



K19500 MANUAL PENETROMETER

OPERATION AND INSTRUCTION MANUAL

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Petroleum Testing & Analysis Instrumentation • Custom Design & Manufacturing

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1 Introduction

The K19500 Manual Penetrometer is designed to measure the consistency of a wide range of semi-solid and solid products with maximum precision and convenience. Used with appropriate plungers, cones, needles, and accessories, these penetrometers provide repeatable penetration values in tenths of a millimeter for greases, waxes, asphalts, petrolatum, creams, food products and many other products.

This manual provides important information regarding safety, technical reference, installation requirements, operating condition specifications, user facility resource requirements, and operating instructions for the Manual Penetrometer. This manual should also be used in conjunction with applicable published laboratory procedures. Information on these procedures is given in section 1.2.

1.1 Koehler's Commitment to our Customers

Providing quality testing instrumentation and technical support services for research and testing laboratories has been our specialty for more than 50 years. At Koehler, the primary focus of our business is providing you with the full support of your laboratory testing needs. Our products are backed by our staff of technically knowledgeable, trained specialists who are experienced in both petroleum products testing and instrument service to better understand your requirements and provide you with the best solutions. You can depend on Koehler for a full range of accurate and reliable instrumentation as well as support for your laboratory testing programs. Please do not hesitate to contact us at any time with your inquiries about equipment, tests, or technical support.

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1.2 Recommended Resources and Publications

1. American Society for Testing and Materials (ASTM)
100 Barr Harbor Drive
West Conshohocken, Pennsylvania 19428
2959, USA
Tel: +1 610 832 9500
Fax: +1 610 832 9555
<http://www.astm.org>
email: service@astm.org

ASTM Publication:

- ASTM D5: Penetration of Bituminous Materials
- ASTM D217: Cone Penetration of Lubricating Grease
- ASTM D937: Cone Penetration of Petroleum
- ASTM D1321: Needle Penetration of Petroleum Waxes
- ASTM D1403: Cone Penetration of Lubricating Grease Using One-Quarter and One-Half Scale Cone Equipment
- ASTM D2884: Yield Stress of Heterogeneous Propellants by the Cone Penetration Method
- ASTM D4950: Classification of and Specification for Automotive Service Greases

2. International Organization for Standardization (ISO)
1, rue de Varembe
Case postale 56
CH-1211 Geneva 20, Switzerland
Tel: 41 22 749 01 11
Fax: 41 22 733 34 30
<http://www.iso.org>

ISO Publication:

- ISO 2137

3. Energy Institute (IP)
61 New Cavendish Street
London, WIM 8AR, United Kingdom
Tel: 44 (0)20 7467 7100 • Fax: 44 (0)20 7255 1472
<http://www.energyinstpubs.org.uk/>

IP Publication:

- IP 49: Determination of Needle Cone Penetration of Bituminous Material

- IP 50: Determination of Cone Penetration of Lubricating Grease
 - IP 179: Determination of Cone Penetration of Grease: One-Quarter and One-Half Scale Cone Method
4. Deutsche International Norm (DIN)
<http://www.din.de>
- DIN Publication:**
- DIN 51804
 - DIN 51580
 - DIN 51579
5. Federal Test Method (FTM)

FTM Publications:

- FTM 791-311
- FTM 791-312
- FTM 791-313

2 Safety Information and Warnings

Safety Considerations. The use of this equipment may involve *hazardous* materials and operations. This manual does not purport to address all of the safety problems associated with the use of this equipment. It is the responsibility of any user of this equipment to investigate, research, and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

Equipment Modifications and Replacement Parts. Any modification or alteration of this equipment from that of factory specifications is not recommended voids the manufacturer warranty, product safety, performance specifications, and/or certifications whether specified or implied, and may result in personal injury and/or property loss. Replacement parts must be O.E.M. exact replacement equipment.

Unit Design. This equipment is specifically designed for use in accordance with the applicable standard test methods listed in section 1.2 of this manual. The use of this equipment in accordance with any other test procedures, or for any other purpose, is not recommended and may be extremely hazardous.

Chemical Reagents Information. Chemicals and reagents used in performing the test may exhibit potential hazards. Any user must be familiarized with the possible dangers before use. We also recommend consulting the Material Data and Safety Sheet (MSDS) on each chemical reagent for additional information. MSDS information can be easily located on the internet at <http://siri.uvm.edu> or <http://www.sigma-aldrich.com>.

NOTE: Light Petroleum Naphtha is used as a cleaning solvent for the penetrometer and its accessories. Do not operate the penetrometer in the presence of Light Petroleum Naphtha.

- Extremely flammable. Vapors or spray mist harmful if inhaled.
- Vapors may cause flash fire.
- Keep away from heat, spark, open flames, or any other ignition sources.
- Keep container closed.
- Prevent build-up of vapors by opening all windows and doors to achieve cross ventilation. Also, use under a hood to ensure proper ventilation.
- Avoid contact with eyes, skin and clothing.
- Do not smoke near the area.
- Beware of static discharges.
- Turn off all stoves, heaters, motors and pilot lights during use and until all vapors are gone.
- Wash hands thoroughly after each use.
- Always wear safety clothing (eye protection, gloves, lab coat, etc.)

3 Getting Started

The instructions for preparing the equipment assume that the user is aware of the contents of this document, which lists the warranty conditions and important precautions.

3.1 Packing List

- K19500 Manual Penetrometer
- K19500-Manual Penetrometer Operation and Instruction Manual
- K19587 47.5 gram Plunger
- Weights 50 g (K19587), 100 g (K19588)

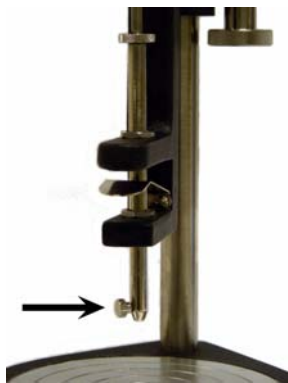
3.2 Unpacking

This unit comes shipped in a corrugated carton. Remove the instrument from the carton and place on a secure level table. Carefully remove the wooden support from the vertical support rod and unwrap the protective covering from the dial indicator.

Ensure that all parts listed on the packing list are present. Inspect the unit and all accessories for damage. If any damage is found, keep all packing materials and immediately report the damage to the carrier. We will assist you with your claim, if requested. When submitting a claim for shipping damage, request that the carrier inspect the shipping container and equipment. Do not return goods to Koehler without written authorization.

Assembly. This unit comes basically assembled except for the attaching of the penetration needle or cone:

1. Level the base, using the circular level and the two adjusting screws provided.
2. Insert the penetrometer needle or cone (per Method) in the plunger, placing the shank all the way up into the plunger. Lock the needle or cone assembly in place with the knurled lock screw (Indicated by arrow). Make sure the needle or cone is screwed in securely.



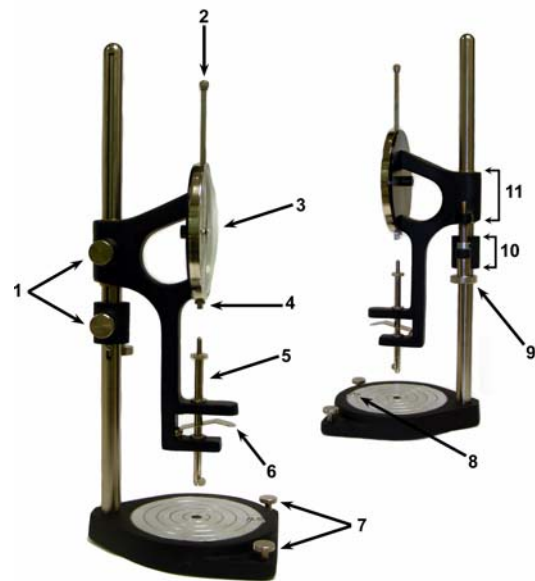
Mounting for Testing Directly into Penetrometer Bath. The Manual Penetrometer can be used for constant temperature testing directly into a Penetrometer Bath (K956XX). Simply loosen the screw located at the bottom of

the base and rotate the head assembly 180° away from the base. The head assembly now can overhang the bath and test consistency samples directly in the bath.

3.3 Installation

Equipment Placement. Place the instrument on a firm, level table. The penetrometer comes equipped with a circular level built into the base assembly. The level is located at the front of the base at the center a two leveling knobs for easy leveling of the instrument.

3.4 Instrument Description



1. Large Lock Screws
2. Indicator Rod
3. Dial Indicator
4. External Zero Adjustment
5. Plunger
6. Trigger
7. Leveler Adjustment Screws
8. Circular Level
9. Fine Adjustment Screw
10. Small Locking Bracket
11. Top Head

4 Operation

1. Make sure that the sample in the sample container is level and smooth and there are no air bubbles present.
2. The head assembly is raised and lowered by loosening the large lock knobs on the small locking bracket and top head. **Make sure the plunger is fully raised and the needle on the dial reads zero.**
3. Lower the head until the point of the penetration needle or cone is within $\frac{1}{8}$ " of the surface of the sample and lock the small locking bracket with the large lock screw.
4. Using the fine adjustment screw mounted on the side of the head, bring the entire head down until the tip of the needle or cone just touches the sample (see Method). Lock the top head with the large lock screw.
5. Start stopwatch, and simultaneously release the plunger by pressing the trigger. **Hold** the trigger for the ASTM allotted time (usually 5 seconds). Release of the trigger will automatically lock the plunger in place at the depth of penetration.
6. Gently push down on the indicator rod (located at the top of the dial), so that it just comes in contact with the top of the plunger. This in turn will move the dial needle to the indicated reading.
7. After recording the results, reset for a new run by first raising the indicator rod back to its top position. Hold the trigger and slide the plunger back to the top. Make sure at this point the dial reads zero.
8. If the dial needle does not read zero when the plunger is all the way up, use the external zero adjustment on the bottom of the dial plate.
9. The 50 and 100 gram weights supplied are for use with extremely hard samples, and can be placed on to top the plunger for deeper penetration.

5 Calibration

1. Place the penetrometer on a clean, level surface. Place the two calibration blocks (the 1" block and the 2" block) stacked on top of each other in the middle of the penetrometer base, as shown:



2. Insert the plunger gull upwards into its housing.
3. Move the penetrometer head down until the tip of the plunger rests on the top of the calibration blocks.
4. Remove the top block.



5. Release the Plunger Trigger a guide the plunger until it is gently resting on the second block.



- Press down on the dial lever until it reaches the top of the plunger.



If the top block removed was the one inch block, the value read on the dial should be 254 ± 2 (1 inch = 24.5 mm). If the top block was the two inch block, the value should read 508 ± 2 .

- If error of the reading is greater than ± 2 , adjust the dial by turning the external zero adjustment screw underneath the dial until the desired range is reached.

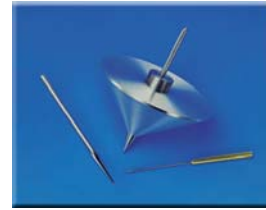
6 Additional Accessories

The Koehler Instrument Company manufactures a wide assortment of attachments and accessories that can meet all of your testing needs for the K19500 Manual Penetrometer. All of the following accessories meet nearly all testing standards including ASTM, ISO, FTM.

Some of the accessories are:



K956XX Penetrometer Bath



Penetrant Cones & Needles



K181XX Grease Worker

7 Replacement Parts

The K19500 Manual Penetrometer requires little routine maintenance to provide many years of continuous service. However, over the course of time, some instrument parts may need to be replaced. When ordering replacement part(s), please provide the model number, serial number, and product shipment date of your equipment so that we can ensure you will receive the proper replacement part(s).

Part Number	Replacement Part
K195-10	Cast Iron Base
K195-11	Plunger Drop Cushion
K195-12	Leveling Screw
K195-13	Upright
K195-14	Vertical Clamp

K195-15	Adjusting Screw
K195-16	Adjusting Screw Washer
K195-17	Locking Screw
K195-18	Small Key
K195-19	Vertical Support
K195-20	Large Key Spring
K195-21	Large Key
K195-22	Plunger Guide Bushing
K195-23	Plunger Release Spacer
K195-24	Plunger Release Trigger
K19525	Plunger Assembly
K195-26	Dial Face Plate
K195-28	Pinion & Shaft
K195-30	Gear Rack Assembly
K195-32	Dial Face
K195-33	Dial Glass Bezel
K195-34	Zero Adjusting Screw

8 Service

Under normal operating conditions and with routine maintenance, the K19500 Manual Penetrometer should not require service. Any service problem can be quickly resolved by contacting Koehler's technical service department either by letter, phone, fax, or email. In order to assure the fastest possible service, please provide us with the following information.

Model Number: _____

Serial Number: _____

Date of Shipment: _____

9 Storage

This laboratory test instrument is equipped with electrical components. Storage facilities should be consistent with an indoor laboratory environment. This testing equipment should not be subjected to extremes of temperature and/or moisture.

This equipment was shipped from the factory in a corrugated cardboard container. If long term storage is anticipated, re-packing the instrument

in a water-resistant container is recommended to ensure equipment safety and longevity.

10 Warranty

We, at Koehler, would like to thank you for your equipment purchase, which is protected by the following warranty. If within one (1) year from the date of receipt, but no longer than fifteen (15) months from the date of shipment, Koehler equipment fails to perform properly because of defects in materials or workmanship, Koehler Instrument Company, Inc. will repair or, at its sole discretion, replace the equipment without charge F.O.B. its plant, provided the equipment has been properly installed, operated, and maintained. Koehler Instrument Company must be advised in writing of the malfunction and authorize the return of the product to the factory. The sole responsibility of Koehler Instrument Company and the purchaser's exclusive remedy for any claim arising out of the purchase of any product is the repair or replacement of the product. In no event shall the cost of the purchaser's remedy exceed the purchase price, nor shall Koehler Instrument Company be liable for any special, indirect, incidental, consequential, or exemplary damages. KOEHLER INSTRUMENT COMPANY, INC. DISCLAIMS ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE. Please save the shipping carton in the event the equipment needs to be returned to the factory for warranty repair. If the carton is discarded, it will be the purchaser's responsibility to provide an appropriate shipping carton.

11 Returned Goods Policy

To return products for credit or replacement, please contact Koehler Customer Service with your purchase order number, our packing list/invoice number, the item(s) to be returned and the reason for the return. You will be issued a Returned Authorization (RA) number, which must be prominently displayed on the shipping container when you return the material to our plant. Shipping containers without an RA number prominently displayed will be returned to the sender. Goods must be returned freight

prepaid. Returns will be subject to a restocking charge, the application of which will depend upon the circumstances necessitating the return. Some returns cannot be authorized, including certain products purchased from outside vendors for the convenience of the customer, products manufactured on special order, products shipped from the factory past ninety (90) days, and products which have been used or modified in such a way that they cannot be returned to stock for future sale.

