

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: $\pm 1^\circ\text{F}$ ($\pm 0.5^\circ\text{C}$)

Circulation: $\frac{1}{2}$ hp 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 $\pm 1^\circ\text{F}$ ($\pm 0.5^\circ\text{C}$). 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 $^\circ\text{C}/^\circ\text{F}$ 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		
K29500	Evaporation Test Cell with Grease Cup	2
K29550	Evaporation Test Cell with Oil Cup	
Test Bath		
K29400	Evaporation Loss Test Bath, 115V 50/60Hz	1
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 $\pm 0.3^\circ\text{F}$ 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 $^\circ\text{C}/^\circ\text{F}$ 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 $^\circ\text{C}/^\circ\text{F}$ 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.



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 lwxh,in.(cm)

25x16x17 (64x41x43)

Net Weight: 175 lbs (79.4kg)

Shipping Information:

Shipping Weight: 224 lbs (101.6kg)

Dimensions: 10.4 Cu. ft.

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 $\pm 1.1^\circ\text{C}$ ($\pm 2^\circ\text{F}$) 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.

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 ¼hp 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 l x w x h, 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.	Description	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.



K19400 High Temperature Dropping Point Apparatus

Please inquire about our Automated Dropping Point Test Equipment by contacting Koehler's Customer Service.

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.

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 l x w x h, in. (cm)

11½ x 9 x 14 (29 x 23 x 36)
 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
K11000	Oxidation Bomb	4
Pressure Measurement and Recording Equipment		
<i>Select either Pressure Gauges or Oxidata™ Pressure Measurement System*</i>		
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		
K10901	Oxidation Bath, 115V 50/60Hz	1
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 l x w x h, 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.



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 l x w x h, in. (cm)

7x12x9 $\frac{3}{4}$ (18x30x25)

Net Weight: 27 lbs (12.3kg)

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

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	1
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	1

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

l x w x h, in. (cm)
 15½ x 12½ x 14 (39 x 32 x 36)
 Net Weight: 27 lbs (12.2kg)

Shipping Information

Shipping Weight: 40 lbs (18.1kg)
 Dimensions: 7.8 Cu. ft.

ROLL STABILITY OF LUBRICATING GREASE



K18320 Double-Unit Roll Stability Tester

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 l×w×h,in.(cm)

Single-Unit: 16½×18½×15 (42×47×38)

Double-Unit: 16½×18½×15 (42×47×38)

Four-Unit: 25×18½×15 (64×47×38)

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.

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.

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 $\pm 0.5^{\circ}\text{F}$ ($\pm 0.3^{\circ}\text{C}$). 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: $\pm 0.5^{\circ}\text{F}$ ($\pm 0.3^{\circ}\text{C}$) 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 lxxwxh,in.(cm)

Low Temperature Pressure Viscometer: $43\frac{1}{4}\times 30\frac{3}{4}\times 66\frac{1}{4}$ (110x78x168)

Net Weight: 640 lbs (290.3kg)

Pressure Viscometer: $30\times 12\times 36$ (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: $\pm 2^{\circ}\text{F}$ ($\pm 1^{\circ}\text{C}$)

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 l x w x h, 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 $\pm 2^{\circ}\text{F}$ ($\pm 1^{\circ}\text{C}$). 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 $+100^{\circ}\text{F}$ 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: $\pm 1^{\circ}\text{F}$ ($\pm 0.5^{\circ}\text{C}$)

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 l x w x h, in. (cm)
 $48\frac{1}{2} \times 34 \times 45\frac{1}{2}$ (123 x 86 x 116)
 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 ½hp 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 available. 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 l x w x h, in. (cm)

20½ x 18 x 15 (52 x 46 x 38)
 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 ½hp 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 ½ 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.



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 l x w x h, in.(cm)

Test Unit: 16x20x15½ (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.

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	

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 ½hp 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.

Specifications

Conforms to the specifications of:
 ASTM D1264, D4950; IP 215; FTM 791-3252
 Drive Motor: ½hp 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 l x w x h, in. (cm)

18x12x18¾ (46x30x48)
 Net Weight: 67 lbs (30.4kg)

Shipping Information

Shipping Weight: 102 lbs (46.3kg)
 Dimensions: 6.7 Cu. ft.

Ordering Information

Catalog No.		Order Qty
Water Washout Tester		
K19200	Water Washout Tester, 115V 60Hz	1
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.

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 ½hp 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.



K18200 Water Spray Off Tester

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.

Specifications

Conforms to the specifications of:
ASTM D4049

Circulation System:

Drive Motor: ½hp, 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 l x w x h, in. (cm)

29x18x33½ (74x46x85)

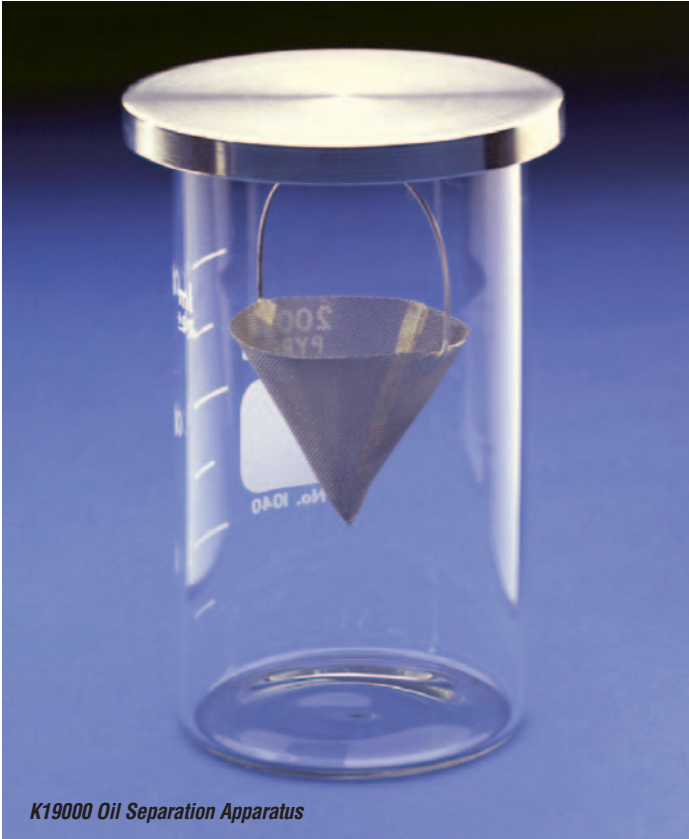
Net Weight: 110 lbs (49.9kg)

Shipping Information

Shipping Weight: 180 lbs (81.6kg)

Dimensions: 14.2 Cu. ft.

OIL SEPARATION FROM LUBRICATING GREASE



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

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 $\pm 1^\circ\text{F}$ ($\pm 0.5^\circ\text{C}$)

Electrical Requirements:

115V 50/60Hz, Single Phase, 3A

220-240V 50/60Hz, Single Phase, 1.5A

Dimensions

Interior: 19"x19"x21½" (50x50x55)

Overall: 47"x23"x31½" (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	1
K18900	Pressure Bleeding Test Cell	4

Accessories

332-002-009	Test Beaker, 20mL	4
250-000-57F	ASTM 57F Thermometer. Range: -4 to $+122^\circ\text{F}$	1
250-000-57C	ASTM 57C Thermometer. Range: -20 to $+50^\circ\text{C}$	1

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



K18900 Pressure Bleeding Test Cell

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 $\pm 0.1^\circ\text{C}$ 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.



K29200 Micro-Oxidation Bath

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

Specifications

Temperature Range: 75°C to 300°C
 Temperature Control: $\pm 0.1^\circ\text{C}$
 Electrical Specifications:
 115V 60Hz, 1 Phase, 2A
 220-240V 50/60Hz, 1 Phase, 1A

Dimensions

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 ventability.

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.

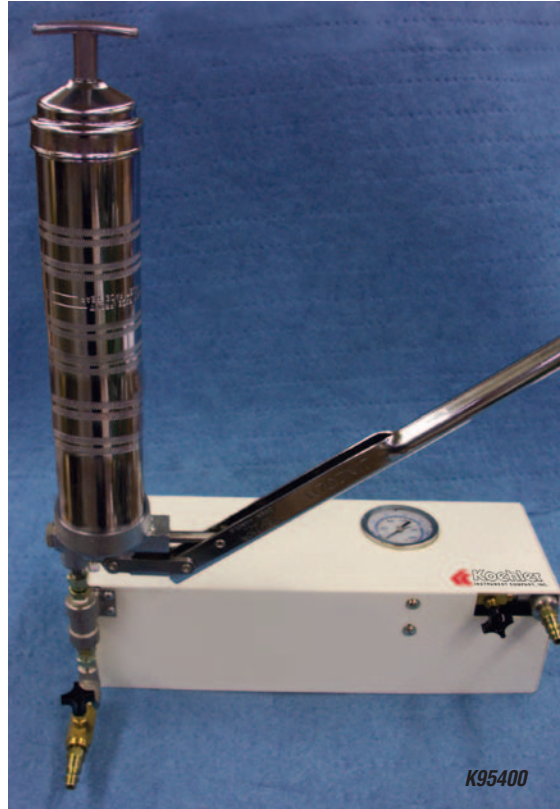
Specifications

Model:
K95400
Electrical Requirements:
None

Dimensions lwxh
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 OilsPage 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 GreasesPage 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 MethodPages 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 GreasesPage 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 GreasesPage 157

ASTM D1092

Hydraulic Oil • Nitrogen • Flexible Tubing • Alcohol
Balance • Kerosene

Grease MobilityPage 158

U.S. Steel Method

Nitrogen • Laboratory Balance

Low Temperature Torque of Ball Bearing GreasesPage 159

ASTM D1478, D4693, D4950, FTM 791-334

Stoddard Solvent • Oven • n-Heptane
Spatula • Desiccant

Low Temperature Torque of Grease-Lubricated Wheel BearingsPage 159

ASTM D4693, D4950

Laboratory Oven • 1,1,1-Trichloroethane • Mercury
Ethylene Glycol • Ultrasonic Cleaner

Leakage Tendencies of Automotive Wheel Bearing GreasesPage 160

ASTM D1263, FTM 791-3454

Laboratory Balance • Spatula • n-Heptane

Life Performance and Accelerated Leakage Tendencies Tests for Automotive Wheel Bearing 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 GreasesPage 162

ASTM D1264, D4950, IP 215, FTM 791-3252

Distilled Water • Stoddard Solvent • n-Heptane

Resistance of Lubricating Grease to Water SprayPage 163

ASTM D4049

Stoddard Solvent • n-Heptane

Oil Separation From Lubricating GreasePage 164

ASTM D6184; FTM 791-321

Laboratory Oven • Laboratory Balance

Oil Separation On Storage of GreasePage 164

IP 121

Laboratory Oven • Laboratory Balance

Oil Separation From Lubricating Grease During StoragePage 165

ASTM D1742, FTM 791-322

Air Supply • Mineral Spirits