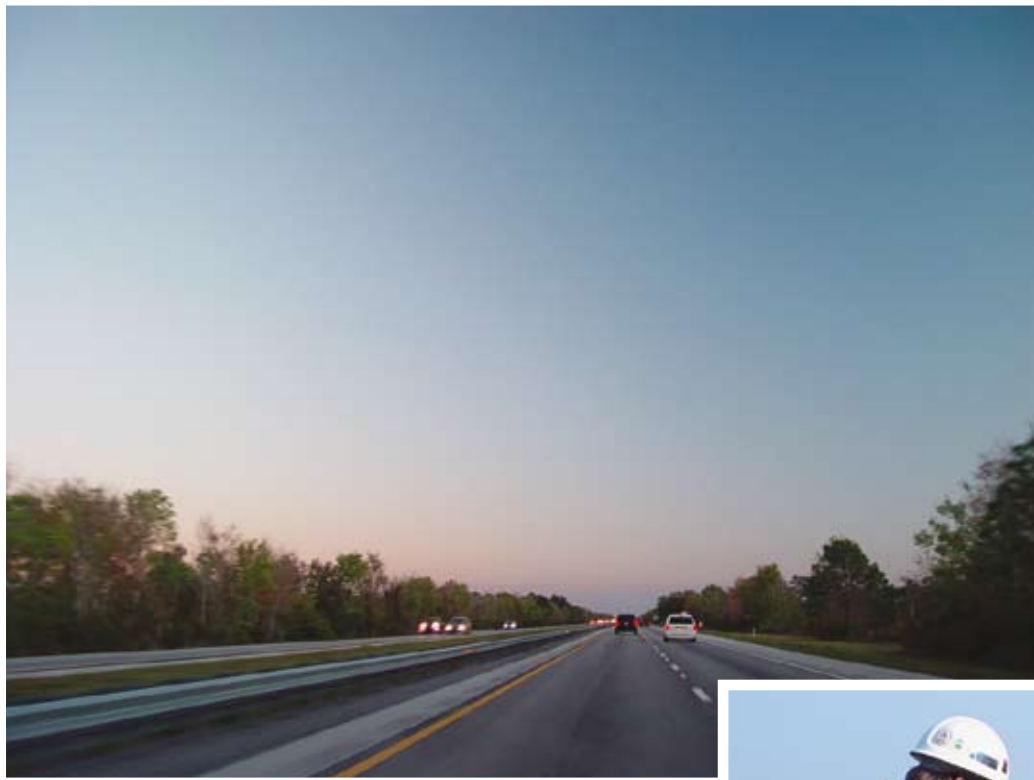


6

BITUMENS



Analysis of bitumen samples

Standards UNE EN 12697-1; BS 598, 5284

Bitumen materials are most commonly used in road construction. This material basically consists of two ingredients, aggregate and a binder.

The term asphalt is simply one of two generic names used to classify or describe bitumen mixtures.

The analysis of bitumen mixtures is essential to ensure compliance with specifications, profitability and control of production. There are several test methods and the most common are described briefly together with the apparatus required to determine the binder content and the classification of aggregates.

Extraction bottle method

This method is used to extract the binder so it can be tested against requirements, either directly or by comparison.

B0001 Bottle shaker.

A bottle shaking machine consisting of a compact bench designed to rotate three bottles simultaneously on their longitudinal axes. The machine is of robust construction and takes 500 mL bottles, with rotation speeds between 0 and 60 rpm.

Power supply: 230 V 50 Hz 1 ph

Dimensions: 385 x 295 x 160 mm

Weight: 10 kg

Accessories:

B0001/1 500 mL glass bottle (borosilicate), 86 mm diameter, 176 mm high, 34 mm neck diameter, in accordance with EN specifications.

B0001/2 Glass rod 6 mm thick with rubber tip (35 mm)



Bitumen measuring instruments

These are used to determine the percentage of bitumen and aggregate in asphalt mixtures without extraction, returning previously established results for the specific gravity values of the bitumen, aggregate and solvents.

B0003 Bitumen measuring instrument, capacity 750 mL

B0004 Bitumen measuring instrument, capacity 1500 mL

Pressure filter method

Standards UNE EN 12697-1; BS 598

B0007 Pressure filter

This filter is used to separate the filler from the solvent solution. It consists of a cylindrical container closed at the bottom by a drilled metal disc that holds another disc with a mesh size of 0.074 mm and a round Whatman No. 5 paper filter, both measuring Ø 270 mm. The upper part has a manometer and a compressed air connection, both connected to the drilled disc at the bottom.

Dimensions: Ø 330 x 120 mm

Weight: 25 kg

Accessories

B0007/1 Paper filters, box 100 units.

B0007/2 Pedal pump, complete with a rubber hose and standard connections.



Standards UNE EN 12697-1; DIN 1996

Hot extraction method

B0010 Hot extraction device, designed to separate the bituminous binder used in the preparation of the compound from fine and coarse aggregate used in the preparation of the mixture.

The device is made up of a 5 L pyrex glass container, a stainless steel basket with mesh size 0.063 mm and capacity for 400 g of compound, and a cover with water circulation to cool the solvent.

Dimensions: Ø 160 x 335 mm

Weight: 5 kg

Accessories:

B0010/1 Heating plate, Ø 185 mm

V0208 Metal fabric with ceramic fibres, 160 x 160 mm

Spare parts:

B0010/2 Stainless steel basket, mesh size of 0.063 mm

B0010/3 Glass container



Standards UNE EN 12697-1, 12697-14; NLT -137; BS 598

B0011 Hot extraction device

Designed to extract bitumen from asphalt. The device consists of a flanged stainless steel beaker (complete with O-ring and cover), a basket with 2 mm mesh, a 12.5 L Dean Stark tank, a Liebig condenser and a box of 100 Ø 400 mm filters.

Weight: 25 kg

Dimensions: 490 x 480 x 900 mm

Accessories:

B0010/1 Heating plate, Ø 185 mm

Spares

B0011/1 Box of Whatman No. 54 paper filters, Ø 400 mm (100 units). Ceramic fibre, 160 x 160 mm



Standards UNE EN 12697-5, 12697-12; ASTM D 2041

B0014 Yale pycnometer

To determine the maximum theoretical specific weight of bituminous mixtures. It consists of a transparent plexiglass vessel with room for three samples weighing 6 kg. Supplied complete with manometer and valve.

Capacity: 10 litres

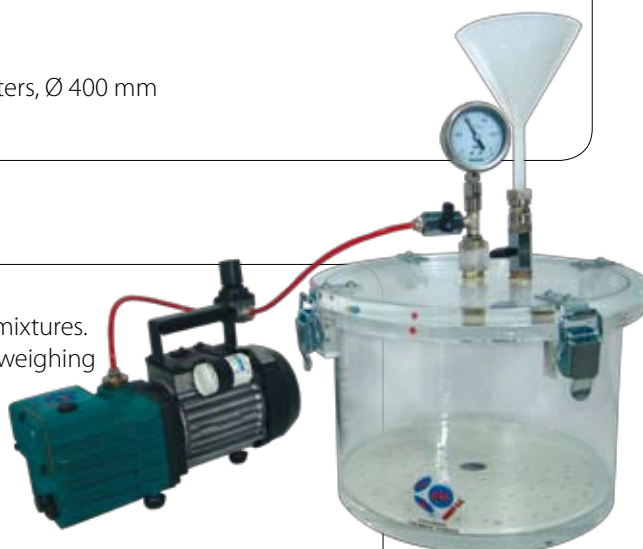
Dimensions: Ø 300 x 450 mm

Accessories:

V0410 Portable vacuum pump. The pump is supplied complete with a regulator, water condensation collector and 3 m connection hose.

B0013 Electromagnetic vibrating deaerator with vibration intensity control. Designed to make the pycnometer vibrate for easier air removal.

B0013/1 Tube to connect pycnometer to vibrating deaerator.



Standards UNE EN 12607-3, 12697-3; NTL 347

B0015 Thin film rotating evaporator

The binder is separated from the sample by dissolving it in dichloromethane. The undissolved solids are separated by centrifuging or filtering prior to recovering the binder by vacuum distillation, using the thin layer rotating evaporator. The apparatus consists of a glass device that includes a condenser, receiver flask, 1L evaporator flask, oil bath with thermostat, motor and vacuum generator.

Power supply: 220 V 50 Hz



Quantitative extraction

Standards UNE EN 12697-1; NLT 164; ASTM D2172; AASHTO T164

Both ASTM and AASHTO specify various methods for the recovery of bitumen from bituminous mixtures. The bitumen is extracted using specific solvents and the content is calculated by comparison.

B0020 Centrifuge extracting machine with capacity for 3000 g

Designed to determine the filler content in bituminous compounds. Built out of steel plate, with four rubber legs to absorb the vibrations from unbalanced loads. The electric motor and control electronics are incorporated in the structure of the machine.

The motor shaft rotates the unit consisting of the plate, filter and centrifuge lid. The discharge is through the hose located at the bottom of the hood. The control panel contains the main ON/OFF switch, a potentiometer to control the speed, the start/stop and brake buttons.

Plate capacity: 3000 g

Power supply: 220 V 50/60 Hz

Dimensions: 540 x 400 x 540 mm

Weight: 35 kg

Accessories and Spare Parts

- B0020/1** Filter paper, pack of 250 units
- B0020/2** Cover and plate, capacity 3000 g
- B0022** Package with 25 L of trichloroethylene
- B0023** Drum with 200 L of trichloroethylene
- B0020/5** Electromagnetic safety microswitch



B0021 Centrifuge extracting machine with 1500 g capacity

Designed to determine the filler content in bituminous compounds.

This model is similar to the **B0020** centrifuge but the container plate has smaller capacity.

Plate capacity: 1500 g

Power supply: 220 V 50/60 Hz

Dimensions: 540 x 400 x 540 mm

Weight: 32 kg

Accessories and Spare Parts

- B0021/1** Filter paper, pack of 250 units
- B0021/2** Cover and plate, capacity 1500 g



Standards UNE EN 12697-1; NLT 164; DIN 196; CNR a. VII N.38.

B0024 Continuous flow centrifuge

Built of steel plate, with four rubber legs to absorb the vibrations from unbalanced loads. The main switch is located on the control panel. Supplied complete with two Ø 8" sieves made of stainless steel with mesh sizes ASTM Nos. 100 and 200, ball valve for passage of compounds and an aluminium beaker.

Characteristics:

Rotation speed: 11000 rpm

Container capacity: 400 g of filler.

Power supply: 220 V 50/60 Hz

Dimensions: 800 x 400 x 440 mm

Weight: 80 kg

Spare parts

B0024/1 Aluminium beaker, capacity 400 g of filler.

B0024/2 Sieve Ø 8" ASTM No. 100

B0024/3 Sieve Ø 8" ASTM No. 200



Standards ASTM D 2172; AASHTO T164

B0025 Reflux extractor, capacity 1000 g

Used to determine the bitumen content in aggregate bituminous mixtures (asphalt). The extractor consists of a base supporting two cones, each with a 500 g capacity, with stainless steel mesh, borosilicate heat-resistant glass beaker and water condenser with special connections for water intake and outlet. The solvent used to extract the bitumen is trichloromethane, which does not give off toxic fumes during the test. Bitumen content is calculated by comparing the initial weight of the asphalt sample and the weight of the aggregate remaining at the end of the test.

Characteristics:

Cone mesh size: square 1.25 - 1.4 mm

Beaker Dimensions: Ø 152 x 457 mm

Dimensions: Ø 180 x 490 mm

Weight: 3 kg

Accessories:

B0010/1 Heating plate, Ø 185 mm

B0025/1 Paper filters, box 50 units.

V0208 Metal fabric with ceramic fibres, 160 x 160 mm

Standards ASTM D 2172; AASHTO T164

Hot reflux extractors



B0026 Reflux extractor, capacity 5000 g Used to determine the bitumen content in aggregate bituminous mixtures (asphalt). The extractor consists of a cylindrical container with approximate capacity of 5 kg, made of stainless steel, a basket with 3 mm mesh and a water condenser cover with special connections for water intake and outlet.

Dimensions: Ø 215 x 430 mm

Weight: 6 kg

B0027 Reflux extractor, capacity 3000 g

Accessories:

B0010/1 Heating plate, Ø 185 mm

Standards EN 12697-1, EN 13108 - LCPC - CNR N.38

B0028 Kumagawa Extractor (Soxhelet) capacity 1 L

Designed to extract bitumen from mixtures. It consists of a heating blanket, a 1000 mL flask, glass connections, ball coolant and 25 filter cartridges.

Power supply: 220 V 50/60 Hz

Spares:

B0028/1 Filter cartridge Ø 58 x 170 mm (25 units)

B0029 Kumagawa Extractor (Soxhelet) capacity 2 L

Similar to **B0028** but with 2 L capacity

Spares:

B0029/1 Filter cartridge Ø 80 x 200 mm (25 units)



Centrifuging

Standards NLT 169/72

B0030 Kerosene centrifuge

Designed for general centrifuging applications, with a stainless steel 18/8 centrifuge chamber. A control panel controlled by a microprocessor, including a main switch, rpm selector/display, a timer adjustable between 0 - 60 minutes, brake button with deceleration and rapid stop options and memory entry and recovery push buttons.

Safety devices include a LED that indicates that the cover is open or not closed correctly so that the rotor cannot start; the push button to open the cover will not be enabled until the cover is completely closed; intermittent noise and light signals, with automatic rotor stop if the load is excessively unbalanced.

Rotating head complete with two cylindrical metal beakers open at the ends, measuring Ø 52.39 x 71.4 mm high, provided with drilled bronze plate.

Power supply: 220 V 50/60 Hz

Dimensions: 365 x 430 x 305 mm

Weight: 23 kg



Standards UNE EN 12697-39; AASHTO T164; NLT384/00; ASTM T 308-99

B0031 Ignition oven

This NCAT asphalt content device is an analyzer that determines the asphalt content in a sample by igniting the sample. The asphalt sample is bathed in oxygenated air and weighed continuously during the ignition process. The NCAT asphalt content analyser software identifies the end point of the ignition and indicates the end of the test. A printer outputs the results.

The oven is heated to a pre-established temperature in the range 450 °C - 550 °C

The hot asphalt mix sample is weighed, divided into equal parts and placed in two reinforced baskets mounted on a tray assembly. The complete assembly is placed on the tray on the oven floor. The tray is mounted on four ceramic supporting tubes that, in turn, are placed on the platform of a digital scale. A fan pushes ambient air through the holes in the four ceramic support tubes located at the base of the chamber. This oxygenated air saturates the asphalt sample laid out to facilitate its ignition and incineration.

The volatile elements that are released are later oxidised when they pass through a ceramic filter heated to 750 °C in a chamber over the main chamber. Five exit nozzles direct the exhaust air toward a plenum chamber with shutters. There the exhaust gas is cooled by mixing it with ambient air. The fan then pushes the exhaust gases through the exhaust nozzle of the plenum chamber. A standard, one-piece exhaust pipe drives the exhaust gases to an external extraction system.

After between 20 and 40 minutes, depending on the weight of the sample, the oven detects the end of the test when all the bitumen has been incinerated and stops emitting a whistle.

A report is printed showing the percentage of bitumen per aggregate and mixture.

Power supply: 6000 W / 220 - 240 V

Width: 55 cm

Depth: 63 cm

Height: 105 cm

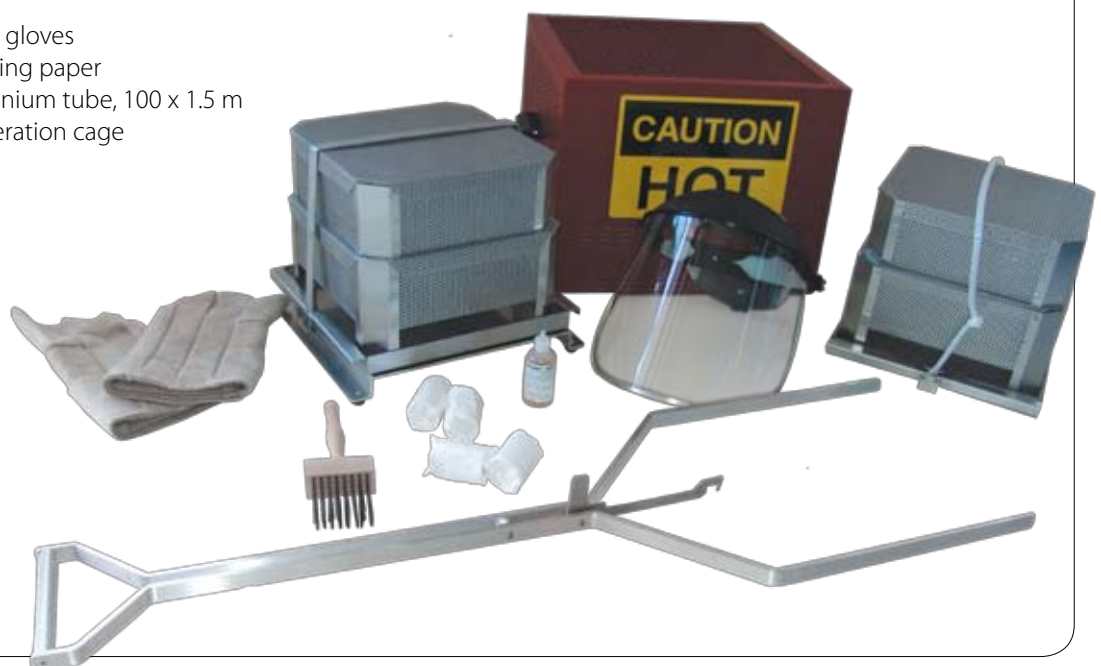
Accessories:

B0031/1 Heat resistant gloves

B0031/2 Thermal printing paper

B0031/3 Flexible aluminium tube, 100 x 1.5 m

B0031/4 Sample incineration cage



Automatic extraction

Standards UNE EN 12697-1; DIN 1996; CNR a. Vil. 38

The ever-increasing emphasis on safety, environmental contamination and automatic handling of toxic materials has led to the need to develop and use automatic bitumen extraction systems. The automatic extractor is a reliable system designed to analyse bituminous mixtures.

B0032 Automatic bitumen extractor

For fast analysis of the amount of bitumen in an asphalt specimen. This machine performs all the operations that usually require separate machines, such as an extractor, centrifuge or automatic distiller - thereby saving time and avoiding risk of operator inhaling toxic fumes.

The equipment consists of a sieving unit (adapted to hold sieves) complete with a suction nozzle and pan with a distribution bay, used to wash and separate the sample of aggregate. A continuous flow machine with three cylinders to separate the binder. A solvent distiller, complete with two tanks, one to collect the used solvent and the other for the recycled solvent. A control panel with accessories to fasten it to a wall, complete with a main switch, timer programmer for the solvent pump and for the centrifuge, sieve vibration intensity and start up buttons.

Power supply: 3 x 380 V 50 Hz 5.5 kW

Dimensions: 1400 x 610 x 1820 mm

Weight: 189 kg

Accessories

B0032/1 Extractor hood to prevent the toxic fumes from spreading.

B0032/2 Sieve, stainless steel, mesh size 0.075 mm

B0032/3 Sieve, stainless steel, mesh size 0.09 mm

B0032/4 Sieve, stainless steel, mesh size 0.15 mm

B0032/5 Sieve, stainless steel, mesh size 0.3 mm

B0032/6 Sieve, stainless steel, mesh size 0.6 mm

B0032/7 Sieve, stainless steel, mesh size 2 mm



Solvent recovery

Non-flammable solvents can be recovered with a distiller. The operation is dangerous and should be performed under strict controlled conditions. Dichloroethane and trichloroethylene are a health hazard and exposure during work should therefore be limited.

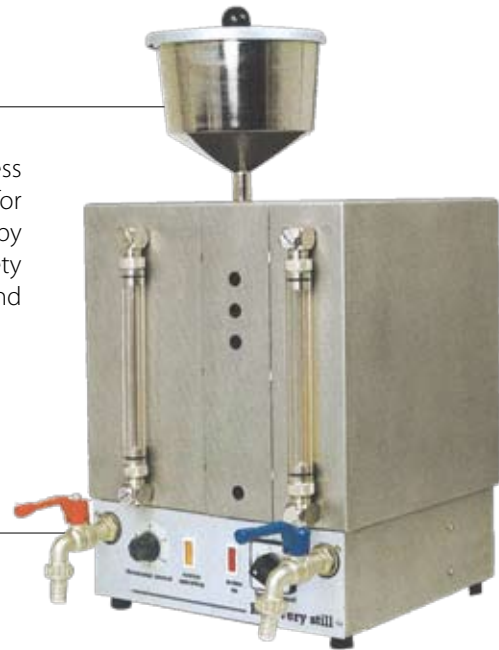
B0035 Distiller for the recovery of the solvent

The distiller has a capacity of 10 L/h, is made completely of stainless steel, is compact and easy to install, consists of two chambers, one for the dirty solvent and another for the distillate. Cooling is carried out by a cooling coil connected to the water network. The distiller has a safety device that cuts off the electrical current in the event of overheating and automatically shuts down the equipment after extraction.

Power supply: 220 V 50 Hz

Dimensions: 320 x 400 x 650 mm

Weight: 15 kg



Mixing and temperature

The density of Marshall test tubes has a direct effect on stability and flow. Efficient control of the mixture, the temperature and packing are closely related. Aggregate that is poorly coated due to low temperatures during the mixing process will have a significant effect on subsequent test results.



B0038 Laboratory mixer

The mixer has a capacity of 20 L and is especially designed for the preparation of bituminous mixtures for Marshall tests or other mixtures. The stainless steel bucket is prepared for the installation of a heating system, necessary to knead the mixture while hot. Supplied complete with a speed control device, a bucket and a hook-type paddle.

Dimensions: 260 x 760 x 860 mm

Weight: 160 kg

B0038/1 Electrical blanket with temperature control.

B0038/2 Kneading paddle.

B0038/3 Spiral paddle.

Marshall compaction

Standards UNE EN 12697-10, 12697-30; NLT 159; ASTM D 1559; BS 598

Marshall manual compacting base

B0040 The Marshall manual compaction base consists of a wooden pedestal, a base plate measuring 30 x 30 cm with a mould-holding device and a guide rail for the hammer.

Dimensions: 1580 x 300 x 300 mm

Weight: 45 kg

B0040/1 Marshall Army-type hammer, weighing 4.5 kg and free-fall of 457 mm



Marshall automatic compactor

B0042 The Marshall automatic compactor is designed to eliminate the tedious process of manual compacting. This machine automatically compacts the sample and stops the motor once the number of impacts previously selected on a digital display have been completed.

Power supply: 220 V 50 Hz

Hammer weight: 4.5 kg

Fall height: 457 mm

Dimensions: 320 x 320 x 1600 mm

Weight: 95 kg



B0042/1 Automatic compactor hammer.

B0046 Marshall paper, box 100 filters.

B0043 Marshall mould made from anti-corrosion treated steel.

B0044 Collar to adapt to Marshall mould.

B0045 Base to adapt to Marshall mould.

B0042/2 Soundproof cabin.

B0042/3 Device for the measurement of specimen thickness during compaction, in compliance with UNE EN 12697-10. The device includes a 50 mm transducer with 0.01 mm accuracy and a digital unit that displays the readings in a graph on screen and then transmits them to a PC. Includes software under Windows.

S0024 Manual hydraulic extractor used to extract samples from CBR, Proctor and Marshall moulds.

Hand powered via a hydraulic pump.

Made of galvanised steel.

Supplied complete with Ø 4" and 6" adaptors

Capacity: 50 kN

Dimensions: Ø 300 x 410 mm

Weight: 30 kg



Standards UNE 12697-32

S0293 Vibrating hammer

Test methods for hot bituminous mixtures, part 32.

Laboratory compacting of bituminous mixtures using a vibrating compactor.

Compaction method to prepare for tests on bituminous samples

S0293 Vibrating compacting hammer, complete with mains connection cable and carrying bag. Vibration frequency: 2750 strokes/minute.

Accessories

S0294 Tool tray.

S0295 Tamper, Ø 146 mm, used for CBR, cement gravel tests, etc.

S0299 Support to ensure more complete and uniform compaction.
Built on a steel structure to which the hammer and mould are attached.

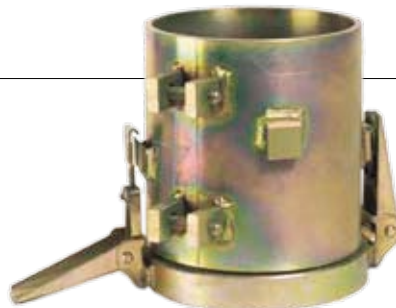
EN 12697/9, 12697/10, 12697/32 – NLT 376 – BS 598:104

B0037 PRD mould (Percentage Refusal Density).

Designed to determine the degree of compaction of bituminous pavement. Manufactured in corrosion resistant steel tubes. The mould is opened by generator and includes two hooks that attach it perfectly to the base.

Dimensions: Ø 152 x 170 mm

Weight: 12 kg



Standards NLT 155;

Marshall specimen curing

B0050 Marshall thermostatic bath to cure specimens.

Built with an internal stainless steel bucket with capacity for 15 Marshall specimens.

Supplied complete with digital electronic thermostat for temperature control between 0 and 100°C

Internal dimensions: 550 x 360 x 200 mm

B0051 Marshall thermostatic bath to cure specimens.

Similar to the previous model but with a capacity for 4 specimens.



Marshall test load frames

Standards UNE EN 12697-34, UNE 103-502; NLT -111; ASTM D1559; AASHTO T245; NF P98/251/2 CNR No.30



Marshall stability

It is vital that stability measurements in specimens tested in a press be accurate if the results are to be representative and uniform. The press and the accessories itemised are designed for fast, easy testing by technicians and to generate a record of the results.

B0055 Marshall motor-driven load frame with a capacity of 50 kN, consisting of two sturdy support columns joined by an adjustable crosshead equipped with a ball joint. The load is applied by a mechanical spindle driven by a gearbox at constant speed and double end-stop. Complete with a control panel, main switch and ramp up / ramp down inverter.

Power supply: 220 V 50 Hz

Test speed: 50.8 mm/min

Horizontal spacing: 290 mm

Vertical spacing: 320 mm

Piston stroke: 65 mm

Dimensions: 470 x 440 x 1300 mm

Weight: 90 kg



Accessories

B0056 Thrust piston threaded on the dynamometric ring.

B0057 Disc extractor piston to remove the specimen from the mould.

B0058 Marshall grip made of cast steel. Supplied with gauge accessory to measure deformation. Internal diameter: 101.6 mm

V0005 Dynamometric ring, 10 kN. Supplied complete with dial gauge, 10 x 0.01 mm

V0006 Dynamometric ring, 30 kN. Supplied complete with dial gauge, 10 x 0.01 mm

V0007 Dynamometric ring, 50 kN. Supplied complete with dial gauge, 10 x 0.01 mm

V0016 Dial gauge, 10 x 0.01 mm adaptable to the Marshall grip.

V0025 Recording of the maximum load reading on the dynamometric ring dial gauge.

V0030 Adjustable magnetic base.



Marshall accessories

S0357 Power channel, consisting of: 5000 kgf load cell. Digital load signal.

This simple device allows us to read the load applied in the various tests more quickly and accurately than with dynamometric rings. It is also equipped with maximum load memory.

S0358 Displacement channel, consisting of: displacement transducer. Digital display of travel or displacement. This device allows us to read displacements (penetration, deformation) of the load plate in the various tests quickly and accurately.

Indicators

CBR, Marshall and CBR / Marshall presses can be equipped with dynamometric rings and dial gauges. They can also be provided with load transducers and deformation meters, in which case the readings are displayed on digital indicators **H0206 Plus** and **H0206/1**.

H0206/1 Digital display

General Characteristics

14-bit Microprocessor board

Backlit alphanumeric LCD display with 9 mm characters.

Two data channels to connect to load, pressure or displacement transducers.

RS232C port to connect to printer or computer.

Saves data in Excel format. (*.xls)

Measurement units available: N; daN; KN; Kg; Nm; g; Kg; bar; mbar; Mpa;

atm; V; mV; mV/V; mm; μ m.

Auto tare key (zero)

Peak activation key.

Key for uploading data to a PC or printer.

PROETI software to save test data and upload them to a PC for printing or storage.



Power supply: 220 V 50/60 Hz

Dimensions: 200 x 80 x 130 mm

Weight: 1 Kg

H0206/PLUS

Digital Force Display Module with Microprocessor **UDI 16/4 PLUS**

16-bit microprocessor board

Back-lit LCD display with 240 x 128 pixel.

Four programmable data collection channels for connection to force, pressure or displacement transducers.

Two RS232C outputs for connection to a printer or PC.

Saves data in Excel format. (.xls)

Measurement units available: N; daN; KN; Kg; Nm; g; Kg; bar; mbar; Mpa; atm; V; mV; mV/V; mm; μ m.

Menu available in 4 languages (Spanish, English, Portuguese and Italian).

PROETI UDI16/4PLUS software for data/curve collection in real time.

Choice of the specimen area to test.

Selection of degree of load (N/s; Mpa/s; kg/cm²s) and tolerance $\pm$ % of value entered

Display of measurement channels selected by the user.

Automatic calculation of Maximum Load (Fm), Unit Load (Rm) and Mean Value.

Storage of data in Excel format.

Allows recorded data to be uploaded to a PC in Excel format (.xls).



Power supply: 220 V 50/60 Hz

Dimensions: 230 x 145 x 180 mm

Weight: 2 kg

H0208 PROETI UDI Software. This software is used for test management and real time display on a PC at the same time, characteristic test curve for load/time or load/deformation (depending on the settings of the **H0206/1** module). The curve data can be saved in Excel format. The software is supplied separately and only runs on the **H0206/1** module.



Marshall test software

The **DATA STORAGE** application is common to all devices. Its user-friendly menus allow the user to choose a pre-defined test or to generate new tests with new control parameters - a useful option for research centres. This application also allows the user to enable, disable or calibrate the sensors.

The software is capable of controlling a large number of tests simultaneously and viewing them in real time. It also has a data recovery system in the event of a power shortage.

The **DATA ANALYSIS** application allows the user to study Marshall test results.

The software supports user selection. The manager generates and defines the tests, and has the capacity to enable and disable the sensors. The operator can only perform the tests, but can not manipulate the settings, thereby safeguarding all the information.

The program can also be accessed remotely.

S0235 Marshall test

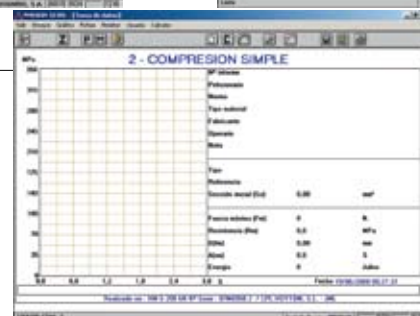
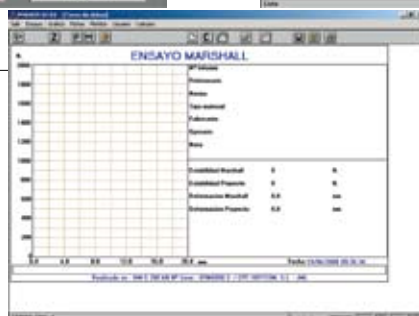
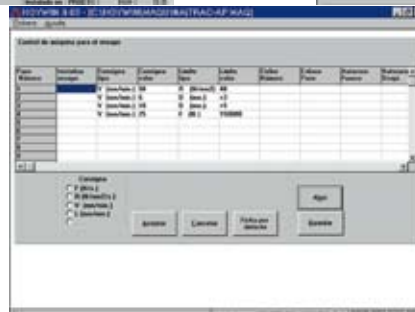
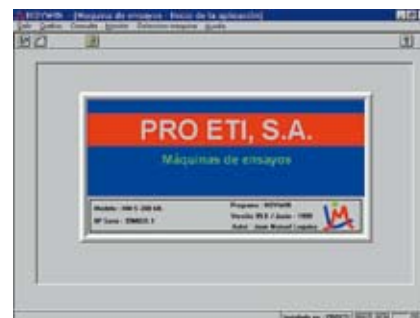
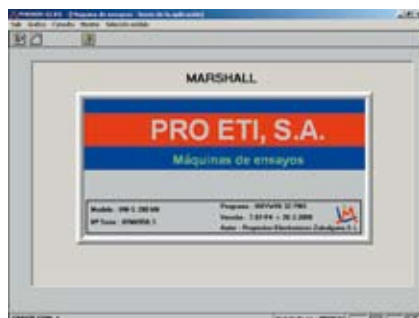
The computerised data acquisition system allows the user to measure, analyse and save test related data. All the operations are guided by a menu for maximum simplicity

The second software option for Marshall presses offered by Proetisa is the software included in the multitest machines.

The computerised data acquisition system allows the user to measure, analyse and save test related data. All the operations are guided by a menu for maximum simplicity

The software allows the user to perform CBR, Marshall, simple compression and CBR tests according to UNE 103502, as well as free tests. The software includes machine control files to control the press load, displacement or both. These files allow the user to program all types of tests.

The software can be used to perform compression tests as well as tensile tests, although the machine first has to be equipped with the necessary accessories.

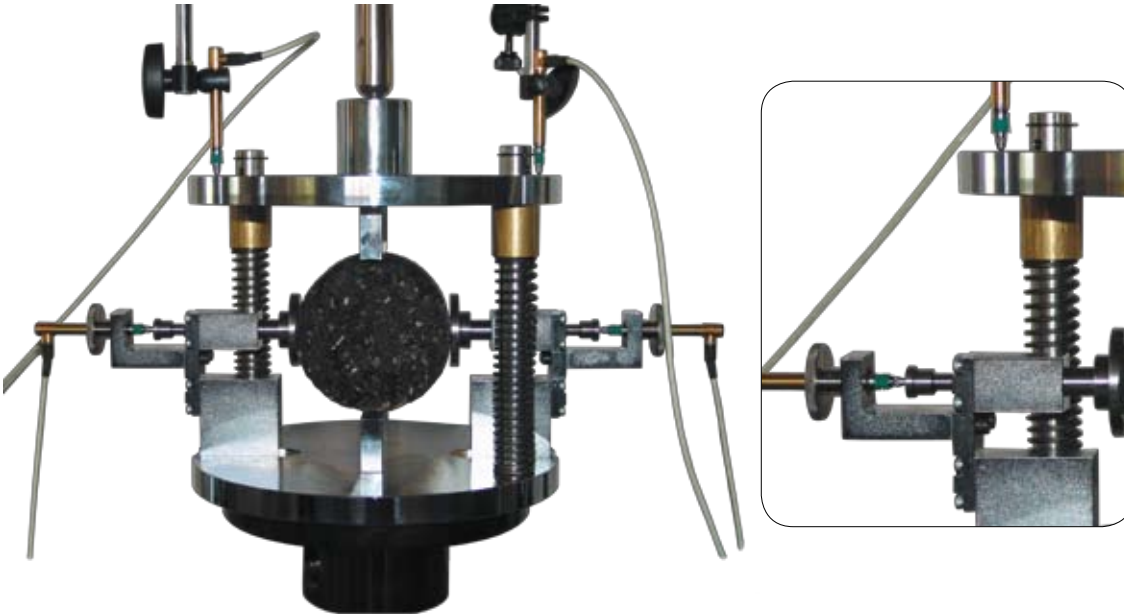


Determining indirect tensile strength

Standards UNE EN 12697-23; ASTM D4123; CNR N.134

B0048 Indirect tensile device.

Used to determine indirect tensile strength of a cylindrical bituminous compound specimen with a diameter 4" or 6". Supplied complete with interchangeable support blades for specimens with diameters of 4" and 6". Anticorrosive cadmium plated.



Dimensions: 248 x 270 mm

Weight: 20 kg

The device uses both LVDTs and standard dial gauges (analogue and digital). The fastening system holds the LVDT without damaging it and without the need for any tools. Sample deformation is transmitted by a disc and spring system.

Apart from the two LVDTs used to measure diameter deformation, one or two LVDTs can be used to measure the axial deformation of the sample. The software can work with two, three or four sensors.

The system is completely exportable to any press.

Equipment necessary for the test:

- S0237/1** LVDT displacement transducer 20 mm linear 0.25%
- S0237/4** LVDT displacement transducer 50 mm linear 0.50% (optional)
- V0030** Adjustable magnetic base. (optional)
- S0200** Data collection unit
- S0235E** Software for indirect tensile tests on aggregates.
- B0055** Marshall Press



Determining water sensitivity of bitumen mixtures



Standards UNE 12697-12

Determining water sensitivity of bitumen mixtures

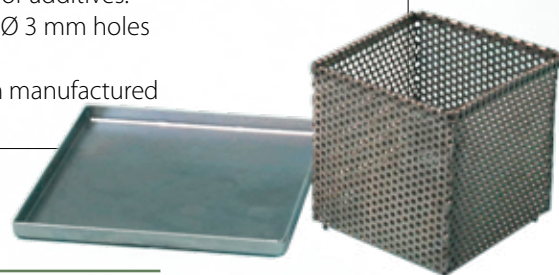
To perform this test, we need a Marshall **B0055** press, a complete indirect **B0048** tensile device and the **B0052** **B0052** Digital water bath with cooling system
Temperature range: + 3 °C to 95 °C
Capacity: 42 L
Internal dimensions: 510 x 350 x 230 mm
 The bath can also be used for Marshall tests

Standards UNE EN 12697-18 - EN 13108

B0059 Metal basket measuring 100 x 100 x 100 mm

To determine the drainage of bituminous samples obtained from various mixtures of aggregates with fine minerals or additives.
 Manufactured in stainless steel plate with Ø 3 mm holes

B0009/1 Tray measuring 160x160x10 mm manufactured in galvanised steel plate.



Hubbard - Field method

Standards NLT 160; ASTM D 1138; AASHTO T 169

Hubbard - Field method

A method used to measure skid resistance of bituminous mixtures and binders passing through a 2 mm sieve.
 The equipment consists of:

- B0065** Cylindrical mould made of hardened steel with 50.8 ± 0.03 mm interior diameter and 120.7 mm high. The recommendation is to have 3 units.
- B0066** Bottom piston made of machined steel, measuring $\varnothing 50.75 \times 50.8$ mm high. The recommendation is to have 3 units.
- B0067** Support made of a square steel section measuring 25.4 x 75 mm long. The recommendation is to have 2 units.
- B0068** Top piston made of machined steel, measuring $\varnothing 50.75 \times 120.7$ mm high. The bottom of the piston is finished in a cylindrical compression plate. The recommendation is to have 3 units.
- B0069** Extractor made of steel.
- B0070** Cylindrical test mould (Type 1), made of special tool steel, with an internal diameter of 51.3 ± 0.05 mm to a height of 38.1mm from its base and gradual increase in its internal diameter to a maximum of 52.3 ± 0.05 mm at the top. Height: 114.3 mm
- B0070/1** Testing ring made of hardened steel, outer $\varnothing$ of $76.7 \pm 0.13 \times 6.4 \pm 0.25$ mm thick, with a round hole of $\varnothing 44.5 \pm 0.03$ mm
- B0070/2** Centring support to maintain the testing ring perfectly adjusted.
- B0071** Cylindrical testing mould (Type 2) with measurements similar to those of Type 1, with an inner coat of hardened steel to reduce wear .



Immersion compression / simple compression bituminous mixtures

Standards NLT 162, 160; ASTM D 1047; AASHTO T 167

Method used to determine the resistance to simple compression of bituminous mixtures. The equipment consists of:

- B0075** Cylindrical steel mould with internal diameter of 101.6 x 177.8 mm high
- B0076** Bottom piston, Ø 101.5 x 50.8 mm high
- B0077** Top piston, Ø 101.5 x 201.6 mm high
- B0078** Support with square section measuring 25 x 75 mm long.
- B0079** Extractor with handles for easy mould removal
- B0080** Funnel



Duriez test

Standards NLT 162, 160; ASTM D 1047; AASHTO T 167

Duriez test

This test is carried out to evaluate the characteristics of bituminous components. The test can be carried out with specimens measuring Ø 80 or 120 mm. Complete Duriez test set for Ø 80 mm, including:

- B0085** Duriez Ø 80 mm mould
- B0086** Demoulding cylinder
- B0087** Piston
- B0088** Base

Complete Duriez test set for Ø 120 mm, including:

- B0090** Duriez Ø 120 mm mould
- B0091** Demoulding cylinder
- B0092** Piston
- B0093** Base



Adhesion test with a Vialit plate

To evaluate the adhesion of bitumen aggregates. This method determines the adhesion of aggregates that are applied to the tread surface of compact asphalt.

Standards UNE EN 12272-3; NLT 313; LCPC

B0097 Vialit test equipment

The equipment consists of a metal base with three pointed vertical rods that support the test plate, one vertical rod 50 cm high with a device on the top for the ball drop, a steel ball weighing 500 g, three test plates and a rubber compacting roller, with a manual pull handle.

Accessories:

B0097/1 500 g steel ball

B0097/2 Metal test tray



Bituminous grout abrasion

This test is carried out to determine the resistance to wear in wet conditions of bituminous grout used in road construction.

Standards UNE EN 12274-5; NLT 320/87; ASTM D 3910

B0100 Bituminous grout abrasion machine

The machine consists of an electric motor with a vertical testing shaft with planetary rotation, abrasion head, specimen immersion bath, testing base measuring Ø 310 x 5 mm thick, three ring moulds and a semi-rigid plastic disc of Ø 300 mm.

Dimensions: 530 x 550 x 800 mm

Weight: 70 kg

Spare parts

B0100/1 Ring mould for testing.

B0100/2 Abrasion head.

B0100/3 Semi-rigid plastic disc.



Bituminous grout consistency

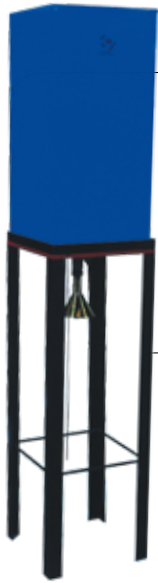
This procedure is used to determine the optimum amount of water needed in grout for the right level of workability.

Standards NLT 371; ASTM D 3910-84

Consistency of bituminous grout with cone

B0105 This equipment is used to determine the consistency of bituminous grout, and consists of a truncated-cone mould with a top diameter of 38 mm, bottom diameter of 89 mm and height of 76 mm, with a top ridge and graduated base 30 x 30 x 3 mm thick with concentric circles.

Resistance to water



Standards NLT 196/84, 321/84/89

B0107 Constant load spray device

The device consists of a water tank, with an appropriate supply and overflow system to maintain a constant load or height of 774.7 mm of water. The spraying device is mounted on the bottom so the water emerges like rain.

The tank is placed on the four legged metal frame at a height of approximately 1 m.

Dimensions: 1580 x 330 x 330 mm

Weight: 45 kg

Indentation tests in cubic or Marshall specimens

Standards UNE 12697-20

Indentation tests in cubic or Marshall specimens

B0063 Asphalt indentation penetrometer

Equipment consisting of a robust steel frame with a screw on which the weighting discs are placed, two penetrating pistons of 1 and 5 cm² surface area, a 30 x 0.01 mm dial gauge, two plexiglass discs weighing 500 N (51 kg) placed on the load device, stainless steel bath. The device has a discharge tap and an outboard thermostat with electronic temperature control (the moulds and buckets are not included, see accessories).

Dimensions: 530 x 600 x 820 mm

Weight: 160 kg

Accessories:

B0059/1 70.7 mm sample-making mould, easy to disassemble, made of steel.

B0059/2 69 mm bucket for use during the indentation test, made of aluminium.

B0059/3 Steel base to attach the Marshall mould to the device.

B0059/4 Penetrometer calibration device.



Specimen recovery method using volume calculation



Standards UNE 12697-20

B0064 Vacuum pump method recovery equipment

Device consisting of an electronically controlled thermostatic bath, two 250 mL flasks, an adjustable vacuum pump and a Kitasato flask with vacuum connections.

Resistance to plastic deformation (Wheel Tracker Machine)

Standards EN 12697-22; BS 598: Part 110: 1996; Austroads 01:2004

Wheel Tracker machines according to European standards

The wheel tracker machine is used to evaluate the resistance to permanent plastic deformation of bituminous materials under conditions that simulate the effect of traffic. A loaded wheel passes over a specimen under specific load, speed and temperature conditions and the wheel tread is controlled continuously during the test. The test samples can be specimens that are prepared with a compactor or 200 mm diameter samples.

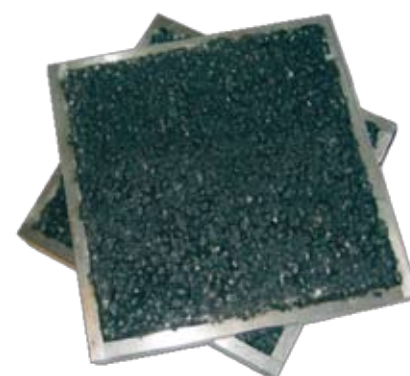
Standard EN 12697-22 describes two testing methods and both can be performed with this wheel tracker machine. Procedure B of this standard is the more common nowadays. It is regarded as more exact for the measurement of permanent deformation depth at 25 points along the trajectory of the wheel. Only two specimens need to be tested to obtain results for a given material. Proetisa offers a new variant of the wheel tracker machine that tests two specimens at the same time, with the benefit that the test conditions are entirely identical.

The wheel tracker machine is used to

- Identify asphalt mixtures vulnerable to permanent deformation.
- Evaluate new materials and formulas.
- Study the effect of compaction (mixture density and empty content) on resistance to permanent plastic deformation.
- Validation of mixture designs.

Characteristics:

- Easy to use software running under Windows.
- Integrated temperature control chamber.
- Test temperature between 30 °C and 60 °C
- Tests for a specific number of steps or specific tread depth.
- Double-pane glass doors for better test observation.
- Specimen conditioning at test temperature.
- Automatic test start/stop and temperature control.
- The machine is delivered with a calibration certificate.
- The slabs can be compacted by the compacting roller and tested by the wheel tracker machine without removing them from the mould.



Wheel Tracker machines according to European standards

Equipment components

The WTEN1 equipment consists of an outer solid aluminium structure that holds a stainless steel temperature control chamber controlled by PID; the double-pane glass door offers complete access to the wheel tracker machine.

The test slab is placed on a table that moves over a distance of 230 mm on support tracks at a pre-defined speed. A wheel covered in solid rubber passes over the slab; as the test progresses, the depth of the track caused by deformation is determined by a calibrated displacement transducer. The equipment is monitored and the test data are collected by an interface unit using the software.

The software automatically starts the wheel tracker machine, maintains the required speed, measures the progress in the depth of the permanent deformation and temperature of the slab, provides a continuously updated screen graph of the deformation/depth of the track versus time and stops the wheel tracker machine when the test ends. When the test ends, the permanent deformation speed is calculated and a test report can be printed using the software. If necessary, an Excel worksheet can be used to analyse and compare the saved data with other data.

Software is included for verification of transducers, diagnosis routines and PRT calibration, etc.

The WTEN2 device (B0111) tests two specimens at the same time. It is wider than the WTEN1 (B0110) and the user can access it from both sides.

We also manufacture a wheel tracker machine similar to the one designed by LCPC, described in EN12697-22 and EN13108-20.

Technical characteristics

Speed range: 42 to 52 passes per minute

Wheel load: 520N or 700N

Temperature range: +30°C to +60°C $\pm$ 0.2 °C

Slab thickness: 50mm - 100mm

Permanent deformation depth: 0mm to 40mm

Data collection: National Instruments

User languages: Spanish, English, French, Russian, Polish, Hungarian, Rumanian

Power supply:

220 - 240 50-60 Hz / 13 A - 110 -120 50-60 Hz / 32 A

Models:

B0110 WTEN1 one position wheel tracker machine

B0111 WTEN2 two position wheel tracker machine

Dimensions:

B0110: 1580 x 660 x 1730 mm

B0111: 1580 x 860 x 1730 mm

Weight:

B0110: 550 kg

B0111: 680 kg

B0112 Large CRT-WTENLD Wheel Tracker Machine

A wheel tracker machine for large scale measurement of resistance to deformation in bituminous mixtures using the methods described in Standard EN 12697-22, i.e., for loads over 13 tons.

The equipment consists of a solid aluminium structure that houses a stainless steel chamber that controls the temperature by means of a PID (from + 30 °C to + 60 $\pm$ 1 °C around the slab). A double-pane glass door offers complete user access.

The test slabs are placed on a table and apply a load of 5000 N $\pm$ 50 N. Both load and load conditions can be changed during the test. Two tyres move making a sinusoidal movement back and forth over a distance of 410 mm. The frequency is normally 1 Hz but it can be adjusted.

The equipment is monitored and the data is collected by an interface unit. The operator controls the machine with an IBM PC or XP that runs the software. It also includes a depth gauge to measure local deformation.

Software

The software automatically starts the wheel moving and pushes the slabs against it. The graph on the screen shows updated deformation/depth of the track versus time and stops the machine at the end of the test. The readings are saved automatically. Finally, the progress of the track graphs can be seen in 3D. When the test ends, the saved data can be analysed in an Excel worksheet or printed in a report.

Power supply: 220-240 AC supply of 13A

Dimensions: 2070 x 1550 x 1800 mm h

Weight: 1000 kg



Servo-pneumatic Testing System

Standards EN 12697- 24, 12697- 25, EN 12697- 26; ASTM D4123, D3497; AASHTO TP31, TP8, TP62, TP46, T307; BS DD 226; NCHRP 1-28A

B0115 Universal machine for servo-pneumatic asphalt tests

This machine has a high-precision servo-valve, as well as a low friction actuator (especially adapted) and sophisticated data collection capabilities that guarantee operation to match many servo-hydraulic systems.

In conjunction with advanced Windows software, this system generates the wave shapes applied by the actuator in digital form so the materials are tested under conditions similar to those applied by static or moving vehicles. The actuator works in two directions so it can apply both compression and tensile loads. This provides high quality control over the shape of the load wave and allows the user to apply tensile and compression loads cyclically at high frequencies. The majority of these international standards are available in software. If necessary, the users can use the Labview software platform to develop their own applications.

Characteristics

Digital control system

Operation at frequencies as high as 70Hz static 14 kN by 7bar (static 19 kN by 10 bar) 9 kN in 2.5Hz for modulus tests (sufficient for most high modulus materials)

Internal displacement transducer for exact position control

Data collection and control system with 16 bit digital servo-control precision.

Load and strength transducers calibrated in accordance with standards.

Transducers available for triaxial, modulus and permanent deformation tests.

A wide range of accessories for tests are available for asphalt mixtures and non-binded materials.

Usually delivered with our temperature control chamber (- 10 °C to + 60 °C, ± 0.2 °C)

Software to perform North American and European tests

Universal test software routine

The CRT-NU14 can be used to:

Design mixtures

Determine finished product specifications

Evaluate new materials

Investigate cracks

Evaluation of pavement – Quality control

The equipment consists of:

The CRT-NU 14:

Stainless steel testing frame with a height-adjustable crosshead.

Pneumatic actuator with a pneumatic servo-valve and integrated displacement transducer (maximum static load 14 kN).

Load transducer (capacity 20 kN).

Data collection and control system includes:

Power supplies

Signal conditioning for the load transducer for 2 thermocouples and 2 displacement transducers (2 additional displacement transducers optional).



Universal machine for servo-pneumatic asphalt tests

Servo-amplifier for PID control of the servo-valve.

High speed multifunction board, 16 bit analogue to digital, 12 bit digital to analogue, digital input-output for closed loop computerised control of the system (National Instruments).

The pneumatic components include a filter, regulator and piping, all the electric and signal cables, thermocouples, software and instruction manual.

Software

Easy to use software under Windows, written in Visual Basic and Labview by National Instruments, allowing the user to set the parameters for his own test applications, supported by powerful development software.

Complete flexibility for test data results on screen with progress display, dials and a large selection of linear or algorithmic graphs.

The test results can be saved in MS Excel compatible format.

Static, sinusoidal, square, triangular load models or user-defined models.

To operate correctly, the software must be installed in a PC compatible with Windows XP or higher.

Specifications

Maximum load: 14 kN by 7 bar and 19 kN by 10 bar

Load transducer: ± 20 kN (3 m V/V)

Piston stroke: ± 15 mm

Piston frequency: Static up to 70 Hz

Data collection: National Instruments

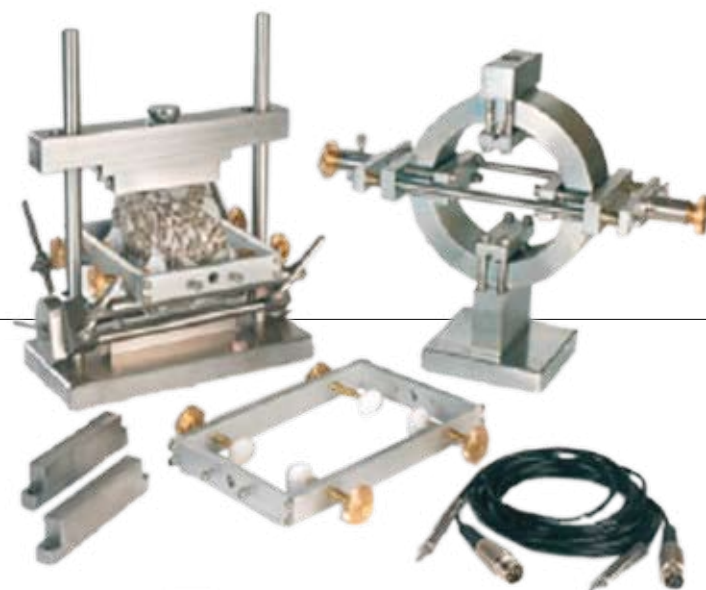
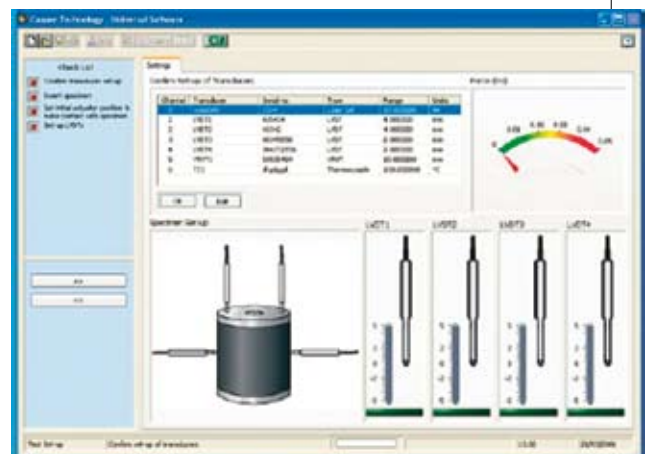
User languages: Spanish, Portuguese, English, French, Italian, German, Russian, Polish, Hungarian and Rumanian

Power supplies: 220 - 240 / 13 A supply at 220 - 240 50-60 Hz / 13 A - 110 -120 50-60 Hz / 32 A

Dimensions: 340 x 320 x 700 mm

Weight: 30 kg

The equipment requires the use of an air compressor at 14 bar, 150 L and 3 Hp



Temperature control during the test

B0125 Temperature control chamber

When tests are performed on asphalt mixtures, temperature control is essential. Test data show that a 1% change in temperature can cause a 10% variation in rigidity results.

This chamber allows the user to control the temperature by 0.2 °C between -10 °C and + 60 °C using the CAL3200 digital temperature controller. Forced air circulation ensures uniform temperature inside the chamber. The condensed water circulates through a pipe behind the chamber to a heated tray underneath, where it evaporates.

The chamber also has a device to prevent high temperatures that stops the fans, heating and cooling and lights up a pilot light if the temperature is higher than that indicated by the system. The front door is all double-thickness glass and has a heating element so is always clear.

Specifications

Temperature range: -10 °C to + 60 °C

Cooling capacity: 560 W

Heating capacity: 1.5 kW

Connection: 230 V

Volume: 625 litres

Dimensions: 800 x 710 x 2000 mm

Weight: 195 kg



Universal servo-hydraulic systems

Standards ASTM D4123; BS DD 226; EN 12697 -26; BS DD 213; EN 12697 -24; ASTM D3497; AASHTO TP31; EN 12697 -25; AASHTO TP8; ASTM D3999; AASHTO P46; ASTM D5311; AASHTO T307

Universal servo-hydraulic systems

B0116 Universal servo-hydraulic testing machine

This machine can test a range of bituminous pavement mixtures, sub-grade soils and sub-base granular materials. Its maximum load capacity is more than 25 kN for high rigidity mixtures. The apparatus is inexpensive, easy to use and does not require very much maintenance. It was designed to provide laboratories with a means to perform a wide range of tests on asphalt mixtures and non-binded materials.

Characteristics

High frequency cycles.

Closed loop controlled system.

Internal displacement transducer for exact position control. Transducers available for triaxial, modulus and permanent deformation tests.

A wide range of accessories for tests area available for asphalt mixtures and non-binded materials.

Tests on samples with diameters of 100 mm and 150 mm.

Delivered with our temperature control chamber (- 10 °C to + 60 °C, ± 0.2 °C).

Software to perform North American and European tests.

Free software updates.

Universal test software routine.

The machine can be used to:

Design mixtures

Determine finished product specifications

Evaluate new materials

Investigate cracks

Evaluate pavement – Quality control

The CRT-HYD25

A sophisticated system of data collection and control is used to generate wave-forms digitally so that materials are tested under conditions similar to those applied by static or moving vehicles.

The load frame is manufactured inside a temperature control chamber and the cross beam supporting the subsystems can be adjusted to the desired height.

Servo-hydraulic system with digital control.

Very sturdy 25 kN load structure with vertical bars.

Temperature control chamber with double-thickness glass door (- 10 °C to + 60 °C, ± 0.2 °C)

All the transducers have linear signal conditioning and range of results ± 10 V

Transducers are calibrated in accordance with national standards.

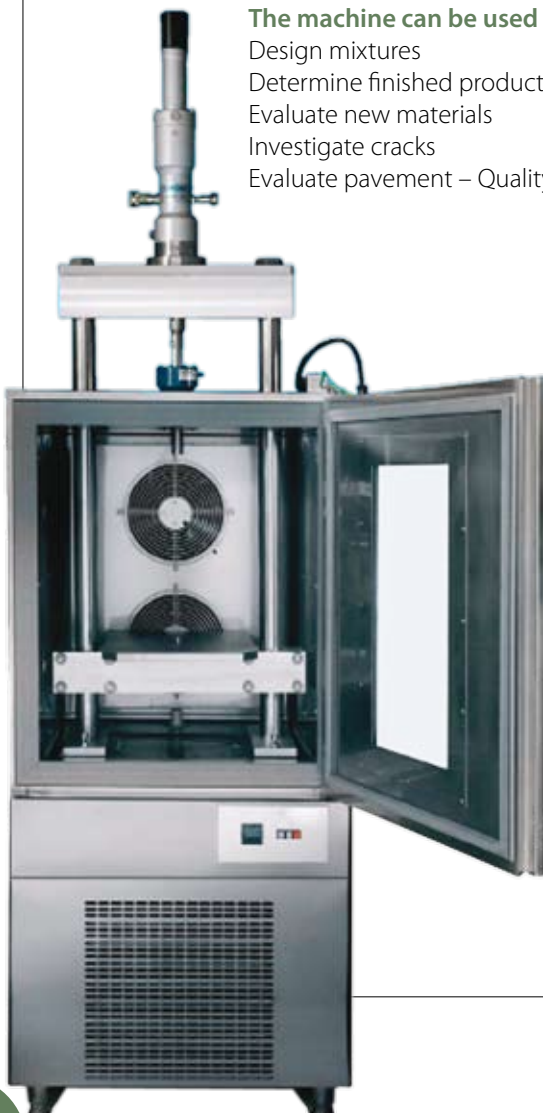
Wide range of accessories and triaxial cells for specimens of non-binded materials with 100 and 150 mm diameters.

Data collection and control system with digital 16 bit servo-control using any input channel.

Programmable PID control.

Up to 16 channels with 16 bit input.

Software and instruction manual.



Software

Software

Easy to use software running under Windows, written in Visual Basic and Labview by National Instruments, allowing the user to set the parameters for his own test applications, supported by powerful development software.

Complete flexibility for test data results on screen with progress display, dials and a large selection of linear or algorithmic graphs.

The test results can be saved in MS Excel compatible format.

Static, sinusoidal, square, triangular load models or user-defined models.

Specifications

Maximum load: 25 kN

Load transducer: ± 25 kN

Piston stroke: ± 50 mm

Piston frequency: Static up to 70 Hz

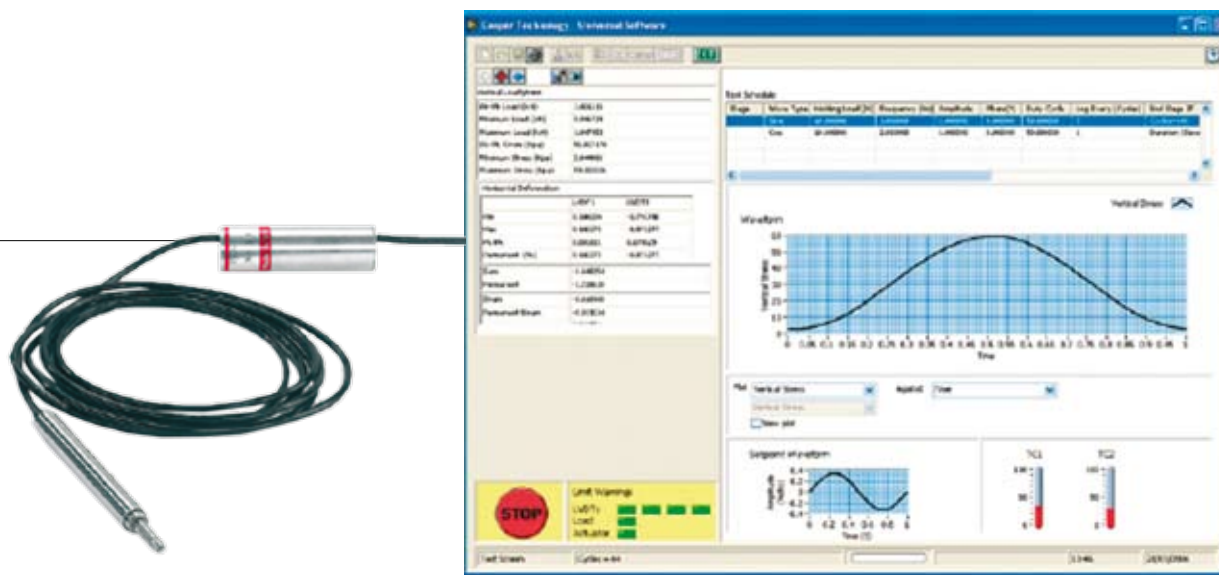
Data collection: National Instruments

User languages: Spanish, Portuguese, English, French, Italian, Russian, Polish, Hungarian

Power supplies: 220-240 / 13A - 110-120 / 3A supply of 220 - 240 50-60 Hz / 13 A - 110 -120 50-60 Hz / 32 A

Frame Dimensions: 780 x 840 x 2700 mm

Frame weight: 780 kg



Fatigue test

Standards EN 12697-24, EN 12697-26; AASTHO TP8

B0118 Fatigue testing equipment

This system for testing fatigue on four flexure points on a beam is completely autonomous and uses cutting-edge technology as described by the new European standard.

The equipment consists of:

Sturdy stainless steel and anodised aluminium structure.

Pneumatic actuator with a servo-valve and integrated displacement transducer (Dynamic load 5 kN)

Load transducer (capacity ± 5 kN).

Characteristics:

Data collection and control system includes:

Power supplies.

Signal conditioning for the load and displacement transducers and LVDT actuator.

Digital signal processor control unit for high speed data collection and PID control of the servo-valve.

Real time high speed controller, 16 bit analogue to digital, 16 bit digital to analogue and digital input-output unit for the closed loop computer control system.

Pneumatic components including filters, regulator and pipes.

Power and signal cables.

Machine test and diagnosis software.

Specifications

Maximum load: 5 kN

Piston stroke: ± 15 mm

Static piston frequency up to: 100 Hz

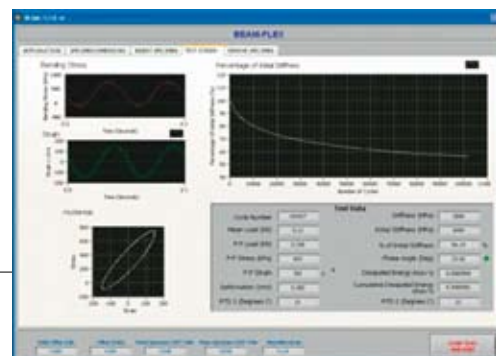
National Instruments data collection

User languages: Spanish, Portuguese, English, French, Italian, Russian, Polish, Hungarian

Power supplies: 220 - 240 50 - 60 Hz / 13 A - 110 - 120 50 - 60 Hz / 32 A

Dimensions: 340 x 320 x 700 mm

Weight: 30 kg



Roller compaction

Standards UNE 12697-33

B0120 Roller compactor

Roller compaction is considered the best method for laboratory preparation of samples from manufacturers that make asphalt pavement slabs with the properties closest to the conditions of road materials.

The pneumatic roller compactor was designed to provide a solution for the problem of manufacturing homogeneous slabs in a laboratory that are large enough to be used in the wheel tracker machine. It is used to compact to a certain mixture density or to apply standard compression stress (compaction energy) in a wide range of bituminous materials.

The samples can be between 50 and 100 mm thick. We have a complete selection of moulds. The roller compactor can apply loads of up to 30 kN on a width of 305 mm, equivalent to heavier onsite compaction equipment. The roller compactor is controlled by a PLC and both the number of steps and the level of compaction can be selected. A safety cabin protects the equipment, which will not run unless the access doors are closed.

The equipment can compact square samples measuring 305 x 305 mm, and it is also designed to compact samples of 305 x 405 mm, so that prisms can be obtained for the fatigue test.

The Roller Compactor **B0121** can compact samples measuring 500 x 180mm

Maximum load: 30 kN over a roller width of 305mm at 7 bar (38kN at 9 bar)

Carriage travel: Ø 150 mm

Time cycle: variable up to 10 cycles/minute

Vibration frequency: 0 – 50 Hz

User languages: Spanish, English, French, Polish

Power supply: 220-240 AC supply of 13A

Dimensions: 1600 x 1000 x 1520 mm h

Weight: 596 kg



Accessories to use with the B0120 roller compactor or Wheel Tracker machine:

- B0120/1** Mould for the compactor or Wheel Tracker machine, dimensions 305 x 305 x 50 mm
- B0120/2** Mould for the compactor or Wheel Tracker machine, dimensions 305 x 305 x 100 mm
- B0120/3** Mould for the compactor, dimensions 305 x 405 x 50 mm
- B0120/4** Mould for the compactor, dimensions 305 x 405 x 100 mm
- B0120/5** Insert to adjust mould depth, dimensions 305 x 305 x 10 mm
- B0120/6** Insert to adjust mould depth, dimensions 305 x 405 x 10 mm

B0121 Roller compactor

Similar to model B0120 except that it compacts samples measuring 500 x 180 mm

Maximum load: 30 kN over a roller width of 305mm at 7 bar (38kN at 9 bar)

Carriage travel: Ø 150 mm

Time cycle: variable up to 10 cycles/minute

Vibration frequency: 0 – 50 Hz

User languages: Spanish, English, French, Polish

Power supply: 220-240 AC supply of 16A

Dimensions: 1920 x 1150 x 1520 mm h

Weight: 610 kg

*This equipment requires the use of an air compressor

Accessories to use with the roller compactor or Wheel Tracker machine:

B0121/1 Steel mould for the compactor or Wheel Tracker Large machine, dimensions 500 x 180 x 50 mm

B0121/2 Steel mould for the compactor or Wheel Tracker Large machine, dimensions 500 x 180 x 100 mm

B0121/3 Steel mould for the compactor or Wheel Tracker Large machine, dimensions 600 x 400 x 100 mm

B0121/4 Steel base for the compactor to level the surface of the sample, dimensions 500 x 180 x 10 mm

B0121/5 Steel base for the compactor to level the surface of the sample, dimensions 600 x 400 x 100 mm



Gyratory compactor

Standards UNE EN 12697-10, 12697-31

Gyratory compactor

The gyratory compactor is manufactured in a high strength, sturdy steel frame.

The loads are applied by a pneumatic cylinder controlled by a high precision pressure regulator. Height is measured by a linear displacement transducer. The rotating movement is generated precisely with an eccentricity having an angle of rotation of 0.082 °C.

The compactor is small but can be used to test all emulsion types. Speed is controlled by a computer which also controls the inverter.

The test software allows the user to choose from several test methods with different density objectives or a specific number of rotations. The software gives the instruction to apply the load and rotation begins. The number of rotations, compaction depth and density are all displayed on the screen. At the end, the software retracts the load and stops the rotation. A high speed USB port connects the compactor and the computer.

The system includes National Instruments software, data collection card and equipment control.

The **B0122/11** software requires a computer with Windows XP. The computer is not included and can be ordered separately.

Technical characteristics:

Voltage: 230 AC / 13 A – 115 V, 50-60Hz 32 A (also available)

Dimensions: 500 x 800 x 2000 mm

Work space needed: 750 x 1700 x 2000 mm

Weight: 350 kg

Requires a compressor that can reach and maintain a pressure of 7 bar (150mm specimens)

Accessories:

B0122/1 Hardened cylindrical mould and plate measuring Ø 100 mm

B0122/2 Hardened cylindrical mould and plate measuring Ø 150 mm

B0122/3 Hardened cylindrical mould and plate measuring Ø 100 mm, with holes for emulsions.

B0122/4 Hardened cylindrical mould and plate measuring Ø 150 mm, with holes for emulsions.

B0122/5 Filter paper of Ø 100 mm (pack 100 units)

B0122/6 Filter paper of Ø 100 mm (pack 150 units)

B0122/7 Pneumatic sample remover.

B0122/8 Angle calibration equipment.

B0122/9 Load calibration equipment.

B0122/10 Air compressor, low noise (filter included).
230V 50Hz

B0122/11 Test management and control software



Samples, preparation and tests

Preparation and care in sampling is absolutely essential to ensure precise, reliable test results. Samples are generally taken to verify the average quality of a delivery or to check uniformity of quality over a whole batch.



Standards ASTM D 140; AASHTO T40

B0130 Bacon sampler

This sampler has a capacity of 237 mL and is used to obtain asphalt samples at various depths within a deposit. The sampler consists of a cylindrical body with top and bottom lids and a conical plunger that acts like a valve when taking in the sample. The top lid has a closing mechanism that keeps the plunger closed once the sample has been taken. Both the upper and middle part of the sampler have holes for tying a string (not included) to hold the sampler while taking the samples.

Dimensions: Ø 50 x 250 mm

Weight: 1 kg

Standards NLT 155; ASTM C188, C189; BS 812

Relative density of the filler

B0135 Pycnometer with capacity of 250 mL made of glass with three concave areas at the bottom for improved stirring of the sample in the container. Provided with a funnel for easy introduction of the sample into the pycnometer.

Total length: 255 mm



Standards NLT 122; ASTM D70; AASHTO T22; ISO 3838; BS 4699

Relative density

B0138 Hubbard-Carmick type pycnometer with 25 mL capacity

B0139 Hubbard-Carmick type pycnometer with 24 mL capacity

V5561 Gay-Lussac type pycnometer with 25 mL capacity



Determination of Loss on Heating

This method is used to determine the effect of heat and air on a film of bituminous material in motion.

Standards UNE EN 12607-2; 13303; NLT -128, 147; UNE 104.281; ASTM D6, D1754; AASHTO T179; BS 2000

Oven with rotating shelf

B0150 An oven used to determine weight loss, with a thermally insulated internal chamber made of stainless steel. The door is airtight, with a double panel and a window measuring 220 x 230 mm with double tempered glass. The temperature is controlled by a microprocessor with a digital display from room temperature to 200 °C.

A Ø 250 mm aluminium rotating platform holds up to 9 test capsules measuring Ø 55 x 35 mm that rotate at between 5 and 6 rpm.

The oven is delivered with 9 test capsules and an ASTM 13C thermometer.

Power supply: 220 V 50 Hz

Internal dimensions: 660 x 450 x 420 mm

Overall dimensions: 1120 x 775 x 630 mm

Weight: 62 kg

Spare parts

B0150/1 Aluminium rotating shelf.

B0166/5 Brass container Ø 55 x 35 mm

B0150/3 Aluminium rotating plate with two Ø 140 x 9.5 mm containers to determine the thin film, in compliance with EN 12607-2



Flash point and ignition point

Standards NLT -185, 186; ASTM D2872; AASHTO T240

B0151 RTFOT - ASTM Oven

An oven built entirely of stainless steel and thermally insulated with fibre glass, used to determine the effect of heat and air on rotating bituminous materials in the form of a fine film; an airtight door with double panels and double tempered glass for inspection. A vertical Ø 305 mm aluminium rotating platform holds up to 8 glass capsules that rotate at 15 ± 0.2 rpm.



Supplied complete with digital, electronic precision temperature control to keep the temperature constant at 163°C , control thermometer, ventilation system and glass capsules.

Power supply: 220 V 50 Hz 1300W

Dimensions: 620 x 620 x 910 mm

Weight: 60 kg

Spare parts

B0151/1 Glass container Ø 64 x 140 mm

V1013 ASTM 13C thermometer, range 155 to 170°C



Standards EN 12607-1

B0151 RTFOT - EN Oven

Similar to model B0151 except for the test chamber, that has been modified to meet the specifications of Standard EN 12607-1.



Bitumen distillation

The test consists of distilling a sample under specific conditions, collecting and measuring the amount distilled at previously specified temperatures. The final distillation residue and the distillation fractions can be determined later by appropriate testing.

Standards UNE EN 13358; NLT 134; UNE 7.112; ASTM D402; AASHTO T78

B0155 Equipment for distilling fluidified bitumen

Complete delivery includes the following equipment:

- B0155/1** Distillation flask, capacity 500 mL
- B0155/2** Flask protection device.
- B0155/3** Glass cooler.
- B0155/4** Extension with 105° angle
- V1008** ASTM 8C thermometer (- 2 + 400 °C)
- B0155/5** 100 mL specimen
- B0155/6** Container for residue 75 x 55 mm
- V0290** Bunsen gas burner.
- V0223** Ring with bosshead to hold the flask.
- V0191** Plate base support (2)



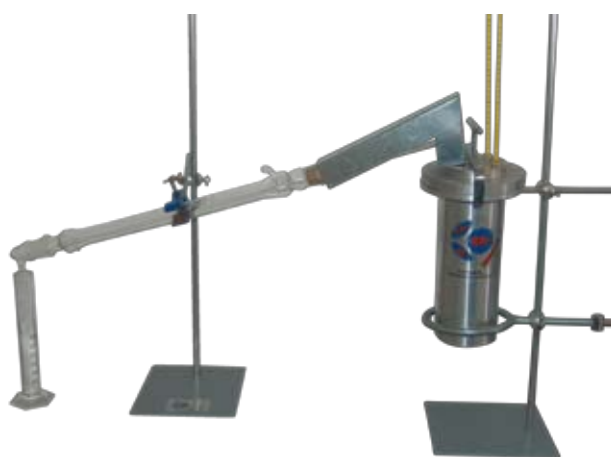
Standards UNE EN 1431; NLT -139; ASTM D244; AASHTO T59

Asphalt emulsion distillation residue

- B0157** Complete equipment to determine distillation residue, including the following components:
- B0157/1** Distillation retort.
- B0157/2** Butane gas ring burner, Ø 120 mm
- B0157/3** Glass elbow release tube.
- B0157/4** Zinc protector.
- B0157/5** Glass cooler.
- B0155/5** 100 mL specimen
- V0290** Bunsen burner
- V0223** Ring with bosshead to hold the retort
- V0191** Plate base support (2)

Accessory:

- V1007** ASTM 7C thermometers (2) (- 2 + 300 °C)



Standards NLT -189

Tar distillation

- B0159** Tar distilling equipment, compete with the following components:
- B0155/1** Distilling flask.
- V1008** Thermometer - 2 + 400 °C.
- B0155/2** Flask protection device.
- B0159/3** Glass cooler Ø 20 x 600 mm
- B0159/2** 25 mL specimen
- B0155/5** 100 mL specimen
- V0290** Bunsen burner
- B0159/1** Metal support with clamp



Softening point

Bituminous binders do not change from a solid state to a liquid state at any specific temperature. However, if special care is taken in increasing the temperature applied to a binder sample, we can define the temperature at which the binder will flow for a specific distance. Therefore, the consistency and quality of the binder can be determined.

Standards NLT -125; ASTM D36, E28; AASHTO T53; DIN 52011; EN 1427

B0160 Complete ball and ring apparatus

Designed to determine the softening point of bitumen, consisting of: two test balls, two rings, two centring guides, a height-adjustable lid and a heat resistant beaker.

Accessories

- V0912** Thermometer 0 - 100 °C
- V0914** Thermometer 0 - 200 °C
- V1015** ASTM 15C thermometer
- V1016** ASTM 16C thermometer
- B0160/5** Magnetic stirrer, with heater.
- V0290** Bunsen burner
- V0207** Metal fabric with ceramic fibres, 100 x 100 mm
- B0160/6** Disposal plate measuring 50 x 75 mm with edges

Spare parts

- B0160/1** Test ball
- B0160/2** Centring guides
- B0160/3** Brass ring
- B0160/4** Ball and ring heating plate



Standards ASTM D36, E28; IP58; DIN 52011; EN 1427; NFT 66008; ISO 4625

B0160 Automatic ball and ring apparatus

Equipment with two independent test cells for double determination of bituminous material softening points, wax, rubber, adhesives and similar products, in a temperature range from 0 to 250 °C, using distilled water (up to 85°C), glycerol (from 80 to 157°C), ethylene glycol (from 30 to 110°C), paraffin, mineral oil or silicone oil (from 80 to 199°C). The test method consists of placing two horizontal cast bitumen discs in brass rings and heating them in a bath under controlled conditions (4.5 to 5.5 °C per minute) while each holds a steel ball. The temperature values for stirring, detection and safety are automatically controlled, recorded and displayed on the equipment processing unit or a computer.

Technical specifications

- Complete equipment in compliance with standards, including complete diagnosis.
- Choice of selection method.
- Indication and program for monitoring, sample and results
- Print out of results, testing data and control of heating at the end of the test.
- RS 232 C port for PC and parallel connection with 25 pin connection for a printer.
- Supplied with ticket printing, PC connection and power supply cables.
- Stirrer with two programmable speeds and four blades to ensure good temperature stability.
- Drop detection via light screen and sensitivity adjustment by software.
- Programmable sample temperature settings at the beginning and the end of the test.
- Drain system in case of beaker rupture.
- Sample temperature measurement by 4 PT100 glass probes (1/10 °C).
- Compact keyboard on the front panel of the upper module.
- Electronics insulated from hot and mechanical components.
- Automatic calibration software and test parameter file.

The equipment is supplied complete with RS 232C ports, standard beakers, two rings with protruding edges, a set of 10 balls, support for two samples, PT 100 temperature probe, stirring blade, electric stirrer support and automatic fan cooling system.

Power supply: 230 V 50/60 Hz single phase

Consumption: 1200 W

Dimensions: 260 x 535 x 500 mm

Weight: 20 kg



Bitumens and bitumen binders

Determining rupture behaviour.

Determining the mixing time for fine aggregates with cationic bituminous emulsions.

Standards EN 13075-1

B0162 Equipment for manual determination of cationic emulsion rupture values

Consisting of:

- Complete dispenser funnel with base plate support, chatteway spatula and two porcelain capsules.



Penetration

This test is used to determine the penetration value of bituminous materials. Penetration is understood as the depth in tenths of millimetres to which a needle of specific characteristics penetrates vertically in a material sample under precise load, time and temperature conditions.

Standards UNE EN 1426; NLT 124; UNE 104281-1-4; ASTM D5, D217; AASHTO T49; BS 2000

Penetration

B0165 A standard penetrometer to determine the consistency of a sample of bituminous material, under fixed load, time and temperature conditions. A sturdy piece of apparatus with a light alloy base plate, adjustable legs, chrome displacement bars and height adjusting device. The probe is free-fall, made of brass. The Ø 150 mm quadrant is divided into 360 degrees of 0.1 mm. Supplied complete with a release and stop push button, automatic zero reset, displacement control, set of 50 and 100 g weights, penetration needle and Ø 55 x 35 and 70 x 45 mm brass containers.

Dimensions: 220 x 170 x 410 mm

Weight: 11 kg



B0166 A standard digital penetrometer to determine the consistency of a sample of bituminous material, under fixed load, time and temperature conditions.

Apparatus with characteristics similar to the **B0165** model except for an electromagnetic control system that allows the penetrating head to fall automatically so the needle free-falls during the five second duration of the test. Supplied complete with a set of 50 and 100 g weights, penetrating needle and Ø 55 x 35 and 70 x 45 mm brass containers

Power supply: 220 V 50 Hz

Dimensions: 220 x 280 x 410 mm

Weight: 15 kg



Penetration (accessories)

Accessories:

B0166/1 Thermostatic bath with digital temperature reading.

Supplies water at the required temperature (25 ± 0.1 °C). Made from stainless steel, with a capacity of 10 L, insulating fibre and digital thermostat heating. Recirculation water pump with connections and cooling coil.



Power supply: 1 x 220 V.50/60 Hz

Dimensions: 375 x 335 x 420 mm

Weight: 12 kg

B0166/2 Mirror, for easy control of the needle with the test specimen.

Spare parts:

B0166/3 Penetrating stainless steel needle.

Diameter: 1 mm

B0166/4 Glass transfer disc with support.

B0166/5 Brass container, Ø 55 x 35 mm used for hard bituminous materials.

B0166/6 Brass container, Ø 70 x 45 mm used for light bituminous materials.

V1017 ASTM 17C thermometer (+19 °C to +27 °C)



B0165/1 Water bath with thermostatic coil included

The unit is used with the B0166/1 bath. It maintains the temperature of the bituminous sample directly over the penetrometer, preventing its transfer.

Flash point and ignition point

This method is used to determine the flash and ignition points of the bitumen, measuring the temperature at which the bitumen should be heated under certain test conditions to produce a specific amount of vapour that forms an inflammable mixture with air.

Standards UNE 51023; NLT -127; ASTM D92; AASHTO 48; BS 4689; IP 36/67

Cleveland Apparatus

B0145 Cleveland Apparatus with electrical heating, complete with aluminium container, thermometer from - 6 to + 400 °C, electric thermoregulator, heating plate, rod and thermometer clip.

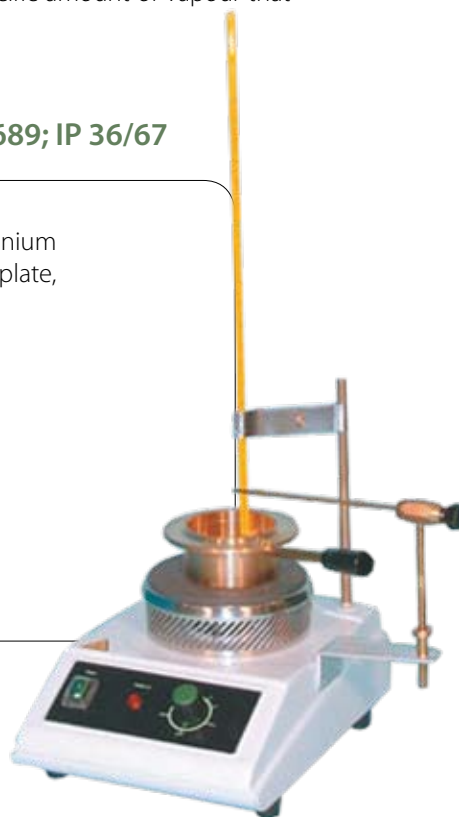
Power supply: 220 V 50 Hz 700 W

Dimensions: 160 x 230 x 580 mm

Weight: 10 kg

Accessories:

B0145/1 Dispositive gas heated.



Standards ASTM D1310, D3143

TAG Viscometer

B0148 Open cup TAG viscometer used to determine the flash points of volatile substances. Suitable for values between 0 and 175 °F. Supplied complete with cup, bath, thermoregulator and thermometers. ASTM 9C from - 5 to + 110 °C and ASTM 57C from -20 to + 50 °C.

Power supply: 220 V 50 Hz 600 W

Dimensions: 200 x 300 x 400 mm

Weight: 6 kg



Viscosity and consistency

Viscosity is a fundamental characteristic of bitumen. It is used to determine how material behaves in use. For example, flow speed at a certain temperature and the temperature required for perfect application.

Standards ASTM D 940, D 1655 – AASHTO T54 – BS 2000 – CNR No. 102 – NF T66-020



B0152 Engler Digital Viscometer

Used to compare the specific viscosity of oils and tars used on roads with water viscosity. Consists of a water bath made of stainless steel with a precision digital thermoregulator, electrical stirrer, cooling unit and Engler flask. Equipped with double safety thermostat to prevent overheating.

Power supply: 220 V 50/60 Hz - 300 W

Dimensions: 265 x 270 x 550 mm

Weight: 12 kg

B0153 Engler Digital Viscometer, 2 specimens

Basically similar to the B0152 model but with room for 2 specimens.

Accessories and spare parts:

V1023 ASTM 23C thermometer, (range +18 to +28°C)

V1024 ASTM 24C thermometer, (range +39 to +54°C)

V1025 ASTM 25C thermometer, (range +95 to +105°C)

B0152/1 IP 76 C thermometer, (range +10 to +55 °C, div. 0.5 °C)

B0152/2 Kohlraush Distillation flask, capacity 200 mL

B0152/3 ASTM No. 50 sieve with mesh

B0152/3 Engler test flask, capacity 50 mL



B0170 Standard Digital Viscometer (TAR, BRTA)

Used to determine tar viscosity. The meter consists of a stainless steel bath with a stirrer, rheostat, electric immersion stirrer with a digital thermostat to keep the water at the desired temperature and a water supply coil.

Equipped with double safety thermostat to avoid overheating.

Supplied with an IP 8C glass thermometer (0-45 °C) and a graduated glass tube with a capacity of 100 mL.

The pass/no pass calibre and ball valve must be ordered separately (see accessories)

Power supply: 220 V 50/60 Hz - 300 W

Dimensions: 265 x 270 x 550 mm

Weight: 12 kg

B0171 Standard Digital Viscometer (TAR, BRTA), 2 specimens

Essentially similar to the B0170 model but with room for 2 specimens.

Accessories:

Standards EN, NF, IP

B0170/1 Pass/no pass calibre for
Ø 4 mm hole

B0170/2 Cup with Ø 4 mm hole

B0170/3 Ball valve for Ø 4 mm hole

Standards EN, NF, IP, BS

B0170/4 Pass/no pass calibre for
Ø 10 mm hole

B0170/5 Cup with Ø 10 mm hole

B0170/6 Ball valve for Ø 10 mm hole

Standards EN 12846

B0170/7 Pass/no pass calibre for
Ø 2 mm hole

B0170/8 Cup with Ø 2 mm hole

B0170/9 Ball valve for Ø 2 mm hole

Standards ASTM D88, D244 - AASHTO T72 - UNE 7066, 51021- NLT-133, 138



B0175 Saybolt Digital Viscometer

Used to measure viscosity in petroleum products at specific temperatures between 70 and 210 °F. Manufactured entirely from stainless steel and supplied complete with two interchangeable "Furol and Universal" holes, oil bath, electrical heater with a digital thermoregulator, stirrer, coil and viscosity flask.

Equipped with double safety thermostat to avoid overheating.

Power supply: 1 x 220V 50Hz 500W

Dimensions: 270 x 270 x 550 mm

Weight: 12 kg

B0176 Saybolt Digital Viscometer, 2 specimens

Basically similar to the B0175 model but with room for 2 specimens.

Accessories and spare parts:

V1017 ASTM 17C, thermometer, (range +19 + 27 °C)

V1018 ASTM 18C, thermometer, (range +34 + 42 °C)

V1019 ASTM 19C, thermometer, (range +49 + 57 °C)

V1020 ASTM 20C, thermometer, (range +57 + 65 °C)

V1021 ASTM 21C, thermometer, (range +79 + 87 °C)

V1022 ASTM 22C thermometer, (range +95 to +103 °C)

B0175/4 Filter funnel with mesh and clamp

B0175/5 Complete extractor tube

B0175/1 Interchangeable Furol nozzle

B0175/2 Interchangeable Universal nozzle

B0175/3 Saybolt flask, capacity 60 mL



Standards EN 22719 – ASTM D93 – AASHTO T73, IP 34, 35 – ISO 2719

B0158 Digital Pensky-Martens Viscometer

Used to determine the flash point of petroleum products by the closed beaker method, for flash points between 40 and 360 °C.

Supplied complete with stirrer, radiation housing, cast iron air bath, electric heating with digital thermoregulator and two ASTM 9C (-5 +110 °C) and ASTM 10C (+90 +370 °C) thermometers

Power supply: 1 x 220V 50Hz 600W

Dimensions: 200 x 300 x 500 mm

Weight: 6 kg





Standards NLT 197

B0178 Saybolt viscometer for high temperatures

Features similar to those of the **B0175** model except that it is designed to perform tests on asphalt materials at a temperature range between + 125 °F and + 450 °F. Supplied with Furol hole, digital temperature thermometer, heating element, stirrer and cooling device.

Power supply: 220 V 50 Hz 600 W

Dimensions: 550 x 350 x 350 mm

Weight: 16 kg

Accessories:

B0175/1 Furol nozzle.

B0175/2 Standard nozzle.

Standards UNE EN 13302; NLT 375; ASTM D3205, 4402; CEN TC 19

B0180 Rotating viscometer

To determine the viscosity of asphalt bitumens. Apparatus controlled by a microprocessor that guarantees viscosity measurement reproducibility and precision of $\pm 1\%$. The equipment has a total of 19 speeds adjustable between 0.3 and 200 rpm. The adjustable digital display screen shows the selected speed (rpm), the spindle chosen (SP), viscosity reading (CP) and the full scale proportion (%). Supplied complete with a support, 4 spindles, protector, base plate with bosshead, carrying bag and instruction manual.

Accessories:

B0180/1 Low viscosity adaptor.

B0180/2 Small sample adaptor.

B0180/3 Temperature controller.

B0180/4 Helicoidal motor movement.

B0180/5 Base plate.

B0180/6 Spindle.

B0180/7 Spindle protector.

B0180/8 Standard calibration oil.



Standards NLT 183; ASTM D139; AASHTO T50

B0183 Float tester

To determine the consistency of bituminous materials. The float tester consists of an aluminium cup with a threaded hole at the bottom and a truncated-cone collar for airtight adjustment to the floater hole.

Cup Dimensions: $\varnothing 92 \times 35$ mm

Hole: $\varnothing 11.1$ mm



Ductility and rupture point

Ductility is the measurement of bitumen resistance to ductility. This method can be used as part of a series of classification tests to determine bitumen properties.

The rupture point is important in countries with very low winter temperatures. The test measures the capacity of bitumen under load to resist low temperatures without cracking.

Standards UNE EN 13589; 13398; NLT 126; UNE 7093; ASTM D113; AASHTO T51; CNR N.44 PR-EN

B0190 Ductilometer



Used to determine bitumen ductility, that is, the distance that a bituminous specimen can be stretched under controlled thermostatic conditions before it ruptures. The ductilometer consists principally of a moving carriage that slides along guide rails. The carriage is driven by an electric motor housed inside a thermostatic stainless steel bath, fitted with heating elements, a thermostat and a pump. The equipment performs the test automatically at a speed of 50 mm/min and can work with 3 specimens simultaneously.

Usable travel: 1500 mm

Power supply: 2 20 V 50 Hz - 1000 W

Weight: 95 kg

Dimensions: 2140 x 350 x 400 mm

Accessories:

B0190/1 Mould in "8" shape for preparation of specimens.

B0190/2 Mould base plate.

B0190/3 Complete cooling system for tests at temperatures of + 5 °C



Standards UNE EN 12593; NLT 182; CNR IP-80; DIN 5201

B0195 FRAAS Apparatus

To determine the breaking point of solid or semi-solid bituminous materials. The equipment consists of a bending system with two concentric displacement glass tubes, a grip for the test sample, a lever-activated bending system, cooling unit, sheet of special steel and an IP 42C thermometer for - 38 + 30 °C.

Spares:

B0195/1 Test sheet made of special steel.

Standards UNE EN 13398; NLT 329

Ductility and rupture point

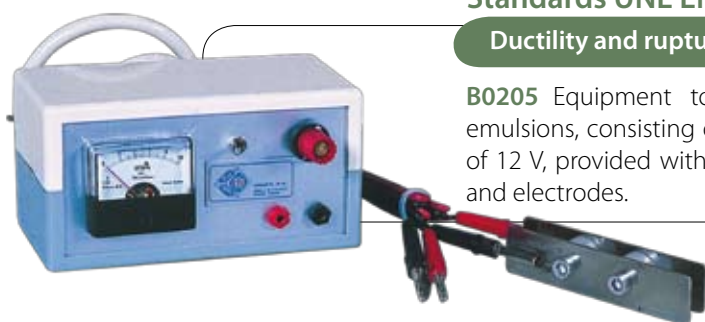
B0200 Torsion meter, to determine the degree of elasticity of modified asphalt bitumens used in road construction. The equipment consists essentially of a metal cylinder Ø 25.4 x 100 mm long, a semi-crown with a graduated scale from 0 to 180°, water bath and container for the sample.



Standards UNE EN 1430; NLT 194; ASTM D 244; AASHTO T59

Ductility and rupture point

B0205 Equipment to determine the particle load in bituminous emulsions, consisting of an electrically powered device at direct current of 12 V, provided with a milliammeter with adjustable heating element and electrodes.



Temperature

The temperature is one of the most important aspects in any construction project that involves the laying of asphalt or concrete.

Thermometers

B0210 Bimetal analogue thermometer, especially designed to measure asphalt temperature.

Measurement range: 0 - 200 ± 2 °C

Bulb dimensions: Ø 4 x 200 mm

B0211 Bimetal digital thermometer, especially designed to measure asphalt temperature.

Measurement range: -50 + 250 ± 1 °C

Bulb dimensions: Ø 4 x 200 mm

V0153 Portable digital thermometer, designed for fast, accurate temperature measurements. With a "Hold" key to retain the measurement.

Measurement range: -50 + 1000 °C

Resolution: 0.1 °C

Conversion: °C / °F

Dimensions: 190 x 57 x 42 mm

Weight: 300 g

Accessories:

V0153/1 Immersion/penetration probe

V0153/2 Surface probe

V0153/3 Dust protection cover



Density - Nuclear method

The new MC-3 Portaprobe is the most accurate, tough and easy to use equipment on the market to measure density and humidity.

Standards ASTM D6938; D2922; D2950; D3017; BS 1377

Density - Nuclear method



Characteristics:

- Automatic depth detection
- Light, portable and accurate
- Double position for backscattering work
- Rechargeable batteries
- Integrated microprocessor to simplify functions
- Simultaneous on-screen display of all measured parameters
- Option of selecting test time and accuracy
- Storage capacity for 128 readings of all data
- RS232C port to upload data to a printer or PC
- Real time clock and calendar

Simple operation

The operator starts the test by pushing the START key... In less than a minute, the 160 character display shows all the results simultaneously. The following data appear on the screen in English or metric units:

- Wet density.
- Dry density.
- Humidity content.
- Humidity percentage.
- Compaction percentage.
- Percentage volume of voids.
- Statistical calculation of precision.

To measure pavement density, place the equipment on the surface to be tested, making sure it is smooth and free from voids. Use the double backscattering position to obtain precise density measurements at 52.1 or 71.1 mm. Measurement depth = 95 % of backscattering range. The MC-3 measures compaction of tread layers from 25 to 76.2 mm thick, correcting the influence of the bottom layer. To measure soil compaction, a small hole is made in the ground with a pickaxe and the equipment is placed over it. By lowering the power source into the hole, density measurements can be taken at increments of 1 or 2 inches (25 or 50 mm), to a depth of 8 or 12 inches. (200 or 300 mm). The humidity measurements are performed on the surface. The measurement depth varies between 4 and 8 inches (100 or 200 mm), with no need to make a hole or prepare the test surface.

Precision

A precision instrument for one-minute tests, with wet density 2.0 gcc and 0.16 gcc humidity:

Backscattering: ± 0.008 gcc (± 0.50 pcf)

Direct transmission: ± 0.004 gcc (± 0.25 pcf)

Humidity: 0.004 gcc (± 0.25 pcf)

Density - Nuclear method

Operations

Function: onsite measurement of density and humidity.

Range: Density 1.120 to 2.730 gcc - Humidity: 0 at 0.708 gcc.

Test time: user-selected.

Operating temperature: from 0 to 60 °C (32 to 140°).

Power supply: 8 rechargeable Ni/Cd batteries.

Battery duration: 500-100 charge/discharge cycles.

Consumption: 10 mA. Allows 600 tests of one minute.

Recharge: 14 hours.

Screen: LCD 160 characters.

Units: user-selected gcc, pcf or cpm.

Storage capacity: up to 128 tests. Optional upload to a PC via RS232C.

X-rays

Gamma source: 10 mCi (370 MBq) Cesium-137.

Neutron source: 50 m Ci (18 50 M Bq) Americium-241 /Be.

Encapsulation: double encapsulated sources, CPN 131.

Dose rate at handle: under 0.5 mR/h (5 microSv/h).

Packaging: radioactive material in special form N.O.S., UN3332.

Transport ratio: 0.4 Category II Yellow - Type A package.

Special form certificates: USA/0627/S, USA/0634/S

Base equipment

Supplied complete, including high density polyethylene bag, lock and keys, tar block, base plate, pickaxe, work tablet, lubricant, signal kit and airtight conditions certificate.



Models:

- S0475/MC-3-82** Portaprobe, Density/Humidity meter for tests up to 200 mm deep with increments of 50 mm
- S0476/MC-3-81** Portaprobe, Density/Humidity meter for tests up to 200 mm deep with increments of 25 mm
- S0480/MC-3-122** Portaprobe, Density/Humidity meter for tests up to 300 mm deep with increments of 50 mm
- S0481/MC-3-121** Portaprobe, Density/Humidity meter for tests up to 300 mm deep with increments of 25 mm

Standards ASTM D6938; D2922; D2950; D3017; BS 1377

Density – Nuclear method – MC – 1 – DRP

Portable equipment for fast, accurate measurements of density/humidity in construction materials, to check compaction. In compliance with ASTM D6938, D2922 and D3017 for soils, and ASTM D2950 for asphalts. The equipment gives the following results directly.

Wet density.
Dry density.
Humidity content.
Humidity percentage.
Compaction percentage.
Percentage volume of voids.

Measures pavement density
Measures soil compaction
Measures surface humidity



X-rays

Gamma source: 10 mCi (370 MBq) Cesium137.
Neutron source: 50 mCi (1850 MBq) Americium-241/Be.
Encapsulation: double encapsulated sources, CPN 131.
Dose rate at handle: under 0.5 mR/h (5 microSv/h).
Packaging: radioactive material in special form N.O.S., UN3332.
Transport Index: 0.4 Category II Yellow. Type A package.
Special form certificates: USA/0627/S, USA/0634/S

Base equipment

Supplied complete, including high density polyethylene bag, lock and keys, tar block, base plate, pickaxe, work tablet, lubricant, signal kit and airtight conditions certificate.

Models:

- S0485/MC-1DR-82** Portaprobe, Density/Humidity meter for tests up to 200 mm deep with increments of 50 mm
- S0486/MC-1DR-81** Portaprobe, Density/Humidity meter for tests up to 200 mm deep with increments of 25 mm
- S0487/MC-1DR-122** Portaprobe, Density/Humidity meter for tests up to 300 mm deep with increments of 50 mm
- S0488/MC-1DR-121** Portaprobe, Density/Humidity meter for tests up to 300 mm deep with increments of 25 mm



Standards TP 68-04; ASTM D 7113-05

Aggregate Density – Non-nuclear Method

B0060 Pavement temperature and density meter.

The PQI 301 device is an instrument designed to take fast and accurate readings of hot asphalt during the compaction process. After a test lasting only three seconds, it shows the density and temperature of the tested asphalt. If the readings are taken during the spreading process, it does not interfere in the process due to the speed involved.

Operation specifications

There are four working modes:

Continuous mode: in this mode the equipment measures the density continuously and shows the following data on screen in real time: density, temperature and % of compaction or volume of voids.

Simple mode: performs a three second test and displays: density, temperature and % of compaction or volume of voids.

Mean mode: takes five readings and shows the mean.

Segregation mode: After a series of tests the equipment identifies variations in density due to segregations and shows the maximum, minimum and mean density values.

Functions:

Density measurement, compaction %, void volume % and segregation.

Temperature measurement in real time. Range from -17.7°C to 177.6°C .



Selection of "layer to layer" depth measurement from 12 mm to 125 mm

Measures temperature in centigrade degrees from -17.7°C to 177.6°C

Accessories:

B0060/1 Printer

B0060/2 Verification block

Sample extraction

The most direct method to evaluate construction materials such as aggregates is to take a sample of the areas to test. The simplest and fastest way to obtain samples with adequate size and quality is with a sample-removal probe.



H0138 Electric sample extractor probe

Three speeds, 360° adjustable so user can work at any angle. The base is steel and supports a column with an adjustable anchoring device. The machine includes two wheels that make it extremely manageable and four legs for lifting and positioning. The column includes a guide required both for advancing the motor/drill bit unit and to remove the unit, whose movements are controlled by a crank. The motor incorporates a fast plug system to cool the drill bit. The vertical column can take extensions to work to a depth of up to 2.7 m.

Power supply: 220-240 V. 50 Hz

Power absorbed : 2000 W

Dimensions: 700 x 450 x 1200 mm

Weight: 100 kg

H0139 Portable sample extraction probe

For road pavement, powered by a 4 stroke gas combustion engine. The machine head slides with the help of a wheel along the two columns. Includes a water cooling unit.

Motor power 5 Hp

Drill bit connection: 1 1/4"

Dimensions: 800 x 450 x 940 mm

Weight: 150 kg

Accessories:

H0140 Special cart designed for onsite transport of the probe.

Includes a water tank for cooling.

H0141 Diamond drill bit Ø 50 x 350 mm

H0142 Diamond drill bit Ø 75 x 350 mm

H0143 Diamond drill bit Ø 100 x 350 mm

H0144 Diamond drill bit Ø 150 x 350 mm

H0145 Diamond drill bit Ø 200 x 350 mm

H0146 Extension, 500 mm long.



Pavement tests

Standards UNE 13036-7

Surface irregularity

The rapid increase of traffic density all over the world has made effectiveness of vehicle control vitally important. Braking efficiency is especially important, and this depends a great deal on the quality of the road surface.

B0220 Mobile ruler approximately 3 m long to measure road irregularities. Made of aluminium alloy. Two graduated wedges are used together.

Accessory:

B0220/1 Graduated wedge.



B0221 Mobile beam equipment

Used to detect irregularities in road surfaces, both in bituminous compounds and concretes. The equipment is made up of a beam with wheels on the ends and centre. The middle wheels detect any vertical deviation over the hypothetical straight line between the wheels on the ends. The vertical deviations are transmitted from the mobile centre wheel to one end with a scale visible to the operator. Supplied complete with a spray to mark the defective parts of the road.



Length: 3000 mm

Maximum detectable deviation: ± 25 mm

Division: 2 mm

Accessories:

B0221/1 Recorder to use with the ruler, complete with 10 rolls of recording paper and 10 pen nibs.

B0221/2 Rolls of recording paper (10 units).

B0221/3 Pen nibs (10 units).

Standards NLT 356; AASHTO T256: S.N.V.

B0222 Benkelman beam

To measure the deflection of flexible pavement under loads from moving wheels. The beam is placed between the treads of the vehicle and in contact with the pavement. Deflection is measured when the vehicle passes through the test zone. Built entirely from aluminium.

Length: 2500 mm

Weight: 15 kg

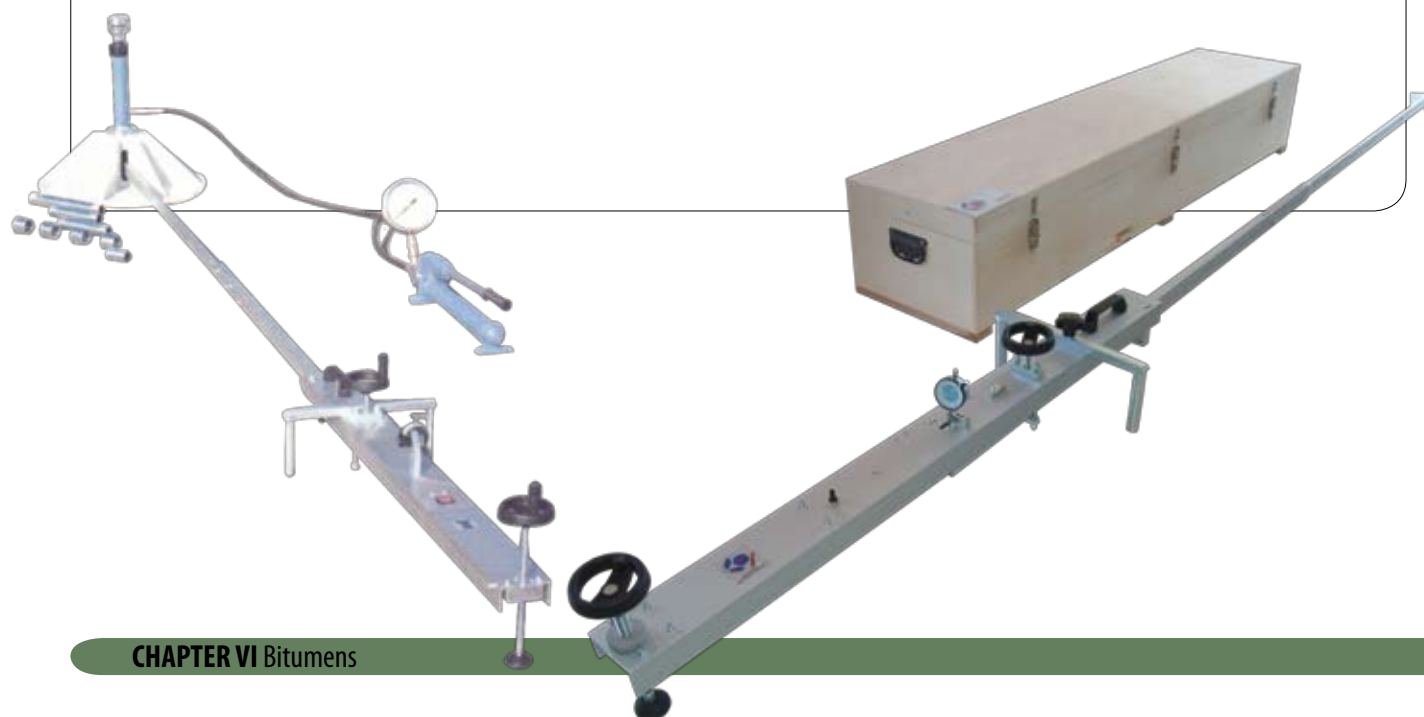
Accessories:

B0222/1 Wooden carrying case.

B0222/2 Calibration device.

B0225 Load plate equipment with a capacity of 100 kN, to be used together with the Benkelman Beam to measure deflection in the centre of the plate from a point of reference not affected by the load. Supplied complete with a load plate measuring $\varnothing 300$ mm, central measuring device, hydraulic 100 kN jack complete with a manual pump, graduated manometer (0 - 100 kN), a set of extensions, ball joints, test accessories and carrier case.

Weight: 75 kg



Measuring skid resistance on roads - Gryptester

B0250 Equipment for measuring skid resistance

A flexible, accurate and economical way to measure skid resistance on roads, highways and at airports. The skid resistance equipment consists of a three-wheeled trailer that measures friction by means of a fourth wheel which has a brake, the principle of fixed skidding. The single measuring wheel is provided with a special smooth tread tyre that is mounted on an instrumented shaft to measure both the horizontal drag and vertical load. These measurements are used to automatically calculate the dynamic friction reading that is transmitted to the data collection computer normally found inside the trailer. This computer also calculates and saves the testing speed for each reading.

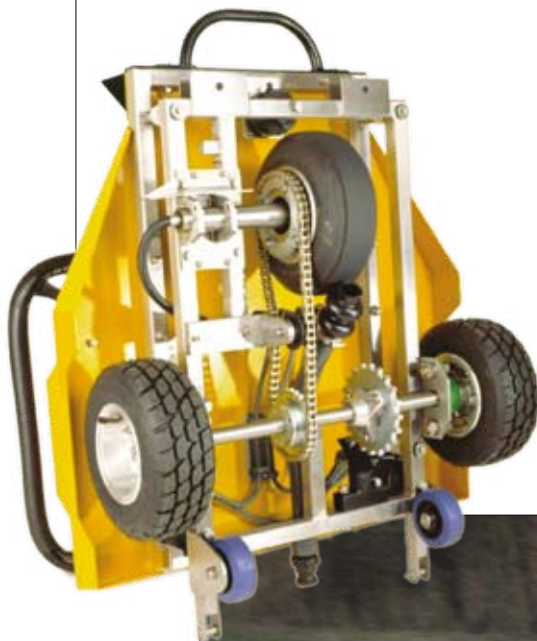
Main features

Inexpensive, reliable, sturdy and easy to maintain.
Excellent repeatability and reproducibility
The readings are not affected by curves in the road.
Suitable for any kind of road.
Easy to deploy and transport - can be hitched to a wide range of vehicles.
80 km of tests with a 500 litre tank.
SCRIM correlation
Easy integration of data with any SPM.



Technical characteristics

Length: 1010 mm (excluding the trailer bar)
Width: 790 mm
Height: 510 mm
Weight: 85 kg
Measuring wheel (1): Smooth texture as per ASTM
Wheel (2): KT3-W tread, K8-CIK Rubber



Texture

Pavement surface texture is an important aspect of road surface safety. For vehicles at high speeds, the surface texture must be good, facilitate water drainage from the road surface and use the tyre tread to absorb the kinetic energy of the vehicle.

Standards NLT 335; ASTM E965; BS 598: Part 105

Texture

Measurement of pavement surface texture using the sand circle method. The test is performed by expanding a pre-established volume of fine sand over a circular surface of the road, completely filling the cavities of the asphalt layer. The ratio of the surface area used for the test and the volume of sand is then calculated.

B0230 Equipment for the sand circle test, consisting of three graduated cylinders of 50, 25 and 10 mL respectively, a rubber-coated disc to spread the sand, a rigid point compass, a ruler, two 2L containers, a soft hair brush, a wind breaker and a portable gas burner.



Standards UNE EN 12272-1; BS 594

Percentage of coat spread

B0237 Calibrated spring scale, complete with tray, chain and spring scale. The percentage of spread is read directly on the graduated scale display.

Weight: 1 kg



Mean coat thickness

A non-destructive method is frequently needed to measure the thickness of bitumen and other non-magnetic materials.

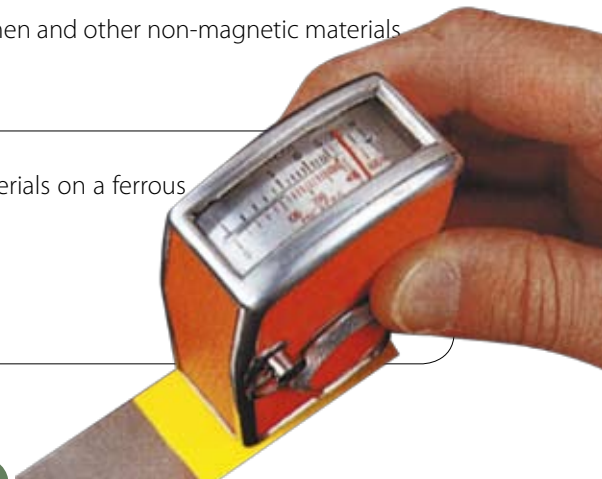
B0240 Thickness meter

To measure the thickness of bitumen coating and other non-magnetic materials on a ferrous base. Supplied in a protective cover.

Accuracy: $\pm 5\%$ of the reading.

Dimensions: 90 x 50 x 25 mm

Weight: 200 g



Standards NLT - 327

Permeability

Onsite permeability of draining pavement with the LCS permeameter.

B0245 LCS permeameter to measure a fixed amount of water passing through a bituminous mix in seconds. The device consists of a transparent, graduated, cylindrical tube measuring $\varnothing 94 \times 500$ mm high placed on a special base, a counterweight of 20 kg with handles and a circular rubber ring 16 mm thick.

Dimensions: 200 x 200 x 700 mm

Weight: 25 kg

