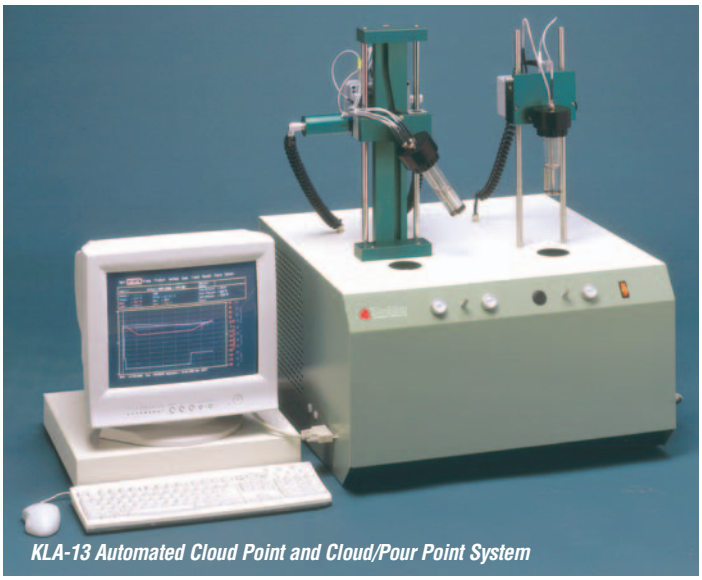
Pour Point Detection–The pour point detection system provides automated testing with the accuracy and repeatability in accordance with ASTM D97 and related international test methods. The automated operation includes the removing the sample from the cooling jacket at 3°C intervals and tilting it to a 90° angle as prescribed by the test method until no flow is observed. Contact of the cold sample with the two Pt-100 temperature probes positioned just above the surface liquid level when the test jar is tilted identifies sample flow. The test jar is automatically returned to the cooling jacket and sampled again until no flow is detected for 5 seconds. The pour point result is then reported at 3°C higher than the temperature at which the sample ceased to flow in accordance with the test method.

Advanced Software Package–The Windows®-based software package can control either a stand-alone system or provides multiple analyzer networking with a single network control station. All analytical parameters are graphed and displayed in real-time as well as recorded in Microsoft® Excel file format. The software monitors the operation and performance of all the analyzer components for proper data measurement, including the solenoid valves, cooling system, other moving parts, as well as the Pt-100 temperature probes and the pressure sensors. The calibration curves for each probes and sensors are displayed individually and saved to the hard disk with date and time of test. Please refer to page 97 or 101 for a picture of the software screen.

Cooling System–For various user applications, the automated cloud point and pour point systems are available with either one-stage cooling for temperatures as low as –35°C or two-stage cooling for temperatures as low as –80°C. The direct cooling system requires no solvent cooling bath and thus eliminates operator exposure to solvents used in standard cooling systems. The direct system is capable of rapid cooling, approaching –80°C bath temperatures in approximately 15 minutes, and utilizes less electricity than in standard cooling systems. The rapid cooling feature combined with a consistent cooling profile system provides repeatable results with high test reproducibility.

Multiple Configuration System–These automated sample cooling and physical property measurement systems can be configured with up to six test positions with one of five possible test heads at each position: cloud point, pour point, cloud & pour point, freezing point, and cold filter plugging point. Standard and customized multiple configuration systems are readily available. Please refer to pages 97 and 101 about freezing point and cold filter plugging point product descriptions. *Please inquire with Koehler Customer Service about product specifications and ordering information.*

On line Fully Automatic Cloud Point Tester for Hydrocarbons Available. Inquire with Koehler Customer Service.



KLA-13 Automated Cloud Point and Cloud/Pour Point System

Specifications

Conforms to the specifications of:
KLA-1: ASTM D2500; IP 219; ISO 3015, ISO 3016; DIN 51597
KLA-2: ASTM D97; IP 15; ISO 3016
KLA-3: ASTM D97, D2500, D5853; IP 15, IP 219; ISO 3015, ISO 3016; DIN 51597
Electrical Requirements:
115V 60Hz, Single Phase
220V 50Hz, Single Phase

Dimensions lxwxh,in.(cm)

28x23x28 (72x59x71)
Net Weight: 205 lbs (93kg)

Included Accessories

Internal built-in direct refrigeration system
One- or two-stage cooling system
Interface Cells and Cables
Operating Software
Acquisition Board
Cord Cable without plug
Test Jars

Ordering Information

Catalog No.	
KLA-1	Automatic Cloud Point System (one-head unit)
KLA-2	Automatic Pour Point System (one-head unit)
KLA-3	Automatic Cloud/Pour Point System (one-head unit)
KLA-1/2	Automatic Cloud Point System (one-head) Two-stage (to –80°C)
KLA-2/2	Automatic Pour Point System (one-head) Two-stage (to –80°C)
KLA-3/2	Automatic Cloud/Pour Point System (one-head) Two-stage (to –80°C)

*Please specify voltage and cooling requirements when ordering. You may order a multiple configuration system (any combination of freezing point, cloud and cloud/pour point, and cold filter plugging point) with up to six heads. Please specify each measurement head with its associated catalog number using the sequential number combination. A two-head cloud point system would be **KLA-11**. A two-head cloud point and cloud/pour point system would be **KLA-13**, and a three-head cloud point, pour point and freezing point system would be **KLA-125**.*

PC Configuration–Operation of the software package requires the use of a PC, which should be ordered separately. *Please inquire with Koehler Customer Service if assistance is needed in procuring a PC.* The PC should have the following minimum requirements: Pentium III 800 MHz processor, 128 MB RAM, 2 GB hard drive, CD-ROM, Windows® operating system, Microsoft® Excel, Windows® keyboard, monitor, mouse, graphic and video cards.

Koehler INSTRUMENT COMPANY, INC.

Dielectric Breakdown Voltage of Insulating Oils

K16175 Automatic Portable Dielectric Tester with K16175-3 Integrated Printer

Test Method

The majority of high-voltage transformers, cables, switchgears, transducers, capacitors, and rectifiers use insulating oils for insulating electrically live parts and to carry off thermal energy. The quality of the insulating oil must be checked at regular intervals to ensure a long equipment service life. The most important requirement of an insulating oil is a high dielectric strength. Determination of the dielectric breakdown voltage of insulating oils provides an early detection method for any reduction in the insulating properties.

High Voltage Insulating Oil Tester

- Conforms to ASTM D877, D1816 and related test specifications
- Suitable for all insulating fluids
- Fast cut-out of the high voltage immediately after oil dielectric breakdown
- Overtemperature protection system with power cut-out

K16176 (100KV) Specifications

Fully Automatic
ASTM D877, D1816
BS EN 60156
Voltage Indication: Digital 0-100kV; ±1kV
Test Voltage: 0-100kV$_{rms}$, symmetric
Voltage Increase: 0.5; 1; 2; 3; 5 kV/Sec
Switch-off Time on BD: < 1ms
Switch-off Current: 4mA
Real Breakdown Monitoring (RBM): detects insulating liquids with specific resistance too low
Relative Humidity: <90% not condensing
Ambient Temperature: Operating 32˚F to 113˚F (0˚C to 45˚C)
Storage -4˚F to 131˚F (-20˚C to 55˚C)
Power Consumption: Max. 200VA
Power Supply: 100-240V/50-60Hz
Weight: 83lbs (37.6 kg)
Dimensions: 17¾"x18⅛"x19¾" (45x46x50cm)
Integrated Printer: 24 digit dot matrix with ink ribbon, paper width 2¼"
Interface: RS232
Additional Test Cycles: 5 (programmable)
Options: Windows PC Software (optional)

Ordering Information

Catalog No.		Order Qty
K16176	Automatic High Voltage Insulation Oil Tester 0-100kVAC	1
K16176-1	Test Vessel with electrodes for ASTM D1816	1
K16176-2	Test Vessel with electrodes for ASTM D877	1
K16176-3	Software (Optional)	
K16176-4	Transport Case	
K16175-12	Setting Gauge 1mm	
K16175-13	Setting Gauge 2mm	
K16175-14	Setting Gauge 2.54mm	

K16175 (75KV) Specifications

Fully Automatic
ASTM D877, D1816, BS EN 60156; CEI EN 60156; IEC 156; VDE 0370 Pt. 5
Voltage Indication: Digital 0-75kV; ±1kV
Test Voltage: 0-75kV$_{rms}$, symmetric
Voltage Increase: 0.5; 1; 2; 3; 5 kV/Sec
Switch-off Time on BD: < 1ms
Switch-off Current: 4mA
Real Breakdown Monitoring (RBM): detects actual flash over
Relative Humidity: <90%
Ambient Temperature: Operating 32˚F to 113˚F (0˚C to 45˚C)
Storage -4˚F to 131˚F (-20˚C to 55˚C)
Power Consumption: Max. 120VA
Power Supply: 100-240V/50-60Hz
Weight: 56.4lbs (25.6 kg) Basic unit
Dimensions: 40.5x34.5x27.5cm
Integrated Printer: optional
Interface: RS232
Additional Test Cycles: 5 (programmable)

Ordering Information

Catalog No.		Order Qty
K16175	Automatic High Voltage Insulation Oil Tester 0-75kVAC	1
K16175-1	Integrated Printer, Rechargable battery & Handle/Strap (Option to be ordered together with K16175)	
K16175-2	Integrated Rechargable battery & Handle/Strap (Option to be ordered together with K16175)	
K16175-3	Integrated Printer (Option to be ordered together with K16175)	
K16175-4	Transport Case	
K16175-5	Test Vessel with electrodes for ASTM D1816	1
K16175-6	Test Vessel with electrodes for ASTM D877	1
K16175-12	Setting Gauge 1mm	
K16175-13	Setting Gauge 2mm	
K16175-14	Setting Gauge 2.54mm	

Coking Tendency of Oil

K50100 Panel Coker

Test Method

Determines the tendency of finished oils to form coke when in contact with surfaces at elevated temperatures for short periods. A sample of oil is mechanically splashed against an aluminum test panel at elevated temperature. After a specified test period, the amount of coke deposited on the panel is determined by weight.

Panel Coking Test Apparatus

- Conforms to FTM 791-3462 specifications
- Suitable as a screening test prior to performing engine tests

Digitally controlled panel coking apparatus for finished lubricating oils, consisting of mechanical splasher, splash chamber and sample oil reservoir Test panel temperature and oil sump temperature are individually controlled by separate heaters with digital-indicating controllers. Mechanical splasher has a variable speed 0-1800rpm drive motor with digital indicating control. A high accuracy variable area flowmeter permits introduction of a corrosive acidic atmosphere to increase the severity of the test. Equipped with a digital countdown timer. Hinged safety cover has a port for fume removal and a safety interlock switch that interrupts power to the drive motor when the cover is lifted.

Specifications

Conforms to the specifications of:
FTM 791-3462
Maximum Temperature:
Test Panel: 400°C (752°F)
Sample Oil: 210°C (410°F)
Temperature Control: Separate controls for test panel and oil temperature, with digital °C/°F digital setpoint and display
Splashing Rate: 0-1800rpm, with digital display
Timer: 0-99.9 hr variable countdown
Flowmeter Range: 0.2-1.0L/hr
Oil Reservoir Capacity: 0.35 liter
Electrical Requirements:
115V 50/60Hz, 8A
220-240V 50/60Hz, 5A

Dimensions lxwxh,in.(cm)

Test Unit: 32x18x21 (81x46x53)
Control Cabinet:
18x12x18 (46x30x46)
Net Weight:
Test Unit: 50 lbs (22.7kg)
Control Cabinet: 25 lbs (11.3kg)

Shipping Information

Shipping Weight: 135 lbs (61.2kg)
Dimensions: 26.7 Cu. ft.

Digital Flowmeter option is available for this unit.

Software compatible, inquire with Koehler Customer Service.

Ordering Information

Catalog No.		Order Qty
K50100	Panel Coking Test Apparatus, 115V 50/60Hz	
K50110	Panel Coking Test Apparatus, with cyclic timer 115V 50/60Hz	
K50119	Panel Coking Test Apparatus, with cyclic timer 220-240V 50/60Hz	
K50190	Panel Coking Test Apparatus, 220-240V 50/60Hz	
	Accessories	
K50101	Aluminum Test Panel	1
K50102	Stainless Steel Test Panel (Type 321)	1

Koehler INSTRUMENT COMPANY, INC.

Evaporation Loss of Lubricating Oils (Noack Test)

K44001 Noack Evaporation Loss Analyzer & Accessories

Ordering Information

Catalog No.		Order Qty
K44000	Noack Evaporation Loss Tester, 115V 60Hz	1
K44001	Non-Woods Metal Noack Evaporation Loss Tester, 115V 60Hz	
K44090	Noack Evaporation Loss Tester, 230V 50/60Hz	
K44091	Non-Woods Metal Noack Evaporation Loss Tester, 230V 50/60Hz	

Accessories

K44063	Standardization Oil	1
K44064	Glassware Set	1
K44065	Evaporation Crucible	1
K44066	Crucible Spanner and Clamp	1
K44067	Reamer, 2mm diameter	1
K44068	Test Balls (5), 3.5mm diameter	1
K44069	Stand with Inclined Manometer and Bleed Valve	1

Additional Accessories (for Woods Metal Unit Only)

K44061	Vacuum Pump, 115V 60Hz	1
K44062	Vacuum Pump, 230V 50/60Hz	
K44071	Automatic Vacuum Regulator, 115V 60Hz Automatically maintains difference pressure of 20mm H_2O throughout the test procedure.	1
K44072	Automatic Vacuum Regulator, 230V 50/60Hz	
K44073	Certified Thermometer Range: 40 to 260°C, with certificate	1
K44074	Certified Thermometer Range: 200 to 400°C, with certificate	1
K44075	Thermometer Holder	2
K44076	300g Woods Metal and Brush	1

Software compatible, inquire with Koehler Customer Service.

Test Method

A quantity of 65g of a lubricant is placed in an evaporative crucible and heated to 250°C for 60 minutes. The evaporation loss tendencies of the lubricant are determined by passing a constant air stream over the heated sample by means of a vacuum pump.

Noack Evaporation Loss Analyzer

- Conforms to ASTM D5800, DIN 51581 specifications
- Non-Woods Metal or Woods Metal heating bath option

The Koehler Noack Evaporation Loss Analyzer tests the evaporation loss tendencies of lubricating oils at temperatures of up to 350°C, available with either a Non-Woods Metal or a Woods Metal heating bath.

Non-Woods Metal Option

Fully insulated aluminum block heating unit has a microprocessor-based digital temperature and pressure controller. A digital stopwatch is also included for recording test and cooling times. The test is started automatically after insertion of the crucible and displays both temperature and pressure curves in real-time throughout the test. The stainless steel evaporation crucible inserts into the aluminum block oven and includes a plated brass lid assembly with threaded support ring, hardened steel air nozzles, and extraction tube with threaded and sealed connection. Order required accessories separately.

Woods Metal Option

Fully insulated aluminum block heating unit has a microprocessor-based digital temperature controller and stopwatch for recording test and cooling times. The evaporation crucible is identical as listed above. Aluminum block accepts certified thermometers for temperature monitoring. Order required accessories, vacuum pump, and automated pressure control unit separately.

Specifications

Conforms to the specifications of:
ASTM D5800; DIN 51581
Capacity: 1 sample
Temperature Range: 150 to 350°C
Temperature Accuracy: ±0.1°C
Electrical Requirements:
115V 60Hz, 12.0A
230V 50Hz, 5.8A

Dimensions lxwxh,in.(cm)

Non-Woods Metal Noack Tester with Stand and Glassware Set:
23¼x14½x26¾ (59x35x68)
Net Weight: 59 lbs (26.7kg)

Woods Metal Noack Tester:
18x14½x14½ (4x38x37)
Glassware Set and Vacuum Regulator:
23¼x14½x26¾ (59x35x68)
Net Weight: 84¼ lbs (38.2kg)

Required Accessories

Glassware Set, consisting of
(2) bottles with ground stoppers, glass tubes, and tubing set
Vacuum Pump
Evaporation Crucible
Crucible Spanner and Clamp
Reamer, 2mm diameter
5 Test Balls, 3.5mm diameter
Protection Gloves
300g Woods Metal and Brush
Stand with Inclined Manometer (range: 0-30mm H_2O) and Bleed Valve for Manual Regulation of Air Stream

Shipping Information

Shipping Weight:
Non-Woods Metal Unit:
124 lbs (56kg)
Woods Metal Unit:
62½ lbs (28.4kg)
Dimensions:
Non-Woods Metal Unit: 5.0 Cu. ft.
Woods Metal Unit: 7.3 Cu. ft.

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.

Foaming Characteristics of Lubricating Oils ..... Pages 108-110

ASTM D892; IP 146; DIN 51566; FTM 791-3211, 791-3213

Air Supply
Acetone
Desiccant
Toluene
Isopropanol
Cotton

Water Separability of Petroleum Oils and Synthetic Fluids ..... Page 111

ASTM D1401; ISO 6614; DIN 51599; FTM 791-3201

Precipitation Naphtha
Nochromix
Cotton
Acetone
Distilled Water

Demulsibility Characteristics of Lubricating Oils ..... Page 112

ASTM D2711 and DIN 51353

Centrifuge
Distilled Water
Centrifuge Tubes
1,1,1-Trichloroethane

Oxidation Stability of Steam Turbine Oils and Inhibited Mineral Insulating Oils by Rotating Bomb ..... Pages 114-118

ASTM D2112, D2272; IP 229

Liquid Detergent
Potassium Hydroxide
Acetone
Chloroform
Oxygen
Petroleum Spirit
Hydrochloric Acid
Isopropanol

Oxidation Stability of Gasoline Automotive Engine Oils by Thin-Film Oxidation Uptake (TFOUT) ..... Pages 114-118

ASTM D4742

Liquid Detergent
n-Hexane
Potassium Hydroxide
Isopropanol
Acetone
Oxygen
Air Supply
Water

Oxidation Stability of Distillate Fuel Oil (Accelerated Method) ..... Pages 119-122

ASTM D2274

Drying Oven
Membrane Filters
Hot Plate
Oxygen
Acetone
Toluene
Filter Assembly
Beaker, 200mL
Isooctane
Water Supply
Methanol

Oxidation Characteristics of Inhibited Mineral Oils ..... Pages 119-122

ASTM D943; DIN 51587

Desiccant Bags
Abrasive Cloth
Distilled Water
Detergent
Hydrochloric Acid
Oxygen
Gloves
Acetone
Glass Syringes, 10 and 50mL
Flexible Tubing
n-Heptane
Isopropanol
Nitrogen

Sludging Tendencies of Inhibited Mineral Oils ..... Pages 119-122

ASTM D4310

Syringe, 50mL
Acetone
n-Heptane
Chromic Acid
Filter Holder
Separatory Funnel
Forceps
Nitrogen
Desiccant Bags
Isopropanol
Flexible Tubing
Detergent
Hydrochloric Acid
Oxygen
Membrane Filters
Weighing Bottle, 60mL
Drying Oven
Vacuum Source
Flushing Tube
Rubber Policeman

Oxidation Characteristics of Extreme Pressure Lubricating Oils ..... Pages 119-122

ASTM D2893

Drying Tower
Chromic Acid or equivalent detergent cleaning solution
Air Supply

Oxidation Stability of Mineral Insulating Oils ..... Page 123

ASTM D2440

n-Heptane
Potassium Hydroxide Solution
Isopropyl Alcohol
Acid Free Filter Paper
Oxygen
Toluene
Chloroform
p-Naphtolbenzein Indicator

Oxidation Stability of Inhibited Mineral Turbine Oils ..... Page 126

IP 280

Oxygen
Phenolphthalein
Hydrochloric Acid
Toluene
Ethanol
Membrane Filters
Burette
Filtration Apparatus
Alkali Blue Indicator
Heptane
Potassium Hydroxide
Dichloromethane
Sulfuric Acid
Evaporating Dish
Air Oven
Conical Flask, 500mL

Oxidation Stability of Straight Mineral Oil ..... Page 126

IP 306

Filtering Crucibles
Burette
Alkali Blue Indicator
n-Heptane
Potassium Hydroxide
Chloroform
Sulfuric Acid
Membrane Filters
Petri Dishes
Oven
Porcelain Crucibles
Oxygen
Phenolphthalein
Hydrochloric Acid
Toluene
Ethanol
Acetone
Forceps
Filtration Apparatus
Isopropanol

Additional Accessories (Continued)

Oxidation Stability of Mineral Insulating Oil ..... Page 126

IP307

Filtering Crucibles
Burette
Alkali Blue Indicator
Heptane
Potassium Hydroxide
Chloroform
Sulfuric Acid
Isopropanol
Forceps
Filtration Apparatus
Porcelain Crucibles
Oxygen
Phenolphthalein
Hydrochloric Acid
Toluene
Ethanol
Acetone
Membrane Filters
Petri Dishes
Oven

Oxidation Stability of Inhibited Mineral Insulating Oils ..... Page 126

IP 335

Porcelain Crucibles
Oxygen
Phenolphthalein Solution
Hydrochloric Acid
Toluene
Ethanol
Forceps
Filtration Apparatus
Sulfuric Acid
Isopropanol
Burette
Alkali Blue Indicator
n-Heptane
Potassium Hydroxide
Chloroform
Membrane Filters, 5.0 µm
Petri Dishes
Oven
Acetone

Thermal Oxidation Stability of Automotive Gear Lubricants ..... Page 127

ASTM 5704; STP12A L-60-1 Performance Test (formerly CRC L-60 Test); FTM 791B Method 2504

Oakite 811
Stoddard Solvent
Reference Oils
Absorbent Cotton
Heptane
Pentane
Toluene
Air Supply
Tweezers
Organic Cleaning Solvent

Corrosiveness and Oxidation Stability of Hydraulic Oils, Aircraft Turbine Engine Lubricants and Other Highly Refined Oils ..... Pages 124-125

ASTM D4636; FTM 791-5307, FTM 791-5308; IHC BT-10, DIN 51394

Air Supply
Analytical Balance
Centrifuge and Tubes
Microscope
Oven (optional)
Forceps
Sodium Dichromate
Brush
Nochromix
Cotton
n-Heptane
Acetone
Nitric Acid
Sodium Hydroxide
Sodium Phosphate
Sulfuric Acid
Distilled Water

Rust Preventing Characteristics of Inhibited Mineral Oil in the Presence of Water (Standard and Horizontal Disc Methods) ..... Pages 128-129

ASTM D665, D3603; NACE TM-01-72; IP 135; ISO 7120; DIN 51355, DIN 51585; FTM 791-4011, 791-5315

Oven
Isooctane
Distilled Water
Petroleum Spirit 60/80
Naphtha
Synthetic Sea Water
Precipitation Naphtha

Corrosion of Lead by Lubricating Oils ..... Page 130

FTM 791-5321.1

Air Supply
Forceps
Acetone
Cotton
Analytical Balance
Petroleum Naphtha
Steel Wool

Bearing Compatibility of Turbine Oils ..... Page 131

FTM 791-3452

Test Equipment for:
- ASTM D445 Kinematic Viscosity (refer to Viscosity Section)
- ASTM D524 Ramsbottom Carbon Residue (refer to Page 53)
- ASTM D974 Total Acid Number

Copper Corrosion From Petroleum Products ..... Page 131

ASTM D130

Filter Paper
Isooctane
Stoddard Solvents
Cotton Wool
Stainless Steel Forceps

Cloud Point and Pour Point of Petroleum Oils ..... Pages 132-133

ASTM D97, D2500; IP 15, 219; ISO 3015, 3016; DIN 51597; FTM 791-201

Methanol
Solid Carbon Dioxide
Calcium Chloride
Ethanol
Sodium Sulfate
Petroleum Naphtha
Acetone
Sodium Chloride

Coking Tendency of Oil ..... Page 135

FTM 791-3462

Emery Paper
Petroleum Ether

Evaporation Loss of Lubricating Oils (Noack Test) ..... Page 136

ASTM D5800; DIN 51581; CEC L40 A93

Balance
Toluene
Naphtha

Tribology

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Vane Pump Wear ASTM D2882	146

Four Ball Wear and EP

K93100 Four Ball Tester

Ordering Information

Catalog No.		Order Qty
K93100	Four Ball Tester, 220V 60 Hz	1
K93100-PN	Four Ball Tester with pneumatic loading, 220V 60Hz	
K93190	Four Ball Tester, 380V 50 Hz	1
K93190-PN	Four Ball Tester with pneumatic loading, 380V 50Hz	

Included Accessories

- Set of Weights
- Ball Chucks
- Ball Pot
- Ball Chuck Remover
- Ball Rack
- Ball Clamp Ring
- Ball Holder Base Disc
- Set of Hand Tools
- Torque Wrench
- Graduated-Scale Microscope
- Electrical Controller
- Connecting Cables
- TriboDATA Software
- Calibration and Test Reports

Accessories

Catalog No.	
K93110	CCD Camera for Wear Scar Imaging
K93105	Test Balls (Pack of 100)

Tribology (Friction and Wear) Testing of Lubricants
Friction and Wear Test Equipment

Koehler Instrument Company is pleased to offer advanced equipment for a variety of friction and wear tests. Several of the standard instruments that we offer are listed here. Please contact us to discuss your requirements for these as well as custom-designed units for tribology analysis methods. Our applications personnel will consult with you on your requirements and work with our design staff to provide solutions for your tribology testing needs.

Test Method

Determines the Wear Preventative (WP) and Extreme Pressure (EP) characteristics of lubricating oils and greases in sliding steel-on-steel applications. The test consists of rotating a steel ball under load against three stationary steel balls coated with lubricant. Measurements are taken at the rotating speeds, temperatures, and duration as specified by published standards. The load-wear index can be calculated from the weld point in EP tests, and lubricant comparisons can be made based upon scar diameters incurred from wear tests.

Four Ball Wear and EP Tester

- Conforms to ASTM D2266, D2596, IP 239, and related specifications
- Performs Wear Preventative (WP) and Extreme Pressure (EP) tests
- Displays and records normal load, frictional torque, time, and temperature
- Test speeds and temperatures are electronically controlled
- Data Acquisition Software and Card are included
- Optional CCD Camera is available for wear scar imaging
- Custom configurations are available
- Precise variable loading capability*

Four Ball Tester performs both Wear Preventative (WP) and Extreme Pressure (EP) analyses for measuring the wear and frictional properties of lubricants under sliding steel-on-steel test conditions. Tests are performed in accordance to the latest ASTM and IP published methods. Normal load on the ball assembly and frictional torque are measured through load cells. Wear scars on the steel balls are measured with a graduated-scale microscope and can be recorded with an optional CCD camera. Data is processed and stored utilizing TriboDATA, an advanced data acquisition and processing software package. Test results can be plotted and compared, as well as exported to other programs.

Specifications

Conforms to the specifications of:
ASTM D2266, D2596, D2783, D4172, D5183*, IP 239
Electrical Requirements:
220V, 60Hz, 3 phase
440V, 50Hz, 3 phase
Drive Motor: 1.5 kW
Test Speeds: 1200, 1440, 1760 rpm
Optional Test Speeds (min/max): 1000/3000, 300/3000 rpm
Maximum Axial Load: 10000 N at 3000 rpm or 12000 N at 1800 rpm
Test Duration (min/max): 1/9999 min
Test Ball diameter: 12.7 mm

Shipping Information

Shipping Weight: 1360 lbs (620 kg)
Dimensions: 45 Cu. ft.

**Pneumatic option required*
IP300 or CEC-L-45-A-99 units available.
Please contact Koehler Customer Service for additional information.

Tribology Data Acquisition System

TriboDATA Data Acquisition System

- Powerful data acquisition system provides analog to digital conversion and data analysis of test results for many tribology instruments available from Koehler as well as ***other tribology instrument manufacturers***
- Real-time display of critical test parameters such as normal load, friction force, temperature, and time

The Koehler TriboDATA System is designed to acquire and process analog data from the various tribology test instrumentation offered from Koehler as well as from *other tribology instrument manufacturers*. The analog-to-digital converter card is comprised of four analog inputs, and the test data is recorded and displayed in real-time. Up to four graphs can be displayed simultaneously. The data can be stored to disk for future reference or exported in an ASCII text format to other software packages. Critical test parameters are also saved with the data. With the TriboDATA hardware and software package, data acquisition of crucial test parameters such as normal load, friction load, temperature, and time can be seamlessly performed to ensure that your test results are consistent and repeatable within prescribed test conditions. As an option, a CCD camera package is available to capture wear scar images and store them on a PC for analysis.

Computer Requirements

Processor: Pentium or higher
Processor Speed: 100 MHz or higher
Operating System: Windows® 95/98/NT
Memory (RAM): 16 Mb
Required Disk Space: 10 Mb
One Free Expansion ISA Slot

Included Accessories

Software on CD
Acquisition Data Card
Connection Cable
Instruction Manual

K93900 TriboDATA Data Acquisition System

Ordering Information

Catalog No.		Order Qty
K93900	TriboDATA Data Acquisition System	1

Friction

Friction Tester

- Requires only a few drops of fluid sample or a small specimen size to test
- Measures frictional force with a piezoelectric force transducer
- Performs friction tests on a variety of lubricants, greases, cutting fluids, metals, composites, ceramics, polymers, and coatings
- Electronic control of stroke length, frequency, duration, and temperature
- TriboData Acquisition Software included to record and graph test results
- Wear characteristics can also be evaluated using a profilometer
- HFRR configuration that correlates to ASTM D6079 and other custom configurations are available

Evaluates the dynamic friction at reciprocatory contacts of dry or lubricated materials as the function of normal load, velocity, frequency, temperature, and time. A wide variety of materials including fluid lubricants, greases, cutting fluids, metals, composites, ceramics, polymers, and coatings can be tested. The test is conducted by pressing the test specimen against a ball, pin, or cylinder undergoing reciprocating linear motion, producing a sinusoidal velocity profile which allows for the monitoring of static and dynamic friction force over a wide range of linear sliding speeds. The test load, stroke, frequency, and temperature can be adjusted to simulate different conditions. The frictional force developed at the contact interface is measured by a piezoelectric force transducer equipped with a charge amplifier. The test results can be displayed and recorded on a storage oscilloscope or acquired on a PC with the TriboDATA acquisition software for evaluation. Wear analysis of the sample can also be evaluated with a profilometer.

Specifications

Normal Load: 5-50N
Frequency: 1-50Hz
Stroke: 0-10mm (1-10Hz)
0-5mm (10 - 20Hz)
0-2mm (20 - 50Hz)
Temperature Range: ambient to 100°C
Test Duration: 0.1-999 min

Shipping Information

Shipping Weight: 264 lbs (120 kg)
Dimensions: 25 Cu. ft.

Included Accessories

Set of Weights
Test Specimen Holders
Ball Sample
Pin Sample
Set of Hand Tools
Electronic Controller
Fuses
Connecting and Signal Cables
TriboDATA Software
Calibration and Test Reports

Ordering Information

Catalog No.		Order Qty
K93400	Friction Tester, 115V 60 Hz	1
K93490	Friction Tester, 230V 50 Hz	

Pin-On-Disc

K93500 Pin-On-Disc Tester

Specifications for Pin-On-Disc with Environmental Chamber & Lubricant Recirculating System

Temperature: 60°C Maximum

Discharge Rate: 0-1 L/min
Viscosity Range: 90 SAE Maximum
Capacity: 3L of Lubricant

Shipping Information

Shipping Weight: 440 lbs (200 kg)
Dimensions: 18 Cu. ft.

Included Accessories

Electrical Controller Unit
Connecting Cables
Spare Fuses
TriboDATA Software
Set of Weights
Set of Hand Tools
Set of Pins
Calibration and Test Reports

Ordering Information

Catalog No.		Order Qty
K93500	Pin-On-Disc Machine, 115V 60 Hz	1
K93590	Pin-On-Disc Machine, 230V 50 Hz	

Optional Configurations Available

Environmental Chamber

Lubricant Recirculating System

Environmental Chamber and
Lubricant Recirculating System

High temperature models (up to 700°C) are available. Please contact Koehler Customer Service for additional information.

Pin-On-Disc Tester

- Conforms to ASTM G99 standard test method
- Analyzes wear and friction characteristics of sliding contacts (dry or lubricated conditions)
- Tests can be performed on a variety of materials: metals, polymers, composites, ceramics, lubricants, cutting fluids, abrasive slurries, coatings, and heat-treated samples
- TriboDATA software package varies and records pin pressure, pin temperature, sliding speed, and lubrication parameters
- Custom configurations available

The Pin-On-Disc machine is a versatile unit designed to evaluate the wear and friction characteristics a variety of materials exposed to sliding contacts in dry or lubricated environments. The sliding friction test occurs between a stationary pin stylus and a rotating disk. Normal load, rotational speed, and wear track diameter can be varied. Electronic sensors monitor wear and the tangential force of friction as a function of load, speed, lubrication, or environmental condition. These parameters as well as the acoustic emissions at the contact are measured and displayed graphically utilizing the TriboDATA software package.

Specifications

Conforms to the specifications of: ASTM G99

Sliding Speed Range:	0.26-10 m/sec
Disc Rotation Speed:	100-2000 rpm
Maximum Normal Load:	200 N
Frictional Force:	0-200 N
Wear Measurement Range:	4 mm
Pin Size:	3-12 mm diagonal/diameter
Disc Size:	160 mm diameter x 8 mm thick
Wear Track Diameter:	10-140 mm

Bearing and Grease Noise Characteristics

Grease Noise Tester

- Quantitative evaluation of grease/bearing noise characteristics
- Peak Detection Algorithm for detection of vibration peaks
- Data Acquisition Software package to monitor, record, and evaluate data
- High quality test spindle rotating at 1800 rpm
- Pneumatic loading device for the test bearing

The Grease Noise Tester evaluates the lubrication integrity of greases, providing a quantitative assessment of the noise characteristics of the grease. The use of clean lubricants is essential for obtaining long bearing life. Many factors affect the degree of cleanliness of greases during normal operation. A clean grease for initial lubrication as well as re-lubrication are essential to ensure machine longevity. In applications where bearing fatigue life is not critical such as low operating loads, a clean grease is essential to ensure low bearing noise required for many electric motor applications.

The Grease Noise Tester measures the specific disturbances caused by the rolling of particulates called vibration peaks, and features a proprietary Peak Detection Algorithm that singles out these vibration peaks from the total bearing vibration signal. The number of vibration peaks and their intensity are analyzed to determine a quantitative value for quiet running behavior of the bearing. In addition, the "grease damping ability" can be evaluated for a direct comparison between the running of a dry bearing versus the running of a lubricated bearing. Designed for proper testing while minimizing the risk of outside contamination, the semi-automated tester utilizes computer-controlled grease dosages and peak measurements on a single test bearing of special low noise quality. The operator simply mounts the test bearing and test grease syringe into the tester, programs the test parameters into the computer, and begins the test. The test results can be monitored, recorded, and evaluated with the data acquisition software package.

Specifications

Electrical Requirements:	400-460 V, 50/60 Hz, 3 Phase
Spindle System:	Hydrodynamic oil spindle
Spindle Speed:	1800 rpm
Air Supply:	Pneumatic system, min. 5.5bar dry air
Axial Loading System:	Pneumatic, 30 N maximum

Dimensions lxwxh,in.(cm)
56½x25½x70 (141x65x170)
Net Weight: 1870 lbs (850kg)

K94300 Grease Noise Tester

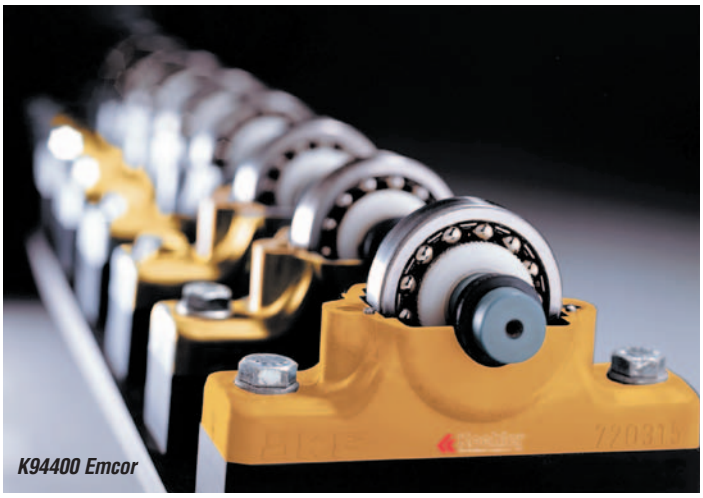
Ordering Information

Catalog No.		Order Qty
K94300	Grease Noise Tester, 400-460V 50/60Hz, 3 Phase	1

Accessories

K94301	Pick-Up Sensor	2
K94302	Calibration System	1
K94303	Test Bearing	20
K94304	Seal for Test Bearing	20
K94305	Pressing Element	1

Corrosion Inhibition Properties of Greases


K94400 Emcor

Test Method

Measures the ability of a grease to protect a bearing against corrosion in the presence of water. Two sets of grease-coated bearings per station are partially immersed in water and rotated at a speed of 80 rpm in a sequence of running and resting periods. At the end of the test, the raceways of the bearing outer rings are inspected for rust.

Emcor Grease Testing Machine

- Conforms to ASTM D6138, IP 220, DIN 51802, and related international test methods
- Evaluates the rust preventive properties of greases and oils
- Performs both standing and dynamic testing

The Emcor Grease Testing Machine evaluates the rust preventive properties of greases on bearing components, measuring the ability of a grease to protect a bearing against corrosion in the presence of water. As bearings are normally used in environments exposed to humidity and temperature variations, condensation may form on the bearing thus promoting the onset of rust. Rust is detrimental to proper bearing operation and will compromise the longevity of the bearing. A good quality grease should be designed to protect the bearing from rust and corrosion under these conditions.

The Emcor test is performed by mounting a double-row bearing per test station for up to 8 separate test stations. The test bearings are specially-treated 1306K/236725 double row self-aligning ball bearings. The bearings are washed carefully, filled with the appropriate quantity of test grease and fitted on the shaft with the help of a nylon sleeve and nut. The seals are fitted and the specified quantity of water is introduced into the housings. The bearings are placed in the housings, and the housings are closed and sealed. The test is conducted with the bearings partially immersed in water in a sequence of running and resting over a period of one week. This also determines whether the thin oil film left in the contact zone of rollers and raceways is able to protect the bearings against corrosion while the bearings are standing. At the end of the test, the raceways of the bearing outer rings are inspected for rust. The Emcor system features test method versatility, since both greases and oils can be tested as well as variations can be made with regard to the test medium (e.g., brine instead of water). The cost for running these tests are minimal. The two test bearings are the only machined parts that have to be renewed for each test, and the polyamide material for the housing is rigid and strong and rarely ever needs replacement.

Ordering Information

Catalog No.		Order Qty
K94400	Emcor Grease Testing Machine, 115V 60Hz	1
K94490	Emcor Grease Testing Machine, 230V 50Hz	
	Accessories	
K94401	Test Bearing	8
K94402	Mounting Sleeve	8
K94403	Mounting Nut	8

Specifications

Conforms to the specifications of:
ASTM D6138; IP 220; ISO 11007; DIN 51802; NFT 60-135; SIS 155130
Electrical Requirements:
115V, 60Hz, 1 phase
230V, 50Hz, 1 phase

Dimensions lxwxh,in.(cm)

48½x15x11 (123x38x28)
Net Weight: 88 lbs (40kg)

Shipping Information

Shipping Weight: 121 lbs (55 kg)
Dimensions: 8 Cu. ft.

Mechanical Stability of Greases

V2F Grease Testing Machine

- Evaluates the mechanical stability of grease under strong forces

The V2F Grease Testing Machine evaluates the mechanical stability of grease in a more stringent fashion than the penetration or roll stability tests. The machine was developed after extensive measurements on railway axleboxes and constructed such that the vibrations simulate the actual accelerative forces typical for passing over rail track joints. To conduct the test, grease is applied to the two test bearings which are mounted into the axlebox. During the first testing period of 72 hours, the bearings are run at 500rpm and the 50kg hammer strikes the axlebox with a force of 12 to 15 G every second. The test rig is calibrated using a normal accelerometer technology, and the temperature of the bearings is monitored during the test. If limited leakage is observed, then a second test is run at 1000 rpm. The amount of grease leakage through the labyrinth seal is measured and evaluated at the end of the test.

Ordering Information

Catalog No.		Order Qty
K94600	V2F Grease Testing Machine, 115V 60Hz, 1 Phase	1
K94690	V2F Grease Testing Machine, 230V 50Hz, 1 Phase	
K94695	V2F Grease Testing Machine, 400V 50Hz, 3 Phase	
	Accessories	
K94601	Test Bearing	2

Dimensions lxwxh,in.(cm)

78¾x39⅛x63 (200x100x160)
Net Weight: 3410 lbs (1550kg)

Shipping Information

Shipping Weight: 4268 lbs (1940kg)
Dimensions: 145 Cu. ft.

Lubricating Ability of Greases

Test Method

Measures the ability of a grease to lubricate under various speeds and at various temperatures, by recording the number of running hours before the grease ceases to lubricate and causes the bearings to fail. The maximum operating speed and temperature for any particular grease can be determined.

ROF Grease Testing Machine

- Evaluates life and temperature performance limits of lubricating greases
- Weibull Analysis Software Package for easy data calculation

The ROF Grease Testing Machine determines both the useful life and high temperature performance limits for a lubricating grease in a small, lightly-loaded deep-groove ball bearing test. The test sample is run at different temperatures and speed, and then results can be used directly for calculation of the grease life in actual lubricated-for-life DGBB applications such as in electric motors. To conduct a test, the standard 6204/C3 test bearings with separate shields are prepared and lubricated with a standard quantity of the test grease. Two bearings are properly mounted in each test station for up to five (5) stations and then slowly brought up to the test temperature. Each bearing set is individually temperature-controlled by means of a thermocouple. When the test temperature deviates by 20°C from the preset test temperature as a result of bearing failure, the particular station involved will be switched off automatically. The other stations will continue running, and a counter monitors the total number of hours each station has run. From the number of running hours, the median grease life (L_{50}, the time at which 50% of the bearings fail due to inadequate lubrication), grease life (L_{10}, the time at which 10% of the bearings fail), and the Weibull Exponent ß (the measure of the spread in grease life) using the Weibull Software Package. From the results obtained, a calculation can be made how bearings will behave in practice as well as a relubrication interval. The test bearings 6204/C3 are normal production bearings and are the only component that has to be renewed for each test, keeping the overall cost at a minimum.

Dimensions lxwxh,in.(cm)
Control Unit: 25½x17¾x36½ (65x45x93)
Bearing Testing: 69x35½x10½ (175x90x27)
Net Weight: 759 lbs (345kg)

K94500 ROF Grease Testing Machine

Ordering Information

Catalog No.		Order Qty
K94500	ROF Grease Testing Machine, 400V 50Hz, 3 Phase	1
K94590	ROF Grease Testing Machine, 460V 60Hz, 3 Phase	
	Accessories	
K94501	Weibull Data Analysis Software	1
K94502	Test Bearing	10

Specifications

Conforms to the specifications of:	DIN 51806
Bearing Type:	6204-2Z/C3, normal filling degree
Standard Shaft Speed:	10,000 rpm
Optional Shaft Speeds:	6,000 and 20,000 rpm
Test Temperature:	ambient to 170 °C
Radial Load:	50N / bearing
Axial Load:	100N / bearing

Shipping Information

Shipping Weight: 935 lbs (425 kg)
Dimensions: 35 Cu. ft.

Mechanical and Dynamic Behavior of Greases

R2F Grease Testing Machine

- Conforms to DIN 51806 test specifications
- Evaluates the mechanical stability properties of lubricating greases
- User variable test conditions provide enhanced system versatility

The R2F Grease Testing Machine evaluates grease performance by measuring the wear of the rollers and the cage. In this test, significant wear will only occur as a consequence of the inability of the grease to maintain a lubricant film in the rolling and sliding contact during the full test period. The grease is tested in two run-in bearings under constant radial load of 8340 N at a speed of 1500 rpm for a period of 480 hours (20 days). Over the first 24 hours, no external heat is applied. The test is then continued for a period 19 days, where heat is applied to the bearing housings at a constant temperature between 60 and 160°C. The test is stopped automatically if the bearing temperature starts to rise more than 3°C above the preset test temperature, due to increased bearing friction.

Ordering Information

Catalog No.		Order Qty
K94700	R2F Grease Testing Machine, 380V 50Hz, 3 Phase	1
	Accessories	
K94701	Test Bearing	2

Dimensions lxwxh,in.(cm)
39⅛x19¾x39⅛ (100x50x100)
Net Weight: 1276 lbs (580kg)

Shipping Information

Shipping Weight: 1507 lbs (685 kg)
Dimensions: 23 Cu. ft.

Multispecimen

Multispecimen Tester

- Multiple test configuration for wear and friction monitoring in one unit
- Speeds variable to 2000 rpm and loads to 1000 N
- Data acquisition system records speed of rotation, normal load, sample temperature, and frictional torque

Measures and displays a variety of friction and wear characteristics on various geometric test samples with different compositions and forms. Test configurations are easy to change on the instrument: single or multiple, sliding or rolling, point, line or area contacts are available. A wide range of materials including coatings, lubricants, plastics, metals, polymers, ceramics, and composites can be readily analyzed. The test is performed by mounting a test sample into the spindle and rotating it against a stationary counter-face test specimen. The spindle rotation speed, normal load, and interface temperature can be user-adjusted in accordance with published ASTM standards. Specimen holders are designed for standard test configurations; optional custom designed holders for customer specific applications are also available. This unit has a temperature range to 120°C, load to 1000 N and speed up to 2000 rpm. Windows®-based TriboDATA data acquisition software is included, and some of the possible configurations are shown in the table to the right.

Specifications

Conforms to the specifications of:
ASTM D2266, D3702, D4172
Normal Load: 5-1000 N
Frictional Torque Measurement Range: 0-10 Nm
Shaft Speed: 200-2000 rpm
Wear Measurement: 0-2000 µm
Non-Rotating Sample Diameter/Diagonal: up to 80 mm
Pin Sample Diameter: up to 8 mm
Ball Diameter: 12.7 mm
Non-rotating Sample Temperature: Ambient to 100°C

Configurations Table

Ball on flat Sliding point contact	1, 2, 3 balls can be used Dry or lubricated contact
Cylinder on flat Sliding line contact	1 or 2 pins. Dry or lubricated
Pin on flat Sliding area contact	1, 2 or 3 pins. Dry or lubricated
Four ball wear Wear preventive properties of lubricants	ASTM D2266 ASTM D4172
Thrust washer Rotating washer against fixed washed with axial load	ASTM D3702

Ordering Information

Catalog No.		Order Qty
K93600	Multispecimen Tester, 220V 60 Hz 3 Phase	1
K93690	Multispecimen Tester, 380V 50 Hz 3 Phase	

Included Accessories

Electrical Controller
Electrical Cables
TriboDATA Software
Set of Hand Tools
Calibration and Test Reports

Included Adapters

Ball on Flat
Cylinder on Flat
Pin on Flat
Four Ball Wear Preventative
Thrust Washer

Shipping Information

Shipping Weight: 880 lbs (400 kg)
Dimensions: 32 Cu. ft.

Tribology Test Specimens and Other Tribology Equipment

Scratch Tester

Evaluates the scratch resistance of a sliding surface pressed against stylus as a function of normal load, sliding speed, geometry and materials such as metals, ceramics, composites, and coatings. Tangential force and level of acoustic emission at the contact are displayed graphically on a PC. Onset of scratch or adhesion failure is inferred from these graphs. Features uni- and bi-directional sliding, user-defined load, interchangeable diamond stylus, data acquisition software, and CCD camera to view and capture scratch image.

Slurry Abrasion Tester

Measures the slurry abrasive resistance of solid materials as prescribed by ASTM G105 specifications. Performs tests on metals, minerals, polymers, composites, ceramics, coatings, and heat-processed materials. A rectangular test sample is rotated in a slurry cup with the temperature maintained using a water bath. The test speed, temperature, duration, sample size, and slurry composition can be varied. The differential mass of the sample before and after the test is converted to volume loss (abrasion index) for direct comparison of the tested materials.

Tapping Torque Tester

Evaluates metal working fluids and various machining operations according to ASTM D5619 for the the torque requirements of tapping operations in pre-drilled samples. Software package acquires cutting torque and rotational speed and displays them as a function of test duration or angle of tool rotation.

Air Jet Erosion Tester

Performs air jet erosion test according to ASTM G76 specifications. A test sample is bombarded by a gas containing particulates with a known velocity and concentration of particles. Comparison can be made by varying test sample composition, size, particle velocity, angle of incidence, and temperature.

Dry Abrasion Tester

Measures index of abrasive resistance to dry sand according to ASTM G65 test specifications. Test specimen is held against a rotating wheel and abraded with a grit of controlled size, composition, and flow with the proper test duration and applied force as prescribed by the ASTM test method. The differential mass of the specimen before and after the test is recorded and converted to volume loss (abrasion index) for direct comparison of tested materials.

Custom-Built Tribology Test Equipment and Test Specimens

Test specimens are available for all of the tribology instrumentation offered from Koehler. Please inquire with customer service about other custom-built tribology test equipment and test specimens. Custom-designed equipment is readily available for the following tribology test methods:

Timken (ASTM D2509, D2782)
BOCLE (ASTM D5001)
Grease Life Tester (ASTM D3336)
Pin and V-Block (ASTM D2670, D3233)
Shear Stability (ASTM D6278)
HFRR (ASTM D6079)
Universal Wear (ASTM G77, G99)
Vane Pump Wear (ASTM D2882)

High Temperature Air Jet Erosion Tester

Lubricating Greases

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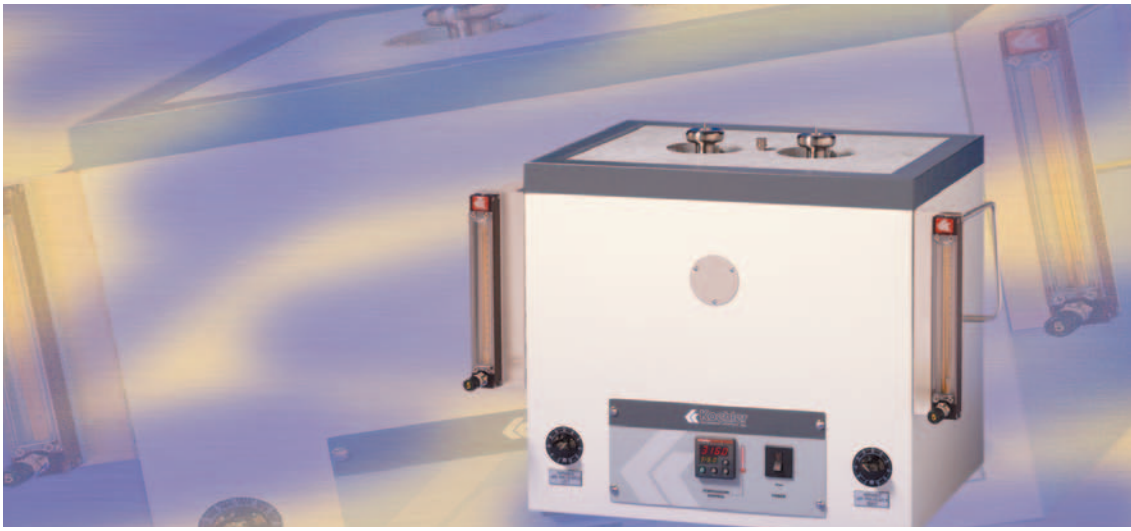
For information on additional test methods for lubricating greases:

–Please refer to the Penetration Section

–Additional test methods are available upon request

–please call or write for information



Evaporation Loss of Lubricating Greases and Oils

K29500 Evaporation Test Cell with Grease Cup

Specifications

Conforms to the specifications of:
ASTM D972, D2878; IP 183; FTM 791-351
Capacity: 2 oil or grease samples
Maximum Temperature: 350°F (177°C)
Temperature Control Stability: ±1°F (± 0.5°C)
Circulation: 1/20hp stainless steel impeller
Bath Medium: 5.3 gal (20L) high temperature transfer fluid
Electrical Requirements:
115V 50/60Hz, Single Phase, 8.6A
220-240V 50/60Hz, Single Phase, 4.5A

Included Accessories

Evaporation Cell:
Grease Sample Cup (K29500)
-or-
Oil Sample Cup (K29550)
Test Bath:
Support Clamps (2)
Thermometer Holder

Dimensions

33" (maximum width with two evaporation cells inserted) x 25½"h (84x65cm)
Net Weight: 62 lbs (28.1kg)

Shipping Information

Shipping Weight: 90 lbs (40.8kg)
Dimensions: 14.2 Cu. ft.

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

Test Method

Evaluates the potential for evaporation loss of lubricant components in high temperature service. A controlled flow of heated air is passed over the sample for a specified period. Evaporation loss is measured by the change in sample weight during the test. The Evaporation Loss test can also be used for Estimating Apparent Vapor Pressures and Molecular Weights of Lubricating Oils (ASTM D2878). A high temperature version of the Evaporation Loss test is available (See ASTM D2595).

Evaporation Loss Tester

- Conforms to ASTM D972, D2878 and related specifications
- Two-sample testing capability

Evaporation Cell–Suitable for evaporation loss tests on lubricating greases and oils in the temperature range of 210 to 300°F (99 to 149°C). Passes heated air over the sample at the required flow rate. Consists of stainless steel body, cover, eduction tube and hood. Calibrated flowmeter with needle valve maintains 2L/min. air flow at standard temperature and pressure. Supplied with stainless steel grease or oil sample cup. Sample cups are interchangeable. Entire assembly mounts in Evaporation Loss Test Bath.

Evaporation Loss Test Bath–Constant temperature oil bath mounts two Evaporation Cells in an upright position at the proper immersion level. Maintains test temperature within ±1°F (±0.5°C). Microprocessor PID control provides quick temperature stabilization without overshoot and the bath is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* Fully insulated, double-wall construction, with stainless steel tank and polyurethane-finished steel exterior.

**Also available–special bath to accommodate both ASTM D972 and D942 (Oxidation Stability of Greases on page 152) test methods. Please contact Koehler for additional information.*

Ordering Information

Catalog No.		Order Qty
Evaporation Test Cell		2
K29500	Evaporation Test Cell with Grease Cup	
K29550	Evaporation Test Cell with Oil Cup	
Test Bath		1
K29400	Evaporation Loss Test Bath, 115V 50/60Hz	
K29490	Evaporation Loss Test Bath, 220-240V 50/60Hz	
	Accessories	
250-000-22F	ASTM 22F Thermometer Range: 204 to 218°F	
250-000-22C	ASTM 22C Thermometer Range: 95 to 103°C	
250-000-67F	ASTM 67F Thermometer Range: 203 to 311°F	
250-000-67C	ASTM 67C Thermometer Range: 95 to 155°C	
K23410	Temperature Limit Control, 115V 50/60Hz Provides overtemperature protection for constant temperature baths.	1
K23419	Temperature Limit Control, 220-240V 50/60Hz	
K29530	Oil Sample Cup with Hood	
K29540	Grease Sample Cup with Hood	

Evaporation Loss of Lubricating Greases Over Wide Temperature Range

Test Method

Similar to the ASTM D972 Evaporation Loss test, extending the temperature range for evaporation loss testing to 600°F (316°C).

High Temperature Evaporation Loss Tester

- Conforms to ASTM D2595 specifications
- Microprocessor temperature control with digital display and overtemperature cut-off
- Microprocessor programmable high accuracy temperature control

Performs evaporation loss tests on lubricating greases at temperatures of up to 600°F (316°C). Maintains sample temperature within ±0.3°F while passing heated air over the sample surface at a controlled flow rate. Consists of evaporation cells and aluminum block oven with controls for sample temperature, air temperature and air flow rate. Evaporation cells include grease sample cup, head, eduction tube, cover and thermocouple tube. Aluminum block oven provides efficient response and safe operation at high temperatures. Microprocessor temperature control has °C/°F switchable digital setpoint and display. Operator and equipment are protected by an overtemperature control circuit which automatically interrupts power to the unit when bath temperature exceeds a programmed cut-off point. Microprocessor PID control provides quick temperature stabilization without overshoot and the bath is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* Separate air preheater controls and flowmeters for each cell permit accurate control of heated air flow to sample surface. Order accessory Digital Thermometer (Cat. No. K29310) to monitor exit air temperature and ASTM 3F or 3C Thermometer for block (sample) temperature. Accessory oil sample cup (Cat. No. K29530) converts evaporation cell for lubricating oil samples.

Ordering Information

Catalog No.		Order Qty
K29300	High Temperature Evaporation Loss Tester, 220-240V 50/60Hz	1
	Accessories	
K29310	Digital Thermometer, 115V 50/60Hz Microprocessor based digital thermocouple thermometer with ten channel input. Monitors Type IC Thermocouples from evaporation cells in K29300 Evaporation Loss Tester. Use together with preheater controls in Model K29300 to maintain air temperature within ±1.1°C (±2°F) per ASTM specifications	1
K29319	Digital Thermometer, 220-240V 50/60Hz	
250-000-03F	ASTM 3F Thermometer Range: 20 to 760°F	
250-000-03C	ASTM 3C Thermometer Range –5 to +400°C	
K29530	Oil Sample Cup with Hood	
K29540	Grease Sample Cup with Hood	

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

K29300 High Temperature Evaporation Loss Tester

Specifications

Conforms to the specifications of:
ASTM D2595, D2878*
*with accessory oil sample cup installed
Capacity: 2 samples
Temperature Range: 200 to 600°F (93 to 316°C)
Sample Temperature Control:
Type: microprocessor digital control
Exit Air Temperature Control: Two 0-500W variable control heaters and type IC thermocouples (order K29310 Digital Thermometer separately)
Air Flow Control: Two externally mounted flowmeters maintaining 2L/min flow at standard temperature and pressure
Electrical Requirements:
220-240V 50/60Hz, Single Phase, 10.4A

Included Accessories

Evaporation Cell Assemblies with grease sample cups (2)
Type IC Thermocouples (2)

Dimensions lxwxh,in.(cm)

25x16x17 (64x41x43)
Net Weight: 175 lbs (79.4kg)

Shipping Information:

Shipping Weight: 224 lbs (101.6kg)
Dimensions: 10.4 Cu. ft.

Koehler INSTRUMENT COMPANY, INC.

Dropping Point of Lubricating Grease

K19490 Dropping Point Apparatus

Test Method

Dropping point determinations are used for identification and quality control purposes, and can be an indication of the highest temperature of utility for some applications. The sample is heated at a prescribed rate in a precision machined cup whose sides slope toward an opening at its center. The temperature at which a liquid drop first falls from the cup is the dropping point of the sample.

Dropping Point Apparatus

- Conforms to ASTM D566, D4950 and related specifications

Performs dropping point determinations on lubricating greases at temperatures of up to 550°F (288°C). Consists of dropping point cup, test cell with accessories and oil bath with stirrer and heater. Test cell is immersed in a 400mL Pyrex™ bath for heating at the prescribed rate. A 750W variable stepless control heater and 1/40hp stirrer permit accurate, uniform control of bath temperature rate of rise. Heater assembly includes refractory top plate and reference dial.

Specifications

Conforms to the specifications of:
ASTM D566, D4950; IP 132; ISO 2176; DIN 51801; FTM 791-1421; NF T 60-102
Maximum Temperature: 550°F (288°C)
Bath Medium: A high temperature heat transfer fluid having a flash point in excess of 400°C is recommended. Silicone fluid (P/N 355-001-002 — page 8) is suitable.
Electrical Requirements:
115V 50/60Hz, Single Phase, 6.5A
220-240V 50/60Hz. Single Phase, 3.4A

Included Accessories

Grease Cup, chromium plated brass
Test Tube with indentations
Cork Ring Guide
Thermometer Corks (2)
Thermometer Depth Gauge
Polished Metal Rod
Connecting Hardware

Dimensions lxwxh,in.(cm)

5x5x31(13x13x78)
Net Weight: 11 lbs (5.0kg)

Shipping Information

Shipping Weight: 16 lbs (7.3kg)
Dimensions: 2.8 Cu. ft.

Ordering Information

Catalog No.		Order Qty
K19490	Dropping Point Apparatus,115V 50/60Hz	1
K19491	Dropping Point Apparatus, 220-240V 50/60Hz	

Accessories

250-000-02F	ASTM 2F Thermometer. Range: 20 to 580°F	2
250-000-02C	ASTM 2C Thermometer. Range: –5 to +300°C	
K194E7	Cup Plug Gauge Checks conformity of test cup with specifications. Per Fig. 1, ASTM D566 and Fig. 1-E7, ASTM D2265	1
K194E6	Polished Metal Rod	
K194EA	Grease Cup	
K19492	Test Tube with indentations	
K19493	Thermometer Cork	
K19499	Cork Ring Guide	

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

Dropping Point of Lubricating Grease Over Wide Temperature Range

Test Method

The ASTM D2265 dropping point test permits higher temperatures than the ASTM D566 method and uses a different heating procedure: the test cell is inserted in an aluminum block oven maintained at a constant temperature that is higher than the expected dropping point of the sample. The sample temperature then rises to the dropping point without operator control.

High Temperature Dropping Point Apparatus

- Conforms to ASTM D2265 and D4950 specifications
- Six-sample testing capability
- Microprocessor programmable high accuracy temperature control

Tests dropping points of lubricating greases at temperatures of up to 400°C (752°F). Includes thermostatically controlled aluminum block oven and six complete dropping point assemblies. Six-place oven has large viewing ports with fluorescent backlighting for excellent visibility. Microprocessor PID control provides quick temperature stabilization without overshoot and the bath is protected by an overtemperature control circuit that interrupts power should block temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* Microprocessor temperature control with digital readout and overtemperature safety cut-off maintains block temperature with ±0.5°C stability. Insulated cabinet has a chemical resistant polyurethane finish.

Ordering Information

Catalog No.		Order Qty
K19400	High Temperature Dropping Point Apparatus, 115V 50/60Hz	1
K19410	High Temperature Dropping Point Apparatus, 220-240V 50/60Hz	

Accessories

250-000-03F	ASTM 3F Thermometer Range: 20 to 760°F	7
250-000-03C	ASTM 3C Thermometer Range: –5 to +400°C	
K194E7	Cup Plug Gauge Per Fig. 1, ASTM D566 and Fig. 1-E-7, ASTM D2265	1
K194EA	Grease Cup	
K194EB	Test Tube, 13x100mm	
K194EC	Cup Support	
K194E1	Thermometer Clamp	
K194E2	Upper Bushing	
K194E3	Lower Bushing	
K194E4	Bushing Support Ring	
K194E5	Thermometer Depth Gauge	
K194E6	Polished Metal Rod	

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

K19400 High Temperature Dropping Point Apparatus

Please inquire about our Automated Dropping Point Test Equipment by contacting Koehler's Customer Service.

Specifications

Conforms to the specifications of:
ASTM D2265, ASTM D4950
Maximum Temperature: 400°C (752°F)
Control Stability: ±0.5°C (±1°F)
Electrical Requirements:
115V 50/60Hz, Single Phase, 6.5A
220-240V 50/60Hz, Single Phase, 3.4A

Included Accessories:

Dropping Point Assemblies (6) consisting of: test tube, grease cup, thermometer clamp, upper and lower bushings and bushing support ring
Thermometer Depth Gauge
Polished Metal Rod
Cup Support

Dimensions lxwxh,in.(cm)

11½x9x14 (29x23x36)
Net Weight: 24½ lbs (11.1kg)

Shipping Information

Shipping Weight: 31 lbs (14.1kg)
Dimensions: 2.6 Cu. ft.

Oxidation Stability of Lubricating Greases by the Oxygen Bomb Method

K10901 Oxidation Bath with K11000 Oxidation Bombs

Test Method

The sample is oxidized in a bomb initially charged with oxygen at 110psi (758kPa) and maintained at elevated temperature for a specified aging period. The pressure drop inside the bomb is measured by means of a gauge or transducer.

Oxidation Stability Test Apparatus

- Conforms to ASTM D942 and related specifications
- Four sample testing capability
- Available Oxidata™ Pressure Measurement System

Consists of Oxidation Bombs, Sample Dishes, Pressure Measuring and Recording Equipment and Oxidation Bath.

Oxidation Bomb–Stainless steel bomb consists of body, lid with stem and needle valve, and dish holder per ASTM specifications. Bomb interior surfaces and inside of stem have a high polish to facilitate cleaning. Safely withstands a working pressure of 180psi (1241kPa) at 99°C (210°F). Includes PTFE gasket seals (3) and cap screws with wrench. PTFE-fluorocarbon seals are available (see Accessories).

Pressure Measurement and Recording Equipment–Select mechanical pressure gauges or, for greater convenience and accuracy in test reporting, the Oxidata™ Pressure Management System designed expressly for ASTM oxidation tests.

Pressure gauge measures pressure inside Oxidation Bomb with accuracy of better than 0.5psi (3.45kPa) in accordance with ASTM specifications. Range: 0-160psi (0-1100kPa), graduated in 1psi intervals. Cleaned for oxygen service.

Oxidata™ Pressure Measurement System–A complete electronic measurement system based on powerful Oxidata™ software for Windows® and Windows 95® environments. Electronically measures and reports pressure versus time and accuracy of better than 0.5 psi (3.45kPa) in the range of 0-200psi (0-1378kPa) for four channels in graphical tabular format. Included RTD attachment permits measurement and reporting of bath temperature. Includes transducers, data acquisition card, multiplexer, Oxidata™ software, RTD probe assembly and connecting cables and hardware. Refer to page 115 for complete specifications on Oxidata™ software.

Oxidation Bath–Constant temperature oil bath holds bombs at the proper depth for determining oxidation stability of lubricating greases. Microprocessor PID control provides quick temperature stabilization without overshoot and the unit is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* Heavily insulated welded stainless steel bath interior has a bomb support rack and overflow standpipe/drain to maintain proper working depth. Steel exterior has a corrosion-resistant polyurethane enamel finish.

Also available–Special baths to accommodate two test methods:

- *ASTM D942 and D525 (Oxidation Stability of Gasoline–Induction Method on pages 81-82)*
- *ASTM D942 and D972 (Evaporation Loss of Lubricating Greases and Oils on page 149)*
- *Higher temperature models are available.*

Please contact Koehler's Customer Service for additional information.

Oxidation Stability of Lubricating Greases by the Oxygen Bomb Method

Oxidata™ Pressure Measurement System

Specifications

Conforms to the specifications of:
ASTM D942; IP 142; DIN 51808; FTM 791-3453
Oxidation Bath:
Capacity: four (4) oxidation bombs
Temperature Range: ambient to 275°F (135°C)
Bath Medium: 12.5 gal (47.3L) white technical oil
Electrical Requirements:
115V 50/60Hz, Single Phase, 13.0A
220-240V 50/60, Single Phase, 6.8A

Dimensions dia.xh,in.(cm)

Interior: 16x14 (41x36)
Overall: 19½x28½ (50x72)

Shipping Information (with electronic pressure measurement system)

Shipping Weight:
Bath: 75 lbs (34.0kg)
Electronic Pressure Measurement System: 48 lbs (21.8kg)
Dimensions:
Bath: 16.7 Cu. ft.
Electronic Pressure Measurement System: 7.8 Cu. ft.

Ordering Information

Catalog No.		Order Qty
Oxidation Bomb		
K11000	Oxidation Bomb	4
Pressure Measurement and Recording Equipment		
*Select either Pressure Gauges or Oxidata™ Pressure Measurement System**		
311-160-003	Pressure Gauge	4
K11005	4-Unit Electronic Pressure Measurement for Lubricating Grease Oxidation Tests, 115V 50/60Hz	
K11095	4-Unit Electronic Pressure Measurement for Lubricating Grease Oxidation Tests, 220-240V 50/60Hz	
Oxidation Bath		1
K10901	Oxidation Bath, 115V 50/60Hz	
K10991	Oxidation Bath, 220-240V 50/60Hz	
Accessories		
K11040	Pyrex™ Dish	20
250-000-22F	ASTM 22F Thermometer. Range: 204 to 218°F	
250-000-22C	ASTM 22C Thermometer. Range: 95 to 103°C	1
355-001-001	White Technical Bath Oil, 1 Gallon container	13
355-001-003	White Technical Bath Oil, 5 Gallon container	3
	See page 8 for specifications	
K10504-0-1	Transducer Assembly	
K10551	Pressure Line. For pressurizing Oxidation Bomb. 6 ft (1.83m) long, with quick release coupling for needle valve on bomb and threaded fitting for oxygen tank	1
K10556	Oxygen Manifold Pressure Relief System Connects to oxygen source to prevent overcharging of bomb. Equipped with relief valve to vent at 125psi and 300 series stainless steel 150psi burst disk assembly. Constructed from 300 series stainless steel. Cleaned for oxygen service.	
K11029	PTFE-fluorocarbon Gasket	

**This ordering information is for installation to Koehler grease oxidation test equipment. For other makes of equipment, a few items of basic hardware may also be required–please contact your Koehler representative for assistance.*

K11000 Oxidation Bomb

Corrosion Preventive Properties of Lubricating Greases

Corrosion Preventive Properties of Lubricating Greases

Corrosion Preventive Properties of Lubricating Greases in Presence of Dilute Synthetic Sea Water Environments

Test Method

Determines the corrosion preventive properties of greases when distributed in a tapered roller bearing stored under wet conditions.

Corrosion Preventive Properties Apparatus

- Conforms to ASTM D1743 and D4950 specifications

Distributes a lubricating grease sample in a roller bearing by running the bearing under light thrust load. Corrosion preventive capability is determined on a pass/fail basis by the presence of rust spots (1mm or larger) on the bearing race after a 60 second run-in period followed by prolonged exposure to water at constant temperature. Consists of variable speed motor, 1750rpm run-in stand, bearing holder assemblies, spindle/thrust loading device, mechanical grease packer pliers and test bearings.

Specifications

Conforms to the specifications of: ASTM D1743, D4950, Draft Method, D5969
Drive Motor: 1750rpm
Electrical Requirements:
115V 50/60Hz, Single Phase, 2.0A
220-240V 50/60Hz. Single Phase, 1.0A

Included Accessories

Bearing Holder Assemblies (3): Consisting of:
1kg weight
upper and lower plastic collars for cone
plastic collar for cup
plastic jar with screw cap
metal screw
Spindle/Thrust Loading Device
Mechanical Grease Packer
Pliers
Test Bearings (3) (cone and roller assemblies)

Dimensions lxwxh,in.(cm)
10x15x20 (25.4x38.1x50.8)
Net Weight: 27 lbs (12.2kg)

Shipping Information
Shipping Weight: 36 lbs (16.3kg)
Dimensions: 5 Cu. ft.

Ordering Information

Catalog No.	
K17980	Corrosion Preventive Properties Apparatus, 115V 50/60Hz
K17989	Corrosion Preventive Properties Apparatus, 220-240V 50/60Hz

Accessories

K17981	Bearing Holder Assembly
K17981-0-2	Upper Flange
K17981-0-3	Lower Flange
K17982	Mechanical Grease Packer
K17983	Pliers
K17984	Plastic Jar
289-004-002	Test Bearing

K17980 Corrosion Preventive Properties Apparatus

Corrosion Preventive Properties Apparatus (Alternate Method)

- Conforms to ASTM D1743-73 specifications

Determines corrosion preventive properties of lubricating greases in accordance with original ASTM D1743-73 specifications, now incorporated as Appendix #2 in the current ASTM D1743 method. Offers a suitable alternative to the new method for laboratories needing a quicker screening test method. Consists of drive motor on base with driving cone hub, thrust loading device, mechanical grease packer, test bearings (3), bearing supports (3) and containers with lids (3).

Specifications

Conforms to the specifications of: ASTM D1743-73, FTM 791-4012
Electrical Requirements:
115V 50/60Hz, Single Phase, 5.2A
220-240V 50/60Hz, Single Phase, 2.6A

Dimensions lxwxh,in.(cm)
7x12x9¾ (18x30x25)
Net Weight: 27 lbs (12.3kg)

Shipping Information
Shipping Weight: 36 lbs (16.3kg)
Dimensions: 5 Cu. ft.

Ordering Information

Catalog No.	
K17970	Corrosion Preventive Properties Apparatus (Alternate Method), 115V 50/60Hz
K17979	Corrosion Preventive Properties Apparatus (Alternate Method), 220-240V 50/60Hz

Accessories (Alternate Method)

K17900	Thrust Loading Device and Mechanical Grease Packer
K17910	Test Bearing
K17920	Bearing Supports
K17930	Container with Lid

Copper Corrosion from Lubricating Grease

Test Method

Measures the tendency of lubricating grease to corrode copper under static conditions. A polished copper strip is immersed in a sample of grease at elevated temperature for a specified period. The strip is examined for corrosion and a classification number from 1-4 is assigned based on a comparison with the ASTM Copper Strip Corrosion Standards.

Copper Strip Tarnish Test Apparatus

- Conforms to ASTM D4048 specifications

Ordering Information

Catalog No.		Order Qty
K25330	Test Tube Bath, 115V 50/60Hz Constant temperature bath with microprocessor temperature control. Control features °C/°F switchable digital setpoint and display and overtemperature cut-off protection. Temperature range from ambient to 190°C (374°F) with ±1°C (±2°F) stability. Welded stainless steel inner wall and powder coated steel outer wall construction, fully insulated	1
K25339	Test Tube Bath, 220-240V 50/60Hz	
K25308	Test Jar Rack Inserts in K25330/K25339 baths to hold sixteen 332-004-004 Test Jars	1
332-004-001	Test Jar	16
K25080	Copper Test Strip Conforming to ASTM specifications	16
380-150-001	Silicone Carbide Paper, 150 grit For polishing of test strips Pack of 50 sheets	1
380-240-001	Silicone Carbide Paper 240 Grit For final polishing of test strips Pack of 50 sheets	1
380-150-000	Silicone Carbide Grain, 150 Grit For final polishing of test strips. 1 lb package	1
K25000	Polishing Vise Holds copper strip firmly in place without marring the edges. Stainless steel, mounted on a composition base	1
K25100	ASTM Copper Corrosion Standards Colored reproductions of tarnished strips encased in plastic	1
332-004-002	Viewing Test Tube Protects copper strip during inspection or storage	16
250-000-130F	ASTM 130F Thermometer Range: 20 to 220°F	1
250-000-130C	ASTM 130C Thermometer Range: –7 to +105°C	

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

K25339 Constant Temperature Bath with 332-004-004 Test Jars

Specifications:

Conforms to the specifications of:
ASTM D4048, FTM 791-5309
Test Tube Bath Capacity: 16 test jars
Maximum Temperature: 190°C (374°F)
Temperature Control Stability: ±1°C (±2°F)
Bath Medium: 5 gal (18.9L) water or high temperature heat transfer fluid
Electrical Requirements:
115V 60Hz, Single Phase, 7.5A
220-240V 50/60Hz, Single Phase, 4A

Dimensions lxwxh,in.(cm)

15½x12½x14 (39x32x36)
Net Weight: 27 lbs (12.2kg)

Shipping Information

Shipping Weight: 40 lbs (18.1kg)
Dimensions: 7.8 Cu. ft.

Koehler INSTRUMENT COMPANY, INC.

Roll Stability of Lubricating Grease

K18320 Double-Unit Roll Stability Tester

Test Method

Provides an indication of shear stability of lubricating greases by testing the change in worked penetrations after two hours in the roll stability tester.

Roll Stability Tester

- Conforms to ASTM D1831 and related specifications
- Single, double and four-unit models
- Microprocessor programmable high accuracy temperature control
- High Temperature model

Roll stability apparatus for shear stability tests on lubricating greases. Rotates steel test cylinders at 10 or 165rpm in a thermostatically controlled environment at temperatures of up to 200°F (93.3°C). Drive system is powered by a rugged ratio motor, and interchangeable drive chain sprockets are easily accessible for converting unit to either operating speed. Microprocessor PID control provides quick temperature stabilization without overshoot and is protected by an overtemperature control circuit that interrupts power should temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* A balanced cast aluminum fan and 1200W heater provide efficient, uniform heat distribution. A dial thermometer in the hinged cover displays chamber temperature. Heaters and drive chain mechanism are shielded for operator safety. Insulated steel cabinet and base are finished with a durable polyurethane enamel finish.

High Temperature Model–A high temperature model is also available that expands the temperature range to 320°F (160°C). Tests can be conducted using the high temperature model unit for time/temperature specifications beyond those listed in existing D1831.

Specifications

Conforms to the specifications of:
ASTM D1831, MIL-G-10924SA
Maximum Temperature: 200°F (93°C)
Temperature Control Stability: ±2°F (±1°C)
Electrical Requirements (Single and double unit models):
115V 60Hz, Single Phase, 10.5A
220-240V 50Hz, Single Phase, 5.5A
220-240V 60Hz, Single Phase, 5.5A

Included Accessories

Test Cylinders with threaded end caps and O-ring seals
Test Rollers, steel, 5kg

Dimensions lxwxh,in.(cm)

Single-Unit: 16½x18⅝x15 (42x47x38)
Double-Unit: 16½x18⅝x15 (42x47x38)
Four-Unit: 25x18⅝x15 (64x47x38)

Net Weight:
Single-Unit: 98 lbs (44.4kg)
Double-Unit: 116 lbs (52.6kg)
Four-Unit: 187 lbs (84.8kg)

Shipping Information

Shipping Weight:
Single-Unit: 142 lbs (64.4kg)
Double-Unit: 175 lbs (79.4kg)
Four-Unit: 270 lbs (122.5kg)

Dimensions:
Single-Unit: 7.7 Cu. ft.
Double-Unit: 9.8 Cu. ft.
Four-Unit: 16.6 Cu. ft.

Ordering Information

Catalog No.	
Roll Stability Tester	
K18300	Single-Unit Model, 115V 60Hz
K18305	Single-Unit Model, 220-240V 50Hz
K18306	Single-Unit Model, 220-240V 60Hz
K18320	Double-Unit Model, 115V 60Hz
K18325	Double-Unit Model, 220-240V 50Hz
K18326	Double-Unit Model, 220-240V 60Hz
K18340	Four-Unit Model, 115V 60Hz
K18341	High Temperature Four-Unit Model, 115V 60Hz
K18345	Four-Unit Model, 220-240V 50Hz
K18346	Four-Unit Model, 220-240V 60Hz
K18347	High Temperature Four-Unit Model, 220/240V 50Hz
K18348	High Temperature Four-Unit Model, 220/240V 60Hz
Accessories	
K183-0-1A	Test Cylinder, plated steel with threaded end caps and O-ring seals
K183-0-4	Steel Cylinder Roller

Apparent Viscosity of Lubricating Greases

Test Method

Apparent viscosity is used to evaluate pumpability and handling characteristics of greases and is also suitable for analysis of adhesives, sealants and other semi-solid products. The sample is forced through a capillary by means of a gear pump-driven hydraulic system and the resulting pressure in the system is measured. Apparent viscosity is then calculated from the flow rate and pressure. Eight different capillaries and two pump speeds are used to determine the apparent viscosity at sixteen shear rates.

Pressure Viscometers

- Conforming to ASTM D1092 and related specifications
- Mechanically refrigerated low temperature model

Low Temperature Pressure Viscometer–Consists of power, hydraulic and grease systems with refrigerated test chamber. Hydraulic system includes constant displacement gear-driven metering pump, hydraulic oil reservoir with 50-mesh screen, stainless steel tubing, high pressure valve and fittings. Drive motor has interchangeable 40 and 64 tooth gears for two-speed operation. Four interchangeable gauges of 0-60, 0-100, 0-600 and 0-5000psi ranges monitor system pressure.
Supplied with three precision machined grease assemblies, each including piston, caps and thermocouple; set of eight (ASTM Nos. 1-8) stainless steel capillaries; and wrenches for gauge installation and removal. The refrigerated test chamber holds three cylinders at a time for sample preparation. Operating range is from ambient to –65°F (–53.8°C), with stability of ±0.5°F (±0.3°C). The refrigeration system uses hermetically sealed, self-lubricating compressors in cascaded configuration to provide efficient cool-down and trouble-free long term operation.
Floor-mounted cabinet is constructed of polished stainless steel with a welded reinforced frame.

Pressure Viscometer–Complete apparent viscometer meeting ASTM D1092 specifications. Includes power, hydraulic and grease systems and standard accessories as supplied with the Low Temperature Pressure Viscometer but without refrigerated test chamber or stainless steel cabinet. Mounted on a sturdy base having locating feet for permanent benchtop placement.

Specifications

Conforms to the specifications of:
ASTM D1092
Operating Range: performs apparent viscosity determinations at sixteen different shear rates
Low Temperature Pressure Viscometer:
Temperature Range: ambient to –65°F (–54°C)
*Optional –100°F cooling range available on special order**
Temperature Control Precision: ±0.5°F (±0.3°C) throughout the operating range
Test Chamber Medium: denatured alcohol

Included Accessories

Stainless Steel Grease Cylinder
Assemblies (3)
Thermocouples (3)
Set of Stainless Steel Capillaries (Nos. 1-8)
Interchangeable Pressure Gauges (4)
Interchangeable Pump Drive Gears, 40 and 64-tooth
Set of Wrenches (3)

Ordering Information

Catalog No.

Low Temperature Pressure Viscometer

K22690	Low Temperature Pressure Viscometer, 115V 60Hz
K22695	Low Temperature Pressure Viscometer, 220-240V 50Hz
K22696	Low Temperature Pressure Viscometer, 220-240 60Hz

**Please call or write for ordering Information on extended (–100°F) cooling range.*

Pressure Viscometer

K22600	Pressure Viscometer, 115V 60Hz
K22615	Pressure Viscometer, 220-240V 50Hz
K22610	Pressure Viscometer, 220-240V 60Hz

Accessories

K22690-0-27	Grease Cylinder Assembly for Low Temperature Pressure Viscometer (K22690 Series) – Includes piston and caps
K226-0-16	Grease Cylinder Assembly for Pressure Viscometer - (K22600 Series) – Includes piston and caps
K226-0-22	Capillary Set. Nos. 1-8
250-000-74F	ASTM 74F Thermometer Range –67.5 to –62.5°F
250-000-74C	ASTM 74C Thermometer Range: –55.4 to –52.6°C

Dimensions lxwxh,in.(cm)

Low Temperature Pressure Viscometer: 43¼x30¾x66¼ (110x78x168)
Net Weight: 640 lbs (290.3kg)
Pressure Viscometer: 30x12x36 (76x30x91)
Net Weight: 121 lbs (54.9kg)

Shipping Information

Low Temperature Pressure Viscometer:
Shipping Weight: 900 lbs (408.2kg)
Dimensions: 89.8 Cu. ft.
Pressure Viscometer:
Shipping Weight: 186 lbs (84.4kg)
Dimensions: 14.8 Cu. ft.

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

Grease Mobility

K22680 Grease Mobility Tester

Specifications

Conforms to the specifications of:
U.S. Steel Method; ASTM Draft Method
Minimum Temperature: –30°F (–34.4°C)
Control Stability: ±2°F (±1°C)

Included Accessories

Grease Cylinder (pressure viscometer) with modified No.1, 40:1 capillary
Sample Collector Turntable

Electrical Requirements:
115V 60Hz, Single Phase, 6A
220-240V 50 or 60Hz, Single Phase, 3A

Dimensions lxwxh,in.(cm)

Cooling Chamber: 12x12x30 (30.5x30.5x76)
Refrigeration Unit: 15x12x12 (38x30x30)
Net Weight: 114 lbs (51.7kg)

Shipping Information

Shipping Weight: 188 lbs (85.3kg)
Dimensions: 18.4 Cu. ft.

Test Method

Determines the resistance of lubricating grease to flow under prescribed conditions. Mobility is measured in grams per second by pumping the sample through a standardized SOD pressure viscometer at controlled temperature and pressure.

Grease Mobility Tester

- U.S. Steel Method; ASTM Draft Method
- Test temperatures as low as –30°F (–34.4°C)

Performs grease mobility tests at low temperatures to predict pumpability characteristics. Determines the suitability of greases for applications in centralized or bulk systems where pumps, valves or pipes are used to distribute or transfer grease. Consists of pressure viscometer, cooling bath and refrigeration system. The stainless steel pressure viscometer is fitted with a modified No.1, 40:1 ratio capillary. After the sample is loaded in the pressure viscometer, the assembly is installed in the cooling bath and allowed to reach the test temperature. Mechanically refrigerated cooling bath can attain test temperatures as low as –30°F (–34.4°C) with stability of ±2°F (±1°C). With the sample at the test temperature, the flow of grease is started under the selected pressure on a nitrogen tank regulator. Flow per second is determined by collecting the grease for a specified period. Includes sample collector turntable.

Ordering Information

Catalog No.	
K22680	Grease Mobility Apparatus, 115V 60Hz
K22685	Grease Mobility Apparatus, 220-240V 50Hz
K22686	Grease Mobility Apparatus, 220-240V 60Hz

Accessories

K22680-0-22	Grease Cylinder with plunger and fittings
K22680-0-16	Capillary
250-100-001	Thermometer dial type Range: –100 to +100°F with 2°F subdivisions

Low-Temperature Torque of Lubricating Grease

Low-Temperature Torque of Ball Bearing Grease

Low-Temperature Torque of Grease-Lubricated Wheel Bearings

Test Method

Significant for the design and specification of greases for low temperature service, the low temperature torque test measures the extent to which a grease sample retards rotation of a bearing assembly at the test temperature.

Low Temperature Torque Apparatus

- Digital torque indication for two samples
- Choice of test rig combinations
- Mechanically refrigerated, with standard –65°F (–54°C) operating range
- Optional cooling range to –100°F (–73°C)
- Conforms to ASTM D1478, D4693 and D4950 specifications
- Data acquisition software available

Refrigerated two unit apparatus for ASTM low temperature torque tests on lubricating greases. Includes an insulated, thermostatically controlled air chamber with test rigs, drive shafts and externally mounted gear motors. Rotates drive shafts at 1rpm while electronic load cell-strain gauge indicators measure the torque required to restrain the test rigs. Digital LED displays indicate torque for each drive unit and cold chamber temperature. On ASTM D4693 models, spindle temperature is also indicated for each drive unit. Includes drive shaft overtorque protection—when drive shaft torque exceeds a preset value, the drive motors automatically shut down to prevent breakage of shaft insulators. Standard cooling range of –65°F (–54°C) meets ASTM requirements for D1478 and D4693 test methods. Optional –100°F (–73°C) range is available for special testing requirements.

ASTM D1478 Model for Ball Bearing Greases–Equipped with two test cages and two 6204 ball bearings per ASTM D1478 specifications.

ASTM D4693 Model for Automotive Wheel Bearing Greases–Equipped with two spring loaded spindle-bearings-hub assemblies, bearing packer assembly and bearing installation and removal tools.

Combined ASTM D1478-D4693 Model–Equipped with one test cage and one 6204 ball bearing for ASTM D1478 testing and one spindle-bearings-hub assembly with bearing packer and tools for ASTM D4693 testing.

Data acquisition software–Data acquisition software facilitates running both ASTM D1478 and D4693 tests. Graph of torque versus time details starting torque, running torque and time elapsed. Includes software, data acquisition board and cable.

Specifications

Conforms to the specifications of:
ASTM D1478, D4693, D4950; FTM 791-334
Cooling Range:
Standard: –65°F (–54°C)
Optional: –100°F (–73°C)
Temperature Uniformity: ±1°F (±0.5°C)
Refrigeration: air cooled mechanical cascade hermetic system
Cabinet: floor-mount, polished stainless steel exterior, rides on swivel casters

K18860 Low Temperature Torque Apparatus

Ordering Information

Catalog No.	Test Method	Cooling Range	Electrical Requirements
K18852	ASTM D1478	–65°F(–54°C)	220-240V 50Hz
K18862			220-240V 60Hz
K18853		–100°F(–73°C)	220-240V 50Hz
K18863			220-240V 60Hz
K18850	ASTM D4693	–65°F(–54°C)	220-240V 50Hz
K18860			220-240V 60Hz
K18851		–100°F(–73°C)	220-240V 50Hz
K18861			220-240V 60Hz
K18854	Combined ASTM D1478-D4693	–65°F(–54°C)	220-240V 50Hz
K18864			220-240V 60Hz
K18855		–100°F(–73°C)	220-240V 50Hz
K18865			220-240V 60Hz

Accessories

K18871	Data Acquisition Package.	1
289-001-006	Test Bearing, 6204, for ASTM D1478	1
K18860-0-24	Inboard Test Bearing, for ASTM D4693, LM-67010-LM-67048 tapered roller bearing	1
K18860-0-16	Outboard Test Bearing for ASTM D4693, LM-11910-LM-11949 tapered roller bearing	1

Dimensions lxwxh,in.(cm)
48½x34x45½ (123x86x116)
Net Weight: 600 lbs (272.2kg)

Shipping Information
Shipping Weight: 697 lbs (316.1kg)
Dimensions: 6.4 Cu. ft.

Leakage Tendencies of Automotive Wheel Bearing Greases

Test Method

Evaluates the tendency of automotive wheel bearing grease to separate oil and/or grease under prescribed laboratory conditions. The test is performed at elevated temperature in a modified automotive spindle-hub assembly rotated at 660rpm. Any leakage of oil or grease during the test period is collected and weighed. See also "ASTM D4290 Accelerated Leakage Tendencies Method" (Page 161).

Leakage Tendencies Tester

- Conforms to ASTM D1263 and FTM 791-3454 specifications
- Microprocessor programmable high accuracy temperature control

Consists of a modified front wheel hub and spindle assembly with drive motor and constant temperature air cabinet. Rotates hub at 660rpm while maintaining spindle temperature at a constant 220°F (104°C) or other specified temperature. Oil that has separated from the sample grease during the test period is collected in the hub cap and in a leakage collector that installs on the spindle. The hub is rotated by a durable ⅛hp motor through a V-belt drive. Microprocessor PID control provides quick temperature stabilization without overshoot, and the unit is protected by an overtemperature control circuit that interrupts power should bath temperature exceed a programmed cut-off point. Dual LED displays provide actual and setpoint temperature values in °C/°F format. *Communications software (RS232, etc.), ramp-to-set and other enhanced features are available as extra cost options. Contact your Koehler representative for information.* Cabinet is insulated on all sides and has a hinged cover for easy access to the hub-spindle assembly. Thermometer ports in the spindle and the cabinet allow for precise setting and monitoring of test temperature. Housed in a heavy-gauge steel exterior with polyurethane enamel finish.

High temperature models to 205˚C avaialble. Contact your Koehler representative for information.

Specifications

Conforms to the specifications of:
ASTM D1263; FTM 791-3454
Maximum Temperature: 250°F (121°C)
Electrical Requirements:
115V 60Hz, Single Phase, 13.0A
220-240V 50Hz, Single Phase, 7A
220-240V 60Hz, Single Phase, 7A

Included Accessories

Large (Inner) Bearing (1)
Small (Outer) Bearing (1)

Dimensions lxwxh,in.(cm)

20½x18x15 (52x46x38)
Net Weight: 95 lbs (43.1kg)

Shipping Information

Shipping Weight: 145 lbs (65.8kg)
Dimensions: 8.3 Cu. ft.

Ordering Information

Catalog No.		Order Qty
Leakage Tendencies Tester		1
K18700	Leakage Tendencies Tester, 115V 60Hz	
K18795	Leakage Tendencies Tester, 220-240V 50Hz	
K18790	Leakage Tendencies Tester, 220-240V 60Hz	
	Accessories	
K18723	Torque Wrench	1
250-000-07F	ASTM 7F Thermometer Range: 30 to +580°F	2
250-000-07C	ASTM 7C Thermometer Range: –2 to +300°C	
289-004-004	Large (Inner) Bearing	
289-004-003	Small (Outer) Bearing	

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

Life Performance and Accelerated Leakage Tendencies

Life Performance of Automotive Wheel Bearing Grease

Leakage Tendencies of Automotive Wheel Bearing Grease Under Accelerated Conditions

Test Method

Evaluates the high temperature stability of automotive wheel bearing greases in a modified automotive front wheel hub-spindle-bearings assembly. The ASTM D3527 Life Performance test employs severe conditions–25 lbf (111N) thrust load, 1000rpm, 160°C spindle temperature –to induce grease deterioration and failure. The test continues in a 20/4 hour on/off cycle until grease breakdown causes measured drive motor torque to increase past an established end point. The number of hours to failure is the test result. The ASTM D4290 Accelerated Leakage Tendencies procedure employs similar test conditions for a 20 hour period, after which leakage of grease and oil is measured and the bearings are washed and examined for deposits of gum and varnish.

High Temperature Wheel Bearing Grease Tester

- Conforms to ASTM D3527, D4290 and D4950 specifications
- Fully automatic operation
- Digital monitoring of all test functions

Performs life performance and accelerated leakage tendencies tests on lubricating greases in accordance with ASTM test specifications. Consists of a modified front wheel hub-spindle-bearings assembly housed in a constant temperature oven and coupled to a ¼hp variable-speed drive motor. Controls test functions automatically and provides continuous digital display of motor torque, rpm, chamber temperature, spindle temperature, time cycle and elapsed time. Test parameters outside of ASTM specifications can be selected by the operator for in-house testing. Automatically terminates test and displays elapsed on-cycle hours when grease deterioration causes drive motor torque to increase to the calibrated end point. A built-in thirty second time delay circuit prevents erroneous test terminations due to momentary surges in motor torque at the beginning of the on-cycle. Insulated constant temperature oven is equipped with a 1200W heater and balanced ⅛ hp circulation fan for efficient heat distribution. Sliding access doors and a movable platform that swings the drive motor out of the way provide easy access to the spindle assembly. Modified steel spindle and hub assembly conforms to all critical 1971 Chevy II dimensions and is fitted with thermocouple, bearing thrust loading device and anodized aluminum grease collector. All controls and monitors are housed in a separate cabinet.

Ordering Information

Catalog No.		Order Qty
Wheel Bearing Grease Tester		1
K18500	High Temperature Wheel Bearing Grease Tester, 115V 60Hz	
K18595	High Temperature Wheel Bearing Grease Tester, 220-240V 50Hz	
K18590	High Temperature Wheel Bearing Grease Tester, 220-240V 60Hz	
	Accessories	
250-000-42C	ASTM 42C Thermometer Range: 95 to 255°C	1
289-004-001	Inboard Bearing Set Includes LM67048 Cone and LM67010 Cup	
289-004-002	Outboard Bearing Set Includes LM11949 Cone and LM11910 Cup	

K18500 High Temperature Wheel Bearing Grease Tester

Specifications

Conforms to the specifications of:
ASTM D3527, D4290, D4950
Digital controls and displays:
Timer: on/off cycle and real time
Chamber Temperature: °C
Spindle Temperature: °C
Motor rpm: 0-1725rpm
Motor Torque: current draw
Elapsed Time: 9999.9 hr.
Maximum Temperature: 177°C (350°F)
Electrical Requirements:
115V 60Hz, Single Phase, 13A
220-240V 50Hz, Single Phase, 7A
220-240V 60Hz, Single Phase, 7A

Included Accessories

Thermocouples (2)
Thermometer holder
Bearings (1set)
Grease Packer Assembly
Bearing Installation/Removal Tools:
bearing installer, small and large
bearing cup removers, bearing cup installer,
bearing puller and spindle wrenches (pins)

Dimensions lxwxh,in.(cm)

Test Unit: 16x20x15¾ (41x51x40)
Control Unit: 16x14x16 (41x36x41)
Net Weight: 145 lbs (65.8kg)

Shipping Information

Shipping Weight: 230 lbs (104.3kg)
Dimensions: 14.8 Cu. ft.

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

Water Washout Characteristics of Lubricating Greases

Test Method

A grease sample is packed in a ball bearing and subjected to a steady water stream under controlled test conditions. The percentage of grease washed out in a one hour period is determined by weight.

Water Washout Tester

- Conforms to ASTM D1264, D4950 and related specifications

Rotates a lubricated ASTM ball bearing at 600rpm in a modified bearing/housing assembly while impinging the bearing with a jet of water at the specified flow rate and temperature. The tared bearing and bearing shields are weighed before installation in the bearing housing and again after testing and drying to determine the amount of sample loss. Consists of reservoir, bearing housing, circulation system and drive motor. Reservoir is equipped with cartridge heater, thermoregulator and thermometer port for accurate temperature control at 100°F and 175°F (38°C and 79°C) per ASTM specifications. Circulation system includes constant velocity carbon bearing gear pump, valves and flowmeter directing a controlled water flow to a capillary (1mm) spray nozzle aimed at the bearing housing. Rugged ⅛hp drive motor rotates test bearing at 600rpm while driving the circulation pump. A two-pulley system permits independent pump operation to circulate water while heating it to test temperature. Mounted on a finished steel base with locating feet for permanent benchtop placement.

Ordering Information

Catalog No.		Order Qty
Water Washout Tester		1
K19200	Water Washout Tester, 115V 60Hz	
K19295	Water Washout Tester, 220-240V 50Hz	
K19290	Water Washout Tester, 220-240V 60Hz	
	Accessories	
289-001-006	Test Bearing	3
K192-1-4	Outer Bearing Shield	3
K192-1-6	Inner Bearing Shield	3
250-000-15F	ASTM 15F Thermometer Range: 30 to 180°F	1
250-000-15C	ASTM 15C Thermometer Range: –2 to +80°C	

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

Specifications

Conforms to the specifications of:
ASTM D1264, D4950; IP 215; FTM 791-3252
Drive Motor: ⅛hp 1725rpm
Temperature Control: ±1°F (±0.5°C) sensitivity
Electrical Requirements:
115V 60Hz, Single Phase,10.1A
220-240V 50Hz, Single Phase, 5.1A
220-240V 60Hz, Single Phase, 5.1A

Included Accessories

Ball Bearing (2)
Drive Train Guard
Acrylic Reservoir Cover
Outer Bearing Shield
Inner Bearing Shield
Test Bearing

Dimensions lxwxh,in.(cm)

18x12x18¾ (46x30x48)
Net Weight: 67 lbs (30.4kg)

Shipping Information

Shipping Weight: 102 lbs (46.3kg)
Dimensions: 6.7 Cu. ft.

Resistance of Lubricating Grease to Water Spray

Test Method

Evaluates the ability of a lubricating grease to adhere to a metal surface when subjected to a direct water spray under controlled conditions. The percentage of grease sprayed off a stainless steel test panel after a specified period is determined by weight.

Water Spray Apparatus

- Conforms to ASTM D4049 specifications
- Improved spray chamber design

Complete Water Spray Apparatus meeting ASTM specifications, including spray chamber, delivery system and constant temperature reservoir. Sprays water at the specified rate and temperature on a test panel coated with sample grease. To test for water spray resistance, fill reservoir with 8L of tap water and set thermostat at test temperature. Circulate the water through the system to attain temperature equilibrium and insert the coated test panel in the spray chamber. Adjust water spray to 40psi (276kPa) and continue for 5 minutes. Water spray system includes ⅛hp positive displacement pump; spray nozzle with snubber fitting: 0-60psi pressure gauge; bypass valve; shut-off and drain valves; and flexible high pressure water lines. Hinged acrylic spray chamber cover is recessed into the chamber housing to insure watertight operation. Two thermometer wells permit separate monitoring of reservoir and water spray temperatures. Standardized grease application fixture coats test panel with the required thickness of sample grease. Uses tap water; does not require water hook-up.

Ordering Information

Catalog No.		Order Qty
Water Spray Apparatus		
K18200	Water Spray Apparatus, 115V 60Hz	1
K18295	Water Spray Apparatus, 220-240V 50Hz	
K18290	Water Spray Apparatus, 220-240V 60Hz	
	Accessories	
250-000-37C	ASTM 37C Thermometer Range: –2 to +52°C	1
K18210	Stainless Steel Test Panel	
K18220	Grease Application Fixture	

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

K18200 Water Spray Off Tester

Specifications

Conforms to the specifications of:
ASTM D4049
Circulation System:
Drive Motor: ⅛hp, 1725rpm
Pump: rotary gear positive displacement type
Pressure Gauge: 0-60psi
Temperature Control Stability: ±1°F (±0.5°C)
Electrical Requirements:
115V 60Hz, Single Phase, 13.3A
220-240V 50Hz, Single Phase, 6.8A
220-240V 60Hz, Single Phase, 6.8A

Included Accessories

Stainless Steel Test Panel
Grease Application Fixture

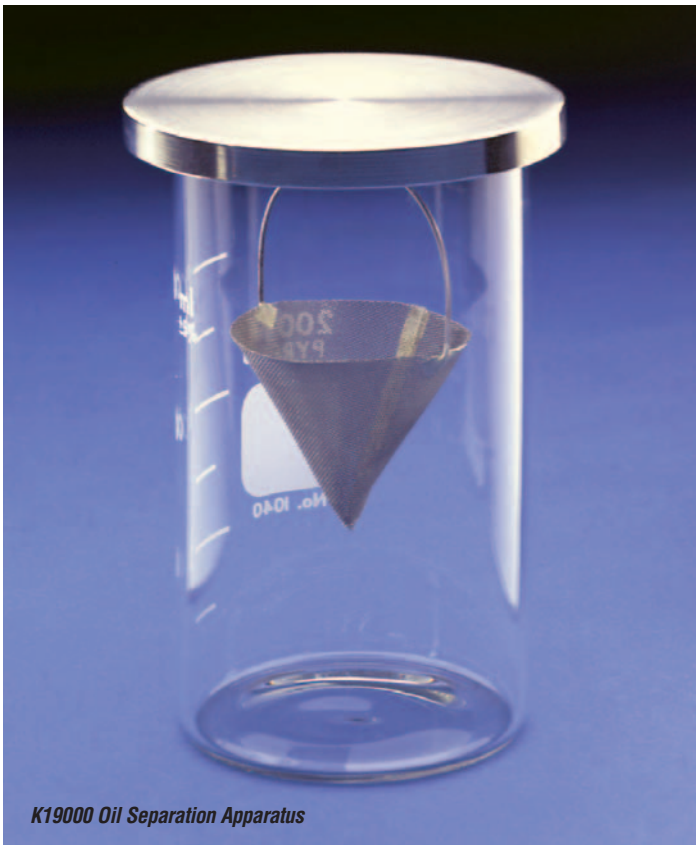
Dimensions lxwxh,in.(cm)

29x18x33½ (74x46x85)
Net Weight: 110 lbs (49.9kg)

Shipping Information

Shipping Weight: 180 lbs (81.6kg)
Dimensions: 14.2 Cu. ft.

Oil Separation From Lubricating Grease



K19000 Oil Separation Apparatus

Test Method

Determines the tendency of oil and lubricating grease to separate at elevated temperature.

Oil Separation Apparatus

- Conforms to ASTM D6184 and FTM 791-321 specifications

Consists of 60 mesh nickel gauze cone with wire handle, tall form 200mL beaker and cover with hook. Place sample in wire gauze cone and determine weight loss after heating at test temperature for specified time period. Withstands test temperatures of up to 900°F (482°C).

Shipping Information

Net Weight: ½ lb (0.2kg)
Shipping Weight: 1 lb (0.45kg)

Ordering Information	
Catalog No.	
K19000	Oil Separation Apparatus

Oil Separation On Storage of Grease

Test Method

Provides a measure of the stability of lubricating grease towards oil separation during storage.

Oil Separation Apparatus

- Conforms to IP 121 specifications

Consists of stainless steel separation cup with cone of 240 mesh woven wire cloth, 100g metal weight and oil cup. Oil separation is determined by placing the sample on the wire mesh cone and loading it with the 100g metal weight. The percentage of sample weight lost is calculated after a storage period of 42 hours.

Shipping Information

Net Weight: ¾ lb (.34kg)
Shipping Weight: 1 lb (.45kg)

Ordering Information	
Catalog No.	
K19050	Oil Separation Apparatus

K19050 Oil Separation Apparatus

Oil Separation From Lubricating Grease During Storage

Test Method

Determines the tendency of lubricating grease to separate oil during storage in a 35 lb pail. The sample is placed on a sieve inside a special test cell and subjected to 0.25psi (1.72kPa) air pressure at constant temperature. Any oil that bleeds from the grease during a 24 hour period is collected in the cell and weighed.

Oil Separation Apparatus

- Conforms to ASTM D1742 and related specifications
- Four sample capability
- Controls temperature and air pressure

Consists of pressure bleeding test cells with air pressure regulation system and constant temperature air cabinet.

Pressure Bleeding Test Cell–Type A test cell includes cup assembly with funnel and positioning seat for beaker; cover with air inlet fitting; and 200-mesh stainless steel sieve strainer with brass support ring. Bayonet type connection and o-ring seal provide tight closure between cover and base. Cup, funnel and base are constructed of chrome plated spun copper. Order test beaker separately.

Constant Temperature Air Cabinet–Provides a constant temperature environment and regulated air pressure per ASTM specifications. Consists of an insulated airtight cabinet with pressure system to accommodate four pressure bleeding test cells. Equipped with electric heater, solid state controller, cooling coil and circulating fan for efficient temperature control at 77°F (25°C). Pressure system includes air inlet pressure regulator with gauge, cartesian manostat, manifold with control valves for four test cells, output gauge, manostat and gas washing bottle. Built-in pressure relief valve protects against pressure surge. Cabinet is constructed of double-wall stainless steel with full insulation. Order thermometer and pressure bleeding test cell separately.

Specifications

Conforms to the specifications of:
ASTM D1742, FTM 791-322
Capacity: four samples
Controller Sensitivity ±1°F (±0.5°C)
Electrical Requirements:
115V 50/60Hz, Single Phase, 3A
220-240V 50/60Hz, Single Phase, 1.5A

Dimensions lxwxh,in.(cm)
Interior: 19¾x19¾x21½ (50x50x55)
Overall: 47*x23¾x31¼ (119x60x79)
*includes external pressure system components
Net Weight: 121 lbs (54.9kg)

Shipping Information

Shipping Weight: 224 lbs (101.6kg)
Dimensions: 27.8 Cu. ft.

K18910 Constant Temperature Air Cabinet with K18900 Cell

Ordering Information

Catalog No.		Order Qty
K18910	Constant Temperature Air Cabinet,115V 50/60Hz	1
K18919	Constant Temperature Air Cabinet, 220-240V 50/60Hz	
K18900	Pressure Bleeding Test Cell	4

Accessories

332-002-009	Test Beaker, 20mL	4
250-000-57F	ASTM 57F Thermometer. Range: –4 to +122°F	1
250-000-57C	ASTM 57C Thermometer. Range: –20 to +50°C	

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

K18900 Pressure Bleeding Test Cell

Koehler INSTRUMENT COMPANY, INC.

Estimation of Deleterious Particles in Lubricating Grease

K19300 Deleterious Particles Determination Apparatus

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

Test Method

Detects and estimates deleterious particle contamination in lubricating greases and other semi-solids and heavy liquids. Grease fillers can be tested for abrasive contaminants by first mixing them into petrolatum or grease known to be free of deleterious particles.

Deleterious Particles Determination Apparatus

- Conforms to ASTM D1404 specifications

Complete apparatus per Figure 1 and 2 of ASTM D1404. Rotates plastic plate 30° against stationary plate while applying 200psi pressure. Includes body, test plate holders, loading screw, calibrated spring with scale for applying test load and removable cap assembly with milled slot and handle for rotating test plates. Constructed of stainless steel. Order plastic test plates separately.

Ordering Information

Catalog No.		Order Qty
K19300	Deleterious Particles Determination Apparatus	1
	Accessories	
K19310	Plastic Test Plate. For use in Model K19300. Highly polished. Two (2) required for each test	20

Micro-Oxidation

Test Method

Evaluates oxidation stability, thermal stability and volatility of greases, lubricant base oils, additives and natural oils by use of a micro-reactor. The sample is placed on the surface of a disposable steel specimen pan (or glass disk for grease samples) and subjected to a metered air flow at constant temperature.

Micro-Oxidation Bath

- Uses micro-reactors and a five-place temperature controlled bath
- Measures oil volatility and oxidative evaporation loss
- For oxidation deposit studies and deposit screening

Micro-oxidation system includes disposable steel specimen pans, Pyrex glass micro-reactors with aluminum headers and constant temperature aluminum block bath with flowmeters. Five-position bath maintains samples with ±0.1°C accuracy in the range from 75°C to 300°C. Bath control has digital set and display of temperature and a high temperature alarm setting for safe operation. A built-in flowmeter with regulating valve for each sample cell maintains oxygen flow at the required rate of 20mL per minute.

Ordering Information

Catalog No.	
K29200	Micro-Oxidation Bath, 115V 60Hz
K29290	Micro-Oxidation Bath, 220-240V 50/60Hz
	Accessories
K29200-1	Glass micro-reactor vessel
K29200-3	Glass disk for grease test
K29200-4	Template for grease application
K29200-5	Steel test pan for automotive engine oil test
K29200-9	Micro dispensing pipette
K29200-10	Specimen pan insertion / removal tool
K29200-12	Micro-reactor with aluminum header

K29200 Micro-Oxidation Bath

Specifications

Temperature Range: 75°C to 300°C
Temperature Control: ± 0.1°C
Electrical Specifications:
115V 60Hz, 1 Phase, 2A
220-240V 50/60Hz, 1 Phase, 1A

Dimensions lxwxh,in.(cm)
13x9x11(33x22.8x28)
Net Weight: 21 lbs (9.5kg)

Included Accessories

Heating bath with flowmeters
Micro-reactors (5)
Steel Specimen Pans
Micro-dispensing pipette
Specimen pan insertion/removal tool
Operating manual

Shipping Information

Shipping Weight: 32 lbs (14.5kg)
Dimensions: 4.2 Cu. ft.

Lincoln Ventmeter

Test Method

The K95400 Lincoln Ventmeter evaluates the ventability of grease, which is useful in determining by consistency what type of greases can be used in a centralized automatic lubrication system. Furthermore, the size or diameter of the supply line in an automatic lubrication system can be accurately determined for a particular type of grease. Pressurizing lubricant grease in 25 feet coil tube to 1800 psi with a grease gun, opening the venting valve and reading the pressure on the gage after 30 seconds will provide the supply line size and maximum supply line information for the tested grease by referring the supplied grease ventmeter reading to supply line reference charts after measuring of the grease ventablility.

Lincoln Ventmeter

Lincoln Ventmeter, as a simulation device of a centralized lubrication system, consists of 25 feet coil tube with valve 1 at the pressure gage end and valve 2 at the end where a level grease gun is connected. Build up pressure with the grease gun attached when valve 1 closed. Open instantly valve 2 when pressure gage reading stabilizes at 1800 psi. Read the pressure gage after venting for 30 seconds. Repeat test three times and take an average reading to determine supply line pipe size and maximum length of supply line.

Test under Different Temperature – The test could be done under any temperature as application required. The standard test recommend three temperature: 0°F, 30°F and 75°F. When testing under temperature other than the ambient, the ventmeter filled with grease should be put in temperature chamber for at least 4 hours. The same test steps should be used for different temperature conditions.

Specifications

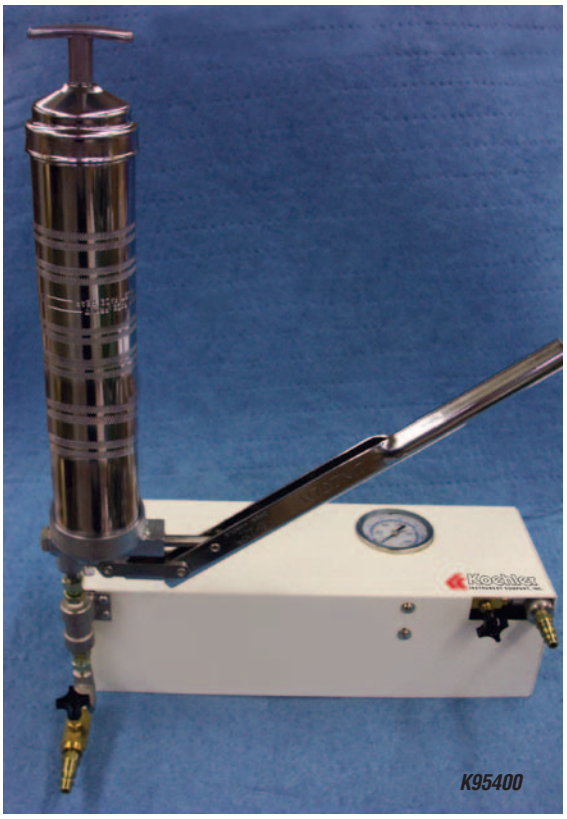
Model:
K95400
Electrical Requirements:
None

Dimensions lxwxh

Overall: 15"x6"x5"

Shipping Information

Shipping Weight: 12 lbs
Dimensions: 16"x10"x6"



Ordering Information		
Catalog No.		**Order Qty**
K95400	Lincoln Ventmeter	1

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.

Evaporation Loss of Lubricating Greases and Oils ..... **Page 148**

ASTM D972, D2878, IP 183, FTM 791-351

Laboratory Balance • m-Terphenyl • Air Supply

Evaporation Loss of Lubricating Grease Over Wide Temperature Range ..... **Page 149**

ASTM D2595, D2878

Laboratory Balance • m-Terphenyl • Air Supply • Cleaning Solvent

Dropping Point of Lubricating Greases ..... **Page 150**

ASTM D566, D4950, IP 132, ISO 2176, DIN 51801, FTM 791-1421

Spatula • Mineral Spirits

Dropping Point of Lubricating Grease Over Wide Temperature Range ..... **Page 151**

ASTM D2265,D4950

Mineral Spirits

Oxidation Stability of Lubricating Greases by the Oxygen Bomb Method ..... **Pages 152-153**

ASTM D942, IP 142, DIN 51808, FTM 791-3453

Oxygen • Forceps • n-Heptane • Oven • Sulfuric Acid
Distilled Water • Chromic Acid • Soap Powder

Corrosion Preventive Properties of Lubricating Greases ..... **Page 154**

ASTM D1743

Syringe, 100mL • Stoddard Solvent • Laboratory Oven
Isopropanol • Distilled Water • Ammonium Hydroxide

Copper Corrosion From Lubricating Grease by the Copper Strip Tarnish Test ..... **Page 155**

ASTM D4048, FTM 791-5309

Steel Forceps • Cotton Wool • Oven
Isooctane • Acetone

Roll Stability of Lubricating Grease ..... **Page 156**

ASTM D1831, MIL-G-10924SA

Spatula

Apparent Viscosity of Lubricating Greases ..... **Page 157**

ASTM D1092

Hydraulic Oil • Nitrogen • Flexible Tubing • Alcohol
Balance • Kerosene

Grease Mobility ..... **Page 158**

U.S. Steel Method

Nitrogen • Laboratory Balance

Low Temperature Torque of Ball Bearing Greases ..... **Page 159**

ASTM D1478, D4693, D4950, FTM 791-334

Stoddard Solvent • Oven • n-Heptane
Spatula • Desiccant

Low Temperature Torque of Grease-Lubricated Wheel Bearings ..... **Page 159**

ASTM D4693, D4950

Laboratory Oven • 1,1,1-Trichloroethane • Mercury
Ethylene Glycol • Ultrasonic Cleaner

Leakage Tendencies of Automotive Wheel Bearing Greases ..... **Page 160**

ASTM D1263, FTM 791-3454

Laboratory Balance • Spatula • n-Heptane

Life Performance and Accelerated Leakage Tendencies Tests for Automotive Wheel Hearing Greases ..... **Page 161**

ASTM D3527, D4290, D4950

Laboratory Balance • SAE Low Engine Oil • n-Heptane
Steel Wool • Penetone ECS • Oven • Stoddard Solvent • Isopropanol

Water Washout Characteristics of Lubricating Greases ..... **Page 162**

ASTM D1264, D4950, IP 215, FTM 791-3252

Distilled Water • Stoddard Solvent • n-Heptane

Resistance of Lubricating Grease to Water Spray ..... **Page 163**

ASTM D4049

Stoddard Solvent • n-Heptane

Oil Separation From Lubricating Grease ..... **Page 164**

ASTM D6184; FTM 791-321

Laboratory Oven • Laboratory Balance

Oil Separation On Storage of Grease ..... **Page 164**

IP 121

Laboratory Oven • Laboratory Balance

Oil Separation From Lubricating Grease During Storage ..... **Page 165**

ASTM D1742, FTM 791-322

Air Supply • Mineral Spirits

Bitumens and Waxes

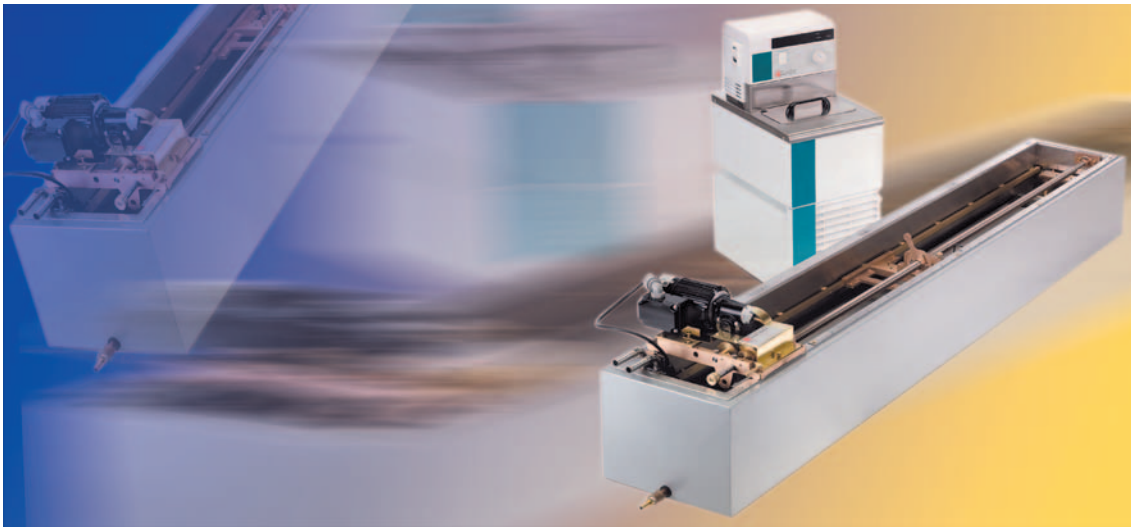
Test Methods	Page
Ductility of Bituminous Materials ASTM D113, P226; AASHTO T51; ANS A37.11; Federal Specifications SS-R-406C; USDA Method 51 (BUL 12-16); IP 32; DIN 52013	**170**
Bituminous Materials in Tension ASTM P226	**171**
Softening Point of Bitumen (Ring-and-Ball Apparatus) ASTM D36, D2398, E28; AASHTO T53; IP 58, 198	**172**
Automated Softening Point of Bitumen (Ring-and-Ball Apparatus) ASTM D36, E28; AASHTO T53; IP 58; ISO 4625; DIN 52011; NF T 66-008; EN 1427, 13179	**172**
Breaking Point of Bitumen, Fraass Method IP 80	**173**
Effect of Heat and Air on Asphaltic Materials (Thin-Film Oven Test) ASTM D1754	**174**
Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin Film Oven Test) ASTM D2872	**175**
Float Test for Bituminous Materials ASTM D139; AASHTO T50; ANS A37.2	**176**
Residue and Oil Distillate in Emulsified Asphalts by Distillation ASTM D244; AASHTO T59	**176**
Blocking and Picking Points of Petroleum Wax ASTM D1465; TAPPI T652	**177**
Melting Point of Petroleum Wax (Cooling Curve) ASTM D87; IP 55; ISO 3841; DIN 51570; FTM 791-1402	**178**
Oil Content of Petroleum Waxes ASTM D721; IP 158; ISO 2908; DIN 51571, 51572; FTM 791-5431	**179**
Solvent Extractables in Petroleum Waxes ASTM D3235	**179**

For information on additional testing methods for bitumens and waxes:

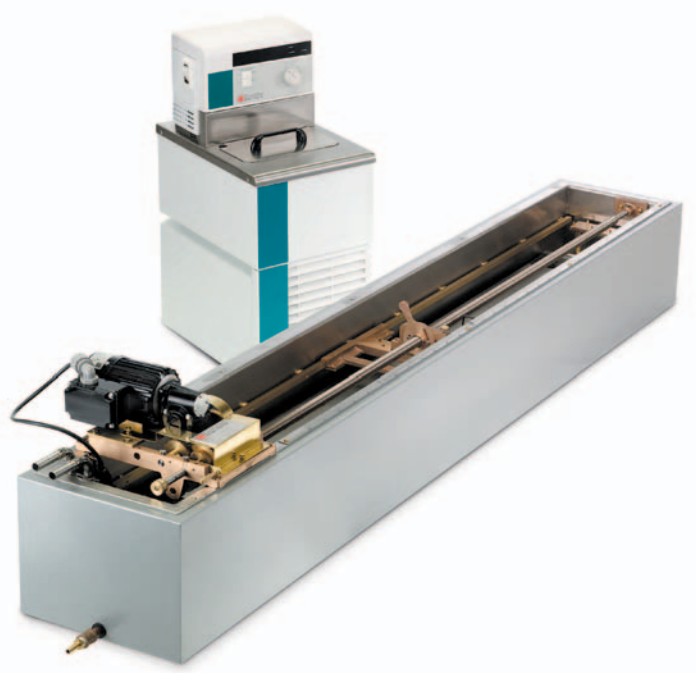
–Saybolt Color of Petroleum Waxes–please refer to pages 44, 46-47

–Water in Petroleum Products and Bituminous Materials by Distillation –please refer to pages 56-57

–Please refer to the Viscosity, Penetration, Flash Point and General Test Equipment Sections



Ductility of Bituminous Materials



K80020 Constant Temperature Ductility Machine with Circulator

Ordering Information

Catalog No.	
K80010	Standard Ductility Testing Machine 115V 60Hz
K80015	Standard Ductility Testing Machine 220-240V 50Hz
K80020	Constant Temperature Ductility Machine 115V 60Hz
K80025	Constant Temperature Ductility Machine 220-240V 50Hz
K80011	Acrylic Cover For trough of Constant Temperature Model

Accessories

K80012	Standard Mold Includes interlocking brass clips and sides, per ASTM D113 and related specifications
K80013	Base Plate (Holds 3 Ductility Moulds) Brass construction. Accommodates three standard or force measurement molds
250-000-63F	ASTM 63F Thermometer Range: 18 to 89°F
250-000-63C	ASTM 63C Thermometer Range: –8 to +32°C

For NIST traceable certified thermometers, please refer to the ASTM Thermometer section on pages 180 through 187.

Test Method

Measures the distance of elongation of a bitumen sample when a briquet specimen is pulled apart at a specified speed and temperature.

Ductility Testing Machine

- Conforms to ASTM D113 and related specifications
- Constant temperature model with circulator
- Available force measuring adapter with digital indication

Standard Ductility Testing Machine–Three-speed apparatus pulls briquets of bituminous materials apart at a uniform speed while immersing them in water. As many as three specimens at a time can be tested at speeds of 0.25, 1 or 5cm per minute. A synchronous direct motor drive unit maintains constant speed without vibration. Drive unit rides on a bronze lead screw mounted above the water level to prevent agitation of water and premature rupture of specimens. A traveling pointer indicates the position of the carriage against a linear centimeter scale on the trough. Elongation capacity is 150cm, with automatic carriage stop. Polished stainless steel trough has overflow connection. Equipped with bronze gears and solid brass components to prevent rusting.

Constant Temperature Model–Similar to the standard Ductility Machine, but equipped with a solid state, thermostatically controlled bath and circulator to control temperature within ± 0.9°F (±0.5°C) in the range of 35-90°F (1.7-32.2°C). Circulant water is directed through stainless steel tubes beneath a false bottom in the trough to provide efficient heat transfer. Supplied with three standard brass briquet molds and brass base plate. See page 171 for information on force measuring adapters and molds.

Specifications

Conforms to the specifications of: ASTM D113; P226;
AASHTO T51; ANS A37.11; Federal Specification SS-R-406C;
USDA Method 5 (BUL 12-16); DIN 52013

Testing Capacity
Standard ductility measurement: 3 samples
Force ductility measurement: 2 samples

Included Accessories

Standard Mold (3)
Base Plate

Dimensions lxwxh,in.(cm)

Test unit (trough): 74x11¾x6½ (188x30x17)
Circulator unit*: 10x9x12½ (25x23x32)
*Constant Temperature Model only

Shipping Information

Shipping Weight:
K80010/K80015: 200 lbs (91kg)
K80020/K80025: 43 lbs (19.5kg)

K80012 Standard Ductility Mold

Bituminous Materials in Tension

Test Method

Evaluates the tensile properties of bituminous materials by measuring the force required to elongate a briquet specimen under controlled laboratory conditions.

Force Measuring Adapter

- Electronic force measurement with digital indication
- Analog output signal for computer interface

Measures the force exerted on a briquet specimen in a standard ductility machine. Use for evaluating the tensile properties of bituminous materials, including asphalt cements, asphalt emulsion residues, polymer modified asphalt cements, and polymer modified asphalt emulsion residues, and for measuring the stress relaxation properties of bituminous materials used in the roofing industry and in the pavement joint sealant industry. Installs easily in the standard or constant temperature ductility machine–no tools are required. Adapter incorporates a linear variable differential transformer (LVDT) to electronically measure the force exerted on the specimen. Stainless steel construction prevents rust and corrosion, and all electrical components are located outside of the water bath. Included digital indicator unit incorporates a power supply for the LVDT and a 0-2 VDC analog output signal for interfacing with a computer data acquisition system, strip chart recorder or datalogger.

Specifications

Conforms to the specifications of:
ASTM P226
Accuracy: ±0.01 pounds

Included Accessories

Weight Holder for Calibration of Adapter

Dimensions lxwxh,in.(cm)

Adapter: 5⅝x1¾x6 (14x4x15)
Digital Indicator Unit:
10x12x3 (25x30x8)

Shipping Information

Shipping Weight: 20 lbs (9.1kg)
Dimensions: 3.4 Cu. ft.

K80041 Force Ductility Mold

Ordering Information

Catalog No.		Order Qty
K80040	Force Measuring Adapter, 115V 60Hz	2
K80045	Force Measuring Adapter, 220-240V 50Hz	

Accessories

K80041	Force Ductility Mold Includes interlocking brass clips and sides per ASTM D-4/P226 specifications	2
K80013	Base Plate	2

Automatic Softening Point of Bitumen (Ring-and-Ball Apparatus)

Automatic Softening Point Apparatus

- Conforms to ASTM D36 and related test specifications
- Optical detectors for automatic measurement of softening point
- Overtemperature protection circuitry

The Automatic Softening Point Apparatus features a microprocessor-based controller, an automatic load ball applicator, two optical detectors, and two test positions for measuring the softening point of bitumens, waxes, and other solid to semi-solid products. The instrument maintains program sequences for both water and glycerin bath tests as well as a user-defined program. A low-mass heating device along with the microprocessor-controlled stirring device and Pt-100 sensor maintain the proper bath heating rate as prescribed by the test method. The dual independent optical detection system provides accurate and precise measurement of the softening point for up to two individual samples without operator intervention, ticket printer, power supply cables, PC and printer outputs and software for the supervision, maintenance and calibration. The backlit LCD display shows the expected softening point as entered by the operator and the actual bath temperature during the test for both positions. The test results can be exported through the RS-232 interface. For added safety, the integrated safety device interrupts power if an overtemperature situation occurs.

Shipping Information

Shipping Weight: 42 lbs (19kg)
Dimensions: 4.9 Cu. ft.

Specifications

Conforms to the specifications of:
ASTM D36, E28; AASHTO T53;
IP 58; ISO 4625; DIN 52011;
NF T 66-008; EN 1427, 13179

Included Accessories

Glass Beaker
Ring and Ball Support
with Temperature Probe
Test Rings (10)
Load Balls (10)
Ball Application and Centering Guide

K87800 Auto Softening Point Apparatus

Ordering Information

Catalog No.	
K87800	Automatic Softening Point Apparatus, 115V 50/60Hz
K87890	Automatic Softening Point Apparatus, 230V 50/60Hz

Accessories

K87800-3	Shouldered Ring, pack of 10
K87800-10	Load Ball, pack of 10

Softening Point of Bitumen (Ring-and-Ball Apparatus)

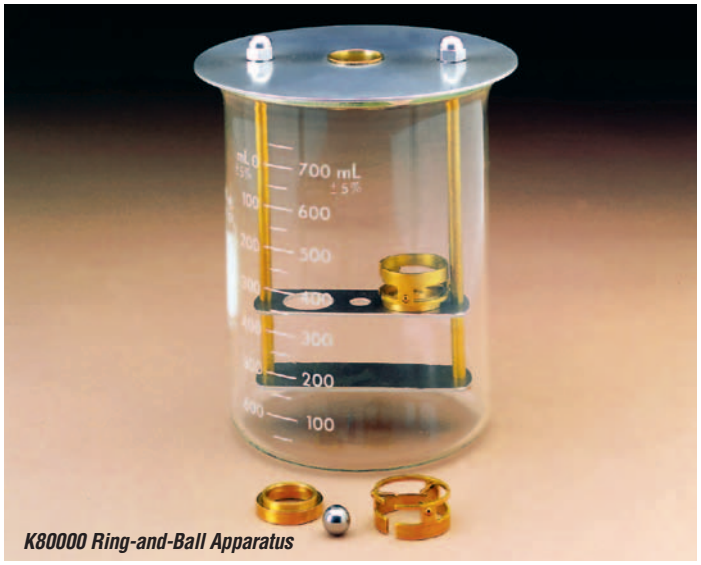
Test Method

The sample is cast in shouldered rings and heated at a controlled rate under the weight of a steel ball. The softening point is the temperature at which the bitumen disks soften and sag downward a specified distance.

Softening Point Apparatus

- Conforms to ASTM D36 and related specifications

Consists of 800mL beaker, 2 standard balls, shouldered rings, ball centering guides, ring holder, bottom plate and beaker cover with support rods. Order thermometer and heater separately.



K80000 Ring-and-Ball Apparatus

Ordering Information

Catalog No.		Order Qty
K80000	Softening Point Apparatus	1

Accessories

K42000	Powertrol Heater 750W heater with variable stepless control and porcelain refractory top plate with positioning well for beaker. Enclosed in a stainless steel housing with cooling vents, Shipping Weight: 8 lbs, 14 oz (3.6kg). 115V 50/60Hz	
K42090	Powertrol Heater, 220-240V 50/60Hz	1
250-000-15F	ASTM 15F Thermometer Range: 30 to 180°F	1
250-000-15C	ASTM 15C Thermometer Range: –2 to +80°C	1
250-000-16F	ASTM 16F Thermometer Range: 85 to 392°F	
250-000-16C	ASTM 16C Thermometer Range: 30 to 200°C	
K80001	Ring. Brass, shouldered ring conforming to ASTM specifications. Pack of 10	
K80002	Ball. Hardened steel, conforming to ASTM specifications. Pack of 10	
K80003	Ball-Centering Guide	

Specifications

Conforms to the specifications of:
ASTM D36, E28; AASHTO T53;
IP 58, 198; NF T 66-008

Shipping Information

Shipping Weight: 4 lbs (1.8kg)

Breaking Point of Bitumen, Fraass Method

Test Method

Determines the breaking point of solid and semi-solid bitumens. A thin steel plaque is coated with the sample and flexed in a bending apparatus at descending temperatures until cracks appear in the sample coating.

Breaking Point Apparatus

- Conforms to IP 80 specifications

Consists of two concentric borosilicate glass tubes with movable steel plate holders. A cone-and-peg mechanism moves the inner tube up and down relative to the outer tube, which varies the distance between the plate holders, causing the stainless steel test plate to be flexed. The inner tube accommodates a test thermometer. Supplied with 12 spring stainless steel plaques.

Ordering Information

Catalog No.		Order Qty
K28300	Bending Apparatus	1
K28310	Cooling Apparatus	1
	Consists of test tubes, cylinder, bungs and thistle tunnel	
K28320	Electric Hotplate, 115V 50/60Hz	1
K28321	Electric Hotplate, 220-240V 50/60Hz	
250-000-33C	ASTM 33C Thermometer. Range: –38 to + 42°C	1

Shipping Information

Shipping Weight: 20 lbs (9.1kg)
Dimensions: 2.5 Cu. ft.

Loss on Heating of Oil and Asphaltic Compounds

Effect of Heat and Air on Asphaltic Materials (Thin Film Oven Test)

Test Method

Determines the effect on asphaltic materials of heating in an oven under prescribed conditions. The results are reported in terms of change in sample mass and/or changes in selected properties such as viscosity, penetration and ductility as evidenced by test data taken before and after the oven cycle.

Asphalt Oven

Dual purpose oven for loss of heat test and thin film test for bitumen and asphaltic materials. Interior chamber of stainless steel and stored powder painter steel exterior. Double glazed window in door for viewing test chamber.

Side mounted controls comprise microprocessor digital control, independent overheat thermostat, mains switch and indicator lamps. Two rotating platforms supplied to perform both the tests.

K45850 Loss on Heat / Thin Film Oven

Ordering Information

Catalog No.		Order Qty
K45850	Loss on Heat/Thin Film Oven for D6, D1754 110V, 60Hz	1
K45859	Loss on Heat/Thin Film Oven for D6, D1754 220V, 50Hz	

Accessories

388-001-003	Sample Container for ASTM D6	9
K17000	Thin Film Oven Pan, aluminum for D1754	4
K17090	Thin Film Oven Pan, stainless steel for D1754	4

Specifications

Conforms to the specifications of:
ASTM D6, D1754; Specification E145, Type 1B; AASHTO T47, T179, BS2000
Temperature Range: to 356˚F (180˚C)
Pre-set at 163˚C ± 1˚C

Dimensions

Internal Chamber Dimension 38cm(H) x 52cm(W) x 46cm(D)
External Dimension 57cm(H) x 87cm(W) x 63cm(D)
(External Dimension does not include motor or handle)
Net Weight: 44kg

Effect of Heat and Air on a Moving Film of Asphalt

Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin Film Oven Test)

Test Method

Determines the effect of heat and air on a moving film of asphalt to serve as an indicator of approximate change in properties during conventional hot-mixing. The results are reported in terms of the changes in selected properties such as viscosity, penetration and ductility brought about by the RTFO test, as evidenced by test data taken before and after the 75 minute oven cycle.

Rolling Thin Film Oven

- Conforms to the specifications of ASTM D2872

Double-walled electrically heated convection oven for rolling thin film oven tests on asphalts. Incorporates all required features per ASTM specifications, including: door with double-pane viewing window; symmetrical top and bottom vents; air plenum; squirrel cage-type 1725rpm fan; digital indicating thermostat to control oven temperature at 163°C ±0.5°C; vertical circular carriage to mechanically rotate the samples at ±0.2rpm; air jets to blow heated air into each sample bottle at its lowest point of travel; and a calibrated flowmeter to control air flow at 4000mL/min. An overtemperature cut-off circuit disconnects power to the unit in the event of control failure.

Specifications

Conforms to the specifications of: ASTM D2872

Included Accessories

Glass Sample Container (8)
ASTM 13C Thermometer

Dimensions lxwxh,in.(cm)

28x26x23 (71x66x58)
Net Weight: 223 lbs (101kg)

Shipping Information

Shipping Weight: 276 lbs (125kg)
Dimensions: 7.96 Cu. ft.

K88000 Rolling Thin Film Oven

Ordering Information

Catalog No.		Order Qty
K88000	Rolling Thin Film Oven, 220-240V 60Hz	1
K88001	Rolling Thin Film Oven, 220-240V 50Hz	
	Accessories	
K88000-1	Glass Sample Container	8
250-000-13C	ASTM 13C Thermometer Range: 155 to 170°C	1

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

Float Test for Bituminous Materials

Test Method

Provides a measure of the consistency of bituminous materials, including asphalts and tar products.

Float Test Apparatus

• Conforms to ASTM D139, AASHTO T50 and ANS A37.2 specifications Consists of aluminum float and three brass collars for determining the consistency of bituminous materials and tar products.

Shipping Information

Shipping Weight: 3 lbs (1.4kg)

Ordering Information

Catalog No.		Order Qty
K30500	Float Test Apparatus	1
	Accessories	
K30510	Float, only	
K30520	Collar, only	
250-000-15F	ASTM 15F Thermometer Range: 30 to 180°F	1
250-000-15C	ASTM 15C Thermometer Range: –2 to +80°C	

K30500 Float Test Apparatus

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

Residue & Oil Distillate in Emulsified Asphalts by Distillation

Test Method

Determines residue and oil distillate in emulsified asphalt for research, quality control and specification acceptance purposes.

Residue and Oil Distillate Determination Apparatus

• Conforms to ASTM D244 and AASHT0 T59 specifications Consists of an aluminum alloy still with lid and clamp assembly, ring burner, connection apparatus, graduate cylinder and thermometers.

Shipping Information

K31900: Shipping Weight: 7 lbs (3.2kg)
Dimensions: 1.3 Cu. ft.
K31956: Shipping Weight: 18 lbs (8.2kg)
Dimensions: 2.8 Cu. ft.

Ordering Information

Catalog No.		Order Qty
K31900	Aluminum Alloy Still	1
	Accessories	
K31910	Ring Burner, 5" (12.7cm) dia	1
K31956	Connection Apparatus Includes Pyrex™ condenser with metal jacket, tin shield, clamps and stand	1
332-002-003	Graduated Cylinder, 100mL	1
250-000-07F	ASTM 7F Thermometer Range: 30 to 580°F	2
250-000-07C	ASTM 7C Thermometer Range: –2 to +300°C	

K31900 Metal Still

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

Blocking and Picking Points of Petroleum Wax

Test Method

Blocking point and picking point are indicators of the temperature above which surface film injury will occur when waxed surfaces come in contact with one another as on a roll of wax paper. Paper test specimens are coated with the wax sample, folded with the waxed surfaces together, and heated on a metal blocking plate having a measured temperature gradient. After a specified period, the specimens are removed and unfolded, and the points at which film disruption occurred are noted together with their corresponding temperatures.

Blocking and Picking Points Apparatus

- Conforms to ASTM D1465 and TAPPI T652 specifications
- Choice of Type A or Type B Blocking Plates

Applies wax samples to paper test specimens and creates a temperature gradient for determining blocking point and picking point temperatures.

Wax Coating Device–Coats paper with wax samples per ASTM specifications. Consists of an insulated electrically heated hot wax bath and a cooling water bath with doctor rods and paper roller. Variable auto transformer and 200W heater situated underneath the hot wax bath heat sample to a temperature above the melting point. Doctor rods connect to an external hot water supply to maintain proper temperature. Cooling bath has water inlet/outlet fittings, and each bath has a built-in paper guide.

Blocking Plates–Choice of Type A or Type B plates per ASTM specifications. Type A Aluminum Blocking Plate uses a strip heater and cooling coil on opposite ends of the block to create a temperature gradient. Six thermocouples along the length of the block input to accessory Digital Thermometer. Accommodates eight rows of paper test specimens.
Type B Aluminum Blocking Plate uses two thermostatically controlled baths to establish a temperature gradient, with the ends of the plate extending into the baths. Cold bath has a cooling coil and 100W immersion heater; hot bath has a 300W immersion heater. Thermoregulators and motor stirrers provide uniform temperature control in each bath. Ten thermocouples along the length of the block input to accessory Digital Thermometer. Accommodates six rows of test specimens.

Digital Thermometer–Ten-channel microprocessor based digital thermocouple thermometer with large LED display. Ten-position front panel rotary selector switch. Mounted in a heavy duty bench case.

Specifications

Conforms to the specifications of: ASTM D1465; TAPPI T652
Electrical Requirements:
Wax Coating Device: 115V 50/60Hz, Single Phase, 1.7A
220-240V 5060Hz, Single Phase, .9A
Type A Blocking Plate: 115V 50/60Hz, Single Phase, 2.1A
220-240V 50/60Hz, Single Phase, 1.1A or
Type B Blocking Plate: 115V 50/60Hz, Single Phase, 3.4A
220-240V 50/60Hz, Single Phase, 1.8A

Included Accessories

Type A Blocking Plate:
Steel weights, 1x1x30"(8)
Sponge rubber pads (8)
IC thermocouples (6) or
Type B Blocking Plate:
Steel weights, 1x1x6" (24)
Sponge rubber pads (8)
IC thermocouples (10)

Dimensions lxwxh,in.(cm)

Wax Coating Device: 19x8x12 (48x20x30)
Type A Blocking Plate: 38x12x2 (97x30x5)
Type B Blocking Plate: 19x8x12 (48x20x30)

Shipping Information

Shipping Weight:
Wax Coating Device: 44 lbs (20kg)
Type A Blocking Plate: 164 lbs (74.4kg)
Type B Blocking Plate: 183 lbs (83.0kg)
Dimensions:
Wax Coating Device: 5.3 Cu. ft.
Type A Blocking Plate: 4.1 Cu. ft.
Type B Blocking Plate: 12.3 Cu. ft.

Ordering Information

Catalog No.		Order Qty
Wax Coating Device		1
K17100	Wax Coating Device, 115V 50/60Hz	
K17190	Wax Coating Device, 220-240V 50/60Hz	
Blocking Plates		1
K17200	Type A Blocking Plate, 115V 50/60Hz	
K17290	Type A Blocking Plate, 220-240V 50/60Hz	
K17300	Type B Blocking Plate. 115V 50/60Hz	
K17390	Type B Blocking Plate. 220-240V 50/60Hz	
Digital Thermometer		1
K29310	Digital Thermometer, 115V 50/60Hz	
K29319	Digital Thermometer, 220-240V 50/60Hz	
K17110	Test Paper, Cereal glassine, 30 lb basic weight. 3½" (8.9cm) wide x 6" (15.25cm) dia. roll on a 3" (7.6cm) dia. core.	1
Thermometers		2
Use with Type B Blocking Plate only.		
250-000-09F	ASTM 9F Thermometer Range: 20 to 230°F	
250-000-09C	ASTM 9C Thermometer Range: –5 to +110°C	

Melting Point of Petroleum Wax (Cooling Curve)

K17500 Wax Melting Point Apparatus

Test Method

Periodic temperature measurements are taken of a sample of molten wax as it is cooled in an air bath. When the wax solidifies, a plateau in the cooling curve occurs, indicating the melting point (cooling curve) of the sample.

Wax Melting Point Apparatus

- Conforms to ASTM D87 and related specifications

Cools molten wax samples in accordance with ASTM and related specifications. Consists of nickel-plated air and water bath assembly with removable cover. Supports test tube in a vertical position in the air bath.

Specifications

Conforms to the specifications of:
ASTM D87; IP 55; ISO 3841; DIN 51570; FTM 791-1402; NF T 60-114

Included Accessories

Test Tube, Thermometer Holders (2)

Dimensions

dia.xh,in.(cm) 5½x7 (14x18)
Net Weight 4 lbs (1.8kg)

Shipping Information

Shipping Weight: 6 lbs (2.7kg)
Dimensions: 0.7 Cu. ft.

Ordering Information

Catalog No.		Order Qty
K17500	Wax Melting Point Apparatus	1
	Accessories	
250-000-14F	ASTM 14F Thermometer Range: 100 to 180°F	2
250-000-14C	ASTM 14C Thermometer Range: 38 to 82°C	
K175-0-8	Test Tube, 25x100mm	

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

Oil Content and Solvent Extractables in Petroleum Waxes

Oil Content of Petroleum Waxes

Solvent Extractables in Petroleum Waxes

Test Method

Oil content or solvent extractables in wax can affect key properties such as strength, hardness, melting point, etc. The sample is dissolved in methyl-ethyl ketone or a 50-50 mixture of methyl-ethyl ketone and toluene, cooled to precipitate the wax, and filtered. The oil content or solvent extractables content of the filtrate is then determined by evaporating the solvent and weighing the residue.

Oil-Solvent Extractables Content Apparatus

- Conforms to ASTM D721, D3235 and related specifications

Determines oil content or solvent extractables content in petroleum waxes in accordance with ASTM specifications. Includes Filter Stick Assembly; Cooling Bath; Air Pressure Regulator; and Evaporation Cabinet.

Filter Stick and Assembly–Filters petroleum wax samples per ASTM specifications. Consists of 10mm diameter sintered glass filter stick with air pressure inlet tube and delivery nozzle, and a 25x170mm test tube. Inserts in Cooling Bath.

Cooling Bath–Accommodates three (3) 25x170mm test tubes for cooling samples and filter stick assemblies. Insulated stainless steel tank with finished steel exterior. Removable composition top plate has thermometer port, filling port and three 25.4mm (1") test tube ports. Fill tank with suitable cooling mixture.

Air Pressure Regulator–Controls air flow to the filter stick assembly at the required rate. Mercury bubbler-type, with 250mL glass cylinder, T-tube and rubber stopper.

Evaporation Cabinet–Thermostatically heated cabinet evaporates solvent from filtrate per specifications. Accommodates four weighing bottles. Delivers air stream vertically downward into bottles through glass jets. Manifold assembly is adjustable for positioning of jets at the correct height above the sample surface. Controls temperature at 35 ±1°C (95 ±2°F). Finished steel cabinet with composition front plate and hinged glass door.

Ordering Information

Catalog No.		Order Qty
K17600	Oil-Solvent Extractables Content Apparatus, 115V 50/60Hz	1
K17690	Oil-Solvent Extractables Content Apparatus, 220-240V 50/60Hz	
	Accessories	
K17605	Mechanically Refrigerated Cooling Bath, 115V 60Hz, up to -35°C	
K17695	Mechanically Refrigerated Cooling Bath, 220-240V 50/60Hz, up to -35°C	
332-004-009	Test Tube, 25x170mm	4
250-000-71F	ASTM 71 F Thermometer Range: –35 to +70°F	1

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

Specifications

Conforms to the specifications of:
ASTM D721, D3235; IP 158; ISO 2908; DIN 51571, 51572; FTM 791-5431
Electrical Requirements:
115V 50/60Hz, Single Phase, 0.8A
220-240 V 50/60Hz, Single Phase, 0.4A

Included Accessories

Weighing Bottles, 15mL (4)
Filter Stick Assembly (K17630)
Air Pressure Regulator (K17640)

Dimensions lxwxh,in.(cm)

Cooling Bath: 8x6x9 (20x15x23)
Evaporation Cabinet: 9x5x16 (23x13x41)
Net Weight:
Cooling Bath: 6 lbs (2.7kg)
Evaporation Cabinet: 7 lbs (3.2kg)

Shipping Information

Shipping Weight: 24 lbs (10.9kg)
Dimensions: 5 Cu. ft.

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.

Ductility of Bituminous Materials ..... Page 160

ASTM D113, D-4; AASHTO T51; ANS A37.11; Federal Specification SS-R-406C; USDA Method 51 (BUL 12-16); IP 32; DIN 52013

Glycerin
No. 50 300 µm Sieve
150mL Beaker, Griffin Low-form
Carbon Disulfide
Celite Analytical Filter Aid (CAFA)
Evaporating Dish
Analytical Balance
Suction Pump
Filtering Crucible, Porcelain
Dextrin, Talc or Kaolin
Spatula
30mL Beaker, Griffin Low-form
Drying Oven
Watch Glasses
Desiccator
Filtering Flask, with Crucible Adapter
Bunsen Burner or Muffle Furnace

Bituminous Materials in Tension ..... Page 161

ASTM D4

150mL Beaker, Griffin Low-form
Carbon Disulfide
Celite Analytical Filter Aid (CAFA)
Evaporating Dish
Analytical Balance
Suction Pump
Filtering Crucible, Porcelain
30mL Beaker, Griffin Low-form
Drying Oven
Watch Glasses
Desiccator
Filtering Flask, with Crucible Adapter
Bunsen Burner or Muffle Furnace

Softening Point of Bitumen (Ring-and-Ball Apparatus) ..... Page 162

ASTM D36, E28; AASHTO T53; IP 58, IP 198

Distilled Water
Ethylene Glycol
Silicone Oil or Grease
Dextrin or Talc
Spatula

Breaking Point of Bitumen ..... Page 162

IP 80

Acetone
Solid Carbon Dioxide

Float Test for Bituminous Materials ..... Page 163

ASTM D139; AASHTO T50 and ANS A37.2

Spatula

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ASTM D244 and AASHTO T59

No. 50 300 µm Sieve
No. 20 850 µm Sieve
Condenser
Xylol

Effect of Heat and Air on Asphaltic Materials ..... Page 164

ASTM D1754

Laboratory Oven with Rotating Shelf
Analytical Balance

Blocking and Picking Points of Petroleum Wax ..... Page 168-169

ASTM D1465; TAPPI T652

Trimming Board
Analytical Balance
Paper Cereal Glassine

Melting Point of Petroleum Wax (Cooling Curve) ..... Page 169

ASTM D87; TAPPI T630M-61; IP 55; ISO 3841; DIN 51570; FTM 791-1402

Heating Device

Oil Content of Petroleum Waxes Solvent Extractables in Petroleum Waxes ..... Page 170

ASTM D721, D3235; TAPPI T636; IP 158; ISO 2908, DIN 51571, 51572; FTM 791-5431

Dropper Pipet, 15mL
Transfer Pipet, 15mL
Analytical Balance
Wire Stirrer
Methyl Ethyl Ketone
Toluene
Anhydrous Calcium Sulfate
Air Supply
Drying Oven
Kerosene
Cotton

Certified Petroleum Standards

Test Methods **Page**

Certified Petroleum Standards Listing.....182

Koehler offers laboratory reference standards for our full line of testing equipment. Each test standard comes with original certification listing the ASTM test method, the name and ISO status of each testing laboratory, and the average test result and standard deviation. Please inquire with Koehler's Customer Service Department about further information as well as ordering these reference standards for your testing needs.

Certified Petroleum Reference Standards

Certified Petroleum Reference Standards

- Manufactured and certified for ASTM and related test procedures
- NIST traceable standards developed utilizing ASTM Round Robin trials
- Custom standards available

Koehler offers an extensive range of certified petroleum reference materials meeting the analytical requirements for ASTM, ISO, EPA, and related test methods, and are traceable to National Institute of Standards and Technology.

Complete certification is provided with each standard. Refer to the list below for the reference standard that you require or contact us to discuss your needs for a special standard. Detailed datasheets and quotations for standards listed below or for specially prepared standards are readily available from Koehler by contacting our Customer Service Department. We will respond to you promptly upon receiving your request.

Certified Standards for Petroleum Test Methods

--	PIANO, PONA, PNA by GC
--	O-PONA Method by GC
--	Simulated Distillation (Sim Dis) by GC
D56	Flash Point by Tag Closed Cup
D86	Synthetic Distillation Standard
D92	Flash Point by Cleveland Open Cup
D93	Flash Point by Pensky-Martens Closed Cup
D97	Pour Point
D445	Kinematic Viscosity *(please refer to pages 18-19)*
D611	Aniline Point
D1015	Freezing Point
D1319	Olefin Analysis by FIA
D1744	Water in Liquid Petroleum Products
D2386	Freezing Point
D2500	Cloud Point
D2789	Hydrocarbon Analysis in Gasoline by GC/MS
D2887	Boiling Range by GC
D3230	Salts in Crude Oil
D3231	Phosphorus in Gasoline
D3237	Lead in Gasoline by AA
D3340	Li and Na in Lubricating Greases by Flame Photometer
D3524	Diesel Fuel Analysis by GC
D3605	Trace Metal in Gas Turbine Fuel by AA
D3606	Aromatics in Gasoline by GC
D3610	Total Cobalt Analysis by Potentiometric Titration
D3710	Boiling Range by GC
D3798	p-Xylene Analysis by GC
D3831	Manganese in Gasoline by AA
D4059	PCB Analysis by GC
D4110	Ion Chromatography
D4291	Ethylene Glycol by GC
D4327	Ion Chromatography
D4377	Water in Liquid Petroleum Products
D4420	Aromatics in Gasoline by GC
D4628	Wear Metals in Lube Oil
D4629	Nitrogen by Chemilluminescence
D4815	Oxygenates in Gasoline by GC
D4927	Wear Metals and Additives by WD-XRF
D4928	Water in Liquid Petroleum Products
D4929	Chlorine in Crude Oil by Microcoulometry
D4951	Wear Metals and Additives by ICP
D5056	Trace Metals in Petroleum Coke by AA
D5059	Lead in Gasoline by X-Ray Spectroscopy
D5134	Petroleum Naphthas through n-Nonane Analysis by GC
D5184	Al and Si by ICP
D5186	Aromatics by SFC
D5188	Vapor-Liquid Ratio Temperature

Certified Standards for Petroleum Test Methods (cont'd)

D5191	Vapor Pressure Standards
D5307	Boiling Range Distribution by GC
D5441	MTBE Analysis by GC
D5442	Petroleum Waxes by GC
D5443	PNA Analysis by Multidimensional GC
D5480	Oil Volatility by GC
D5482	Vapor Pressure Standards
D5501	Ethanol Analysis by GC
D5580	Aromatics by GC
D5599	Oxygenates by OFID
D5600	Trace Metals by ICP
D5622	Oxygenates by Reductive Pyrolysis
D5623	Sulfur Compounds by Sulfur Selective Detection
D5708	Trace Metals by ICP
D5762	Nitrogen by Chemilluminescence
D5769	Aromatics by GC/MS
D5771	Cloud Point (Stepped Cooling Method)
D5772	Cloud Point (Linear Cooling Rate)
D5773	Cloud Point (Constant Cooling Rate)
D5863	Trace Metals by AA
D5901	Freezing Point (Auto Optical Method)
D5949	Pour Point (Auto Pressure Pulsing Method)
D5950	Pour Point (Auto Tilt Method)
D5972	Freezing Point
D5985	Pour Point (Rotational Method)
D5986	Oxygenates and Aromatics by GC/FTIR
D6160	PCBs by GC
D6258	Solvent Red 164 Dye Concentration in Diesel Fuels
D6277	Benzene in Spark Ignition Fuels
D6293	Oxygenates in Engine Fuels by GC
D6296	Total Olefins in Spark Ignition Engine Fuels by GC
D6304	Water in Liquid Petroleum Products
D6352	Boiling Range Distribution of Petroleum
D6378	Vapor Pressure
D6379	Aromatic Hydrocarbon by HPLC
D6417	Engine Oil by GC
D6443	Metals in Oil
D6481	Lube Oils by ED-XRF
D6550	Olefin Content of Gasoline by SFC

Sulfur Standards

D2622	Sulfur by XRF
D3120	Sulfur by Oxidative Microcoulometry
D3246	Sulfur in Petroleum Gas by Oxidative Microcoulometry
D4294	Sulfur by ED-XRF
D5453	Sulfur by Ultraviolet Fluorescence
D6334	Sulfur in Gasoline by Wavelength
D6445	Sulfur in Gasoline by ED-XRF

ASTM Thermometers, Test Specimens and Glassware

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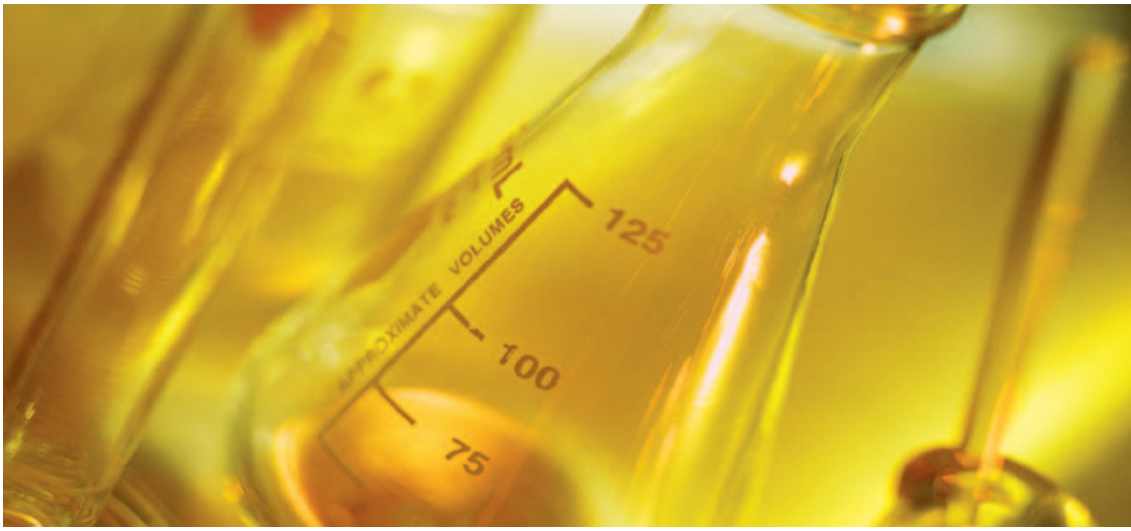

ASTM Thermometers

Koehler is pleased to offer our customers calibrated thermometers in addition to the wide range of ASTM thermometers available. Thermometers are calibrated to ASTM E-1 requirements in accordance with Method E-77 and are NIST traceable. Calibrated thermometers come with an ISO/IEC 17025 and ANSI/NCSL Z-540-1 Report of Calibration. When ordering, please indicate by catalog number the thermometer(s) which meet your testing requirements.

Catalog Number	ASTM Designation	IP Reference	Name	Range
250-000-01C	1C	—	Partial Immersion	–20 to +150°C
250-004-01C	1C	—	1C CERTIFIED @ ASTM specified test points of –20, 0, +50, 100, 150°C	
250-000-01F	1F	—	Partial Immersion	0 to 302°F
250-004-01F	1F	—	1F CERTIFIED @ ASTM specified test points of 0, 32, 122, 212, 302°F	
250-000-02C	2C	62C	Partial Immersion	–5 to +300°C
250-004-02C	2C	62C	2C CERTIFIED @ ASTM specified test points of 0, 75, 150, 225, 300°C	
250-000-02F	2F	62F	Partial Immersion	20 to 580°F
250-004-02F	2F	62F	2F CERTIFIED @ ASTM specified test points of 32, 150, 300, 450, 580°F	
250-000-03C	3C	73C	Partial Immersion	–5 to +400°C
250-004-03C	3C	73C	3C CERTIFIED @ ASTM specified test points of 0, 100, 200, 300, 370°C	
250-000-03F	3F	73F	Partial Immersion	20 to 760°F
250-004-03F	3F	73F	3F CERTIFIED @ ASTM specified test points of 32, 200, 370, 540, 700°F	
250-000-04C	4C	—	Acid Heat	–1 to +105°C
250-004-04C	4C	—	4C CERTIFIED @ ASTM specified test points of 0, 50, 100°C	
250-000-04F	4F	—	Acid Heat	30 to 220°F
250-004-04F	4F	—	4F CERTIFIED @ ASTM specified test points of 32, 122, 212°F	
250-000-05C	5C	1C	Cloud & Pour, High	–38 to +50°C
250-004-05C	5C	1C	5C CERTIFIED @ ASTM specified test points of –35, 0, +50°C	
250-000-05F	5F	1F	Cloud & Pour, High	–36 to +120°F
250-004-05F	5F	1F	5F CERTIFIED @ ASTM specified test points of –30, +32, 120°F	
250-000-06C	6C	2C	Cloud & Pour, Low	–80 to +20°C
250-004-06C	6C	2C	6C CERTIFIED @ ASTM specified test points of –70, –35, 0, +20°C	
250-000-06F	6F	2F	Cloud & Pour, Low	–112 to +70°F
250-004-06F	6F	2F	6F CERTIFIED @ ASTM specified test points of –94, –30, +32, 70°F	
250-000-07C	7C	5C	Distillation, Low	–2 to +300°C
250-004-07C	7C	5C	7C CERTIFIED @ ASTM specified test points of 0, 50, 100, 150, 200, 250, 300°C	
250-000-07F	7F	—	Distillation, Low	30 to 580°F
250-004-07F	7F	—	7F CERTIFIED @ ASTM specified test points of 32, 100, 200, 300, 400, 500, 570°F	
250-000-08C	8C	6C	Distillation, High	–2 to +400°C
250-004-08C	8C	6C	8C CERTIFIED @ ASTM specified test points of 0, 100, 200, 300, 370°C	
250-000-08F	8F	—	Distillation, High	30 to 760°F
250-004-08F	8F	—	8F CERTIFIED @ ASTM specified test points of 32, 200, 370, 540, 700°F	
250-000-09C	9C	15C	Pensky-Martens, Low	–5 to +110°C
250-004-09C	9C	15C	9C CERTIFIED @ ASTM specified test points of 0, 35, 70, 105°C	
250-000-09F	9F	15F	Pensky-Martens, Low	20 to 230°F
250-004-09F	9F	15F	9F CERTIFIED @ ASTM specified test points of 32, 100, 160, 220°F	
250-000-10C	10C	16C	Pensky-Martens, High	90 to 370°C
250-004-10C	10C	16C	10C CERTIFIED @ ASTM specified test points of 100, 200, 300, 370C	
250-000-10F	10F	16F	Pensky-Martens, High	200 to 700°F
250-004-10F	10F	16F	10F CERTIFIED @ ASTM specified test points of 212, 390, 570, 700F	
250-000-11C	11C	28C	Open Flash	–6 to +400°C
250-004-11C	11C	28C	11C CERTIFIED @ ASTM specified test points of 0, 100, 200, 300, 370°C	
250-000-11F	11F	28F	Open Flash	20 to 760°F
250-004-11F	11F	28F	11F CERTIFIED @ ASTM specified test points of 32, 200, 370, 540, 700°F	
250-000-12C	12C	64C	Gravity (Density)	–20 to +102°C
250-004-12C	12C	64C	12C CERTIFIED @ ASTM specified test points of –20, –10, 0, +10, 20, 30, 40, 50, 60, 70, 80, 90, 100°C	
250-000-12F	12F	64F	Gravity (Density)	–5 to +215°F
250-004-12F	12F	64F	12F CERTIFIED @ ASTM specified test points of –5, 15, 32, 60, 85, 110, 135, 160, 185, 210°F	

Koehler now offers mercury-free thermometers that have the performance of mercury. To inquire, please refer to the catalog number for the corresponding thermohydrometer or calibrated thermometer and add -NM. For example, the 250-000-01C ASTM 1C Thermometer would be the 250-001-01C-NM Non-Mercury ASTM 1C Thermometer.

ASTM Thermometers

Catalog Number	ASTM Designation	IP Reference	Name	Range
250-000-13C	13C	47C	Loss on Heat	155 to 170°C°
250-004-13C	13C	47C	13C CERTIFIED @ ASTM specified test points of 155, 163, 170°C	
250-000-14C	14C	17C	Paraffin Wax Melting Point	38 to 82°C
250-004-14C	14C	17C	14C CERTIFIED @ ASTM specified test points of 40, 50, 60, 70, 80°C	
250-000-14F	14F	17F	Paraffin Wax Melting Point	100 to 180°F
250-004-14F	14F	17F	14F CERTIFIED @ ASTM specified test points of 100, 120, 140, 160, 180°F	
250-000-15C	15C	60C	Softening Point, Low	–2 to +80°C
250-004-15C	15C	60C	15C CERTIFIED @ ASTM specified test points of 0, 20, 40, 60, 80°C	
250-000-15F	15F	—	Softening Point, Low	30 to 180°F
250-004-15F	15F	—	15F CERTIFIED @ ASTM specified test points of 32, 70, 100, 140, 180°F	
250-000-16C	16C	61C	Softening Point, High	30 to 200°C
250-004-16C	16C	61C	16C CERTIFIED @ ASTM specified test points of 30, 60, 90, 120, 150, 180, 200°C	
250-000-16F	16F	—	Softening Point, High	85 to 392°F
250-004-16F	16F	—	16F CERTIFIED @ ASTM specified test points of 90, 140, 190, 240, 290, 340, 390°F	
250-000-17C	17C	—	Saybolt Viscosity	19 to 27°C
250-004-17C	17C	—	17C CERTIFIED @ ASTM specified test points of 21, 25°C	
250-000-17F	17F	—	Saybolt Viscosity	66 to 80°F
250-004-17F	17F	—	17F CERTIFIED @ ASTM specified test points of 70, 77°F	
250-000-18C	18C	23C	Saybolt Viscosity & Reid Vapor	34 to 42°C
250-004-18C	18C	23C	18C CERTIFIED @ ASTM specified test points of 38, 41°C	
250-000-18F	18F	23F	Saybolt Viscosity & Reid Vapor	94 to 108°F
250-004-18F	18F	23F	18F CERTIFIED @ ASTM specified test points of 100, 107°F	
250-000-19C	19C	—	Saybolt Viscosity	49 to 57°C
250-004-19C	19C	—	19C CERTIFIED @ ASTM specified test points of 50, 54°C	
250-000-19F	19F	—	Saybolt Viscosity	120 to 134°F
250-004-19F	19F	—	19F CERTIFIED @ ASTM specified test points of 122, 130°F	
250-000-20C	20C	—	Saybolt Viscosity	57 to 65°C
250-004-20C	20C	—	20C CERTIFIED @ ASTM specified test points of 60, 64°C	
250-000-20F	20F	—	Saybolt Viscosity	134 to 148°F
250-004-20F	20F	—	20F CERTIFIED @ ASTM specified test points of 140, 147°F	
250-000-21C	21C	—	Saybolt Viscosity	79 to 87°C
250-004-21C	21C	—	21C CERTIFIED @ ASTM specified test points of 82, 86°C	
250-000-21F	21F	—	Saybolt Viscosity	174 to 188°F
250-004-21F	21F	—	21F CERTIFIED @ ASTM specified test points of 180, 187°F	
250-000-22C	22C	24C	Saybolt Viscosity & Oxidation Stability	95 to 103°C
250-004-22C	22C	24C	22C CERTIFIED @ ASTM specified test points of 99, 102°C	
250-000-22F	22F	24F	Saybolt Viscosity & Oxidation Stability	204 to 218°F
250-004-22F	22F	24F	22F CERTIFIED @ ASTM specified test points of 210, 212°F	
250-000-23C	23C	—	Viscosity Engler	18 to 28°C
250-004-23C	23C	—	23C CERTIFIED @ ASTM specified test points of 20, 25°C	
250-000-24C	24C	—	Viscosity Engler	39 to 54°C
250-004-24C	24C	—	24C CERTIFIED @ ASTM specified test points of 40, 50°C	
250-000-25C	25C	—	Viscosity Engler	95 to 105°C
250-004-25C	25C	—	25C CERTIFIED @ ASTM specified test points of 95, 100°C	
250-000-26C	26C	—	Stability Test of Soluble Nitro-Cellulose	130 to 140°C
250-004-26C	26C	—	26C CERTIFIED @ ASTM specified test points of 130, 135, 140°C	
250-000-27C	27C	—	Turpentine Distillation	147 to 182°C
250-004-27C	27C	—	27C CERTIFIED @ ASTM specified test points of 155, 165, 175°C	
250-000-28C	28C	31C	Kinematic Viscosity @ 37.8C	36.6 to 39.4°C
250-004-28C	28C	31C	28C CERTIFIED @ ASTM specified test points of 0, 37.8, 39°C	
250-000-28F	28F	—	Kinematic Viscosity @ 100F	97.5 to 102.5°F
250-004-28F	28F	—	28F CERTIFIED @ ASTM specified test points of 32, 100, 102°F	

ASTM Thermometers

Catalog Number	ASTM Designation	IP Reference	Name	Range
250-000-29C	29C	34C	Kinematic Viscosity @ 54.4C	52.6 to 55.4°C
250-004-29C	29C	34C	29C CERTIFIED @ ASTM specified test points of 0, 54.4, 55°C	
250-000-29F	29F	—	Kinematic Viscosity @ 130F	127.5 to 132.5°F
250-004-29F	29F	—	29F CERTIFIED @ ASTM specified test points of 32, 130, 132°F	
250-000-30F	30F	32F	Kinematic Viscosity @ 210F	207.5 to 212.5°F
250-004-30F	30F	32F	30F CERTIFIED @ ASTM specified test points of 32, 210, 212°F	
250-000-31F	31F	—	Reid Vapor	–30 to +120°F
250-004-31F	31F	—	31F CERTIFIED @ ASTM specified test points of –20, +32, 100°F	
250-000-33C	33C	20C	Aniline Point	–38 to +42°C
250-004-33C	33C	20C	33C CERTIFIED @ ASTM specified test points of –35, –20, 0, +20, 40°C	
250-000-33F	33F	—	Aniline Point	–36.5 to +107.5°F
250-004-33F	33F	—	33F CERTIFIED @ ASTM specified test points of –31, –4, +32, 68, 104°F	
250-000-34C	34C	21C	Aniline Point	25 to 105°C
250-004-34C	34C	21C	34C CERTIFIED @ ASTM specified test points of 25, 45, 65, 85, 100°C	
250-000-34F	34F	—	Aniline Point	77 to 221°F
250-004-34F	34F	—	34F CERTIFIED @ ASTM specified test points of 77, 113, 149, 185, 212°F	
250-000-35C	35C	59C	Aniline Point	90 to 170°C
250-004-35C	35C	59C	35C CERTIFIED @ ASTM specified test points of 100, 120, 140, 160, 170°C	
250-000-35F	35F	—	Aniline Point	194 to 338°F
250-004-35F	35F	—	35F CERTIFIED @ ASTM specified test points of 212, 250, 285, 320, 338°F	
250-000-36C	36C	—	Titer Test	–2 to +68°C
250-004-36C	36C	—	36C CERTIFIED @ ASTM specified test points of 0, 15, 30, 45, 65°C	
250-000-37C	37C	77C	Solvents Distillation	–2 to +52°C
250-004-37C	37C	77C	37C CERTIFIED @ ASTM specified test points of 0, 15, 30, 50°C	
250-000-38C	38C	78C	Solvents Distillation	24 to 78°C
250-004-38C	38C	78C	38C CERTIFIED @ ASTM specified test points of 25, 40, 55, 75C	
250-000-39C	39C	79C	Solvents Distillation	48 to 102°C
250-004-39C	39C	79C	39C CERTIFIED @ ASTM specified test points of 50, 65, 80, 100°C	
250-000-40C	40C	80C	Solvents Distillation	72 to 126°C
250-004-40C	40C	80C	40C CERTIFIED @ ASTM specified test points of 75, 90, 105, 125°C	
250-000-41C	41C	81C	Solvents Distillation	98 to 152°C
250-004-41C	41C	81C	41C CERTIFIED @ ASTM specified test points of 100, 115, 130, 150°C	
250-000-42C	42C	82C	Solvents Distillation	95 to 255°C
250-004-42C	42C	82C	42C CERTIFIED @ ASTM specified test points of 100, 150, 200, 250°C	
250-000-43C	43C	65C	Kinematic Viscosity	–51.6 to –34°C
250-004-43C	43C	65C	43C CERTIFIED @ ASTM specified test points of –50, –45, –40, –35, 0°C	
250-000-43F	43F	65F	Kinematic Viscosity	–61 to –29°F
250-004-43F	43F	65F	43F CERTIFIED @ ASTM specified test points of –60, –50, –40, –30, +32°F	
250-000-44C	44C	29C	Kinematic Viscosity @ 20C	18.5 to 21.5°C
250-004-44C	44C	29C	44C CERTIFIED @ ASTM specified test points of 0, 20, 21°C	
250-000-44F	44F	29F	Kinematic Viscosity @ 68F	66.5 to 71.5°F
250-004-44F	44F	29F	44F CERTIFIED @ ASTM specified test points of 32, 68, 70°F	
250-000-45C	45C	30C	Kinematic Viscosity @ 25C	23.6 to 26.4°C
250-004-45C	45C	30C	45C CERTIFIED @ ASTM specified test points of 0, 25, 26°C	
250-000-45F	45F	30F	Kinematic Viscosity @ 77F	74.5 to 79.5°F
250-004-45F	45F	30F	45F CERTIFIED @ ASTM specified test points of 32, 77, 79°F	
250-000-46C	46C	66C	Kinematic Viscosity @ 50C	48.6 to 51.4°C
250-004-46C	46C	66C	46C CERTIFIED @ ASTM specified test points of 0, 50, 51°C	
250-000-46F	46F	66F	Kinematic Viscosity @ 122F	119.5 to 124.5°F
250-004-46F	46F	66F	46F CERTIFIED @ ASTM specified test points of 32, 122, 124°F	

Koehler now offers mercury-free thermometers that have the performance of mercury. To inquire, please refer to the catalog number for the corresponding thermohydrometer or calibrated thermometer and add -NM. For example, the 250-000-01C ASTM 1C Thermometer would be the 250-001-01C-NM Non-Mercury ASTM 1C Thermometer.

ASTM Thermometers

Catalog Number	ASTM Designation	IP Reference	Name	Range
250-000-47C	47C	35C	Kinematic Viscosity @ 60C	58.6 to 61.4°C
250-004-47C	47C	35C	47C CERTIFIED @ ASTM specified test points of 0, 60, 61°C	
250-000-47F	47F	35F	Kinematic Viscosity @ 140F	137.5 to 142.5°F
250-004-47F	47F	35F	47F CERTIFIED @ ASTM specified test points of 32, 140, 142°F	
250-000-48C	48C	90C	Kinematic Viscosity @ 82.2C	80.6 to 83.4°C
250-004-48C	48C	90C	48C CERTIFIED @ ASTM specified test points of 0, 82.2, 83°C	
250-000-48F	48F	90F	Kinematic Viscosity @ 180F	177.5 to 182.5°F
250-004-48F	48F	90F	48F CERTIFIED @ ASTM specified test points of 32, 180, 182°F	
250-000-49C	49C	—	Stormer Viscosity	20 to 70°C
250-004-49C	49C	—	49C CERTIFIED @ ASTM specified test points of 20, 35, 50, 70°C	
250-000-50F	50F	—	Gas Calorimeter Inlet	54 to 101°F
250-004-50F	50F	—	50F CERTIFIED @ ASTM specified test points of 55, 60, 65, 70, 75, 80, 85, 90, 95, 100°F	
250-000-51F	51F	—	Gas Calorimeter Outlet	69 to 116°F
250-004-51F	51F	—	51F CERTIFIED @ ASTM specified test points of 70, 75, 80, 85, 90, 95, 100, 105, 110, 115°F	
250-000-52C	52C	—	Butadiene Boiling Point	–10 to +5°C
250-004-52C	52C	—	52C CERTIFIED @ ASTM specified test points of –10, 0, +5°C	
250-000-53C	53C	—	Benzene Freezing Pt	–0.6 to +10.4°C
250-004-53C	53C	—	53C CERTIFIED @ ASTM specified test points of 0, 5, 10°C	
250-000-54C	54C	18C	Congealing Point	20 to 100.6°C
250-004-54C	54C	18C	54C CERTIFIED @ ASTM specified test points of 20, 50, 75, 100°C	
250-000-54F	54F	18F	Congealing Point	68 to 213°F
250-004-54F	54F	18F	54F CERTIFIED @ ASTM specified test points of 70, 120, 170, 210°F	
250-000-56C	56C	—	Bomb Calorimeter	19 to 35°C
250-004-56C	56C	—	56C CERTIFIED @ ASTM specified test points of 19, 21, 23, 25, 27, 29, 31°C	
250-000-56F	56F	—	Bomb Calorimeter	66 to 95°F
250-004-56F	56F	—	56F CERTIFIED @ ASTM specified test points of 66, 70, 74, 78, 82, 88, 92, 95°F	
250-000-57C	57C	—	Tag Closed Tester Low Range	–20 to +50°C
250-004-57C	57C	—	57C CERTIFIED @ ASTM specified test points of –20, 0, 25, +50°C	
250-000-57F	57F	—	Tag Closed Tester Low Range	–4 to +122°F
250-004-57F	57F	—	57F CERTIFIED @ ASTM specified test points of –3, +32, 77, 122°F	
250-000-58C	58C	—	Tank Gauging	–34 to +49°C
250-004-58C	58C	—	58C CERTIFIED @ ASTM specified test points of –30, 0, +25, 45°C	
250-000-58F	58F	—	Tank Gauging	–30 to +120°F
250-004-58F	58F	—	58F CERTIFIED @ ASTM specified test points of –20, +32, 80, 120°F	
250-000-59C	59C	—	Tank Gauging	–18 to +82°C
250-004-59C	59C	—	59C CERTIFIED @ ASTM specified test points of 0, 25, 55, 80°C	
250-000-59F	59F	—	Tank Gauging	0 to 180°F
250-004-59F	59F	—	59F CERTIFIED @ ASTM specified test points of 32, 80, 130, 180°F	
250-000-60C	60C	—	Tank Gauging	77 to 260°C
250-004-60C	60C	—	60C CERTIFIED @ ASTM specified test points of 100, 175, 255°C	
250-000-60F	60F	—	Tank Gauging	170 to 500°F
250-004-60F	60F	—	60F CERTIFIED @ ASTM specified test points of 212, 350, 490°F	
250-000-61C	61C	63C	Petrolatum Melting Point	32 to 127°C
250-004-61C	61C	63C	61C CERTIFIED @ ASTM specified test points of 40, 60, 80, 100, 120°C	
250-000-61F	61F	—	Petrolatum Melting Point	90 to 260°F
250-004-61F	61F	—	61F CERTIFIED @ ASTM specified test points of 100, 150, 200, 250°F	
250-000-62C	62C	—	Reference Standard	–38 to +2°C
250-004-62C	62C	—	62C CERTIFIED @ ASTM specified test points of –37, –30, –20, –10, 0°C	
250-000-62F	62F	—	Reference Standard	–36 to +35°F
250-004-62F	62F	—	62F CERTIFIED @ ASTM specified test points of –35, –15, 0, +15, 32°F	

ASTM Thermometers

Catalog Number	ASTM Designation	IP Reference	Name	Range
250-000-63C	63C	—	Reference Standard	–8 to +32°C
250-004-63C	63C	—	63C CERTIFIED @ ASTM specified test points of –7, 0, +10, 20, 30°C	
250-000-63F	63F	—	Reference Standard	18 to 89°F
250-004-63F	63F	—	63F CERTIFIED @ ASTM specified test points of 20, 32, 50, 70, 88°F	
250-000-64C	64C	—	Reference Standard	25 to 55°C
250-004-64C	64C	—	64C CERTIFIED @ ASTM specified test points of 0, 25, 35, 45, 55°C	
250-000-64F	64F	—	Reference Standard	77 to 131°F
250-004-64F	64F	—	64F CERTIFIED @ ASTM specified test points of 32, 80, 95, 115, 130°F	
250-000-65C	65C	—	Reference Standard	50 to 80°C
250-004-65C	65C	—	65C CERTIFIED @ ASTM specified test points of 0, 50, 60, 70, 80°C	
250-000-65F	65F	—	Reference Standard	122 to 176°F
250-004-65F	65F	—	65F CERTIFIED @ ASTM specified test points of 32, 125, 145, 160, 175°F	
250-000-66C	66C	—	Reference Standard	75 to 105°C
250-004-66C	66C	—	66C CERTIFIED @ ASTM specified test points of 0, 75, 85, 95, 105°C	
250-000-66F	66F	—	Reference Standard	167 to 221°F
250-004-66F	66F	—	66F CERTIFIED @ ASTM specified test points of 32, 168, 185, 200, 220°F	
250-000-67C	67C	—	Reference Standard	95 to 155°C
250-004-67C	67C	—	67C CERTIFIED @ ASTM specified test points of 0, 100, 110, 130, 150°C	
250-000-67F	67F	—	Reference Standard	203 to 311°F
250-004-67F	67F	—	67F CERTIFIED @ ASTM specified test points of 32, 205, 240, 275, 310°F	
250-000-68C	68C	—	Reference Standard	145 to 205°C
250-004-68C	68C	—	68C CERTIFIED @ ASTM specified test points of 0, 150, 170, 190, 205°C	
250-000-68F	68F	—	Reference Standard	293 to 401°F
250-004-68F	68F	—	68F CERTIFIED @ ASTM specified test points of 32, 300, 340, 370, 400°F	
250-000-69C	69C	—	Reference Standard	195 to 305°C
250-004-69C	69C	—	69C CERTIFIED @ ASTM specified test points of 0, 200, 235, 270, 305°C	
250-000-69F	69F	—	Reference Standard	383 to 581°F
250-004-69F	69F	—	69F CERTIFIED @ ASTM specified test points of 32, 400, 460, 520, 580°F	
250-000-70C	70C	—	Reference Standard	295 to 405°C
250-004-70C	70C	—	70C CERTIFIED @ ASTM specified test points of 0, 300, 335, 370, 400°C	
250-000-70F	70F	—	Reference Standard	563 to 761°F
250-004-70F	70F	—	70F CERTIFIED @ ASTM specified test points of 32, 570, 640, 700, 760°F	
250-000-71C	71C	72C	Oil in Wax	–37 to +21°C
250-004-71C	71C	72C	71C CERTIFIED @ ASTM specified test points of –35, –18, 0, +20°C	
250-000-71F	71F	72F	Oil in Wax	–35 to +70°F
250-004-71F	71F	72F	71F CERTIFIED @ ASTM specified test points of –30, 0, +32, 70°F	
250-000-72C	72C	67C	Kinematic Viscosity @ –17.8C	–19.4 to –16.6°C
250-004-72C	72C	67C	72C CERTIFIED @ ASTM specified test points of –19, –17.8, 0°C	
250-000-72F	72F	67F	Kinematic Viscosity @ 0F	–2.5 to +2.5°F
250-004-72F	72F	67F	72F CERTIFIED @ ASTM specified test points of –2, 0, +32°F	
250-000-73C	73C	68C	Kinematic Viscosity @ –40C	–41.4 to –38.6°C
250-004-73C	73C	68C	73C CERTIFIED @ ASTM specified test points of –41, –40, 0°C	
250-000-73F	73F	68F	Kinematic Viscosity @ –40F	–42.5 to –37.5°F
250-004-73F	73F	68F	73F CERTIFIED @ ASTM specified test points of –42, –40, +32°F	
250-000-74C	74C	69C	Kinematic Viscosity @ –53.9C	–55.4 to –52.6°C
250-004-74C	74C	69C	74C CERTIFIED @ ASTM specified test points of –55, –53.9, 0°C	
250-000-74F	74F	69F	Kinematic Viscosity @ –65F	–67.5 to –62.5°F
250-004-74F	74F	69F	74F CERTIFIED @ ASTM specified test points of –67, –65, +32°F	
250-000-75F	75F	—	Coolant Freezing Point	–35 to +35°F
250-004-75F	75F	—	75F CERTIFIED @ ASTM specified test points of –35, 0, +32°F	

Koehler now offers mercury-free thermometers that have the performance of mercury. To inquire, please refer to the catalog number for the corresponding thermohydrometer or calibrated thermometer and add -NM. For example, the 250-000-01C ASTM 1C Thermometer would be the 250-001-01C-NM Non-Mercury ASTM 1C Thermometer.

ASTM Thermometers

Catalog Number	ASTM Designation	IP Reference	Name	Range
250-000-76F	76F	—	Coolant Freezing Point	–65 to +5°F
250-004-76F	76F	—	76F CERTIFIED @ ASTM specified test points of –65, –30, +32°F	
250-000-77F	77F	—	Saybolt Viscosity	245 to 265°F
250-004-77F	77F	—	77F CERTIFIED @ ASTM specified test points of 250, 260°F	
250-000-78F	78F	—	Saybolt Viscosity	295 to 315°F
250-004-78F	78F	—	78F CERTIFIED @ ASTM specified test points of 300, 310°F	
250-000-79F	79F	—	Saybolt Viscosity	345 to 365°F
250-004-79F	79F	—	79F CERTIFIED @ ASTM specified test points of 350, 360°F	
250-000-80F	80F	—	Saybolt Viscosity	395 to 415°F
250-004-80F	80F	—	80F CERTIFIED @ ASTM specified test points of 400, 410°F	
250-000-81F	81F	—	Saybolt Viscosity	445 to 465°F
250-004-81F	81F	—	81F CERTIFIED @ ASTM specified test points of 450, 460°F	
250-000-82C	82C	—	Fuel Rating, Engine	–15 to +105°C
250-004-82C	82C	—	82C CERTIFIED @ ASTM specified test points of 0, 50, 100°C	
250-000-82F	82F	—	Fuel Rating, Engine	0 to 220°F
250-004-82F	82F	—	82F CERTIFIED @ ASTM specified test points of 32, 100, 200°F	
250-000-83C	83C	—	Fuel Rating, Air	15 to 70°C
250-004-83C	83C	—	83C CERTIFIED @ ASTM specified test points of 25, 70°C	
250-000-83F	83F	—	Fuel Rating, Air	60 to 160°F
250-004-83F	83F	—	83F CERTIFIED @ ASTM specified test points of 85, 135°F	
250-000-84C	84C	—	Fuel Rating, Orifice	25 to 80°C
250-004-84C	84C	—	84C CERTIFIED @ ASTM specified test points of 30, 80°C	
250-000-84F	84F	—	Fuel Rating, Orifice	75 to 175°F
250-004-84F	84F	—	84F CERTIFIED @ ASTM specified test points of 100, 150°F	
250-000-85C	85C	—	Fuel Rating, Surge	40 to 150°C
250-004-85C	85C	—	85C CERTIFIED @ ASTM specified test points of 50, 150°C	
250-000-85F	85F	—	Fuel Rating, Surge	100 to 300°F
250-004-85F	85F	—	85F CERTIFIED @ ASTM specified test points of 150, 250°F	
250-000-86C	86C	—	Fuel Rating, Mix	95 to 175°C
250-004-86C	86C	—	86C CERTIFIED @ ASTM specified test points of 100, 175°C	
250-000-86F	86F	—	Fuel Rating, Mix	200 to 350°F
250-004-86F	86F	—	86F CERTIFIED @ ASTM specified test points of 225, 325°F	
250-000-87C	87C	—	Fuel Rating, Coolant	150 to 205°C
250-004-87C	87C	—	87C CERTIFIED @ ASTM specified test points of 160, 200°C	
250-000-87F	87F	—	Fuel Rating, Coolant	300 to 400°F
250-004-87F	87F	—	87F CERTIFIED @ ASTM specified test points of 300, 400°F	
250-000-88C	88C	—	Vegetable Oil Flash	10 to 200°C
250-004-88C	88C	—	88C CERTIFIED @ ASTM specified test points of 40, 100, 150, 200°C	
250-000-88F	88F	—	Vegetable Oil Flash	50 to 392°F
250-004-88F	88F	—	88F CERTIFIED @ ASTM specified test points of 110, 212, 300, 392°F	
250-000-89C	89C	—	Solidification Point	–20 to +10°C
250-004-89C	89C	—	89C CERTIFIED @ ASTM specified test points of –20, –10, 0, +10°C	
250-000-90C	90C	—	Solidification Point	0 to 30°C
250-004-90C	90C	—	90C CERTIFIED @ ASTM specified test points of 0, 10, 20, 30°C	
250-000-91C	91C	—	Solidification Point	20 to 50°C
250-004-91C	91C	—	91C CERTIFIED @ ASTM specified test points of 20, 30, 40, 50°C	
250-000-92C	92C	—	Solidification Point	40 to 70°C
250-004-92C	92C	—	92C CERTIFIED @ ASTM specified test points of 40, 50, 60, 70°C	
250-000-93C	93C	—	Solidification Point	60 to 90°C
250-004-93C	93C	—	93C CERTIFIED @ ASTM specified test points of 60, 70, 80, 90°C	

ASTM Thermometers

Catalog Number	ASTM Designation	IP Reference	Name	Range
250-000-94C	94C	—	Solidification Point	80 to 110°C
250-004-94C	94C	—	94C CERTIFIED @ ASTM specified test points of 80, 90, 100, 110°C	
250-000-95C	95C	—	Solidification Point	100 to 130°C
250-004-95C	95C	—	95C CERTIFIED @ ASTM specified test points of 100, 110, 120, 130°C	
250-000-96C	96C	—	Solidification Point	120 to 150°C
250-004-96C	96C	—	96C CERTIFIED @ ASTM specified test points of 120, 130, 140, 150°C	
250-000-97C	97C	—	Tank Gauging	–18 to +49°C
250-004-97C	97C	—	97C CERTIFIED @ ASTM specified test points of –15, 0, +20, 45°C	
250-000-97F	97F	—	Tank Gauging	0 to 120°F
250-004-97F	97F	—	97F CERTIFIED @ ASTM specified test points of 0, 32, 70, 110°F	
250-000-98C	98C	—	Tank Gauging	16 to 82°C
250-004-98C	98C	—	98C CERTIFIED @ ASTM specified test points of 20, 40, 60, 80°C	
250-000-98F	98F	—	Tank Gauging	60 to 180°F
250-004-98F	98F	—	98F CERTIFIED @ ASTM specified test points of 60, 100, 140, 180°F	
250-000-99C	99C	—	Weathering Test	–50 to +5°C
250-004-99C	99C	—	99C CERTIFIED @ ASTM specified test points of –46, –32, –18, 0°C	
250-000-99F	99F	—	Weathering Test	–58 to +41°F
250-004-99F	99F	—	99F CERTIFIED @ ASTM specified test points of –50, –25, 0, +32°F	
250-000-100C	100C	—	Solidification Point	145 to 205°C
250-004-100C	100C	—	100C CERTIFIED @ ASTM specified test points of 145, 165, 185, 205°C	
250-000-101C	101C	—	Solidification Point	195 to 305°C
250-004-101C	101C	—	101C CERTIFIED @ ASTM specified test points of 200, 250, 300°C	
250-000-102C	102C	83C	Solvents Distillation	123 to 177°C
250-004-102C	102C	83C	102C CERTIFIED @ ASTM specified test points of 125, 140, 155, 175°C	
250-000-103C	103C	84C	Solvents Distillation	148 to 202°C
250-004-103C	103C	84C	103C CERTIFIED @ ASTM specified test points of 150, 165, 180, 200°C	
250-000-104C	104C	85C	Solvents Distillation	173 to 227°C
250-004-104C	104C	85C	104C CERTIFIED @ ASTM specified test points of 175, 190, 205, 225°C	
250-000-105C	105C	86C	Solvents Distillation	198 to 252°C
250-004-105C	105C	86C	105C CERTIFIED @ ASTM specified test points of 200, 215, 230, 250°C	
250-000-106C	106C	87C	Solvents Distillation	223 to 277°C
250-004-106C	106C	87C	106C CERTIFIED @ ASTM specified test points of 225, 240, 255, 275°C	
250-000-107C	107C	88C	Solvents Distillation	248 to 302°C
250-004-107C	107C	88C	107C CERTIFIED @ ASTM specified test points of 250, 265, 280, 300°C	
250-000-108F	108F	—	Saybolt Viscosity	270 to 290°F
250-004-108F	108F	—	108F CERTIFIED @ ASTM specified test points of 275, 285°F	
250-000-109F	109F	—	Saybolt Viscosity	320 to 340°F
250-004-109F	109F	—	109F CERTIFIED @ ASTM specified test points of 325, 335°F	
250-000-110C	110C	93C	Kinematic Viscosity @ 135C	133.6 to 136.4°C
250-004-110C	110C	93C	110C CERTIFIED @ ASTM specified test points of 0, 135, 136°C	
250-000-110F	110F	—	Kinematic Viscosity @ 275F	272.5 to 277.5°F
250-004-110F	110F	—	110F CERTIFIED @ ASTM specified test points of 32, 275, 277°F	
250-000-111C	111C	—	Tar Acid Distillation	170 to 250°C
250-004-111C	111C	—	111C CERTIFIED @ ASTM specified test points of 170, 200, 250°C	
250-000-112C	112C	—	Solidification Benzene	4 to 6°C
250-004-112C	112C	—	112C CERTIFIED @ ASTM specified test points of 0, 4, 5, 6°C	
250-000-113C	113C	89C	Bituminous Materials Softening Point	–1 to +175°C
250-004-113C	113C	89C	113C CERTIFIED @ ASTM specified test points of 0, 50, 100, 150, 175°C	
250-000-113F	113F	89F	Bituminous Materials Softening Point	30 to 350°F
250-004-113F	113F	89F	113F CERTIFIED @ ASTM specified test points of 32, 122, 212, 302, 347°F	

Koehler now offers mercury-free thermometers that have the performance of mercury. To inquire, please refer to the catalog number for the corresponding thermohydrometer or calibrated thermometer and add -NM. For example, the 250-000-01C ASTM 1C Thermometer would be the 250-001-01C-NM Non-Mercury ASTM 1C Thermometer.

ASTM Thermometers

Catalog Number	ASTM Designation	IP Reference	Name	Range
250-000-114C	114C	14C	Aviation Fuel Freezing Point	–80 to +20°C
250-004-114C	114C	14C	114C CERTIFIED @ ASTM specified test points of –75, –60, –40, 0°C	
250-000-114F	114F	—	Aviation Fuel Freezing Point	–112 to +70°F
250-004-114F	114F	—	114F CERTIFIED @ ASTM specified test points of –103, –76, –40, +32°F	
250-000-115C	115C	—	Beckman Differential	0 to 6°C CERTIFICATION DOES NOT APPLY
250-000-116C	116C	—	Bomb Colorimeter	18.9 to 25.1C°
250-004-116C	116C	—	116C CERTIFIED @ ASTM specified test points of 19, 20, 21, 22, 23, 24, 25°C	
250-000-117C	117C	—	Bomb Calorimeter	23.9 to 30.1°C
250-004-117C	117C	—	117C CERTIFIED @ ASTM specified test points of 24, 25, 26, 27, 28, 29, 30°C	
250-000-118C	118C	—	Kinematic Viscosity @ 30C	28.6 to 31.4°C
250-004-118C	118C	—	118C CERTIFIED @ ASTM specified test points of 0, 30, 31°C	
250-000-118F	118F	—	Kinematic Viscosity @ 86F	83.5 to 88.5°F
250-004-118F	118F	—	118F CERTIFIED @ ASTM specified test points of 32, 86, 88°F	
250-000-119C	119C	—	Coolant Freezing Point	–38.3 to –30°C
250-004-119C	119C	—	119C CERTIFIED @ ASTM specified test points of –38, –30, 0°C	
250-000-119F	119F	—	Coolant Freezing Point	–37 to –22°F
250-004-119F	119F	—	119F CERTIFIED @ ASTM specified test points of –36, –22, +32°F	
250-000-120C	120C	92C	Kinematic Viscosity @ 40C	38.6 to 41.4°C
250-004-120C	120C	92C	120C CERTIFIED @ ASTM specified test points of 0, 40, 41°C	
250-000-121C	121C	32C	Kinematic Viscosity @ 100C	98.6 to 101.4°C
250-004-121C	121C	32C	121C CERTIFIED @ ASTM specified test points of 0, 100, 101°C	
250-000-122C	122C	94C	Brookfield Viscosity	–45 to –35°C
250-004-122C	122C	94C	122C CERTIFIED @ ASTM specified test points of –45, –40, -35°C	
250-000-123C	123C	95C	Brookfield Viscosity	–35 to –25°C
250-004-123C	123C	95C	123C CERTIFIED @ ASTM specified test points of –35, –30, -25°C	
250-000-124C	124C	96C	Brookfield Viscosity	–25 to –15°C
250-004-124C	124C	96C	124C CERTIFIED @ ASTM specified test points of –25, –20, –15°C	
250-000-125C	125C	97C	Brookfield Viscosity	–15 to –5°C
250-004-125C	125C	97C	125C CERTIFIED @ ASTM specified test points of –15, –10, –5°C	
250-000-126C	126C	71C	Kinematic Viscosity @ –26.1C	–27.4 to –24.6°C
250-004-126C	126C	71C	126C CERTIFIED @ ASTM specified test points of –27, -26.1, 0°C	
250-000-126F	126F	71F	Kinematic Viscosity @ –15F	–17.5 to –12.5°F
250-004-126C	126F	71F	126F CERTIFIED @ ASTM specified test points of –17, –15, +32°F	
250-000-127C	127C	99C	Kinematic Viscosity @ -20C	–21.4 to –18.6°C
250-004-127C	127C	99C	127C CERTIFIED @ ASTM specified test points of –21, –20, 0°C	
250-000-128C	128C	33C	Kinematic Viscosity @ 0C	–1.4 to +1.4°C
250-004-128C	128C	33C	128C CERTIFIED @ ASTM specified test points of 0, 1°C	
250-000-128F	128F	33F	Kinematic Viscosity @ 32F	29.5 to 34.5°F
250-004-128F	128F	33F	128F CERTIFIED @ ASTM specified test points of 32, 34°F	
250-000-129C	129C	36C	Kinematic Viscosity @ 93.3C	91.6 to 94.4°C
250-004-129C	129C	36C	129C CERTIFIED @ ASTM specified test points of 0, 93.3, 94°C	
250-000-129F	129F	36F	Kinematic Viscosity @ 200F	197.5 to 202.5°F
250-004-129F	129F	36F	129F CERTIFIED @ ASTM specified test points of 32, 200, 202°F	
250-000-130C	130C	—	Tank Gauging	–7 to +105°C
250-004-130C	130C	—	130C CERTIFIED @ ASTM specified test points of 0, 35, 70, 105°C	
250-000-130F	130F	—	Tank Gauging	20 to 220°F
250-004-130F	130F	—	130F CERTIFIED @ ASTM specified test points of 32, 100, 160, 220°F	
250-000-132C	132C	—	Kinematic Viscosity @ 150C	148.6 to 151.4°C
250-004-132C	132C	—	132C CERTIFIED @ ASTM specified test points of 0, 150, 151°C	

Glass Apparatus for ASTM Test Methods

C70 Determination of the Percentage of Voids and Surface Moisture in Fine Aggregates

K00C70 Specific Gravity Flask, Chapman, graduated at 200mL and 375-450mL

C128 Determination of Specific Gravity of Hydraulic Cement, Sand, Powdered Materials

K0C128 Specific Gravity Flask, Le Chatelier, 250mL, 17mL Bulb, Graduated Neck

C135 Determination of Specific Gravity of Pigments, Drying Oils, Varnishes, Resins, etc.

K0C135-10 Pycnometer, 10mL, with Thermometer and Cap
K0C135-25 Pycnometer, 25mL, with Thermometer and Cap
K0C135-50 Pycnometer, 50mL, with Thermometer and Cap
K0C135-100 Pycnometer, 100mL, with Thermometer and Cap

C188 Determination of Specific Gravity of Hydraulic Cement, Sand, Other Powdered Materials

K0C128 Specific Gravity Flask, Le Chatelier, 250mL, 17mL Bulb, Graduated Neck

D20 Distillation of Bituminous Products

K00D20-300 Flask, Distillation, 300mL, Side Arm, 10mm ID x 220mm
K00D20-500 Flask, Distillation, 500mL, Side Arm, 10mm ID x 220mm

D29 Analysis of Dry Shellac and Shellac Varnishes

K00D29-125 Iodine Flask, 125mL, S/T 24/40 Mercury Seal w/Hollow Stopper
K00D29-250 Iodine Flask, 250mL, S/T 24/40 Mercury Seal w/Hollow Stopper
K00D29-300 Iodine Flask, 300mL, S/T 24/40 Mercury Seal w/Hollow Stopper
K00D29-500 Iodine Flask, 500mL, S/T 24/40 Mercury Seal w/Hollow Stopper
K00D29-1000 Iodine Flask, 1000mL, S/T 24/40 Mercury Seal w/Hollow Stopper

D70 Specific Gravity and Density of Semi-Solid Bituminous Materials

K00D70 Pycnometer Bottle, 24-30mL, Uncalibrated

D115 Determination of Specific Gravity of Solid (Bituminous) Materials, Asphalt Cements, and Soft Tar Pitches

K0D115-750 Specific Gravity Flask, 750mL, w/Capillary Stem and Cap
K0D115-750 Specific Gravity Flask, 1000mL, w/Capillary Stem and Cap`

D153 Determination of Specific Gravity of Pigments, Drying Oils, Varnishes, Resins, etc.

K0C135-10 Pycnometer, 10mL, with Thermometer and Cap
K0C135-25 Pycnometer, 25mL, with Thermometer and Cap
K0C135-50 Pycnometer, 50mL, with Thermometer and Cap
K0C135-100 Pycnometer, 100mL, with Thermometer and Cap

D215 Determination of Carbon Dioxide and Sulfur Dioxide in Carbonates

K0D215 Alkalimeter, Knorr, 250mL Flask, S/T 24/40 and S/T 16

D297 Direct Determination of Isoprene Polymer Using Heating Mantles.

K0D297 Rubber Distillation System consisting of 500mL Steam Generating Flask, 100mL Digestion Flask, Claisen Head, Spray Bulb, Condensing Adapter, two 500mL Receiving Flasks, and Condenser (supplied **without heat mantles**)

D301 Determination of Consistency of Soluble Nitrocellulose by Falling Ball Method

K0D301 Falling Ball Viscosity Tube, 1" x 14", graduated 10" apart, with 5 Steel Balls, .312" OD

D322 Determination of Dilution in Crankcase Oil

K0D322-5 Distillation Receiver, S/T 24/40, graduated 5mL in 0.1mL divisions
K0D322-12 Distillation Receiver, S/T 24/40, graduated 12.5mL x 0.1 divisions

D369 Determination of Specific Gravity

K0D369-1 Specific Gravity Bottle, Gas-Lussac, 1mL, Unadjusted
K0D369-2 Specific Gravity Bottle, Gas-Lussac, 2mL, Unadjusted
K0D369-5 Specific Gravity Bottle, Gas-Lussac, 5mL, Unadjusted
K0D369-10 Specific Gravity Bottle, Gas-Lussac, 10mL, Unadjusted

D402 Distillation of Cut-Back Asphaltic (Bituminous) Products

K0D402-F Flask, Distillation, 500mL, Side arm 13x220mm
K0D402-C Condenser, Liebig, Plain, 300mm
K0D402-A Adapter, Glass, 105 Degree, 18mm ID x 5mm ID

D422 Soil Testing Hydrometer Cylinders

K0D422-1000 Hydrometer Cylinder, 1000mL TC, 460mm tall
K0D422-1205 Hydrometer Cylinder, graduated 1130 and 1205mL, 460mm tall

D453 Determination of Tar Acid

K0D453 Separatory Funnel, Tar Acid, S/T 19 Stopper, 2mm Stopcock, Graduated Stem between Bulbs, 65 to 100mL in 0.2mL divisions

D555 Iodine Determination

K00D29-125 Iodine Flask, 125mL, S/T 24/40 Mercury Seal w/Hollow Stopper
K00D29-250 Iodine Flask, 250mL, S/T 24/40 Mercury Seal w/Hollow Stopper
K00D29-300 Iodine Flask, 300mL, S/T 24/40 Mercury Seal w/Hollow Stopper
K00D29-500 Iodine Flask, 500mL, S/T 24/40 Mercury Seal w/Hollow Stopper
K00D29-1000 Iodine Flask, 100mL, S/T 24/40 Mercury Seal w/Hollow Stopper

D565 Carbonizable Substances in White Mineral Oil

K0D565 Test Tube, Ground Stopper, 15x140, graduated 5 and 10mL

D612 Carbonizable Substances in Parafin Wax

K0D565 Test Tube, Ground Stopper, 15x140, graduated 5 and 10mL

D789 Determination of Relative Viscosity of Polymer Solution in Formic Acid Solution

K0D789 Viscometry Apparatus, consisting of 25mL Pipette, 50mL Flask with S/T 19/22 joints, and Pipette Adapter

Glass Apparatus for ASTM Test Methods

D848 Acid Wash Color of Industrial Aromatic Hydrocarbons

K0D848-A	Sample Bottle, 1 ounce capacity, flat bottom, square, glass stoppered and graduated at 7mL and 28mL
K0D848-B	Individual Color Standard Bottle, 1 ounce capacity, flat bottom, square, glass stoppered, with a Specified number (0-14)
K0D848-C	Set of Fifteen (15) Color Standard Bottles numbered 0-14, empty
K0D848-D	Individual Color Standard Bottle, filled with specific number solution
K0D848-E	Set of Fifteen(15) Color Standard bottles (0-14) filled
K0D848-F	Color Standard Set with Case, lighted white plexiglass, full set of color standards sealed in bottles, and two sample bottles

D854 Determination of Specific Gravity

K0D369-1	Specific Gravity Bottle, Gas-Lussac, 1mL, Unadjusted
K0D369-2	Specific Gravity Bottle, Gas-Lussac, 2mL, Unadjusted
K0D369-5	Specific Gravity Bottle, Gas-Lussac, 5mL, Unadjusted
K0D369-10	Specific Gravity Bottle, Gas-Lussac, 10mL, Unadjusted

D888 Determination of Dissolved Oxygen in Water

K0D888	Gas Collecting Tube, McLean type, 500mL, 3mm Stopcocks, graduated 2mL on Tube Ends

D889 Determination of Volatile Oil in Rosin

K0D889	Distillation Receiver, 5mL in 0.1mL divisions, S/T 24/40

D891 Determination of Specific Gravity of Liquid Chemicals, Halogenated Organic Solvents,Ethylene Glycols, Propylene Glycols

K0D891-25	Specific Gravity Bottle for Volatile Liquids, 25mL, Jacketed
K0D891-50	Specific Gravity Bottle for Volatile Liquids, 50mL, Jacketed

D914 Testing Ethylcellulose and Methylcellulose

K0D914	Apparatus for Testing Ethylcellulose

D941 Density and Relative Density (Specific Gravity) of Liquids by Lipkin Bicapillary Pycnometer

K0D941	Pycnometer, side-arm type, 4.5 ±0.5mL, Weight less than 30g

D1015 Freezing Points of High Purity Hydrocarbons

KD1015-FT	Freezing Point Tube, Glass, with Hi-Vac Stopcock

D1016 Purity of Hydrocarbons from Freezing Points

KD1015-AS	Apparatus for Obtaining Sample, consisting of Dewar Flask, 50mL Condensing Tube, 3-way Stopcock, and Connecting Tubes 10mm OD with S/J 18/7 Ball and Socket Joints
KD1015-NG	Distilling Apparatus for Gaseous Substances, consisting of two Dewar Flasks, Distilling Tube, and Receiver
KD1015-NL	Distilling Apparatus for Normally Liquid Substances, consisting of Dewar Flask, Receiver, and 200mL Flask with Cap

D1018 Hydrogen in Petroleum Fractions

KD1018-B	Lamp Burner, S/T 14/20 Joints, Concentric Tubes
KD1018-F	Flask, Erlenmeyer shape, 25mL, with hooks for springs, S/T 14/10
KD1018-C	Chimney only
KD1018-A	Absorber only, Turner type

D1065 Determination of Unsaponifiable Matter In Gum and Wood Rosin

KD1065	Extraction Apparatus, Ether, S/T 24/40, 400mm Condenser, 250mL Flask

D1072 Total Sulfur in Fuel Gases

KD1072-B	Burner, S/T 14/10 Joint, Gas
KD1266-C	Chimney, S/T 14/10 and S/T 24/40 Joints
KD1266-A	Absorber, S/T 24/40 Joints, Parallel Chambers, AU Shape
KD1266-ST	Spray Trap, S/T 24/40 Joint, 65mm OD

D1091 Phosphorus Lubricating Oils s in And Additives

KD1091	Flask, Kjeldahl, Digestion, 300mL, with Ground Glass Stopper

D1093 Centrifuge Tube, 100mL

K00D96-8	Centrifuge Tube, Conical, A8-Inch (203mm), 100mL

D1120 Determination of Equilibrium Boiling Point of Engine Antifreezes Miscible With Water

KD1120	Distillation Apparatus, 100mL Flask, 200mm Condenser, S/T 19/38

D1168 Testing Hydrocarbon Waxes for Electrical Insulation

KD1168	Dilatometer, 0-2mL in 0.02mL divisions, S/T 14/20 Joint, 2mm Stopcock

D1173 Test For Foaming Properties of Surface-Active Agents

KD1173	Pour Foam Test Apparatus, Ross-Miles, 200mL Pipette, Receiver graduated at 50mL and 250mL, Teflon Stopcocks, 2mm and 6mm Bore, Jacketed

D1217 Density and Relative Density of Liquids By Bingham Pycnometer

KD1217-P	Pycnometer, Bingham type, Stoppered, 25mL 1.0 - 1.1mm neck
KD1217-PC	Pycnometer Cleaning Apparatus, Hot Chromic Acid, consisting of 3-way Stopcock with Joint Inside Chamber

D1266 Sulfur in Petroleum Products (Lamp)

KD1266-A	Absorber, S/T 24/40 Joints, Parallel Chambers, AU shape
KD1266-C	Chimney, S/T 14/10 and S/T 24/40 Joints
KD1266-ST	Spray Trap, S/T 24/40 Joint, 65mm OD
KD1266-SF	Standard Flask, 25mL, S/T 14/10 Joint, with Hooks
KD1266-FA	Flask for Aromatic Samples with Side Arm
KD1266-SB	Standard Burner, S/T 14/10 Joints
KD1266-BA	Burner for Aromatic Samples

D1347 Standard Method of Testing Methylcellulose

KD914	Apparatus for Testing Ethylcellulose

D1394 Jones-Blair Reductor

KD1394	Column, Jones-Blair Reductor, 19mm ID x 450mm Long, 4mm stpk

Glass Apparatus for ASTM Test Methods

D1480 Density and Relative Density of Viscous Materials by Bingham Pycnometer

KD1480	Pycnometer, Bingham Type, Stoppered, 2mm ID neck, 10mL

D1481 Density and Relative Density of Viscous Materials by Lipkin Bicapillary Pycnometer

KD1481	Pycnometer, Side-Arm Type, Weight less than 35 grams, 10mL

D1505 Density Gradient Determination

KD1505-C	Density Gradient Column, Jacketed, 38mm ID x 44" long
KD1505-F	Density Float (specify exact density and color identification)

D1541 Iodine Flasks

K00D29-125	Iodine Flask, 125mL, S/T 24/40 Mercury Seal w/Hollow Stopper
K00D29-250	Iodine Flask, 250mL, S/T 24/40 Mercury Seal w/Hollow Stopper
K00D29-300	Iodine Flask, 300mL, S/T 24/40 Mercury Seal w/Hollow Stopper
K00D29-500	Iodine Flask, 500mL, S/T 24/40 Mercury Seal w/Hollow Stopper
K00D29-1000	Iodine Flask, 1000mL, S/T 24/40 Mercury Seal w/Hollow Stopper

D1607 Sampling Nitrogen Dioxide in Small Concentrations

KD1607	Gas Bubbler Apparatus, S/T 29/42, S/J 18/7, Coarse Pencil Frit

D1638 Specific Gravity of Pigments, Drying Oils, Varnishes, Resins, etc.

K0C135-10	Pycnometer, 10mL, with Thermometer and Cap
K0C135-25	Pycnometer, 25mL, with Thermometer and Cap
K0C135-50	Pycnometer, 50mL, with Thermometer and Cap
K0C135-100	Pycnometer, 100mL, with Thermometer and Cap

D1839 Amyl Nitrate in Diesel Fuels

KD1839-F	Flask, Distilling, 300mL, S/T 24/40 Joint
KD1839-DC	Distillate Collector, S/T 24/40 Joints
KD1839-C	Condenser, Allihn, 300mm, S/T 24/40 Joint
KD1839-VF	Volumetric Flask, 100mL, Stoppered
KD1839-FF	Funnel for Volumetric Flask

D1949 Separation of Tetraethyllead and Tetramethyllead in Gasoline

KD1949-F	Flask, 200mL, S/T 24/40 Joint
KD1949-DC	Distilling Column, 12mm IDx300, Vacuum Jacketed (w/o Beads)
KD1949-C	Condenser, Liebig type, S/T 10/30 Top Joint, 100mm

D1963 Specific Gravity of Pigments, Drying Oils, Varnishes, Resins, etc.

K0C135-10	Pycnometer, 10mL, with Thermometer and Cap
K0C135-25	Pycnometer, 25mL, with Thermometer and Cap
K0C135-50	Pycnometer, 50mL, with Thermometer and Cap
K0C135-100	Pycnometer, 100mL, with Thermometer and Cap

D1966 Determination of Water and Sediment By Centrifuge Method

KD1966	Centrifuge Tube, Pear-Shape, 100mL with Lower Stem Graduated to 1.5mL in 0.1mL divisions

D2001 Depentanization of Gasoline and Naphthas

KD2001-A	Distillation Column, Jacketed, 13mm ID
KD2001-B	Reflux Condenser Head for Distillation Column
KD2001-C	Trap for Light End Depentanization
KD2001-D	Receiver, Graduated, 12.5mL, S/T 19/38 Male Joint
KD2001-E	Dewar Flask, for Immersion of Receiver
KD2001-F	Flask, Distilling, 100mL, R.B., S/T 24/40 Joint

D2002 Isolation of Representative Saturates Fractions from Low-Olefinic Petroleum Naphthas

KD2002-C-1	Alternate Analytical Absorption Column, w/top adapter
KD2002-C	Absorption Column, Analytical, Water Jacketed
KD2002-ER	Eluant Reservoir, 250mL, S/J 28/15 Joints with Stopper
KD2002-R	Receiver, 10mL with TFE Stopcock and S/T 14/35 Joint

D2003 Isolation of Representative Saturates Fraction from High-Olefinic Petroleum Naphthas

KD2003-AC	Absorption Column, Water Jacketed, S/J 28/15 and S/T 14/35 Joints
KD2003-R	Receiver, Graduated, 10mL, S/T 14/35 Joint, TFE Stopcock

D2007 Characteristic Groups in Rubber Extender and Processing Oils and other Petroleum-Derived Oils by the Clay-Gel Absorption Chromatographic Method

KD2007-C	Clay-Gel Percolating Column (2 required), S/T 24/40, Fritted Disc
KD2007-F	Distillation Flask, 3-neck, 500mL, S/T 24/40 Joint, for Extraction
KD2007-H	Distillation Head with Vigreaux Column, S/T 24/40, TFE Stopcock
KD2007-CT	Connecting Tube from Flask to Column, S/T 24/40 *(If ordered with Flask, Head, and Column, Tube can be supplied custom fitted. Otherwise user must heat glass tube to soften and align and conform to fit properly, or install a flexible connection device such as teflon bellows or slip-fit teflon tubing sleeve).*
KD2007-RC	Reflux Condenser, S/T 24/40, Friedrichs
KD2007-B	Beaker, Anticreep, 150mL
KD2007-APC	Azobenzene Percolation Column, 12x600mm, 125mL Reservoir
KD2007-MV	Teflon Metering Stopcock for Azobenzene Percolation Column

D2036 Determination of Cyanides in Water

KD2036	Complete Distillation Apparatus, consisting of 1000mL 2-neck Flask, Cold Finger Condenser, Absorber Trap, Inlet Tube

D2111 Determination of Specific Gravity of Liquid Chemicals, Halogenated Organic Solvents Ethylene Glycols and Propylene Glycols

K0D891-25	Specific Gravity Bottle for Volatile Liquids, 25mL, Jacketed
K0D891-50	Specific Gravity Bottle for Volatile Liquids, 50mL, Jacketed

D2162 Basic Calibration of Master Viscometers And Viscosity Oil Standards

KD2162-C1	Cannon Master Viscometer, Approximately 0.001-0.003cSt/s
KD2162-C3	Cannon Master Viscometer, Approximately 0.003-0.009cSt/s
KD2162-U1	Ubbelohde Master Viscometer, Approximately 0.001-0.003cSt/s
KD2162-U3	Ubbelohde Master Viscometer, Approximately 0.003-0.009cSt/s

Glass Apparatus for ASTM Test Methods

D2184 Determination of Isotopic Concentration of Heavy Water.

KD2184-P Pycnometer, 25mL, S/T 7/15 Stopper
KD2184-MS2 Matched Set of two Pycnometers

D2352 Determination of Carbon Dioxide and Sulfur Dioxide in Carbonates

K0D215 Alkalimeter, Knorr, 250mL Flask, S/T 24/40 and S/T 16

D2363 Testing of Hydroxpropyl Methylcellulose

KD2363 Complete apparatus for Steam Distillation including Steam Boiler Tube with Inlet Adapter, 25mL Boiling Flask with Side Neck, Vigreaux Column, 110mm long Liebig Type Condenser, and Vertical Adapter for delivery (S/T 14/20 Joints) (boiler has S/T 24/40 joints)

D2385 Hydrogen Sulfide and Mercaptan Sulfur In Natural Gas (Cadmium Sulfate Iodometric Titration Method)

KD2385-GWB Gas Washing Bottle, 70x280mm, Coarse Fritted Disc, S/T 24/40
KD2385-ST Spray Trap, S/T 24/40 Joint, 65mm OD Bulb

D2420 Hydrogen Sulfide in LP Gases by Lead Acetate Method

KD2420 Apparatus including Cylinder, Stoppers, Watch Glass and Glass Rod

D2533 Vapor-Liquid Ratio of Spark-Ignition Engine Fuels

KD2533 Buret, Vapor-Liquid Ratio, Graduated 0 - 35mL

D2549 Separation of Representative Aromatics and Nonaromatics Fractions of High-Boiling Oils by Elution Chromatography

KD2549-C2 Chromatographic Column, 10x760mm, 100mL bulb, for 2 gram
KD2549-C10 Chromatographic Column, 15x1150mm, 200mL bulb, for 10 gram

D2569 Distillation of Pitch

KD2569-F Flask, Distillation, 300mLx131mm tall w/side arm 10x220mm
77-2569-C Condenser, Air, 13x360mm

D2619 Hydrolytic Stability of Hydraulic Fluids (Beverage Bottle Method)

K00D96-8 Centrifuge Tube, Conical, A8-Inch (203mm), 100mL

D2717 Thermal Conductivity of Liquids

KD2717 Thermal Conductivity Cell, Platinum Resistance Thermometer

D2748 Determination of Pyridine Bases in Acids

KD2748 Distillation Apparatus Consisting of 1000mL Boiling Flask, Bulb Trap Adapter, Connection Adapter, 600mm Liebig Type Condenser, and Lower Drip Adapter, S/T 24/40 Joints

D2780 Solubility of Fixed Gases in Liquids

KD2780-PS Ambient Pressure Saturator, Glass, 1000mL, S/T 27 Joint, PTFE Stopcock w/O-Rings, Upper Head for Gas Inlet, Outlet and Dispersion Element, and Heating Mantel and Thermocouple wire x 6 ft long
KD2780-ES Gas Extraction System consisting of KD2780-ES1 through KD2780-ES7
KD2780-ES1 Reflux Condenser, Liebig, S/T 24/40, 300mm
KD2780-ES2 Gas Extraction Chamber, 60 x 280mm, S/J 12/2 Joints
KD2780-ES3 Boiler Flask, 500mL, Round Bottom, S/J 35/25 Socket Joint, with Adapter, 35/25 x 12/2 S/J Joint
KD2780-ES4 Gas Buret, Water Jacketed, 100mL, with 3-Way, TEE Bore Stopcock and S/J 12/2 Joint
KD2780-ES5 Leveling Bulb, 500mL
KD2780-ES6 Connecting Manifold with 3 - TFE 120 Degree Stopcocks
KD2780-ES7 Manometer, Open End, 1-Meter, S/J 12/2 Connection

D2879 Vapor Pressure-Temperature Relationship and Initial Decomposition Temperature of Liquids by Isoteniscope

KD2879 Isoteniscope Pressure Manometer, 8mm Od x 500mm w/bulb

D2886 Vacuum Trap

KD2886 Vacuum Trap, 22x125mm, Inlet & Outlet Arms 10mm OD

D2892 Distillation of Crude Petroleum (15- Theoretical Plate Column)

Quotations submitted on request. Specify Type, Scale, and Sizes of Components Required.

D2910 Extraction Apparatus

KD2910 Complete Extraction Apparatus consisting of 3000 mL Solvent Flask, Extractor Body with Extraction Chamber, Siphon Tube, Removable Filter and Top Lid, and Allihn Condenser 250mm. Joints are S/T 45/50

D2912 Oxidant Content of Atmosphere

KD2912 Impinger, Midget, S/T 24/40, 25mm Body, 5mm Inlet, 1mm Nozzle, Body Graduated 0-25mL in 5mL Divisions

D2913 Mercaptan Content of Atmosphere

KD2913 Impinger, Midget, S/T 24/40, 25mm Body Graduated to 25mL in 5mL Divisions, 5mm ID inlet, Coarse Fritted Pencil at Tip

D2914 Oxidant Content of Atmosphere

KD2912 Impinger, Midget, S/T 24/40, 25mm Body, 5mm Inlet, 1mm Nozzle, Body Graduated 0-25mL in 5mL Divisions

D2972 Determination of Arsenic in Water

KD2972 Arsenic Determination Apparatus consisting of 125mL Erlenmeyer Flask, Scrubber Tube, and Absorber Tube, S/T 24/40 and S/J 12/2

D3120 Trace Quantities of Sulfur in Light Liquid Petroleum Hydrocarbons by Oxidative Microcoulometry

KD3120 Pyrolysis Tube, Quartz, S/J 18/9 Ball exit, 6mm Inlets, Septum

D3234 Abrasion Resistance of Petroleum Wax Coatings

KD3234-T Glass Tube, 1" ID x 12" Long, with Support Device for #12 Sieve
KD3234-S Screen Sieve, Size #12, cut 1" Diameter
KD3234-F Separatory Funnel, 500mL, 4mm TFE Stopcock, Stem Cut Short

Glass Apparatus for ASTM Test Methods

D3242 Acidity in Aviation Turbine Fuel
KD3242 Titration Flask, 500mL, Erlenmeyer Shape, with Inlet Tube

D3246 Sulfur in Petroleum Gas By Oxidative Microcoulometry
KD3120 Pyrolysis Tube, Quartz, S/J 18/9 Ball exit, 6mm Inlets, Septum

D3431 Trace Nitrogen in Liquid Petroleum Hydrocarbons (Microcoulometric Method)
KD3120 Pyrolysis Tube, Quartz, S/J 18/9 Ball exit, 6mm Inlets, Septum

D3505 Density of Liquid Hydrocarbon Materials
K0D941 Pycnometer, Side Arm Type, 4.5 ±0.5mL, Weight less than 30g

D3608 Sampling Low Concentrations of Nitrogen Dioxide
KD1607 Gas Bubbler Apparatus, S/T 29/42, S/J 18/7, Coarse Pencil Fit

D3712 Analysis of Oil-Soluble Petroleum Sulfonates by Liquid Chromatography
KD3712-C Chromatographic Column, 22 x 300mm w/250mL Reservoir, 28/15
KD3712-P Pycnometer for Determining Specific Gravity, 50mL ±1.0mL

D3825 Dynamic Surface Tension by the Fast-Bubble Technique
KD3825 Glass Bubbler Unit, Jacketed, without Pressure Transducer

D3831 Manganese in Gasoline by Atomic Absorption Spectrometry
KD3831 Automatic Pipette, 9.0mL, with Auto-zero and TFE Stopcock

D3867 Test for Nitrite-Nitrate in Water
KD3867 Cadmium Reduction Column, 5x200mm, 85mL Reservoir

D3904 Oil from Oil Shale (Resource Evaluation by the USBM Fischer Assay Procedure)
KD3904-R Receiver, 100mL Centrifuge Tube, Pear Shape
KD3904-A Adapter, S/T 24/40, to Receive Product from Retort
KD3904-C Condenser, Allihn, 300mm, S/T 24/40

D3907 Testing Fluid Cracking Catalysts by Microactivity Test
KD3907-R Glass Reactor body, 18mmx376mm, S/T 28/15 and 12/5 O-ring Joints
KD3907-PR Product Receiver, Liquid, S/T 12/5 O-ring Joints

D3908 Hydrogen Chemisorption on Supported Platinum on Alumina Catalysts by Volumetric Vacuum Method.
KD3908 Sample Cell, S/T 10/30 Joints, 2mm Vacuum Stopcocks

D3945 Shear Stability of Polymer-Containing Fluids Using a Diesel Injector Nozzle
KD3945-CV Cooling Vessel, Jacketed, 25mm IDx180mm long, TFE Stopcock
KD3945-FR Fluid Reservoir, 250mL, w/Distributor Plate and 3-way Stopcock

D4006 Water in Crude Oil by Distillation
KD4006-F Flask, 1000mL, S/T 24/40, Round Bottom
KD4006-R Receiver, 5mL in .05mL Divisions, S/T 24/40, Solvent Return Tube
KD4006-C Condenser, 400mm, Liebig, S/T 24/40
KD4006-DT Drying Tube for Top of Condenser, S/T 24/40

D4180 Vibratory Packing Density of Formed Catalyst Carriers
KD4180 Feed Funnel, 100mm x 20mm ID

D4484 Inorganic Particles in Marine Residual Fuel Oils by Selective Centrifugal Separation
KD2709 Centrifuge Tube, Conical, 100mL, Tip Graduated to .05mL in .01 Divisions

D4486 Kinematic Viscosity of Volatile and Reactive Liquids
KD4486 Viscometer for Vulnerable Liquids (specify approximate constant)

D4512 Vibrated Apparent Packing Density of Fine Catalyst Particles and Powder
KD4180 Feed Funnel, 100mm x 20mm ID

D4629 Organically Bound Trace Nitrogen in Liquid Petroleum Hydrocarbons by Oxidative Combustion and Chemilluminescence Detection
KD4629 Pyrolysis Tube, Quartz, S/J 18/9 Ball outlet, 6mm Inlets, Septum

D4814 Automotive Spark-Ignition Engine Fuel
KD2533 Buret, Vapor-Liquid Ratio, Graduated, 0-35mL

D4871 Guide for Universal Oxidation/Thermal Stability Test Apparatus
KD4871-TC Test Cell, 38 x 300mm, S/T 34/45 Joint
KD4871-C Condenser, Allihn, 330mm, S/T 34/45 Joint, Top 9mm ID
KD4871-GI1 Gas Inlet Tube, 8x850mm with Capillary Tip (no Support Ring)
KD4871-GI1A Alternate Gas Inlet Tube, 8x850mm with Capillary Tip but w/Support Ring
77-4871-GI2 Gas Inlet Tube, 8x455mm, Capillary Tip, Top Bent 90 Degrees
KD4871-BH Basic Head, S/T 34/45 Joint, Septum Port, Screw Cap Joint
KD4871-IH Intermediate Head, S/T 34/45, 170mm long, Septum Port
KD4871-SH Sampling Head, S/T 34/45 x 175mm long, Septum Port
KD4871-SR Support Ring, 9.5mm IDx12.7mm ODx7mm long with 4 Hooks
KD4871-SP Spacer Ring, 9.5 mm ID x 12.7mm OD x 7mm Long

Standardized Metal Test Specimens

For those specimens not previously mentioned in this catalog, following is a list, by test method, of available standardized metal test specimens. Please contact Koehler Customer Service for additional information.

Test Method No.

Federal Test Methods

791-2503
791-2504
791-3007
791-3462
791-3805
791-3810
791-3814
791-4001
791-4011
791-5304
791-5305
791-5306
791-5307
791-5308
791-5309
791-5310
791-5311
791-5312
791-5314
791-5315
791-5321
791-5322
791-5323
791-5324
791-5325
791-5329
791-5331
791-6503
791-7001

ASTM Methods

D115
D609
D849
D897
D1261
D1275
D1384
D1402
D2266
D2511
D2570
D2596
D2619
D2688
D2783
D2847
D3810
D4635
D4871
E8
F483
F484
F519

Military Standards (MIL)

MIL-A-7866
MIL-A-8243
MIL-B-81705
MIL-C-6529
MIL-C-11796
MIL-C-15074
MIL-C-19853A
MIL-C-16173
MIL-C-22230
MIL-C-23411
MIL-C-25769H
MIL-C-46113
MIL-C-81309A
MIL-L-6085
MIL-L-7808
MIL-L-7870
MIL-L-8937
MIL-L-23398
MIL-L-23699
MIL-L-23699B
MIL-L-25017C
MIL-L-46000
MIL-L-46010
MIL-L-B1329
MIL-R-81294
MIL-R-25143A
MIL-S-8660

Spare Parts

Spare parts are generally available from stock for immediate shipment from our manufacturing facility in Bohemia, New York. The parts listings in this section are for customers who may wish to maintain a stock of spares at their facility for several years of operation. This may be of particular interest to overseas customers. Suggested quantities are in parentheses ( ).

Please note: The parts listed in this section are for current equipment models at the time of printing. When ordering spare parts for new equipment from this catalog, substitutions may be made by Koehler to reflect engineering changes. Koehler will provide written notification of any changes before processing your order. When ordering spare parts for existing equipment, please specify the model number and serial number of your equipment. This will insure that the correct parts are supplied.

K10020 Powertrol Heater, 115V ..... Page 43
225-115-002 Heater 1000W (1)

K10029 Powertrol Heater, 220-240V ..... Page 43
225-230-002 Heater, 1000W (1)

K10090 U-Tube Aniline Apparatus, 115V ..... Page 43
K10050 Belt (1)
K10060 Pyrex U-Tube (1)
279-063-002 Bulb (1)
288-115-001 Motor (1)
289-002-001 Bearings (4)

K10091 U-Tube Aniline Apparatus, 220-240V ..... Page 43
K10050 Belt (1)
K10060 Pyrex U-Tube (1)
279-063-002 Bulb (1)
K10091-090000 Motor, Modification (1)
289-002-001 Bearings (4)

K10190 Thin Film Aniline Apparatus, 115V ..... Page 43
K10050 Belt (1)
K10120 Pyrex Pump Body (1)
K10130 Thin Film Tube (1)
279-063-002 Bulb (1)
288-115-001 Motor (1)
289-002-001 Bearings (2)

K10191 Thin Film Aniline Apparatus, 220-240V ..... Page 43
K10050 Belt (1)
K10120 Pyrex Pump Body (1)
K10130 Thin Film Tube (1)
279-063-002 Bulb (1)
289-002-001 Bearings (2)
K10091-09000 Motor, Modification (1)

K10200 Automatic Aniline Apparatus, 115V ..... Page 42
K10220 Heating & Cooling Tube (1)
K102-5S Flexible Drive Shaft (1)
280-115-001 Powerstat (1)
288-115-001 Motor (1)
279-115-001 Indicator Light Bulb (2)
278-010-001 Fuse, 10A (1)
K102-20 Heater Coil (1)
289-001-001 Bearings (2)

K10290 Automatic Aniline Apparatus, 220-240V ..... Page 42
K10220 Heating & Cooling Tube (1)
K102-5S Flexible Drive Shaft (1)
280-115-001 Powerstat (1)
288-115-001 Motor (1)
279-115-001 Indicator Light Bulb (2)
278-010-010 Fuse, 10A (1)
K102-20 Heater Coil (1)
090-024-001 Relay (1)
289-001-001 Bearings (2)
240-230-001 Transformer (1)

K10400 Oxidation Stability Bath, 2-Unit, 115V ..... Pages 81, 82
K10400-11000 Heater, 2000W
379-001-001 Liquid Level Switch

K10401 Oxidation Stability Bath, 2 Unit, 115V ..... Pages 81, 82
220-120-007 Cartridge Heater, 250W (6)
265-122-002 RTD Temperature Probe, 3 in., 3 Wire, 1200
265-122-003 RTD Temperature Probe, 3 in., 2 Wire, 1200
278-020-002 Fuse, 20A
278-001-002 Fuse, 1A
278-104-002 Fuse, 0.25A

K10402 Oxidation Stability Bath, 2-Unit, 220-240V ..... Pages 81, 82
K10402-11000 Heater, 2000W
379-001-001 Liquid Level Switch

K10403 Oxidation Stability Bath, 4-Unit, 115V ..... Pages 81, 82
220-120-007 Cartridge Heater
265-122-002 RTD Temperature Probe, 3 in., 3 Wire
265-122-003 RTD Temperature Probe, 3 in., 2 Wire
278-030-001 Fuse, 30A
278-001-002 Fuse, 1A
278-104-002 Fuse, 0.25A

K10404 Oxidation Stability Bath, 4-6 Unit, 220-240V ..... Pages 81, 82
K70519 RTD Temperature Probe, 12 in.
265-600-001 RTD Temperature Probe, 4 in.
278-020-002 Fuse, 20A
278-001-002 Fuse, 1A
278-104-002 Fuse, 0.25A

K10491 Oxidation Stability Bath, 2-Unit, 220-240V ..... Pages 81, 82
220-240-006 Cartridge Heater, 250W (6)
265-122-002 RTD Temperature Probe, 3 in., 2 Wire
265-122-003 RTD Temperature Probe, 3 in., 3 Wire
278-020-002 Fuse, 20A
278-001-002 Fuse, 1A
278-104-002 Fuse, 0.25A

K10493 Oxidation Stability Bath, 4-Unit, 220-240V ..... Pages 81, 82
220-240-006 Cartridge Heater, 250W, 240V
265-122-002 RTD Temperature Probe, 3 in., 2 Wire, 1200
265-122-003 RTD Temperature Probe, 3 in., 3 Wire, 1200
278-020-002 Fuse, 20A
278-001-002 Fuse, 1A
278-104-002 Fuse, 0.25A
041-032-001 Relay, Solid State, 4-32 V DC, 20A
275-103-024 Temperature Controller, 100-240V, 1 out

Spare Parts (Continued)

K10500 Oxidation Pressure Vessel ..... Page 80
K10510 Composition Gaskets
K105-0-12 Relief Tube
260-102-005 Rupture Disc, Alum with Liner
260-104-014 Burst Disc Holder
461-001-001 Silicone Vacuum Grease

K10901 Oxidation Bath, 115V ..... Page 152-153
K70519 RTD Temperature Probe, 12 in.
265-600-001 RTD Temperature Probe, 4 in.
278-020-002 Fuse, 20A
278-001-002 Fuse, 1A
278-104-002 Fuse, 0.25A
275-103-024 Temperature Controller, 100-240V, 1 out

K10991 Oxidation Bath, 220-240V ..... Page 152-153
K70519 RTD Temperature Probe, 12 in.
265-600-001 RTD Temperature Probe, 4 in.
278-020-002 Fuse, 20A
278-001-002 Fuse, 1A
278-104-002 Fuse, 0.25A
275-103-024 Temperature Controller, 100-240V, 1 out

K11201 Reid Vapor Pressure Bomb for LPG ..... Page 92
AS568-210 O-ring (1)
AS568-113 O-ring (1)

K11415/K11416 Reid Vapor Pressure Bath, 21-Unit, 220-240V, 50Hz and 60Hz ..... Page 93
235-240-005 Heater, 6000W (1)
265-400-002 Temperature Probe (1)

K11450 Reid Vapor Pressure Bath, 4-Unit, 115V ..... Page 93
K11450-0-1 Heater, 2000W, 115V
K70519 RTD Temperature Probe, 12 in.
278-020-002 Fuse, 20A
278-001-002 Fuse, 1A
288-115-004 Motor (1)
275-103-020 Temperature Controller, 100-240V, 2 out

K11459 Vapor Pressure Bath, 4-Unit, 220-240V ..... Page 93
K11459-0-1 Heater, 2000W, 230V (1)
K70519 RTD Temperature Probe, 12 in.
278-020-002 Fuse, 20A
278-001-002 Fuse, 1A
288-115-004 Motor (1)
275-103-020 Temperature Controller, 100-240V, 2 out

K12100 Oxidation Stability Bath, 115V ..... Page 123
K121-0-17 Heater, 750W, 115V (1)
K70519 RTD Temperature Probe, 12 in.
265-600-001 RTD Temperature Probe, 4 in.
278-020-002 Fuse, 20A
278-001-002 Fuse, 1A
278-104-002 Fuse, 0.25A
288-115-062 Motor, 115V, 60Hz (1)
275-103-024 Temperature Controller, 100-240V, 1 out

K12190 Oxidation Stability Bath, 220-240V ..... Page 123
K121A-0-17 Heater, 750W, 230V (1)
288-230-002 Motor, 230V, 50/60Hz (1)
K70519 RTD Temperature Probe, 12 in.
265-600-001 RTD Temperature Probe, 4 in.
278-020-002 Fuse, 20A
278-001-002 Fuse, 1A
278-104-002 Fuse, 0.25A

K12200 Oxidation Stability Bath, 8-Unit, 115V ..... Page 120
K122-2-15B Heater, 750W (1)
K122-2-15C Heater, 750W (1)
288-115-004 Motor (1)
K70519 RTD Temperature Probe, 12 in.
265-600-001 RTD Temperature Probe, 4 in.
278-020-002 Fuse, 20A
278-001-002 Fuse, 1A
278-104-002 Fuse, 0.25A
275-103-024 Temperature Controller, 100-240V, 1 out

K12201 Solid Block Oxidation Bath, 220-240V ..... Page 121
091-240-003 Relay, 120/240V, 25A
265-400-004 RTD Probe, 10 in.
220-240-009 Heater, 750W, 220V (6)

K12212 Oxidation Stability Bath, 12-Unit, 115V ..... Page 120
K122-12-2-22A Heater, 1500W, back, 115V (1)
K122-12-2-22B Heater, 1500W, middle, 115V (1)
K122-12-2-22C Heater, 750W, front, 115V (1)
K70519 RTD Temperature Probe, 12 in.
265-600-001 RTD Temperature Probe, 4 in.
288-115-004 Motor (1)
K23300-03004 Stirrer Shaft
091-032-004 Relay, Solid State, 32 V DC
278-040-001 Fuse, 40A, Time Delay CLSG

K12219 Oxidation Stability Bath, 12-Unit, 220-240V ..... Page 120
K122-12A-2-22A Heater, 1500W, back, 220V (1)
K122-12A-2-22B Heater, 1500W, middle, 220V (1)
K122-12A-2-22C Heater, 750W, front, 220V (1)
K70519 RTD Temperature Probe, 12 in.
265-600-001 RTD Temperature Probe, 4 in.
278-030-001 Fuse, 30A, Slo-blo, midget
278-001-002 Fuse, 1A
278-104-002 Fuse, 0.25A
288-115-004 Motor (1)
275-103-024 Temperature Controller, 100-240V, 1out

K12290 Oxidation Stability Bath, 8-Unit, 220-240V ..... Page 120
K122A-2-15B Heater, 750W, Inner, 230V (1)
K122A-2-15C Heater, 750W, Outer, 230V (1)
K70519 RTD Temperature Probe, 12 in.
265-600-001 RTD Temperature Probe, 4 in.
278-020-002 Fuse, 20A
278-001-002 Fuse, 1A
278-104-002 Fuse, 0.25A
288-115-004 Motor (1)

Spare Parts (Continued)

K12300 Series Oxidation Stability Bath, 220-240V, 50 and 60Hz...Page 121
Model Numbers K12330, K12339, K12300, K12395
235-240-005 Heater, 6000W, 240V (2)
265-400-002 RTD Temperature Probe, 12 in.
265-400-004 RTD Temperature Probe, 10 in.

K13009 Saybolt Chromometer.....Page 44
K13018 Gasket (pkg. of 12)
K13020 Color Standard (Full) (2)
K13029 Color Standard (Half) (1)
K13032 Glass Set, Turret & Draincock Assembly
K13039 Plain Tube with Turret Assembly
K13050 Graduated Tube with Connections and Draincock Assembly
K13090 Frosted Mirror without Base (1)
K13012 Graduated Tube Gasket

K13100 Saybolt Wax Chromometer, 115V.....Page 44
K13018 Gasket (pkg. of 12)
K13020 Color Standard (Full) (1)
K13029 Color Standard (Half) (1)
K13033 Glass Set, Turret and Graduated Tube
K13090 Frosted Mirror without Base (1)
K131-0-26 Cartridge Heater, 115V (1)
K131-0-28 Strip Heater, 200W, 115V (1)
AS568-211 O-ring (2)

K13190 Saybolt Wax Chromometer, 220-240V.....Page 44
K13018 Gasket (pkg. of 12)
K13020 Color Standard (Full) (1)
K13029 Color Standard (Half) (1)
K13033 Glass Set, Turret and Graduated Tube
K13090 Frosted Mirror without Base (1)
K131A-0-26 Cartridge Heater, 50W, 230V (1)
K131A-0-28 Strip Heater, 200W, 230V (1)
AS568-211 O-ring (2)

K13900 Cleveland Flash Tester, 115V.....Page 36
K138-1-17 Insulation Plate (1)
225-115-002 Heater, 1000W, 115V (1)
010-115-005 Wattstat, 115V (1)

K13990 Cleveland Flash Tester, 220-240V.....Page 36
K138-1-17 Insulation Plate (1)
225-230-002 Heater, 1000W, 230V (1)
AS568-008 O-ring (1)
010-230-004 Wattstat, 230V (1)

K14600 Tag Electric Closed Tester, 115V.....Page 35
190-120-001 Heater (1)
010-115-005 Wattstat, 115V (1)

K14670 Tag Electric Closed Tester, 220-240V.....Page 35
190-240-009 Heater (1)
010-230-004 Wattstat, 230V (1)

K15600 Tag Electric Open Cup Flash Tester, 115V.....Page 37
190-120-001 Heater (1)
K138-0-11 Valve Stem (2)
K156-0-1A Flame Test Burner and Pilot Assembly (1)

K15670 Tag Electric Open Cup Flash Tester, 220-240V.....Page 37
190-240-009 Ring Heater (1)
K138-0-11 Valve Stem (2)
K156-0-1A Flame Test Burner and Pilot Assembly (1)

K16000 Pensky-Martens Flash Tester, Gas.....Page 34
K160-9 Flexible Shaft (1)
K16220-0-6 Drive Belt

K16200 Pensky-Martens Flash Tester, 115V.....Page 34
225-115-002 Heater, 1000W (1)
K160-9 Flexible Shaft (1)

K16270 Pensky-Martens Flash Tester, 220-240V.....Page 34
225-230-002 Heater, 1000W (1)
K160-9 Flexible Shaft (1)

K17100 Wax Coating Device, 115V.....Page 177
190-120-009 Heater (1)
K171-0-12 Equalizer Rod
280-115-004 Variable Transformer

K17190 Wax Coating Device, 220-240V.....Page 177
190-120-009 Heater (1)
240-230-001 Stepdown Transformer (1)

K17200 Type A Blocking Plate, 115V.....Page 177
236-115-001 Heater, 250W (1)

K17290 Type A Blocking Plate, 220-240V.....Page 177
236-230-001 Heater, 250W (1)

K17300 Type B Blocking Plate, 115V.....Page 177
K173-0-11 A Heater (1)
K173-0-11 C Heater, 300W (1)
288-115-001 Motor (1)

K17390 Type B Blocking Plate, 220-240V.....Page 177
K173-0-11B Heater (1)
K173-0-11D Heater, 300W (1)
288-230-002 Motor (1)

K17500 Wax Melting Point Apparatus.....Page 178
K175-0-5 Cork, Sample Thermometer (1)
K175-0-6 Cork, Bath Thermometer (1)
285-000-006 Cork without hole (1)
K175-0-8 Pyrex Sample Tube (1)

K17600 Oil Solvent Extractables Content Apparatus, 115V.....Page 179
K176-1-0-26 Glass Manifold (1)
279-115-006 Lamp, 100W, 115V (1)
332-003-004 15mL Weighing Bottle (4)

K17690 Oil Solvent of Extractables Content Apparatus, 220-240V.....Page 179
K176-1-0-26 Glass Manifold (1)
279-230-004 Lamp, 100W, 230V (1)
332-003-004 15mL Weighing Bottle (4)

K17970/K17979 Corrosion Preventive Properties Apparatus, 115V and 220-240V.....Page 154
K17910 Test Bearings (3)
K17930 Containers/Lids (3)
K179-0-6 Spring
K179-0-8 Lockscrew
288-115-036 Motor, 115/230V, 60Hz

Spare Parts (Continued)

K17980/K17989 Corrosion Preventive Properties Apparatus, 115V and 220-240V.....Page 154

AS568-224	O-ring (1)
AS568-329	O-ring (1)
360-115-012	Motor Speed Control
289-004-002	Outboard Bearing Set
288-115-053	Motor, 1/4 hp, 130 V DC and Resistor
278-002-001	Fuse, 2A

K18000 Manual Grease Working Machine.....Page 28

22H-308-20C	Wing Screws (6)

K18100 Series Mechanical Grease Workers, Single-Unit, 115V and 220-240V.....Pages 26, 28

Model Numbers K18100, K18110, K18119

289-001-002	Bearing (1)
320-115-001	Counter
050-001-006	Start/Stop Switch
050-001-007	Proximity Switch
K180-1-0-11	Clamp Spring (2)
271-015-001	Thermal Circuit Breaker, 15A

K18190 Series Mechanical Grease Workers, Double-Unit, 115V and 220-240V.....Page 28

Model Numbers K18190, K18191, K18192

289-001-002	Bearing (2)
320-115-001	Counter
050-001-006	Start/Stop Switch
050-001-007	Proximity Switch
K180-1-0-11	Clamp Spring (4)
271-015-001	Thermal Circuit Breaker, 15A

K18200 Water Spray Apparatus, 115V, 60Hz.....Page 163

301-002-006	Belt (1)
K182-0-10	Heater, 750W (1)
K18210	Test Panel
255-200-001	Temperature Control with Fitting
356-001-002	Pump
039-104-00B	Snubber, Brass
165-308-001	Leveling Foot (4)
288-115-015	Motor 115V, 60Hz, 1/3 hp

K18290/K18295 Water Spray Apparatus, 220-240V, 50Hz and 60Hz.....Page 163

301-002-006	Belt (1)
K182A-0-10	Heater (1)
K18210	Test Panel
255-200-001	Temperature Control
356-001-002	Pump
039-104-00B	Snubber, Brass
165-308-001	Leveling Foot (4)
288-115-012	Motor 115/230V, 60Hz, 1/3 hp
288-115-010	Motor, 220-240V, 50Hz

K18300/K18320 Roll Stability Tester, Single/Double Unit, 115V.....Pages 27, 156

325-000-025	#25 Chain (30")
237-115-002	Heater, Finned, Strip, 600W, 115V
265-600-001	RTD Temperature Probe, 4 in. (1)
K183-0-44	Bearing (4)
AS568-117	O-ring
AS568-154	O-ring
278-020-002	Fuse, 20A
278-001-002	Fuse, 1A
091-032-001	Relay, Solid State, 4-32V DC, 20A
275-103-020	Temperature Controller, 100-240V, 2 out

K18305 Series Roll Stability Tester, Single/Double-Unit, 220-240V, 50Hz.....Page 156

Model Numbers K18305, K18306, K18325, K18326

325-000-025	#25 Chain (30")
237-240-004	Heater, 600W, 230V
265-550-001	RTD Temperature Probe, 4 in. (1)
289-002-006	Flanged Bushings (6)
K183-1-21B	Plain Bushings (4)
278-020-002	Fuse, 20A
278-001-002	Fuse, 1A
288-115-004	Motor Fan
AS568-117	O-ring
AS568-154	O-ring

K18340 Roll Stability Tester, 4-Unit, 115V, 60Hz.....Page 156

237-115-001	Heater, 1000W, 115V (2)
265-600-001	RTD Temperature Probe, 4 in. (1)
289-002-004	Ball Bearing (3)
289-002-006	Flanged Bushing (12)
K183-1-21B	Plain Bushing (11)
288-115-035	Motor, Gear, 115V, 60Hz, 83rpm
278-020-002	Fuse, 20A
278-001-002	Fuse, 1A
AS568-117	O-ring
AS568-154	O-ring
275-103-020	Temperature Controller, 100-240V, 2 out

K18345/K18346 Roll Stability Tester, 4-Unit, 220-240V, 50Hz and 60Hz.....Page 156

215-230-002	Heater, 2000W, 115V (1)
265-600-001	RTD Temperature Probe, 4 in. (1)
288-115-004	Motor, Fan
278-020-002	Fuse, 20A
278-001-002	Fuse, 1A
AS568-117	O-ring
AS568-154	O-ring
288-230-009	Motor, 230V, 50Hz, 70rpm

K18500 High Temperature Wheel Bearing Tester, 115V, 60Hz.....Page 161

215-115-001	Heater, 1200W, 115V (1)
288-115-004	Fan Motor (1)
K185-0-42	Cabinet Thermocouple (1)
K185-0-42A	Spindle Thermocouple (1)
289-004-001	Inboard Bearing Set
289-004-002	Outboard Bearing Set
K185-0-66	Motor, modification

K18590/K18595 High Temperature Wheel Bearing Tester, 220-240V, 50Hz and 60Hz.....Page 161

215-230-001	Heater (1)
288-115-004	Fan Motor (1)
278-010-001	Fuse, 10A (5)
278-015-001	Fuse, 15A (5)
278-020-001	Fuse, 20A (5)
K185-0-42	Cabinet Thermocouple (1)
K1 85-0-42A	Spindle Thermocouple (1)
289-004-001	Inboard Bearing Set
289-004-002	Outboard Bearing Set

Spare Parts (Continued)

K18700 Leakage Tendencies of Automotive Wheel Bearing Greases, 115V, 60Hz ..... Page 160

275-103-020	Temperature Controller, 100-240V, 2 out
200-115-004	Heater (2)
301-004-002	Vee Belt (60Hz) (1)
288-115-027	Motor
265-122-002	RTD Temperature Probe

K18790 Leakage Tendencies of Automotive Wheel Bearing Greases, 220-240V, 60Hz ..... Page 160

200-230-004	Heater (2)
301-004-002	Vee Belt (60Hz) (1)
265-122-002	RTD Temperature Probe
288-115-027	Motor
275-103-020	Temperature Controller, 100-240V, 2 out

K18795 Leakage Tendencies of Automotive Wheel Bearing Greases, 220-240V, 50Hz ..... Page 160

200-230-004	Heater, 660W, 230V (2)
301-004-005	Vee Belt (50Hz) (1)
265-122-002	RTD Temperature Probe, 3 in. (1)
288-230-005	Motor

K18850 Series Low Temperature Torque Apparatus, 220-240V, 50Hz and 60Hz ..... Page 159

Model Numbers K18850, K18851, K18852, K18853, K18854, K18855, K18860, K18861, K18862, K18863, K18864, K18865

301-002-007	Timing Belt (2)
265-000-002	Spindle Thermocouple (2)
289-007-001	Boston 5F x ⅞ Flanged Bearing (4)
360-230-001	Strain Gauge (2)
K18860-0-16	Small Bearing Set (2)
K18860-0-24	Large Bearing Set (2)
288-230-007	Motor, 230V, 50/60Hz, 1/15 hp, 1.4A (1)

K18910 Constant Temperature Air Cabinet, 115V ..... Page 165

288-115-062	Motor, 115V, 60Hz
K189-1-0-17	Heater, 115V, 50W
283-120-002	Solenoid Valve, 115V (2)
265-400-002	RTD Temperature Probe
275-103-023	Electronic Temperature Control, Digital
278-061-002	Fuse, 1A, Slo-blo

K18919 Constant Temperature Air Cabinet, 220-240V ..... Page 165

288-230-002	Motor, 230V
K189-1A-0-17	Heater, 230V
283-240-001	Solenoid Valve, 230V (2)
265-400-002	RTD Temperature Probe
275-103-023	Electric Temperature Control
278-001-002	Fuse, 1A, Slo-blo

K19200 Water Washout Tester, 115V, 60Hz ..... Page 162

K192-4-4	Heater, 380 W, 115V (1)
301-004-008	Vee Belt, 22"
301-004-007	Vee Belt, 37"
289-001-009	Ball Bearing (2)
289-001-006	Test Bearing (3)
K192-4-3	Thermoregulator
K192-2-5	Flowmeter
288-115-027	Motor
AS568-214	O-ring (2)
356-001-001	Water Pump
K192-1-8	Bearing Housing Gasket

K19290 Water Washout Tester, 220-240V, 60Hz ..... Page 162

K192A-4-4	Heater, 380W, 220V (1)
301-004-008	Vee Belt, 22"
301-004-007	Vee Belt, 37"
289-001-009	Ball Bearing
289-001-006	Test Bearing
AS568-214	O-ring
K192-1-8	Bearing Housing Gasket
K1142-4-3	Thermoregulator
K192-2-5	Flowmeter
288-115-027	Motor
356-001-001	Water Pump

K19295 Water Washout Tester, 220-240V, 50Hz ..... Page 162

K192A-4-4	Heater, 380W, 220V (1)
301-004-003	Vee Belt, 37", 50 Hz (1)
288-230-005	Motor, 110/220V, 50Hz

K19400 High Temperature Dropping Point Apparatus, 115V ..... Page 151

220-120-001	Heater (cartridge), 750W, 120V (1)
279-115-002	Lamp (1)
330-000-001	Starter (1)
265-203-001	Temperature Probe, Type "K", 3/16 dia x 4"
K194EB	Test Tube 13x100mm (10)
K194EC	Cup Support (10)
275-103-023	Electronic Temperature Control
091-240-002	Solid State Relay, 25A, 90-240V

K19410 High Temperature Dropping Point Apparatus, 220-240V ..... Page 151

220-240-001	Heater (cartridge) (1)
279-115-002	Lamp (1)
330-000-001	Starter (1)
265-203-001	Temperature Probe, Type "K" (1)
K194EB	Test Tube 13x100mm (10)
K194EC	Cup Support (10)
275-103-023	Electronic Temperature Control, 100-240V
091-240-002	Solid State Relay, 25A, 90-240V

K19490 Dropping Point Apparatus, 115V ..... Page 150

K19492	Test Tube with Indentations
K19493	Thermometer Cork
K194A-0-7	Bath Thermometer Cork
332-002-005	Pyrex™ Beaker
010-115-005	Wattstat, 115V
225-115-002	Heater Element
288-115-001	Motor

K19491 Dropping Point Apparatus, 220-240V ..... Page 150

K19492	Test Tube with Indentation
K19493	Thermometer Cork
K194A-0-7	Bath Thermometer Cork
332-002-005	Pyrex™ Beaker
010-230-004	Wattstat, 230V
225-230-001	Heater Element, 230V
K19491-0-12	Motor, 230V, 50/60Hz, 1/40 hp

K19500 Penetrometer ..... Page 24

332-005-008	5" diameter Watch Glass (1)
K195-11	Plunger Drop Cushion
K195-23	Plunger Release Spacer
K195-24	Plunger Release Lever (1)
K195-29	Teflon Inserts

Spare Parts (Continued)

K21404/K21494 Automatic Saybolt Viscosity Bath ..... Page 16

K21404-03009	Sensor assembly
K21404-2300	Cabinet power supply
K21404-03013	Flask holder assembly

K21410 Saybolt Viscometer Bath, 115V ..... Page 16

K21410-0-15	Heater, 1200W, 115V (2)
288-115-062	Motor, 115V, 60Hz (1)
265-500-001	RTD Temperature Probe, 12 in.
265-600-001	RTD Temperature Probe, 4 in.
278-020-002	Fuse, 20A
278-001-002	Fuse, 1A
278-104-002	Fuse, 0.25A

K21420 Saybolt Viscometer Bath, 220-240V ..... Page 16

K21420-0-15	Heater, 1200W, 230V (2)
K23700-03014	Motor, 230V, 50/60Hz (1)
265-500-001	RTD Temperature Probe, 12 in.
265-600-001	RTD Temperature Probe, 4 in.
278-020-002	Fuse, 20A
278-001-002	Fuse, 1A
278-104-002	Fuse, 0.25A

K22600/K22610 Pressure Viscometer, 115V and 220-240V ..... Page 157

K226-0-20	Cylinder Gasket (2)
K226-0-21	Capillary Gasket (8)
265-000-001	Thermocouple (1)
288-115-014	Motor (1)
349-000-009	Coupling Spider (1)

K22615 Pressure Viscometer, 220-240V, 50Hz ..... Page 157

K226-0-20	Cylinder Gasket (2)
K226-0-21	Capillary Gasket (8)
265-000-001	Thermocouple (1)
288-230-005	Motor, 220V, 50Hz (1)
349-000-009	Coupling Spider (1)

K22680 Series Grease Mobility Tester, 115V and 220-240V ..... Page 158

Model Numbers K22680, K22685, K22686

K226-0-20	Cylinder Gasket (2)
K226-0-21	Capillary Gasket (1)

K22690 Series Low Temperature Pressure Viscometer, 115V and 220-240V, 50Hz and 60Hz ..... Page 157

Model Numbers K22690, K22695, K22696

320-000-003	Counter
288-115-014	Motor, 115/230V, 60Hz
288-230-005	Motor, 115/230V, 50Hz
K226-0-22	Capillaries (8)
265-000-001	Thermocouple Wires
AS568-231	O-ring

K22751 Digital Refrigerated Kinematic Viscosity Bath, 115V ..... Page 7

091-032-001	Solid State Relay
288-115-058	Stirrer Motor, 115V, 60Hz
335-115-004	Condenser Fan Motor, 115V
220-120-009	Heater, 115V
265-500-001	RTD Sensor, 1/4" x 12"
279-115-009	Fluorescent Lamp
278-020-002	Fuse, 20A
278-001-002	Fuse, 1A
278-104-002	Fuse, 0.25A
265-500-001	RTD Temperature Probe, 1/4" x 12"

K22752/K22754 Digital Refrigerated Kinematic Viscosity Bath, 220-240V ..... Page 7

091-032-001	Solid State Relay
288-230-020	Motor, 230V, 50/60Hz
335-230-001	Condenser Fan Motor, 230V
220-240-013	Heater, 230V, 500W
265-500-001	RTD Sensor
279-115-009	Fluorescent Lamp
278-020-002	Fuse, 20A
278-001-002	Fuse, 1A
278-104-002	Fuse, 0.25A

K22753 Digital Refrigerated Kinematic Viscosity Bath, 115V ..... Page 7

091-032-003	Solid State Relay
288-115-058	Motor, 115V, 60Hz
335-115-004	Condenser Fan Motor, 115V
220-120-009	Heater, 115V
265-500-001	RTD Sensor, 1/4" x 12"
279-115-009	Fluorescent Lamp
278-020-002	Fuse, 20A
278-001-002	Fuse, 1A
278-104-002	Fuse, 0.25A

K23700/K23800 Series Kinematic Viscosity Baths, 115V, 50Hz/60Hz ..... Pages 4-5

Model Numbers K23700, K23702, K23706, K23708, K23800, K23802

K23700-02003	RTD Temperature Probe
278-104-002	Fuse, 0.25A, Slo-blo
279-115-009	Fluorescent Lamp, 50W, 120V
335-115-005	Fan, 115V, 50/60Hz, 53CFM
332-001-001	Pyrex™ Jar
K23700-03006	Heater, 1250W, 115V
K23700-03013	Motor, Modification, 115V
275-103-027	Temperature Controller

K23700/K23800 Series Kinematic Viscosity Baths, 220-240V, 50Hz/60Hz ..... Pages 4-5

Model Numbers K23790, K23792, K23796, K23798, K23890, K23892

K23700-02003	RTD Temperature Probe
278-104-002	Fuse, 0.25A, Slo-blo
279-115-009	Fluorescent Lamp, 50W, 120V
335-230-005	Fan, 230V, 50/60Hz, 53CFM
332-001-001	Pyrex™ Jar
K23700-03015	Heater, 1250W, 230V
K23700-03014	Motor, Modification, 230V

K23702 –OS, K23792-OS, K 23708-OS, K 23798-OS Kinematic Viscosity Bath ..... Pages 5

360-030-001	Amplifier, 110-30 VDC, blue led
275-600-004	Interfuse, PLC
275-600-005	Controller, PLC, 100-240 VAC
K237120S-03038	Holder, Reflection

K25310/K25320 Copper Strip Corrosion Test Bath, 4-Unit and 8-Unit, 115V ..... Pages 90, 91, 99

K253-1-0-8	Heater, 750W (1)
K253-2-0-8	Heater, 750W (K25320) (1)
191	RTD Probe Assembly
275-250-003	Electronic Temperature Control

Spare Parts (Continued)

K25319/K25329 Copper Strip Corrosion Test Bath, 4-Unit and 8-Unit, 220-240V ..... Pages 90, 91, 99

K253-1A-0-8	Heater, 750W (1)
K253-2A-0-8	Heater, 750W (K25309) (1)
191	RTD Probe Assembly
275-250-003	Electronic Temperature Control

K25330 Test Tube Bath, 115V ..... Pages 90, 91, 131, 155

K346-0-3	Heater, 750W, 115V (1)
288-115-001	Stirrer Motor (1)
K70519	RTD Temperature Probe, 12 in.
278-020-002	Fuse, 20A
278-001-002	Fuse, 1A
091-032-001	Relay, Solid State, 4-32V DC, 20A
275-103-020	Temperature Controller, 100-240V, 2 out

K25339 Test Tube Bath, 220-240V ..... Pages 90, 91, 131, 155

K253-1A-0-8	Heater, 750W, 230V (1)
K70519	RTD Temperature Probe, 12 in.
278-020-002	Fuse, 20A
278-001-002	Fuse, 1A
K10091-09000	Stirrer Motor
091-032-001	Relay, Solid State, 4-32V DC, 20A
275-103-020	Temperature Controller, 100-240V, 2 out

K25900 Constant Temperature Water Bath, 115V 60Hz ..... Page 103

K25900-0-15	Heater, 750W (1)
010-500-003	Temperature Probe, 500Ω (1)
288-115-004	Motor (1)
010-115-002	Type "B" Controller
010-010-002	Potentiometer
356-115-001	Pump

K25990/K25995 Constant Temperature Water Bath, 220-240V, 50Hz and 60Hz ..... Page 103

K25990-0-15	Heater, 750W (1)
010-500-003	Temperature Probe 500Ω (1)
288-115-004	Motor (1)
010-115-002	Type "B" Controller
010-010-002	Potentiometer
356-115-001	Pump

K26150 Pressure Hydrometer Cylinder ..... Page 103

AS568-032	O-ring, Buna 'N'
K26015	Lucite Cylinder
260-104-001	Pressure Release Valve
K26150-0-6	Neoprene Cushion

K26200 Constant Temperature Hydrometer Bath, 115V ..... Page 50

K262-0-10	Heater (1)
354-001-002	Rheostat (1)

K26290 Constant Temperature Hydrometer Bath, 220-240V ..... Page 50

K262A-0-10	Heater (1)
354-001-002	Rheostat (1)

K26400 Constant Temperature Hydrometer Bath, 115V ..... Page 50

K26400-1-5	Heater, 1500W (1)
K26400-1-5A	Heater, 1000W (1)
K70519	RTD Temperature Probe, 12 in.
265-600-001	RTD Temperature Probe, 4 in.
091-032-002	Relay, Solid State, 4-32 V DC, 30A
275-103-024	Temperature Controller, 100-240V, 1 out

K26490 Constant Temperature Hydrometer Bath, 220-240V ..... Page 50

K26490-1-5	Heater, 1500W (1)
K70519	RTD Temperature Probe, 12 in.
265-600-001	RTD Temperature Probe, 4 in.
091-032-002	Relay, Solid State, 4-32 V DC, 30A
275-103-024	Temperature Controller, 100-240V, 1 out

K26500 Thermometer Calibration Bath, 115V ..... Page 63

K26500-0-15	Heater, 750W (1)
265-500-001	RTD Temperature Probe (1)
288-115-001	Motor (1)
091-240-003	Relay, 120/240V, 25A
275-103-025	Temperature Controller, 100-240V

K26590 Thermometer Calibration Bath, 220-240V ..... Page 63

K26500-0-15A	Heater, 750W (1)
265-500-001	RTD Temperature Probe (1)
288-230-002	Motor (1)
275-103-025	Temperature Controller, 100-240V

K27000 Smoke Point Lamp ..... Page 95

K27040	Replacement Window (1)
K270-0-22	Scale (1)

K27100 Ramsbottom Carbon Residue Apparatus, 115V ..... Page 59

230-115-001	Heater, 2400W (1)
265-203-001	Temperature Probe, Type "K", 3/16 dia x 4"
278-030-001	Fuse, 30A
278-001-002	Fuse, 1A
278-104-002	Fuse, 0.25A
091-032-002	Relay, Solid State, 4-32V DC, 20A
275-103-024	Temperature Controller, 100-240V, 1 out

K27190 Ramsbottom Carbon Residue Apparatus, 220-240V ..... Page 59

230-230-002	Heater, 2400W (1)
265-203-001	Temperature Probe, Type "K", 3/16 dia x 4"
278-020-002	Fuse, 20A
278-001-002	Fuse, 1A
278-104-002	Fuse, 0.25A
091-032-001	Relay, Solid State, 4-32V DC, 20A
275-103-024	Temperature Controller, 100-240V, 1 out

K28300 Bending Apparatus ..... Page 173

K283-0-14	Test Panel

K28310 Cooling Apparatus ..... Page 173

K28310-0-1	Large Stopper
K28310-0-2	Small Stopper
K28310-0-3	Inner Flask
K297-0-1	Vacuum Flask
332-014-001	Funnel

K29300 High Temperature Evaporation Loss Apparatus ..... Page 149

190-240-003	Heater, 500W, 240V (1)
220-240-002	Heater, 650W (2)
265-203-001	K Type Temperature Probe, 3 in., 3 Wire
278-020-002	Fuse, 20A
278-001-002	Fuse, 1A
278-104-002	Fuse, 0.25A
010-230-004	Wattstat (2)
K293-0-12	Thermocouples (2)
K293-0-20	Flowmeter (2)
010-230-004	Wattstat, 230V

Spare Parts (Continued)

K29400 Evaporation Loss Bath, 115V.....Page 148
K294-0-1 Heater, 1000W (1)
288-115-004 Motor (1)
K70519 RTD Temperature Probe, 12 in.
265-600-001 RTD Temperature Probe, 4 in.
278-020-002 Fuse, 20A
278-001-002 Fuse, 1A
278-104-002 Fuse, 0.25A
091-032-002 Relay, Solid State, 4-32V DC, 20A
275-103-024 Temperature Controller, 100-240V, 1 out

K29490 Evaporation Loss Test Bath, 220-240V.....Page 148
K294A-0-1 Heater, 1000W (1)
288-115-004 Motor (1)
K70519 RTD Temperature Probe, 12 in.
265-600-001 RTD Temperature Probe, 4 in.
278-020-002 Fuse, 20A
278-001-002 Fuse, 1A
278-104-002 Fuse, 0.25A
275-103-024 Temperature Controller, 100-240V, 1 out

K29700 Freezing Point Apparatus.....Page 96
K297-0-1 Vacuum Flask (1)
K297-0-2 Sample Tube (Jacketed) (1)
K297-0-8 Cork Strip (1)
K297-0-5 #2 Neoprene Stopper

K29750/K29759 Freezing Point Apparatus (ASTM D1177), 115V and 220-240V.....Page 68
K29750-1-1 200mL Tube (1)
332-003-012 2 quart Dewar Flask (1)

K29760/K29769 Wax Appearance Point Apparatus, 115V and 220-240V.....Page 94
K297-0-1 Vacuum Flask (1)
K29760-0-2 Sample Tube (1)

K29900/K29990 Lead Corrosion Apparatus, 220-240V, 50Hz and 60Hz.....Page 130
288-115-004 Bath Motor (1)
K299-0-45A Heater, 500W (1)
K299-0-45B Heater, 500W (1)
K299-0-45C Heater, 2000W (1)
265-600-001 RTD Temperature Probe, 4 in.
K70519 RTD Temperature Probe, 12 in.
278-020-002 Fuse, 20A
278-001-002 Fuse, 1A
278-104-002 Fuse, 0.25A
091-032-001 Relay, Solid State, 4-32 V DC, 20A
275-103-024 Temperature Controller, 100-240V, 1 out

K30160/K30161 Rust Preventing Characteristics Oil Bath, 115V, 60Hz.....Pages 98, 128
K301A-0-5 Heater, 1500W (1)
301-005-001 Belt (1)
288-115-056 Motor (1)
265-600-001 RTD Temperature Probe, 4 in.
278-020-002 Fuse, 20A
278-001-002 Fuse, 1A
278-104-002 Fuse, 0.25A
275-103-024 Temperature Controller, 100-240V, 1 out

K30165/K30167 Rust Preventing Characteristics Oil Bath, 220-240V, 50Hz.....Page 98, 128
301-005-001 Belt (1)
K301A-1-0-5 Heater, 1500W (1)
288-230-001 Motor (1)
265-600-001 RTD Temperature Probe, 4 in., 600F
278-020-002 Fuse, 20A
278-001-002 Fuse, 1A
278-104-002 Fuse, 0.25A
091-032-001 Relay, Solid State, 4-32 V DC, 20A
275-103-024 Temperature Controller, 100-240V, 1 out

K30166/K30168 Rust Preventing Characteristics Oil Bath, 220-240V, 60Hz.....Page 98, 128
301-005-001 Belt (1)
K301A-1-0-5 Heater, 1500W (1)
288-230-003 Motor (1)
265-600-001 RTD Temperature Probe, 4 in., 600F
278-020-002 Fuse, 20A
278-001-002 Fuse, 1A
278-104-002 Fuse, 0.25A

K31956 Connection Apparatus.....Page 176
K319-0-6 Condenser
363-102-003 ½ ID Latex Tubing (2")
K319-0-9 #14 Cork
K319-0-10 #4 Cork (2)
K319-0-7 End Tube
K319-0-8 Pyrex™ Tube
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091-032-001 Relay, Solid State, 4-32V DC, 20A
275-103-020 Temperature Controller, 100-240V, 2 out

K33780 Existent Gum Evaporation Bath, 3-Unit, 115V.....Page 86
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265-122-002 Temperature Probe 1200
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K337-2-14 Flowmeter
275-103-020 Temperature Controller, 100-240V, 2 out
278-020-002 Fuse, 20A
091-032-001 Relay, Solid State, 4-32V DC, 20A

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091-032-001 Relay, Solid State, 4-32V DC, 20A
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225-115-002 Heater, 1000W (1)
265-550-004 RTD Probe 0.25 OD x 90 deg. bend

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225-230-002 Heater, 1000W (1)
265-550-004 RTD Probe 0.25 OD x 90 deg. bend

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225-115-002 Heater, 1000W (1)
265-550-004 RTD Probe 0.25 OD x 90 deg. bend

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K46100-03030	Copper Test Jacket
091-032-003	Relay
265-400-005	RTD Probe
275-103-030	Temperature Controller, 1 out
283-120-005	Solenoid Coil, 115V
283-308-001	Solenoid Valve
278-001-002	Fuse, 1A
283-240-002	Solenoid Valve, 220V

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K46300-03002	Foam Covers
K46100-03030	Copper Test Jacket
091-032-003	Relay
265-400-005	RTD Probe
275-103-031	Temperature Controller, 1 out
283-120-005	Solenoid Coil, 115V
283-308-001	Solenoid Valve
278-001-002	Fuse, 1A
283-240-002	Solenoid Valve, 220V

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354-001-003	Rheostat (1)

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K470-0-1-10	Thermocouple (1)
K470-0-1-15	Thermocouple (3)
332-003-007	500mL Flask (1)

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311-015-003	Gauge (1)
290-010-001	Pressure Regulator (1)
037-108-00B	Toggle Valve (1)
261-104-001	Filter (1)

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290-010-001	Pressure Regulator (1)
037-108-00B	Toggle Valve (1)
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265-203-002	Thermocouple
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332-017-001	Separatory Funnel
220-240-010	Cartridge Heater, 300W, 240V
220-120-008	Cartridge Heater, 300W, 115V
091-240-002	Solid State Relay
278-005-001	Fuse, 5A (4)
278-002-001	Fuse, 2A (1)
278-001-002	Fuse, 1A

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190-120-009	Heater, 200W (4)
230-115-002	Heater, 600W (1)
AS568-213	O-ring (24)
K56110	Oxidation Tubes and Absorption Tubes 12 Sets (2 per set)
265-122-002	RTD Temperature Probe, 3 in., 2 Wire
265-122-003	RTD Temperature Probe, 3 in., 3 Wire
278-020-002	Fuse, 20A
278-001-002	Fuse, 1A
278-104-002	Fuse, 0.25A

K56190 Cigre Bath, 220-240V.....Page 126

190-240-008	Heater, 200W (4)
230-230-003	Heater, 600W (1)
AS568-213	O-ring (24)
K56110	Oxidation Tubes and Absorption Tubes 12 Sets (2 per set)
265-122-002	RTD Temperature Probe, 3 in., 2 Wire
265-122-003	RTD Temperature Probe, 3 in., 3 Wire
278-020-002	Fuse, 20A
278-001-002	Fuse, 1A
278-104-002	Fuse, 0.25A

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K70050-00000	Silicone O-ring (qty. depends on usage)
K70060	Valve (1)

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K702-0-8A	Heater, 1000W (1)
K702-0-8B	Heater, 750W (1)
301-004-001	Vee Belt (1)
AS568-345-V14	O-ring (2)
K700B-0-41	Drive Shaft Seal (8)
K702-CHAIN	Chain Kit (1)
050-001-028	Switch
289-001-005	Ball Bearing (2)
K70519	RTD Temperature Probe, 12 in.
265-600-001	RTD Temperature Probe, 4 in.
278-020-002	Fuse, 20A
278-001-002	Fuse, 1A
278-104-002	Fuse, 0.25A

K70300/K70390 3-Unit RBOT Bath, 220-240V, 50Hz and 60Hz.....Page 116

K703-0-8	Heater, 1000W (2)
K703-0-8A	Heater, 750W (1)
301-004-001	Vee Belt (1)
AS568-345-V14	O-ring (3)
K700B-0-41	Drive Shaft Seal (12)
K703-CHAIN	Chain Kit (1)
289-001-005	Ball Bearing (2)
288-115-004	Motor
050-001-028	Switch
K70519	RTD Temperature Probe, 12 in.
265-600-001	RTD Temperature Probe, 4 in.
278-020-002	Fuse, 20A
278-001-002	Fuse, 1A
278-104-002	Fuse, 0.25A

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K704-0-8A	Heater, 750W (1)
301-004-001	Vee Belt (1)
AS568-345-V14	O-ring (4)
289-001-005	Ball Bearing (4)
K700B-0-41	Drive Shaft Seal (16)
K704-CHAIN	Chain Kit (1)
288-115-004	Motor, Aux. Stirrer
050-001-028	Switch
K70519	RTD Temperature Probe, 12 in.
265-600-001	RTD Temperature Probe, 4 in.
278-020-002	Fuse, 20A
278-001-002	Fuse, 1A
278-104-002	Fuse, 0.25A

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K87100-9	Roll of Printer Paper (consumable)

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KLA-1S-008-041	“O” ring for CP test jar
KLA-1S-008-06	Fiber optic for cloud point
KLA-1S-008-12	PT100 product w/ connector (white)

KLA-2 Automatic Pour Point System .....Pages 133

KLA-2S-008-04	Pour Point glass cell
KLA-2S-008-041	“O” ring for PP test jar
KLA-2S-008-12	PT100 product w/connector
KLA-2S-008-13	PT100 detection

KLA-3 Automatic Cloud/Pour Point System .....Pages 133

KLA-3S-008-12	PT100 product w/ connector (white)
KLA-3S-008-06	Fiber optic for Cloud Point
KLA-3S-008-12A	PT100 product w/ connector
KLA-3S-008-13	PT100 detection
KLA-3S-008-04A	Calibrated Pour Point glass cell

KLA-4 Automatic Cold Filter Plugging Point System .....Pages 101

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KLA-4S-008-041	“O” ring for CFPP test jar
KLA-4S-008-12	PT100 product w/ connector
KLA-4S-008-13	Calibrated aspiration pipette
KLA-4S-013-01	Filter assembly
KLA-4S-013-02	Filter
KLA-4S-1232	“O” ring (small) for CFPP filter
KLA-4S-1288	“O” ring for CFPP filter

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