

BITUMEN TESTI

81 Bitumen and bituminous binders

Bituminous materials, a by-product of the oil distillation process, look set to remain as a constituent material of road paving for some considerable time to come, being used to withstand the flexural and compressive stresses caused by traffic. Due to the ever increasing intensity of today's traffic conditions there is a demand for higher levels of performance from asphalt. This section includes a wide range of testing equipment to fulfill all Standard requirements.

BITUMEN TESTING

81

Bitumen and bituminous binders

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Indentation penetrometer

STANDARD

▶ ASTM D140 ▶ AASHTO T40

**81-B0010
BACON SAMPLER**

Used to obtain bitumen or oil samples from various levels.

Made from brass.

- Dimensions: 80 mm diameter x 250 mm long
- Weight approx.: 1.5 kg



Bitumen preparation

**81-B0099/B
AIR BATH**

Used for softening bituminous materials before tests. The stainless steel vessel can receive up to 600 g of bitumen. Built-in thermostat. Heat protection.

- Power: 600 W
- Dimensions: 170x230x300 mm
- Weight approx.: 3 kg



**81-PV0007
LABORATORY MIXER-
EMULSIFIER**

Ideal for the laboratory preparation of polymer modified bitumen samples and for emulsifying, homogenizing, disintegrating and dissolving. Complete with 5 L capacity bowl and mantle heater. 230 V, 50-60 Hz, 1 ph.

- Power: 250 W (mixer), 600 W (heater)
- Overall dimensions: 350 x 500 x 940 mm (w x d x h)
- Weight: 30 kg approx.



Penetration of bituminous materials

STANDARD

▶ EN 1426 ▶ ASTM D5 ▶ AASHTO T49

STANDARD DIGITAL PENETROMETERS



81-B0100/D with Needle, Mirror, Glass transfer dish, Sample cup and thermometer



81-B0101/E with Needle, Mirror, Glass transfer dish, Sample cup and thermometer

MAIN FEATURES

- » Digital penetration measurement
- » Complete with micrometric vertical adjustment
- » Semi-automatic version with automatic controller and adjustable electronic timer of the fall time
- » Digital circulation water bath with cooling coil and immersion probe available.
- » The electronic timer allows the user to set up and read the fall time of the needle during testing

Available in two versions - digital and digital semi-automatic - the penetrometer has a cast iron base with levelling screws, a 0.01 mm precision digital penetration measurement gauge and release button, and an automatic zeroing function. The semi-automatic model 81-B0101/E is supplied complete with a controller which automatically releases the plunger using a magnetic device. Needles, cups, thermometer and mirror are not included and have to be ordered separately - see Accessories.

Tests should be performed with the penetration cup placed in thermostatically-controlled water, using a device such as the 81-PV0102 Digital circulation water bath with conditioning vessel. See Accessories.

Weight: 8.5 kg approx.

81-B0100/D
Digital standard penetrometer complete with micrometric vertical adjustment

micrometric vertical adjustment and adjustable electronic timer of the fall time, according to EN 1426, ASTM D5, AASHTO T49. 230 V, 50-60 Hz.

81-B0101/E
Digital electronic semi-automatic penetrometer complete with

81-B0101/EZ
As above but 110 V, 60 Hz, 1 ph

Accessories

Also suitable for PIVOT Automatic penetrometer (page 386)

Penetrometer needles

81-B0113

Penetration needle 2.5 ± 0.05 g. made from hardened polished stainless steel. Univocally traceable by engraved serial number. Conforming to ASTM D5 and EN 1426. Supplied with conformity certificate.

81-B0113/A

Same as above set of 3.

81-B0113/1

Verified penetrometer needle 2.5 ± 0.5 g. Fully hardened, tempered and polished stainless steel. Conforming to ASTM D5 and EN 1426. Supplied complete with official UKAS Verification Certificate

81-PV0113/AM

Magnetic penetrometer needles for PIVOT automatic penetrometer, 2.5 ± 0.05 g. Set of 3.



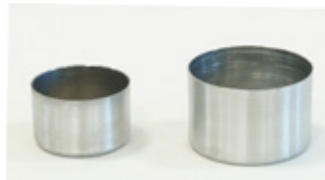
Sample cups

81-B0110/A

Sample cup, diameter 55x35 mm. Set of 6 pieces

81-B0110/B

Sample cup, diameter 70x45 mm. Set of 6 pieces



Glass transfer dish

81-B0109

Glass transfer dish with support, 100 mm diameter x 100 mm high



Mirror

81-B0100/1

Mirror with articulate holder. To make easy the surface contact between the needle and the sample.

Thermometers

82-B0100/6MF

IP 38 C Thermometer, range from +23 to +26°C, 0.1°C graduation, mercury free

82-B0125/2MF

ASTM 17C thermometer, range from +19 to +27°C range, 0.1°C graduation, mercury free

82-B0122/4MF

ASTM 563 C thermometer, range from -8 to +32°C range, 0.1°C graduation, mercury free

Water bath with digital thermo-regulator and immersed PT100 probe

81-PV0102

Water bath including heating controller and cooling coil, immersion temperature probe, internal support grid and connections to mains water or water chiller. Temperature range 25 to 60 ± 0.1 °C. 230 V, 50-60 Hz, 1 ph

81-PV0102/Z

As above but 110 V, 60 Hz, 1 ph

Simple water bath

81-PV0102/A

Water bath complete with internal water coil, support for specimen and water connections. To be used with external chiller series 81-PV0102/CHx

Water chiller

81-PV0102/CH

Water chiller, 7.5 l capacity, with electronic temperature controller with ± 0.1 °C accuracy and fluid temperature range between 5 and 30°C. Suitable for chilling penetrometer water baths or temperature controlled setting time tests. 350 W, 230 V, 50-60 Hz, 1 ph Overall dimensions: 415X300X420mm Weight approx.: 15 kg

81-PV0102/CHZ

As above but 110 V, 60 Hz, 1 ph

Standard penetration cone

81-B0115

Standard penetration cone conforming to ASTM D217 and EN 13880-2



81-B0100/D and 81-PV0102 thermostatically controlled water bath with thermoregulator and immersion probe



81-B0101/E Digital electronic semi-automatic penetrometer and 81-PV0102 digital water bath with thermoregulator and immersion temperature probe



81-PV0102/CH



81-B0101/E with Needle, Mirror, Sample cup and 81-PV0102/A Digital circulation water bath.



Fully Automatic Penetrometer 81-PV0103

STANDARD

- ▶ EN 1426 ▶ ASTM D5 ▶ AASHTO T49
- ▶ JIS K 2207 ▶ IP 49 ▶ DIN 52210
- ▶ AFNOR T66-004 ▶ ASTM D217



Pivot Automatic penetrometer with 81-PV0102 water bath with thermoregulator and 81-PV0102/CH chiller



PIVOT

A compact instrument, microprocessor controlled, using the latest technologies and programming tools. It includes a 6" lateral touchscreen display, intuitive and easy to use, which shows the penetration/time curve and can display and average up to 6 tests.

The instrument reaches the test start point automatically, and it is supplied with an integrated LED lamp. The device also has the possibility to recall the vertical position for repeated tests.

The test should be performed placing the penetration cup in thermostatically controlled water, using a suitable device as our water bath with thermoregulatory and immersed probe (see accessories page 385).



This is one of the many **ADVANCED** products of **CONTROLS** Group range.

To get more info visit
www.controls-group.com
or link directly to the QRCode

COMMON FEATURES

- » Fully automatic operation. The entire test cycle (rapid approach, starting point determination, penetration and return to the initial position) is automatically performed by simply pressing the start button on the touch screen display
- » Rapid approach and automatic starting point determination to eliminate any operator inaccuracy during needle position
- » Penetration measurement via contactless displacement transducer, with 0.01 mm resolution
- » Penetration range: 0 to 50 mm
- » Programmable penetration time: 0 to 9999 sec.
- » Programmable delay time: 0 to 999 sec.
- » Real time display of penetration/time curve
- » 6" color touchscreen display, easy to use thanks to the user friendly software
- » High precision vertical movement by stepper motor
- » Eight programmable reference positions for the holder assembly
- » Up to 6 tests simultaneously displayed
- » Saves time and delivers first class results

Automatic ring and ball apparatus

STANDARD

▶ EN 1427 ▶ ASTM D36 ▶ AASHTO T53

81



MAIN FEATURES

- » Microprocessor controlled
- » Full automatic testing procedure for both test with water or glycerol as heating fluid
- » Large graphic display
- » RS232 port for PC or printer
- » Memory up to 50 tests

This advanced microprocessor controlled automatic tester is used to determine the softening point of bitumen using water or glycerol as heating fluid. The softening point is taken by two suitably positioned light barriers and the temperature is measured by a PT100 sensor placed in a central position. During operation a magnetic stirrer with adjustable speed assures temperature uniformity in the vessel. The temperature gradient is strictly maintained throughout the test by the electronic system which conforms with the Standards.

Safety features

The hot plate is automatically turned off at the end of the test. The apparatus is also fitted with an emergency stop button. The test is automatically interrupted if the probe fails or is not correctly positioned. The hot plate will not be damaged or affected by accidental leakages of water or glycerol, or if the beaker breaks.



Specifications

The apparatus comprises the following parts:

- Heater and magnetic stirrer with speed control
- Temperature probe
- Glass beaker, test rings and ball support
- Application and centering device for steel balls
- Light barrier system
- Microprocessor system and large graphic display with membrane keyboard
- RS232 port for PC or printer

Firmware

Main menu:

- Test on boiled, distilled or deionized water for softening point between 30 and 80° C
- Test on glycerol for softening point above 80 and up to 150° C
- Test configuration set-up
- File management
- Date and time
- Operator name, test number, general notes
- Language selection
- Test parameters conforming to the type of test: up to 80° C or above 80 up to 150° C, hot plate pre-heating temperature thermocouple calibration
- Magnetic stirrer speed adjustment from 0 to 150 rpm
- Baud rate selection 38400 for PC and 9600 for printer

Physical specifications

- Power: 750 W
- Overall dimensions: 530 x 300 x 280 mm (w x d x h)
- Weight: approx.16 kg

Ordering information

81-PV0143

Automatic ring and ball apparatus. 230 V, 50-60 Hz, 1 ph.

81-PV0143/Z

As above but 110V, 60 Hz, 1 ph.

Accessories

82-P0172/1

RS232 cable

82-P0172/M

Serial printer 110-230V, 50-60Hz, 1 Ph

Spares

81-PV0145/1

Brass ring

81-PV0145/2

Steel ball

81-PV0145/3

Ball centering guide

81-PV0143/1

600 ml beaker

Softening Point Of Asphalt

STANDARD

▶ EN 1427 ▶ ASTM D367 ▶ AASHTO T53

81-B0145/A

STANDARD RING AND BALL APPARATUS

This set of equipment is used for determining the softening point of bituminous materials and comprises:

- **81-PV0145/1** Two brass rings
- **81-PV0145/2** Two 9.5 mm diameter steel balls
- **81-PV0145/3** Two ball centering guides
- **81-PV0143/1** Glass vessel
- **81-PV0145/5** Pouring plate
- **81-PV145/6** Ring holder/assembly
- **82-D1200/1MF** Glass thermometer, -2 to +80 °C range, 0.2 °C graduations, IP61C, ASTM 15C, mercury free

Total weight: 1 kg approx.

Note: all the above items can also be purchased individually.

The test has to be performed using specific liquids and a suitable hot plate selected from the listed accessories. We offer three hot plate solutions:

- **10-D1402/D** Standard hot plate, 185 mm diameter, 1500 W. The most economical solution, conforming to ASTM standards.
- **81-B0145/C1** Hot plate with centering/protection device for 81-B0145/A Ring and Ball apparatus. A more professional solution.
- **81-B0145/D** Hot plate with magnetic stirrer, conforming to both ASTM and EN standards which require the water to be stirred for better temperature uniformity



81-B0145/A



81-B0145/A with 10-D1402/D Hot plate, conforming to ASTM standard



81-B0145/A with 81-B0145/C1 Hot plate with centering/protection device, conforming to ASTM standard



81-B0145/A with 81-B0145/D Hot plate with magnetic stirrer, conforming to EN and ASTM standards

Ordering information

81-B0145/A

Ring and ball apparatus, including ring holder/assembly, two brass rings, two brass ball centering guides, two steel balls, pouring plate, glass vessel and glass thermometer.

Accessories

Hot plates

10-D1402/D

Hot plate, 185 mm diameter. 230 V, 50-60 Hz, 1 ph. Power: 1500 W Overall dimensions: 260 x 260 x 135 mm Weight: 3 kg approx.

10-D1402/DZ

As above but 110 V, 60 Hz, 1 ph.

81-B0145/C1

Hot plate with centering/protection device. 230 V, 50-60 Hz, 1 ph. Power: 700 W Overall dimensions: 170 x 320 x 130 mm Weight: 2.3 kg approx.

81-B0145/C1Z

As above but 110 V, 60 Hz, 1 ph.

81-B0145/D

Hot plate with magnetic stirrer. Electronic stirrer adjustment from 100 to 1200 rpm, aluminum plate. 230 V, 50-60 Hz, 1 ph. Power: 700 W Overall dimensions: 170 x 230 x 150 mm Weight 3 kg approx.

Spare parts

81-PV0145/1

Brass ring.

81-PV0145/2

Steel ball, 9.5 mm diameter.

81-PV0145/3

Ball centering guide.

81-PV0143/1

Glass vessel, 600 ml.

82-D1200/1MF

Glass thermometer, -2 to +80 °C range, 0.2 °C graduations, IP 60C, ASTM 15C, mercury free.

82-D1200/2MF

Glass thermometer, +30 to 200 °C range, 0.5 °C graduations, IP 61C, ASTM 16C, mercury free.

Water in bitumen and bitumen emulsions

STANDARD

- ▶ ASTM D95 ▶ ASTM D244 ▶ AASHTO T55 ▶ AASHTO T59 ▶ IP 74/77
- ▶ NLT 123 ▶ CNR 101

WATER IN BITUMINOUS MATERIALS TEST SET (DEAN-STARK)

Used for determining the water content of bituminous and petroleum materials by distillation with a water immiscible, volatile solvent. The set comprises:

- 10 ml glass still
- Glass receiver
- Glass condenser
- Electric heater with thermoregulator

Power: 250 W
Weight: 4 kg approx.



81-B0155/A / 81-B0155/B

Ordering information

81-B0155/A

Water in bituminous materials test set (Dean-Stark). 230 V, 50-60 Hz, 1 ph.

81-B0155/AZ

As above but 110 V, 60 Hz, 1 ph.

Spares

81-B0155/1

Glass still, 10 ml.

81-B0155/2

Glass receiver, 500 ml.

81-B0155/3

Glass condenser.

STANDARD

- ▶ EN 1428 ▶ EN 12847 ▶ ASTM D244 ▶ NF T66 - 023 ▶ NLT 60 - 113

WATER IN BITUMEN EMULSIONS TEST SET

Identical to the model 81-B0155/A except for the glass still which has a 25 ml capacity with 0.1 ml graduations.

Ordering information

81-B0155/B

Water in bitumen emulsions test set. 230 V, 50-60 Hz, 1 ph.

81-B0155/BZ

As above but 110 V, 60 Hz, 1 ph.

Spares

81-B0155/B2

Glass still, 25 ml.

Residue on sieving and mixing stability

STANDARD

- ▶ EN 1429

RESIDUE ON SIEVING OF BITUMINOUS EMULSIONS

The test is performed using the following sieves:

15-D7595

Stainless steel test sieve, 75 mm diameter, 0.16 mm openings.

15-D7545

Stainless steel test sieve, 75 mm diameter, 0.5 mm openings.

15-D7504

Pan and cover for 75 mm diameter sieves.

Weight of each sieve: 100 g approx.



15-D7545, 15-D7595 and 15-D7504

STANDARD

- ▶ EN 12848

MIXING STABILITY WITH CEMENT OF BITUMINOUS EMULSIONS

The test is performed using the following sieves:

15-D7595

Stainless steel test sieve, 75 mm diameter, 0.16 mm openings.

15-D7585

Stainless steel test sieve, 75 mm diameter, 2 mm openings.

15-D7504

Pan and cover for 75 mm diameter sieves.

Weight of each sieve: 100 g approx.

Storage stability of asphalt emulsions

STANDARD

- ▶ NF T66-022

81-B0114 APPARATUS FOR THE DETERMINATION OF STORAGE STABILITY OF EMULSIONS.

- 230 V, 50-60 Hz, 1 ph

The test is based on settlement measurement conforming to NF T66-022 Standard. It consists of a 12 V current source, vessel, cylindrical electrode and holder.

- Overall dimensions: 200x200x520 mm
- Weight approx.: 4 kg



81-B0114

Degree of solubility of bituminous binders

STANDARD

▶ EN 12592 ▶ ASTM D2042

TEST SET FOR THE DETERMINATION OF SOLUBILITY

The set is available in two versions:

81-B0148

Test set for the determination of solubility conforming to ASTM D2042, comprising:

- 86-D1044
- Filter flask, 500 ml capacity
- 86-D1189
- Funnel for Gooch crucible
- 86-D1188
- Gooch crucible
- 86-D1188/1
- Rubber ring for Gooch crucible
- 86-D1188/2
- Filter discs, fiberglass, 25 mm diameter, pack of 100
- Weight: 0.6 kg approx.

81-B0148/A

Test set for the determination of solubility conforming to EN 12592, comprising:

- 86-D1044
- Filter flask, 500 ml capacity
- 86-D1189
- Funnel for Gooch crucible
- 86-D1188/3
- Gooch crucible porosity 4 septum filter
- 86-D1188/1
- Rubber ring for Gooch crucible
- 86-D1188/4
- Glass powder, 1 kg
- Weight: 1.6 kg approx.

Particle charge of emulsified asphalt

STANDARD

▶ EN 1430 ▶ ASTM D244 ▶ CNR 99
▶ NLT-194



81-B0129/E

PARTICLE CHARGE TESTER

Used to identify particle charge of emulsions. The apparatus comprises a digital milliammeter, a variable resistor and two stainless steel electrodes.

Overall dimensions: 140 x 200 x 270 mm
Weight: 2.2 kg approx.

Ordering information

81-B0129/E

Particle charge tester. 110-230 V, 50-60 Hz, 1 ph.

Emulsified asphalt - residue by distillation

STANDARD

▶ EN 1431 ▶ ASTM D244
▶ AASHTO T59 ▶ CNR 100

81-B0153 EMULSIFIED ASPHALT DISTILLATION APPARATUS

This apparatus is used to examine asphalt emulsions composed principally of a semi-solid or liquid asphaltic base, water and an emulsified agent. It consists of an aluminum-alloy still with ring burner, a glass connecting tube with water-cooled condenser, a 100 ml capacity graduated cylinder, support stands, holders and two thermometers with -2 to +300°C range.

Weight: 9 kg approx.

Breaking point- Fraas method

STANDARD

▶ EN 12593

81-B0158 BREAKING POINT APPARATUS

The apparatus is for determining the Fraas breaking point of solid and semi-solid bitumen. This breaking point is the temperature at which bitumen first becomes brittle, as indicated by the appearance of cracks when a thin film of the bitumen on a metal plaque is cooled and flexed in accordance with specified conditions.

The apparatus consists of a bending device, a plaque measuring 41x20x0.15 mm made of flexible stainless steel, a cooling device, a thermometer IP 42C, a plate and a stand.

Weight: 3 kg approx.

Accessories

70-C9902/2

Dry ice maker.

Spares

81-B0158/1

Spare stainless steel plaques. Pack of 10.

82-B0158/3MF

Thermometer IP 42C, mercury free. -38°C to +30°C range.



81-B0148



81-B0153



81-B0158

Settling tendency of bitumen emulsions

STANDARD

▶ EN 12847 ▶ ASTM D6930

81-B0134 STOPPERED GLASS GRADUATED CYLINDER

Used for determining settling tendency of bitumen emulsions.

600 ml capacity, with one division mark at 500 ml. Complete with two closeable side tubes.

Weight: 1 kg approx.

Note: To perform the test the 81-B0155/B Water in bitumen emulsions test set is also required. See page 389

Penetration power of bitumen emulsions

STANDARD

▶ EN 12849 ▶ IP 487

81-B0136 GLASS TUBE WITH FUSED-ON GLASS FILTER

Used for determining the penetration power of bitumen emulsions.

41.5 mm inside diameter, approx. 115 mm total height, fitted with glass filter disc pore size between 160 and 250 µm

Weight: 1 kg approx.



81-B0136

81-B0134

Distillation of cut-back asphaltic products

STANDARD

▶ ASTM D402 ▶ AASHTO T78 ▶ NF T66-003 ▶ UNE 7072 ▶ UNE 7112

APPARATUS FOR DISTILLATION OF CUT-BACK ASPHALT

This apparatus is used for the examination of cut-back asphaltic materials by the distillation test. It consists of:

- Distillation flask
- Condenser
- Adapter
- Shield
- Shield and flask support
- Electric heater with thermoregulator
- Cylinder receiver
- Thermometer, -2 to +400°C range

Weight: 6 kg approx.

Ordering information

81-B0150/E

Apparatus for distillation of cut-back asphalt. 230 V, 50-60 Hz, 1 ph.

81-B0150/EZ

As above but 110 V, 60 Hz, 1 ph.

Accessories

82-B0150/10MF

Low distillation thermometer, -2 to +300°C range, 1 °C graduations, IP 5C, ASTM 7C, mercury-free.

81-B0150/12

Crow receiver, 25 ml capacity.

81-B0150/13

Crow receiver, 50 ml capacity.

81-B0150/14

Crow receiver, 100 ml capacity.

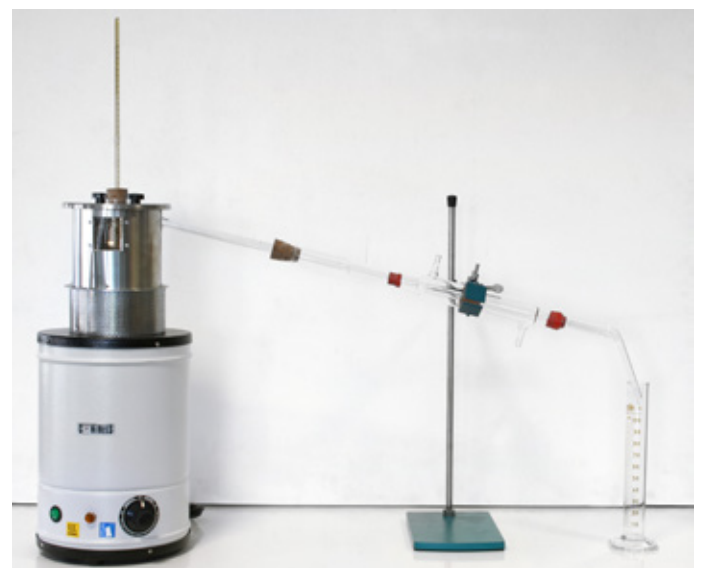
Spares

81-B0150/1

Distillation flask.

82-B0150/11MF

High distillation thermometer, -2 to +400°C range, 1 °C graduations, IP 6C, ASTM 8C, mercury-free.



81-B0150/E

Breaking value of cationic bitumen emulsions: mineral filler method

STANDARD

▶ EN 13075-1 ▶ IP 494

81 **81-B0139**
TEST SET FOR THE DETERMINATION OF THE BREAKING VALUE OF CATIONIC BITUMEN EMULSIONS

The breaking value is a dimensionless number corresponding to the amount of reference filler, in grams, needed to coagulate 100 g of bitumen emulsions. The test is performed with a set of items comprising:

- Feeding pan
- Two enamel dishes
- Nickel spatula
- Support base and clamp

The above set corresponds to the basic "Equipment for manual procedure" described by the EN 13075-1 standard.

To perform the test conforming to the "Semi-automatic procedure", the set has to be used with a Stirrer motor (81-B0139/D) and an Adjustable filler feeder (81-B0139/F) - see Accessories.

Weight: 1.5 kg approx.

Accessories

81-B0139/D

Electric stirrer complete with stirring paddle, adjustable rotating speed up to 1300 rpm, complete with support base. 110-230 V, 50-60 Hz, 1 ph.

81-B0139/C

Stainless steel metal can, 500 ml capacity.

81-B0139/F

Adjustable filler feeder. 110-230 V, 50-60 Hz, 1 ph.

81-B0139/3

Reference filler, 12.5 kg bag, conforming to EN 13075-1 and EN 13075-2..



81-B0139/F



81-B0139/D



81-B0139

Density / relative density of bitumen

STANDARD

▶ EN-ISO 3838

HUBBARD-CARMICK PYKNOMETERS

Used for determining the density or relative density of bitumen.

86-D1115

Hubbard-Carmick specific gravity bottle, 24 ml capacity. Weight: 20 g approx.

86-D1120

Hubbard-Carmick specific gravity bottle, 25 ml capacity. Weight: 20 g approx.



86-D1115, 86-D1116

Flash and fire point by Cleveland open cup

STANDARD

▶ EN 22592 ▶ ISO 2592 ▶ ASTM D92 ▶ AASHTO T48 ▶ IP36

81-B0130/C

CLEVELAND FLASH TESTER

Used for determining the flash and fire point of petroleum products, this tester consists of a brass cup mounted on an electric heater with a temperature controller. Conforming to the CE European directives, it is supplied complete with double line-fuse, hot plate control system and a thermometer with -6 +400°C range. 230 V, 50-60 Hz, 1 ph.

Power: 600 W
Weight: 5 kg approx.

Spare parts

81-B0130/1C

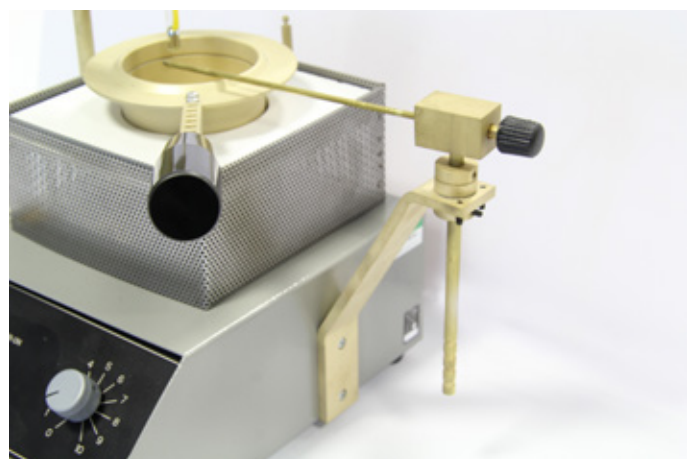
Brass cup.

82-B0130/2MF

Thermometer, -6 to +400°C range, IP 28C, ASTM 11C, mercury-free.



81-B0130/C



81-B0130/C Brass cup mounted on the electric heater

Flash point by Tag open cup tester

STANDARD

▶ ASTM D1310 ▶ ASTM D3143

81-B0138/A

TAG OPEN CUP FLASH POINT TESTER

Used for determining the flash point of volatile flammable materials. The tester conforms to CE requirements and consists of:

- Electric furnace with electronic control of heating power
- Flame rotating ignition device (LPG supply is required)
- Glass cup
- Insulating plate
- Support and clamp for thermometer
- Gauge
- Stainless steel frame
- Double line-fuse

Thermometers are not included - see Accessories.

230 V, 50-60 Hz, 1 ph.

Power: 600 W

Dimensions: 250 x 170 x 400 mm (wxdxh)

Weight: 4 kg approx.



81-B0138/A

Accessories

82-B0138/A1MF

Thermometer, -38 to +42°C range, IP 20C, ASTM 33C, mercury-free.

82-B0138/A3MF

Thermometer, +90 to 170°C range, IP 59C, ASTM 35C, mercury-free.

82-B0135/1MF

Thermometer, -5 to +110°C range, IP 15C, ASTM 9C, mercury-free.

Standard Tar/Brta viscosity

STANDARD

▶ EN 12846 ▶ EN 13357 ▶ NFT66-005 ▶ IP 484

STANDARD TAR VISCOMETERS

Used for determining the viscosity of cut-back bitumen and road oil. The apparatus, housed in a stainless steel case, consists of a tank fitted with a thermostat, a rheostat, an agitator, an immersion heater to take the water to the required temperature and a cooling coil for connection to the water supply. The temperature is checked by a 0-45°C thermometer. The apparatus is supplied with a metal cup cover and stopper holder.

Cups have to be ordered separately - see Accessories. (EN 13357 requires the 4 and 10 mm cups, EN 12846 requires the 2, 4 and 10 mm cups.)

Power: 300 W
Overall dimensions: 262 x 262 x 550 mm
Weight: 10 kg approx.

Ordering information

81-B0122/C
Digital standard tar viscometer. 230 V, 50-60 Hz, 1 ph.

81-B0122/CZ
As above but 110 V, 60 Hz, 1 ph.

Accessories

Cups

81-B0122/B2
Cup, 10 mm diameter.

81-B0123/B2
Cup, 4 mm diameter.

81-B0124/B2
Cup, 2 mm diameter.

Go/No go gauges

81-B0122/B1
Go/No go gauge for 10 mm orifice.

81-B0123/B1
Go/No go gauge for 4 mm orifice.

81-B0124/B1
Go/No go gauge for 2 mm orifice.

Thermometer

82-B0122/3MF
Thermometer, 0 to 45°C range, 0.2°C graduations, IP 8C, mercury-free.

Graduated cylinder

86-D1003
Graduated cylinder, 100 ml capacity



81-B0122/C with 86-D1003

Engler viscosity

STANDARD

▶ ASTM D490 ▶ ASTM D1665 ▶ AASHTO T54 ▶ BS 2000 ▶ NF T66-020
▶ CNR 102

ENGLER VISCOMETERS

Used to determine the specific viscosity of tars and their products. It includes a contact thermoregulator and stirring device.

The thermometer is not included - see Accessories.

Power: 300 W
Dimensions: 262 x 262 x 550 mm
Weight: 10 kg approx.

Ordering information

81-B0120/B
Engler digital viscometer. 230 V, 50-60 Hz, 1 ph.

81-B0120/BZ
As above but 110 V, 60 Hz, 1 ph.

Accessories

Thermometers

82-B0121/1MF
Thermometer, +18 to 28°C range, 0.2°C graduations, ASTM 23C, mercury-free.

82-B0121/2MF
Thermometer, +33 to 54°C range, 0.2°C graduations, ASTM 24C, mercury-free.

82-B0121/3MF
Thermometer, +95 to 105°C range, 0.2°C graduations, ASTM 25C, mercury-free.

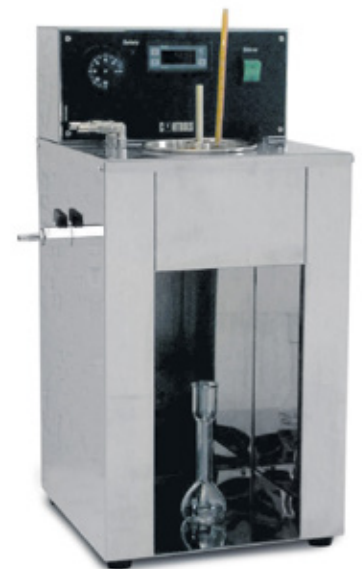
82-B0121/4MF
Thermometer, +10 to 55°C range, 0.5 °C graduations, immersion 93 mm, IP 76C, mercury-free.

Flask and strainer

81-B0120/2
Kohlrash calibration flask, 200 ml capacity.

81-B0120/4
Strainer No. 50 ASTM.

81-B0120/1
Testing flask, 50 ml capacity.



81-B0120/B with thermometer and testing flask

Saybolt viscosity

STANDARD

▶ ASTM D88 ▶ ASTM D7496 ▶ AASHTO T72

SAYBOLT VISCOMETERS

This test is for taking an empirical measurement of the Saybolt viscosity of petroleum products at specified temperatures between 21.1 to 98.9°C (70 to 210°F) with diathermic oil.

The viscometers, available in two versions - single and two-tube - include a bath, Furol and Universal orifices, key, control box, stirring device, cooling coil, 60 ml flask and digital thermoregulator. The funnel, thermometers, withdrawal tube and diathermic oil are not included and have to be ordered separately - see Accessories.



81-B0121

Product code	81-B0121 81-B0121/Z	81-B0121/A 81-B0121/AZ
Model	Single tube	Two tubes
Power, W	300	500
Dimensions, mm (w x d x h)	260 x 260 x 500	420 x 260 x 500
Weight, kg (approx.)	7	10

Ordering information

81-B0121

Saybolt digital viscometer. 230 V, 50-60 Hz, 1 ph.

81-B0121/Z

As above but 110 V, 60 Hz, 1 ph.

81-B0121/A

Saybolt two-tube digital viscometer. 230 V, 50-60 Hz, 1 ph.

81-B0121/AZ

As above but 110 V, 60 Hz, 1 ph.

Accessories

Thermometers

82-B0125/2MF

Saybolt thermometer, +19 to 27°C range, 0.1°C graduations, ASTM 17C, mercury-free.

82-B0125/3MF

Saybolt thermometer +34 to 42°C range, 0.1°C graduations, IP 23C, ASTM 18C, mercury-free.

82-B0125/4MF

Saybolt thermometer +49 to 57°C range, 0.1°C graduations, ASTM 19C, mercury-free.

82-B0125/5MF

Saybolt thermometer +57 to 65°C range, 0.1°C graduations, ASTM 20C, mercury-free.

82-B0125/6MF

Saybolt thermometer +79 to 87°C range, 0.1°C graduations, 250 mm length ASTM 21C, mercury-free.

82-B0125/7MF

Saybolt thermometer +95 to 103°C range, 0.1°C graduations, ASTM S22C, mercury-free.

Filter funnel and withdrawal tube

81-B0125/13

Filter funnel with wire mesh and clip.

81-B0125/14

Withdrawal tube.

75-B0165/5

Diathermic oil can of 18 kg

Spares

81-B0125/1

Saybolt viscosity flask, 60 ml capacity.

81-B0125/10

Universal orifice for Saybolt viscometer.

81-B0125/11

Furol orifice for Saybolt viscometer.



81-B0121/A

Kinematic Viscosity

STANDARD

▶ ASTM D2170 ▶ AASHTO T201 ▶ EN 12595

81

CANNON-FENSKÉ OPAQUE VISCOMETERS

Used for the determination of kinematic viscosity of liquid asphalts (bitumen) and road oils at 60° C, and distillation residue of liquid asphalts and asphalt cements at 135°C. Cannon-Fenske Opaque models are suitable for opaque liquids. Supplied complete with calibration certificate.

Code	Capillary No.	Approx. Constant cSt/S	Kinematic viscosity range cSt
81-B0116/1	150	0.035	7 to 35
81-B0116/2	200	0.1	20 to 100
81-B0116/3	300	0.25	50 to 250
81-B0116/4	350	0.5	100 to 500
81-B0116/5	400	1.2	240 to 1200
81-B0116/6	450	2.5	500 to 2500
81-B0116/7	500	8	1600 to 8000
81-B0116/8	600	20	4000 to 20,000

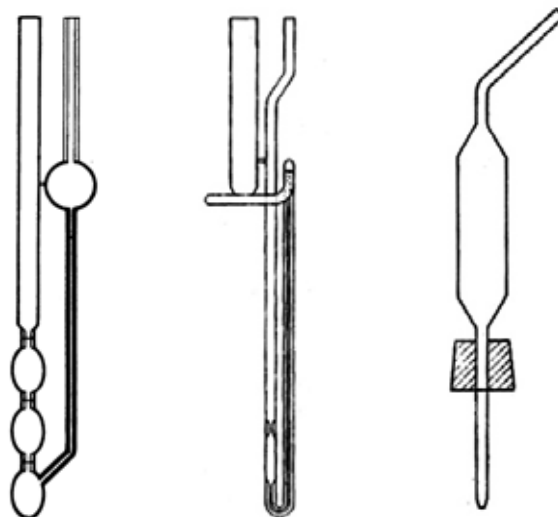
To determine the kinematic viscosity, all the above Cannon-Fenske viscometers must be placed into the 81-PV0116/F Viscometer bath using the holder 81-B0116/H1, included in PV0116/F). See accessories.

ZEITFUCHS CROSS-ARM VISCOMETERS

Used for the determination of kinematic viscosity of liquid asphalts (bitumen), road oil and distillation residues of liquid asphalts and asphalt cements at 135°C. Supplied complete with calibration certificate.

Code	Capillary NO.	Approx. Constant cSt/S	Kinematic viscosity range cSt
81-B0116/10	4	0.1	20 to 100
81-B0116/11	5	0.3	60 to 300
81-B0116/12	6	1.0	200 to 1000
81-B0116/13	7	3.0	600 to 3000
81-B0116/14	8	10.0	2000 to 10000
81-B0116/15	9	30.0	6000 to 30000
81-B0116/16	10	100.0	20000 to 100000

For determining the kinematic viscosity, all the above Zeitfuchs viscometers must be placed into the 81-PV0116/F Viscometer bath using the holder 81-B0116/H2. See accessories.



81-B0116/1 to 81-B0116/8

81-B0116/10 to 81-B0116/16

81-B0116/20 to 81-B0116/27

BS U-TUBE MODIFIED REVERSE FLOW VISCOMETERS

Used for the determination of kinematic viscosity of liquid asphalts (bitumen), road oil and distillation residues of liquid asphalts and asphalt cements at 135°C. Supplied complete with calibration certificate.

Code	Capillary NO.	Approx. Constant cSt/S	Kinematic viscosity range cSt
81-B0116/20	4	0.1	6 to 100
81-B0116/21	5	0.3	18 to 300
81-B0116/22	6	1.0	60 to 1000
81-B0116/23	7	3.0	180 to 3000
81-B0116/24	8	10	600 to 10000
81-B0116/25	9	30	1800 to 30000
81-B0116/26	10	100	6000 to 100000
81-B0116/27	11	300	18000 to 300000

For determining the kinematic viscosity, all the above BS U-Tube viscometers must be placed into the 81-PV0116/F Viscometer bath using the holder 81-B0116/H3. See accessories.

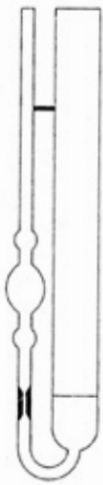
Dynamic Viscosity

STANDARD

▶ ASTM D2171 ▶ EN 12596

CANNON-MANNING VACUUM VISCOMETERS

Used for determining the viscosity of bitumen at 60° C. Supplied complete with calibration certificate.



Code	Capillary No.	Viscosity range
81-B0117/1	6	0.036 to 0.8
81-B0117/2	7	0.12 to 2.4
81-B0117/3	8	0.36 to 8
81-B0117/4	9	1.2 to 24
81-B0117/5	10	3.6 to 80
81-B0117/6	11	12 to 240
81-B0117/7	12	36 to 800
81-B0117/8	13	120 to 2400
81-B0117/9	14	360 to 8000
81-B0117/10	15	1200 to 24,000
81-B0117/11	16	3600 to 80,000

To determine the dynamic viscosity, the Cannon-Manning viscometers must be placed into the 81-PV0116/F Viscometer bath using the holder 81-B0117/H1. A pressure regulator and vacuum manifold is also required. See accessories

ASPHALT INSTITUTE VACUUM VISCOMETERS

Used for determining the viscosity of bitumen at 60° C. Supplied complete with calibration certificate.



Code	Capillary No.	Viscosity range
81-B0117/15	25	42 to 800
81-B0117/16	50	180 to 3200
81-B0117/17	100	600 to 12,800
81-B0117/18	200	2400 to 52,000
81-B0117/20	400	9600 to 140,000
81-B0117/21	800	38,000 to 5,800,000

To determine the dynamic viscosity, the Asphalt Institute viscometers must be introduced into the 81-PV0116/F Viscometer bath using the holder 81-B0117/H2. A pressure regulator and vacuum manifold is also required. See accessories

STANDARD

▶ ASTM D2171 ▶ EN 12596

VISCOMETER BATH

81-PV0116/F

Viscometer bath. 230 V, 50-60 Hz, 1 ph.

81-PV0116/FZ

As above, but. 110 V, 60 Hz, 1 ph.

It is used in the determination of both the kinematic and dynamic viscosity. Used to maintain the capillary type viscometers at a uniform temperature. The bath consists of a cylindrical glass vessel with a stainless steel cover with 50.8 mm diameter holes, motor stirrer, refrigerating coil with water connections, heating system, contact thermometer, external protection and insulating base.

Thermometers and viscometers are not included.

- Temperature: room temp. +5°C to 150° C
- Power: 2000 W
- Temperature stability: +/-0.03°C
- Temperature sensor: PID
- Jar capacity: approx.20 liters
- 5 viscometer tubes
- Weight: approx.12 kg



Accessories

Holders for using viscometers with 81-PV0116/F Viscometer bath

81-B0116/H2

Holder for Zeitfuchs Cross-Arm viscometers

81-B0116/H3

Holder for U-Tube viscometers

81-B0117/H1

Holder for Cannon-Manning viscometers

81-B0117/H2

Holder for Asphalt Institute viscometers

Pressure regulator and Vacuum manifold

(for Dynamic viscometers)

81-B0116/B

Viscometer vacuum regulator. Used for precise pressure control. 230 V, 50-60 Hz, 1 ph.

81-B0116/C

Vacuum manifold. Used for applying a vacuum to the viscometers placed in the bath.

Kinematic and Dynamic viscosity thermometers

82-B0116/40MF

Kinematic viscosity thermometer, range 58.5 to 61.5°C, type, IP 35C, ASTM 47C, mercury-free.

82-B0116/45MF

Kinematic viscosity thermometer, range 133.5 to 136.5°, type, IP 93C, ASTM 110C, mercury-free.



Ductilometers

DUCTIMETER

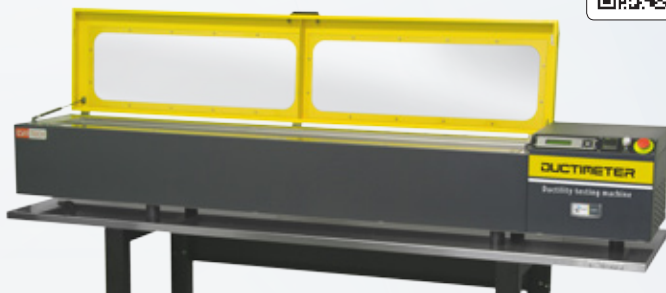
The ductility test is performed for determining the ductility of bituminous materials by measuring the elongation before breaking when two ends of briquette specimens are pulled apart at a specified speed and temperature.

We offer three different versions:

STANDARD VERSION

STANDARD

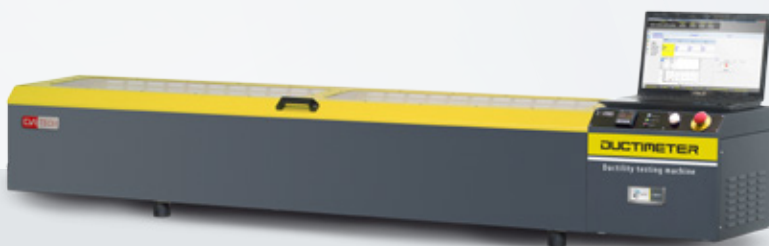
▶ EN 13398 ▶ ASTM D113 ▶ AASHTO T51 ▶ ASTM D6084



HIGH PERFORMANCE VERSION FOR FORCE DUCTILITY TEST

STANDARD

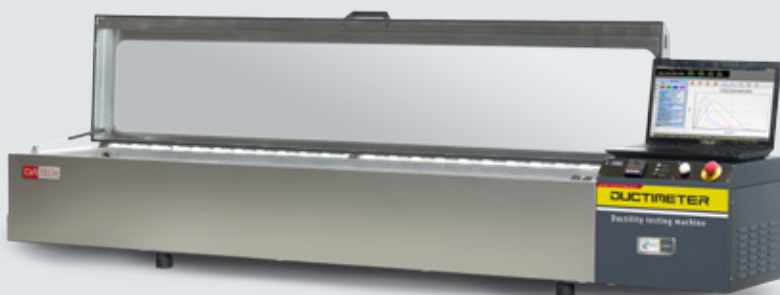
▶ EN 13398 ▶ ASTM D113 ▶ AASHTO T51 ▶ EN 13589 ▶ EN 13703
▶ ASTM D6084 ▶ AASHTO T300



RESEARCH VERSION FOR FORCE DUCTILITY TEST ON STANDARD AND MODIFIED BITUMEN

STANDARD

▶ EN 13398 ▶ ASTM D113 ▶ AASHTO T51 ▶ EN 13589 ▶ EN 13703
▶ ASTM D6084 ▶ AASHTO T300



COMMON FEATURES

- » 4 tension line (briquette capacity) x 1500 mm
- » Easy and free access to the large testing space
- » Closed-loop PID temperature control system
- » Double drive screw rod
- » Stainless steel insulated water bath
- » Exclusive in-built thermoregulation system compensating the exchange of heat and cooling, resulting in a very strict temperature control, optimized by the connection to chiller (optional)
- » Adjustable speed range from 5 to 100 mm/min
- » High carriage return speed of 500 mm/min for greater productivity
- » Elongation measurement by encoder



Detail of water bath. Easy and free access to the large testing space, common to all versions

ADDITIONAL FEATURES OF THE HIGH PERFORMANCE VERSION

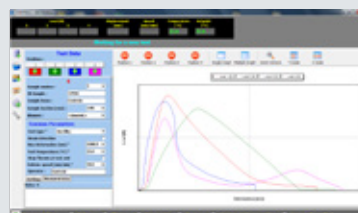
- » PC-controlled using dedicated software
- » Includes a system for measuring forces up to 1200 N (4 x 300 N, 2 x 500 N)
- » Temperature range at 25°C and from 4 to 30°C with water chiller
- » Real time load and displacement graphics via PC

ADDITIONAL FEATURES OF THE RESEARCH VERSION

- » Adjustable speed range from 1 to 200 mm
- » Temperature range from -10 to 60°C with water chiller
- » Elongation measurement by optical system
- » System for measuring forces up to 2000 N (4 x 500 N)
- » Extensive use of stainless steel for frame, cover and tank



Detail of load cells and briquette moulds of High performance and Research ductimeters



This is one of the many **ADVANCED** products of **CONTROLS** Group range.

To get more info visit www.controls-group.com or link directly to the QRcode

Determination of flexural creep stiffness

STANDARD

▶ ASTM D6648 ▶ AASHTO T313 ▶ EN14771



81-PV5902

MAIN FEATURES

- » Durable, corrosion-resistant construction
- » Computerized control, data acquisition and analysis
- » PID temperature controller with digital display
- » Two independent platinum RTDs for precise temperature control
- » Mechanically-refrigerated cooling bath with environmentally-safe non-CFC coolant
- » Integral LVDT and temperature compensated load cell for accurate test results
- » Includes complete calibration kit with carrying case
- » Includes ASTM/AASHTO-compliant specimen moulds
- » PC and software included

75

81-PV5902 BENDING BEAM RHEOMETER (BBR)

The BBR System consists of a fluid bath base unit, a three-point bending test apparatus which is easily removed from the base unit for specimen loading and unloading, an external cooling unit with temperature controller, and a calibration hardware kit with carrying case. The system is supplied complete with PC and testing software.

Ordering information

81-PV5902
Bending Beam Rheometer (BBR).
230 V, 50-60 Hz, 1 ph.

81-PV5904
As above but 115V, 50-60 Hz, 1 ph.

Spares

81-PV059/1
Extra aluminum beam mould.

81-PV059/2
Set of 36 plastic strips for BBR moulds.

Technical specifications

- Load frame: integral stainless steel frictionless construction
- Loading shaft: in-line stainless steel with blunt point
- Load cell: 500 g (temperature-compensated)
- Mechanical overload protection: standard
- Test cycle times: cycle times for pre-load, recovery and test load are completely operator-adjustable
- Test weights: calibrated and traceable
- Sample supports: 25 mm (0.98 in.) diameter stainless steel spaced 101.6 mm (4.00 in.) apart
- LVDT displacement transducers: 6.35 mm (0.25 in.) calibrated range to provide 2 µm resolution throughout testing and verification range
- Cooling unit: included (non-CFC refrigerant)
- Recommended cooling bath fluid: non-flammable ethylene glycol mixture
- Operating temperature: ambient to -40 °C (-40°F)
- Temperature measurement: Platinum RTD
- Compressed air requirement: 0.34 MPa (50 psi) clean, dry air supply required

Test load

- Variable test range from 0 to 200 g standard
- System maintains required test load to within ±0.5 g throughout the test cycle

Testing software

- Display of load, displacement and bath temperature provides ease of setup and operation
- Real time displacement, loading, and temperature graphs are displayed during the test cycle and can be re-scaled as needed for easy viewing

Shipping weight: 115 kg approx.



Sample supports (moulds) and Calibration kit

RTFOT Rolling thin-film oven

Determination of the resistance to hardening under the influence of heat and air

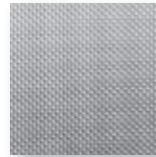
STANDARD

▶ ASTM D2872 ▶ AASHTO T240 ▶ EN 12607-1



MAIN FEATURES

- » Touchscreen display with 4.5" color control panel, including timer function, visual warnings and digital air flow indicator.
- » Full conformity to temperature specifications (time to reach target temperature after switch on, target temperature adjustment after samples insertion) from the Standards
- » Carousel rotation with closed-loop controlled speed
- » Safety features: Automatic over-temperature switch, door switch, pilot lamp and alarm for door open with fan still running; magnetothermic switch
- » High quality stainless steel structure, internal and external
- » Door with double-glazed window
- » Door locking system allowing easy opening also with busy hands



Detail of external stainless lining "linen patterned" resistant to scratches and shocks

BITUMEN OVENS FOR ROLLING THIN-FILM OVEN TEST (RTFOT)

Two versions are available:

81-PV1612
conforming to ASTM/AASHTO standards

81-PV1622
conforming to EN standard

The only difference between the two models is the inside dimension of the testing chamber.

These ovens are used for measuring the effect of heat and air on a moving film of semi-solid bituminous materials. The internal chamber is made from stainless steel, insulated with fiberglass or similar, with an external frame made from engine-turned stainless steel and a door with a centrally located window. Special attention has been given to the safety features which conform to CE requirements. The oven is supplied complete with digital flow meter, ASTM 13C thermometer and 8 heat resistant glass containers (64 mm high x 140 mm diameter). The oven must be connected to a compressed air source supplying 2 bar maximum pressure. If not available in the laboratory we recommend the 81-PV0161/12 Di-

aphragm pump. See accessories. The ASTM and EN versions are basically identical except for a small difference of the internal dimensions of the testing chamber.
Power: 3000 W
External dimensions: 750 x 750 x 900 mm (w x d x h)
Weight: approx. 50 kg

Ordering information

ASTM/AASHTO versions:

81-PV1612
RTFOT, Bitumen oven for rolling thin film oven test. ASTM version. 230 V, 50 Hz, 1 ph.

81-PV1613
As above but 220 V, 60 Hz, 1 ph.

81-PV1614
As above but 110 V, 60 Hz, 1 ph.

EN version:

81-PV1622
RTFOT, Bitumen oven for rolling thin film oven test. EN version. 230 V, 50 Hz, 1 ph.



Door locking system allowing easy opening also with busy hands

Accessories

Diaphragm pump

81-PV0161/12
Diaphragm pump 6 liters/min at 2.4 bar. 110-230 V, 50-60 Hz, 1 ph.

Description

Free air displacement 6 liters/min, maximum pressure 2.4 bar (when used as an air compressor).
Power: 65 W
Weight: approx. 1.9 kg

81-PV0161/13
Scraper for RTFOT bottle

81-PV0161/14
Metal rack for holding/cooling RTFOT bottles

81-PV0161/15
RTFOT bottle tong

Spares

81-PV0161/10
Spare glass container

82-PV0160/10MF
IP 47C, ASTM 13C Thermometer, +150 to +175°C, 0.5°C divisions.

Rotary evaporation apparatus for determining the resistance to hardening under the influence of heat and air: RFT method

STANDARD

▶ EN 12607-3

RFT test method description

100 g of bituminous binder is introduced into the 1000 ml rotating flask of the rotary evaporator. When the test temperature reaches 165°C a flow of air at ambient temperature is introduced into the rotating flask. The air flow hardens the sample and the hardening effect is evaluated by measuring penetration, softening point and dynamic viscosity of the treated bituminous binder sample.

General description

The rotary evaporator is equipped with a distillation flask, a variable speed motor capable of rotating the distillation flask at a rate adjustable from 20 to 270 rpm, a condenser, solvent recovery flask, and a heated oil bath. The angle of the distillation flask from the horizontal to the bath is approximately 15°. Supplied complete with a 1000 ml distillation flask.

Ordering information

81-PV1650

Rotary evaporation apparatus. 230 V, 50 Hz, 1 ph.

81-PV1650/Z

As above but 110 V, 60 Hz, 1 ph.

Accessories

81-B0165/4

Glass evaporating flask, 1 liter capacity.

81-PV0161/12

Diaphragm pump, 6 L/min at 2.4 bar. 110-230 V, 50-60 Hz, 1 ph.

Detailed information on page 400

86-D1445

Support base 200 x 130 mm with rod.

86-D1450

Double sleeve clamp.

86-D1453

Clamp, large size.

86-D1111

300 mm diameter desiccator complete with plate.

86-D0819

Silica gel, 1 kg.



75-B0165

Effect of heat and air and loss on heating of oil and bituminous compounds: thin-film oven test (TFOT)

STANDARD

▶ EN 12607-2 ▶ EN 13303 ▶ ASTM D6 ▶ ASTM D1754 ▶ AASHTO T47
▶ AASHTO T179 ▶ BS 2000 ▶ NF T66-011 ▶ UNE 7110 ▶ CNR 50

TFOT bitumen oven

Used for determining the loss in mass (exclusive of water) of oil and bituminous compounds and the effect of heat and air on a film of semi-solid bituminous material. The oven has to be used with the correct accessory depending on which testing standard is being followed:

- For EN 13303, ASTM D6, AASHTO T47, BS 2000, NF T66-011, CNR No. 50 select accessory 81-B0160/1;
- For EN 12607-2, ASTM D1754, AASHTO T149, UNE 7110 select accessory 81-B0160/2.

See Accessories.

Technical specifications

- Internal chamber made from stainless steel
- Insulation with fiberglass or similar
- External frame made from enameled steel
- Temperature control by contact thermometer
- Door with double panel window
- Power: 1300 W
- Inside dimensions: 330 x 330 x 330 mm
- Outside dimensions: 500 x 500 x 900 mm
- Weight: 35 kg approx.

Ordering information

81-B0160/C

TFOT bitumen oven. 230 V, 50 Hz, 1 ph.

81-B0160/CY

As above but 220 V, 60 Hz, 1 ph.

81-B0160/CZ

As above but 110 V, 60 Hz, 1 ph.

Accessories

81-B0160/1

Rotating shelf with 9 containers measuring 55 mm diameter x 35 mm height.

81-B0160/2

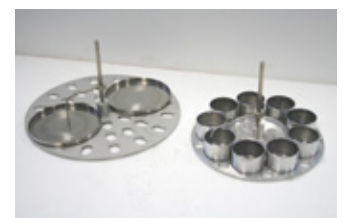
Rotating shelf, 250 mm diameter.

82-PV0160/10MF

IP 47C, ASTM 13C Thermometer, +150 to +175°C, 0.5°C divisions.



81-B0160/C



81-B0160/1 and 81-B0160/2



Pressure Ageing Vessel

Long Term Ageing Conditioning of Asphalt Binder



Vacuum Degassing Oven



Pressure Ageing Vessel PAV and Vacuum Degassing Oven VDO



PAV

STANDARD
 ▶ ASTM D6521 ▶ AASHTO R28 ▶ EN 14769

The Pressure Ageing Vessel (PAV) has been developed to simulate in-service ageing of asphalt binder after 5 to 10 years. The binder is exposed to high pressure and temperature for 20 or 65 hours (selectable up to 99) to simulate the effect of long-term oxidative ageing.

This conditioning process is intended to provide an evaluation of the relative resistance of asphalt binders to oxidative ageing at selected elevate temperatures and pressures. It is normally performed after an initial conditioning using a Rolling Thin Film Oven (RTFOT).

The apparatus consists of a stainless steel (AISI 304 with ASME and CE certifications) pressure vessel with encased band heaters and integral pressure and temperature controls. Data logs of both temperature and pressure are saved on USB stick or transferred to PC at the end of the test.

The user friendly software allows the operator to view the vessel temperature and pressure in real time, both as set targets and actual values, with a high rate of refresh. It is also possible to view, in real time, the temperature and pressure graphs.

Most standards also require the Vacuum Degassing Oven (VDO see next page) mandatory to remove air bubbles created during accelerated oxidative ageing to make the aged binder suitable for further tests as BBR, DSR, Penetration, Ductility etc.

MAIN FEATURES

- » Platinum RTD temperature internal measurement to +/- 0.1° C
- » 6" color touchscreen reclinable display
- » Freely selectable test temperatures from 8° to 120°C, PID controlled to +/- 0.5°C
- » Temperature and pressure calibrations performable by the user
- » Efficient heating system allowing the test temperature to be achieved in one hour, exceeding the Standards' specification
- » Network ready for remote monitoring of the test status from PC, tablet or smartphone
- » Programmable pre-heating functions (limited to 60° C to avoid accidental burns during sample rack positioning) for time optimization
- » CE and ASME certified pressure vessel
- » Testing time up to 99 hours
- » Electrically locked top cover, to avoid direct exposure of the pressure vessel during the test
- » Pressure monitored by transducer and controlled to 2.1 +/- 0.1 MPa
- » Forced ventilation cooling system allowing quick cooling of sample rack to avoid accidental burn
- » User friendly software allows real time readout of vessel temperature and pressure
- » Over temperature limit switch
- » Over pressure relief valve

The PAV requires a suitable compressed air tank, 2.1Mpa minimum pressure. This could be for example an air compressor or commercial bottled air, depending on reference standards.

- Dimensions (lxwxh): 430 x 660 x 480 mm
- Weight approx.: 90 kg

Accessories

81-PV2600/1

Spare sample container (TFOT pan) for PAV

81-2600/2

Spare sample rack for PAV



Pressure transducer calibration menu

Detail of inclinable touchscreen display



This is one of the many **ADVANCED** products of **CONTROLS** Group range.

To get more info visit www.controls-group.com or link directly to the QRCode

VDO

MAIN FEATURES

- » Designed to remove air bubbles created during accelerated oxidative ageing of asphalt binder by the PAV
- » Platinum RTD temperature internal measurement to +/- 0.1° C
- » Selectable test temperature (from ambient to 200° C) controlled to +/- 4.0° C
- » Integrated vacuum pump
- » Vacuum monitored by transducer and controlled to 15 +/- 0.1 kPa absolute pressure
- » Digital touchscreen 6" color display for temperature, vacuum, set points and actual values
- » Over temperature limit switch
- » Network ready for remote monitoring of the test status from PC, tablet or smartphone

The apparatus consists of a stainless steel vacuum vessel with encased band heaters and integral vacuum and temperature controls. The vacuum chamber can accept either eight 55x35 mm or four 70x45 mm (available as accessories) sample containers. The instrument is supplied complete with temperature traceable calibration certificate, 8 aluminum 55x35 mm sample containers, a sample holder and operator's manual.

- Dimensions (lxwxh): 430 x 440 x 480 mm
- Weight approx.: 30 kg

81-PV2610

Vacuum Degassing Oven (VDO) conforming to ASTM D6521, AASHTO R28 and EN 14769. 230V, 50-60 Hz, 1 ph

81-PV2610/Z

as above but 110V, 60 Hz, 1 ph

Accessories

81-PV2610/1

Set of eight 55x35 mm sample containers for VDO

81-PV2610/2

Set of four 70x45 mm sample containers for VDO



81-PV2610/1



81-PV2610/2

Rotational viscometers

STANDARD

▶ ASTM D2196 ▶ ASTM D4402 ▶ AASHTO T316 ▶ EN 13302



81-PV0118/C Standard version



81-PV0118/B High performance version

Apparent viscosity of unfilled asphalt is evaluated by a rotational viscometer which measures the torque generated by a calibrated spindle rotating at a selected speed into a bitumen sample heated at precise temperature in the range between ambient temperature to 260°C. The measured relative resistance to rotation is converted, by a factor, in viscosity units, cP or mPa.s.

We offer two versions:

81-PV0118/C Standard rotational viscometer and

81-PV0118/B High performance rotational viscometer, featuring a superior level of test automation

COMMON FEATURES

- » Data displayed: selected speed, selected spindle, viscosity reading, percentage of full scale, relative and absolute viscosity
- » Unit converter SI to CGS
- » AUTO-TEST with sound and visual malfunction alarm
- » AUTO-RANGE function
- » User-enabled calibration
- » 10 languages options
- » Repeatability: 0.2%
- » Accuracy 0,1% of full scale

ADDITIONAL FEATURES OF THE 81-PV0118/A VERSION

- » Display of Sample temperature, Shear rate and Shear stress (with coaxial spindles), Density (entered by the user) Step program status, Analysis and visual characteristics (flow curves), Viscosity reading: Dynamic (cP or mPa.s) or Kinematic viscosity (cSt)
- » Program features:
 - Time to torque=target torque pre-setting device
 - Time to stop=target time pre-setting device
 - 10 working memories
 - Customizable options
 - Programmable
 - Multistep
 - Ramp

81 – PV0118/C

Rotational viscometer supplied with stand, boss head, spindle protection, spindle rack, power supply cable. 100-240V, 50-60 Hz, 1Ph

81-PV0118/B

Rotational Viscometer, high performance version, calibration certificate, USB, WIFI, Bluetooth, temperature sensor, datalogger software and power supply cable. Viscosity range 100-40 000 000cP, rotational speed 0.01-200rpm. Conforming to ASTM D2196, ASTM 4402, AASHTO T316, UNI EN 13302. 100-240V/50-60 Hz/1ph

Technical specifications	81-PV0118/C	81-PV0118/B
Viscosity range (cP)	100-13.000.000	100-40.000.000
Rotational speed range (r.p.m.)	0.3-100	0.01-200 18 selectable
Resolution:		
Using low viscosity adapter	cP 0.01	cP 0.01
For lower than 10000	cP 0.1	cP 0.1
Equal to or above 10000	cP 1	cP 1
Repeatability	0.2%	0.2%
Thermometer features:		
-Thermometer margins		0 to + 100°C 32°F to 212°F
-Resolution	N.A.	0.1°C, 0.2°F
-Precision		±0.1°C
Type of probe		PT100

Elastic recovery apparatus by torsion method

STANDARD

► NLT 329 ► INVIAS E 727 ► M-MMP-4-05-024 ► IRAM 6830

81-B0149

ELASTIC RECOVERY APPARATUS

Used for determining the degree of elasticity of modified asphalt used in road construction by the elastic recovery by torsion method.

The equipment basically consists of a metal cylinder Ø 25.4 x 100 mm long, a guide support with a scale graduated from 0 to 180°, a water bath and a container for the sample.

The test consists of inducing angular deformation by means of a steel cylinder of specific dimensions, embedded into a sample of modified asphalt, in order to observe its recovery capacity

Accessories:

82-B0125/2MF

Saybolt thermometer, +19 to 27°C range, 0.1°C graduations, ASTM 17, mercury free.



Accessories for both versions

Temperature control unit

The temperature control unit consist of a heating chamber that is used to work in conjunction with rotary viscometers at high temperatures. Viscosity of solid road unfilled asphalts has to be measured at temperatures ranging from 34°C to 260°C according to the Specifications of ASTM D4402. The heater contains the container with sample in which a suitable spindle is immersed and driven by the rotary viscometer to measure viscosity. A digital microprocessor control unit grants the required accuracy of test temperature.

81-PV0118/T

Temperature control unit with temperature range from ambient plus 5°C to 300°C. 220-240V/50-60Hz/1ph

81-PV0118/TZ

As above but 110V/60Hz/1ph



81-PV0118/2

Aluminum disposable test chamber

81-PV0118/3

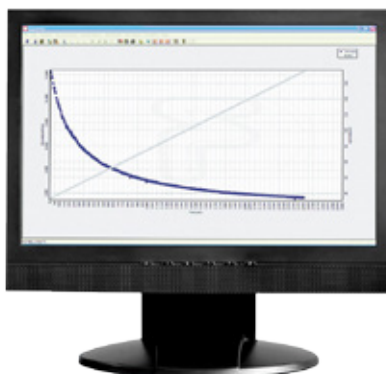
Stainless steel reusable test chamber

81-PV0118/4

Set of 4 stainless steel spindles,

Viscosity ranges:

- TR8, 50-170 K,
- TR9, 250-830 K
- TR10, 500-1.7 M
- TR11, 1K-3.3 m



Software for High Performance Rotational Viscometer

Rheological properties of asphalt binders

81-PV6202



STANDARD

- ▶ AASHTO T315 ▶ AASHTO T316, T350 ▶ AASHTO M320
- ▶ AASHTO M332 ▶ AASHTO R29 ▶ ASTM D7175 ▶ ASTM D4402
- ▶ ASTM D7405 ▶ EN 13302 ▶ EN 13702-1 ▶ EN 13702-2
- ▶ EN 14770 ▶ EN 14896



DSR

DSR, DYNAMIC SHEAR RHEOMETER

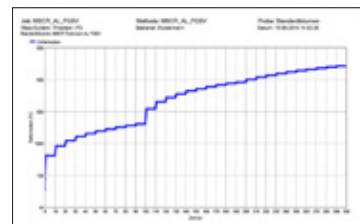
Dynamic Shear Rheometers (DSR) performs the critical rheological characterization analysis required for SuperPave Performance Grade (PG) classification of asphalt binders.

The behavior of the binder under various temperature and loading conditions is measured to predict the performance of binders at anticipated climatic conditions.

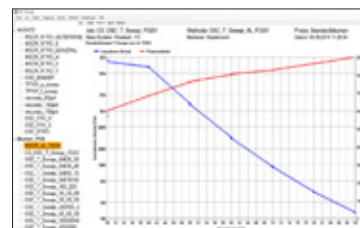
The DSR test uses a thin asphalt binder sample sandwiched between two circular plates. The lower plate is fixed while the upper plate oscillates back and forth across the sample to create a shearing action. DSR tests are conducted on unaged, RTFO aged and PAV aged asphalt binder samples. The test is largely software controlled.

81-PV6102 and **81-PV6202** are able to perform SuperPave performance grading according to AASHTO T315 and ASTM D7175, Viscosity determination of asphalt binder in according to AASHTO T316 and ASTM D4402 and determine Multi Stress Creep Recovery (MSCR) according to AASHTO T350 and ASTM D7405.

MAIN FEATURES



MSCR - Test



G* and phase angle δ

- » Performance Grade (PG) determination test.
- » Determination of deformation properties of bitumen with Multiple Stress Creep Recovery test (MSCR – Test).
- » Determination of complex shear modulus G^* and phase angle δ of road bitumen at different temperatures.
- » Precise and stable temperature control unit (Peltier unit).
- » Excellent temperature stability and accuracy.
- » Meet and exceed AASHTO, ASTM and EN Standards.
- » Simple to use.



81-PV6102



81-PV6202

Technical Specification

Rheometer

- Torque range 0,1 to 150 mNm
- Torque resolution 0,002 mNm
- Speed range 0 to 1000 rpm
- Speed resolution 0,015 rpm
- Rotation angle range -50° to 300°
- Angle resolution 0.001°
- Frequency 0.001 to 10 Hz
- Viscosity range 0.1 to 7x10⁷ Pas
- Complex shear modulus 0.1 to 4x10⁶ kPas
- Phase angle range 0 to 90°

Temperature control unit (Peltier unit)

- Maximum temperature 150°C
- Minimum temperature -10°C
- Temperature accuracy $\leq 0.1 K$, range 5°C to 90°C
- Interface USB 2.0

Software manager

- Prepared jobs for automatic and fast execution of all bitumen tests
- Automated evaluation and analysis of measuring results in accordance with AASHTO
- With estimation of Performance Grade
- Different test types for original binders, RTFO and PAV
- Grade Determination and PASS/FAIL conditions
- Bitumen Wizard

Technical Specification

Rheometer

- Torque range 0,1 to 150 mNm
- Torque resolution 0,002 mNm
- Speed range 0 to 2,000 rpm
- Speed resolution 0,015 rpm
- Viscosity range 1 to 3 x 10⁹ mPas
- Complex shear modulus 0.1 to 4 x 10⁶ kPa
- Phase angle range 0 to 90°
- Frequency 0.001 to 100 Hz
- Normal force range -30 to 30 N
- Normal force resolution 0.01 N
- Automatic gap setting yes
- Gap resolution 1 µm

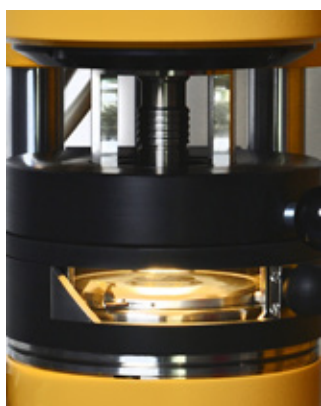
Temperature control unit (peltier unit)

- Maximum temperature 150°C
- Minimum temperature -10°C
- Temperature accuracy $\leq 0.1 K$, range 5°C to 90°C
- Interface USB 2.0

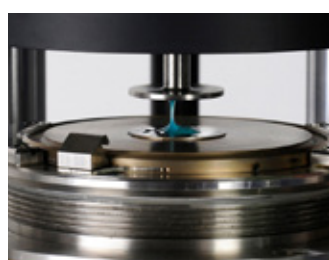
Software manager

- Prepared jobs for automatic and fast execution of all bitumen tests
- Automated evaluation and analysis of measuring results in accordance with AASHTO
- With estimation of Performance Grade
- Different test types for original binders, RTFO and PAV
- Grade Determination and PASS/FAIL conditions
- Bitumen Wizard

Lighted chambers



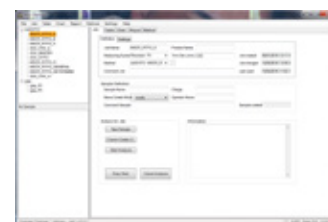
Peltier unit: Peltier control unit, peltier tempered basic plate, basic plate support, adapter, exchange grip, exchangeable plate (ø 25mm), measuring plate P3 (ø 25mm), measuring plate P4 (ø 8mm).



Set of trimming tools, set of rubber moulds, 20 ml calibration liquid NF 5000000, interface cables, USB adapter, user manual



Software Manager for Bitumen tests



This is one of the many **ADVANCED** products of **CONTROLS** Group range.

To get more info visit www.controls-group.com or link directly to the QRCode