

## Penetration of Greases and Waxes

**ASTM D 217 – IP 50 – DIN 51 580 – ISO 2137**

**ASTM D 937 – IP 179**

**ASTM D 1321 – DIN 51 579**

**ASTM D 1403 – IP 310 – DIN 51 804, part 2**

Penetration is the resistance which a material under specified conditions of test provides against being pierced by a specifically shaped penetrator.

Beside the configuration of the penetrator used, prime importance attaches to such factors of temperature, time and load of test as are specified by the different standard

methods of test. Penetration is expressed in penetration units (1 unit = one-tenth of a millimetre).

Penetration serves as a measure of consistency (hardness, softness, resistance to handling, and solvent attack) to determine the plasticity of a wide range of materials, as well as for the evaluation of

such rheological characteristics as rheopexy and thixotropy.

The penetrometer is therefore widely used in the field of research, engineering and production control of various sectors of industry.

18-1000

### **Penetrometer PNR 10**

digitally indicating instrument on microprocessor base, comprising:  
 large face milled penetrometer platform with levelling screws and control panel in the form of a *splash water protected membrane keyboard*, which also contains the LED display;  
 penetrometer head with hand wheels for coarse and fine adjustment, low voltage illuminator and observation lens on flexible arms, solenoid release mechanism and electronic depth gauge.

**Measuring range:** 0... 48 mm

**Resolution:** 1/100 mm in the range 0... 10 mm;  
 1/10 mm in the range 10.1... 48 mm;  
 automatically changing

**Time range:** 0.1 sec... 9999 sec;  
 standard time preset to 5 sec.

**Pause mode** for relieved test cycles

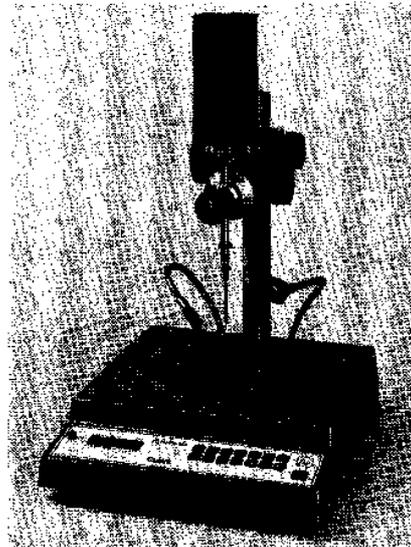
**Excess value device** with audible alarm for penetration values overstepping the adjusted tolerances.

**C-value display** for margarine tests

**Analogue output** for connection of a line recorder.

**Zero-point detector** for electrically conductive samples

**Mains data:** 220 V/50 Hz (other voltage or 60 Hz upon request)



## Auxiliary Equipment for Penetrometers

18-0640

**x-y-Recorder** for recording penetration curves;  
 for connection to 220 V/50 Hz.

18-0712

**Halogen lamp**, extra bright, to be placed beside the penetrometer;  
 especially useful when testing bituminous materials under water surface.  
 For connection to 220 V/50 Hz.

18-0301

### **Circulation thermostat**

particularly suited to supply transfer dishes with a cooling coil etc.;  
 tank made of stainless steel, with infinitely variable heating control,  
 low level and excess temperature protection, bath cover, and tubing  
 for cooling water, with inlet and outlet nozzles.

Operating temperature: -20... 150 °C (by use of external cooling)

Temperature constancy: 0.02 K

Heating power: 2000 watts

Dimensions: 380 x 205 x 345 mm (length x width x height)

Mains data: 220 V/50 Hz (other voltage and/or 60 Hz upon request)