

Asphalt

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The main engineering use of bituminous materials is for road construction, with the material consisting primarily of two ingredients: aggregate and binder.

The term Asphalt is simply one of two generic names used to classify or describe bituminous mixtures; the other being Macadam. In the USA the term Asphalt denotes what in the UK is known as Bitumen.

Within these two broad groups lie an almost infinite number of mixtures which can be specified to suit particular engineering requirements. Our latest testing equipment has therefore been developed to enable construction engineers and laboratory staff to carry out a wide range of industry standard tests quickly, simply and reliably.

Our range of manual and automatic equipment allows you to determine properties that include optimum binder content, aggregate grading and void content, using traditional methods such as the Marshall test.



45 Asphalt - Analysis and Binder Recovery

Analysis and Binder Recovery

Asphalt Centrifuge Extractors

EN 12697-1; ASTM D2172; AASHTO T164

- ◆ Continuously variable speed control from 0 to 3,600 rpm (1500 g capacity model)
- ◆ Brake control for rapid deceleration
- ◆ Available in either 1500 g or 3000 g capacity models

The Centrifuge Extractor is used to determine the quantitative amount of bitumen in bituminous paving mixtures whilst providing high safety to the operator.

Specification		
Dimensions (l x w x h)	559 x 305 x 508 mm	
Control	1500 g 3000 g	Variable speed, 0-3600 rpm Variable speed, 0-2600 rpm
Cover	Precision-machined aluminium; removable, with integral cup for adding solvent	
Housing	Cast aluminium, sealed	
Bowl	Precision-machined aluminium; removable	
Filter discs	100 included	
Weight	EL45-3800 EL45-3805	35 kg 41 kg

Ordering Information

EL45-3800/01 RotaTest 1500 g Capacity. Meets EN/ASTM. For 220 V AC, 50 – 60 Hz, 1ph

EL45-3805/01 RotaTest 3000 g Capacity. For 220 V AC, 50 – 60 Hz, 1ph.

Accessories

EL45-3803 Filter Papers for EL45-3800. Pack of 100.

EL45-3807 Filter Papers for EL45-3805. Pack of 100.

Spare

EL45-3805/10 Replacement Bowl. 3000 g.



EL45-3800/01 RotaTest



EL45-3855/01 Reflux Extractor

Reflux Extractor (4000 gram)

ASTM D2172; AASHTO T164

- ◆ 4000 gram capacity
- ◆ Glass jar for visual observations
- ◆ Thermostatically controlled hot plate

The 4000 gram capacity of the Reflux Extractor provides higher accuracy for acceptance testing procedures. This extractor has two cone type screens holding 2000 grams each. The unit consists of two cone screens, water condenser, pyrex reflux jar, a thermostatically controlled hot plate and a supply of filter paper.

Specification	
Capacity	4000 g
Baskets	Stainless steel wire, mounted; 2,000 g capacity. 2 included
Condenser	Copper
Jar	Pyrex glass, 280 mm diameter x 510 mm height
Hot plate	Thermostatically controlled
Filter paper	Coarse-textured (Grade 617); 40 cm diameter

Ordering Information

EL45-3855/01 Reflux Extractor (4000 gram). For 220 – 240 V AC, 50 – 60 Hz, 1ph.

Accessories

EL45-3857 Filter Paper. Pack of 50.

45 Asphalt - Design and Testing of Bituminous Mixtures

Mixing and Temperature

The density of Marshall specimens has a direct effect on stability and flow therefore the correct moulding and compaction of laboratory specimens is essential if economical design mixes are to be produced.

Efficient mixing, temperature and compaction control are closely related. Poor coating of the aggregate due to low temperatures during the mixing process will have a major effect on subsequent test results.

Mixing

EN 12697-35

A 5 litre (nominal) Mixer used in conjunction with an Isomantle is suitable for mixing samples of asphalt.

Bench-mounting Mixer. 5 litre nominal capacity. Supplied with bowl, beater and whisk see EL23-6191/01.

Ordering Information

EL45-5580/01 Isomantle Electric Heater for use with EL23-6191 Bench Mounting Mixer. Weight 4.2 kg. For 220 – 240 V AC, 50 - 60 Hz, 1 ph.



EL45-5580/01 Isomantle Electric Heater

Manual Compaction

EN 12697-30

Ordering Information

EL45-6310 Compaction Mould comprising mould body, baseplate and combined filling/extraction collar. Weight 3.5 kg.

EL45-6410 Compaction Pedestal BS 598 comprising a 300 mm sq x 25 mm thick steel plate complete with 4 tie rods and securing nuts. A mould clamp and hammer guide are fitted to the plate. The unit is supplied complete with a laminated hardwood block. Weight 40 kg.

EL45-6460 Compaction Hammer. Satisfies BS 598. The hammer has a 4535 g sliding weight with a free fall of 457 mm. Weight 7.85 kg.

EL45-6462 Paper Discs. Non-absorbent, 99 mm diameter, pack of 100. Weight 300 kg.

EL45-6463 Steel Block. 100 mm diameter x 50 mm height. For heating the compaction hammer foot. Weight 3 kg.

Accessories

EL45-6490/01 60 L Water Bath with LED display, cover and internal perforated shelf. Temperature range ambient to 95°C ±1°C. For 220 – 240 V AC, 50 – 60 Hz 1ph.

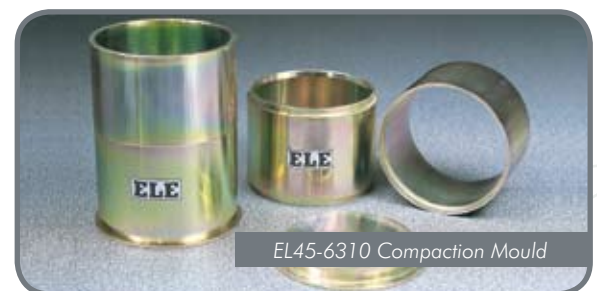
Proctor/Core Cutter Extruder see EL23-4200

Spares

EL45-6310/10 Compaction Mould Body accepts baseplate and filling/extraction collar of EL45-6310

EL45-6310/11 Baseplate for compaction mould

EL45-6310/12 Filling/Extraction Collar for compaction mould.



EL45-6310 Compaction Mould

45 Asphalt - Design and Testing of Bituminous Mixtures

Automatic Compaction

The use of automatic compaction will result in consistent and repeatable laboratory specimens. Testing houses and design consultants who use the Marshall method of mix design will benefit from automatic compaction apparatus, which releases staff for other work during the compaction process.

AutoComp 100-A

EN 12697-10, -30

- ◆ Fully automatic, simple to operate
- ◆ Built-in safety features
- ◆ Uniform compaction
- ◆ Automatic blow counter

This ruggedly constructed automatic compactor provides a consistent and even degree of compaction. The unit incorporates a compaction pedestal comprising a laminated hardwood block secured to a concrete base by a 300 mm square x 25 mm thick steel plate. The mechanism lifts the 4535 g hammer and automatically releases it at the specified height of 457 mm.

The conveniently positioned control fascia panel comprises of a mains light, start and stop buttons and a direct-reading counter used to set the required number of blows. During operation the AutoComp 100-A automatically counts down to zero. Dual rammer pick-ups have been incorporated, reducing stress on the machine's internal mechanism.

Particular attention has been paid to operator safety by the inclusion of various in-built safety features.

Specification	
Dimensions (l x w x h)	535 x 535 x 1880 mm
Compaction foot diameter	98.52 mm
Sliding weight	4535 g
Height of drop	457 mm
Weight	278 kg

Ordering Information

EL45-6600/01 AutoComp 100-A as specified.
For 220 – 240 V AC, 50 Hz, 1 ph.

Accessories

Compaction Mould see EL45-6310

Paper Discs see EL45-6462

Steel Block see EL45-6463



45 Asphalt - Design and Testing of Bituminous Mixtures

Marshall Stability and Flow

The accurate measurement of stability and flow of specimens tested in a load frame is important if consistent and representative results are to be achieved. The load frames and ancillary items listed have been designed to enable technicians to test specimens quickly and easily with confident recording of results.

Marshall Test 50

EN 12697-34

- ◆ Geared screwjack and motor drive
- ◆ Precise speed
- ◆ Internal limit switch for both directions of travel
- ◆ Easy to use controls

This bench-mounting mechanical load frame is ruggedly constructed to encompass the strain and loads involved with the test. The unit is compact in size and can be quickly installed on a bench top, requiring only a power point. It has been designed for simple operation, is easy to clean and requires minimum maintenance.

Specification	
Dimensions (l x w x h)	550 x 400 x 870 mm
Rated power	373 W
Platen speed	50.8 mm per minute
Weight	65 kg



Ordering Information

EL45-6810/01 Marshall Test 50. Load frame, 50 kN capacity. Supplied without Breaking Head. For 220 – 240 V AC, 50 Hz, 1 ph.

EL45-6880 Flow Meter BS/EN. Dial gauge graduated 0.01 mm with 25 mm travel. Supplied with stem brake unit and flow meter pedestal. Weight 610 g.

EL45-6890 Flow Meter. Dial gauge graduated 0.001 inches with 1 inch travel. Supplied with stem brake unit and flow meter pedestal. Weight 610 g.

EL45-6850 Breaking Head (Marshall) complete with gauge disc. Supplied without flow meter. Weight 9 kg.

50 kN Load Measuring Ring. Calibrated in compression see EL78-0860.

45 Asphalt - Design and Testing of Bituminous Mixtures

Electronic Instrumentation

- ◆ *Peak load and the corresponding flow*
- ◆ *Windows® download software supplied*
- ◆ *User-selectable SI, Metric and Imperial Units*
- ◆ *ECU features large character LCD display*

A limitation of using conventional dial gauges in the Marshall test is the difficulty of accurately synchronising the measurement of flow with that of peak load reading.

To overcome this limitation the Marshall Test 50 load frame can easily be fitted with optional electronic load and flow measurement transducers connected to EL27-1200/09 (E)lectronic (C)ontrol (U)nit for simpler test operation and data recording.

At the end of a test the ECU will automatically hold the maximum load and flow readings enabling test data to be downloaded to a PC using the Windows® software supplied as standard with ECU.

Analysis and reporting can then be easily created in MS Excel or equivalent software.

The ECU can be programmed to automatically stop the load frame should transducer limits be exceeded, protecting test accessories and load frame drive system.

The above combination results in a powerful package to satisfy modern day laboratory Marshall testing requirements for accuracy and reliability.

Ordering Information

ECU Electronic Control and Readout Unit for use with ELE CBR, MultiPlex and Marshall machines see EL27-1200/09.

50 kN capacity S-type Load Cell see EL27-1559

EL45-6820/11 Flow Transducer. Pre-calibrated, for use with EL45-6850 Breaking Head.



EL45-6810 series Marshall Test 50 with accessories



EL27-1200/09 ECU Electronic Control and Readout Unit

MultiPlex 50

EN 12697-34, BS 598, 1377, 1924; ASTM D1883

Designed for performing laboratory CBR, Marshall stability and quick undrained triaxial tests on one load frame.

MultiPlex 50 Load Frame see EL25-3700/01

45 Asphalt - Specific Gravity

Specific Gravity

Vacuum Pyknometer (6000 Gram)

EN 12697-5

- ◆ *Large capacity design minimises segregation effects*
- ◆ *Lightweight polycarbonate construction*
- ◆ *Transparent top for visual observations*

The Vacuum Pyknometer is a large capacity unit used in the Rice Test for determining the maximum specific gravity of bituminous paving mixtures.

The Pyknometer has a total volume of approximately 10 litres and will conveniently accept samples of 6000 grams to minimise segregation effects. The unit is constructed of lightweight polycarbonate, with the upper half being transparent for visual observation of the effects of the vacuum.

The Vacuum Pyknometer Apparatus consists of a 6000 g pyknometer, vacuum pump with control valves/gauges, water trap and connection tubing.

Specification	
Dimensions	273 x 406 mm (outside diameter x height)
Capacity	Approx. 10 litres, 6000 g sample weight
Connections	Water inlet valve; quick disconnect for vacuum gauge and hose
Weight	3.6 kg

Ordering Information

EL45-9305/01 Vacuum Pyknometer Apparatus supplied complete with 6000 g pyknometer, vacuum pump with control valves/gauges, water trap and connection tubing. For 220 – 240 V AC, 50 Hz, 1 ph.

Spare

EL45-9300 Vacuum Pyknometer, 6000 g



Rice Test Vibrator

The Rice Test Vibrator is used with the EL45-9300 6000 g Vacuum Pyknometer. Adjustable clamps hold the pyknometer securely to the base during vibration.

Specification	
Dimensions	495 x 30 mm (height x base diameter)
Motor	1/20 hp, 1.6 amp
Weight	5.5 kg

Ordering Information

EL45-9315/01 Rice Test Vibrator.
For 220 – 240 V AC, 50 Hz, 1 ph.

Accessory

EL45-9315/10 Attachment required for 6000 g Pyknometer.

Timer Clock see EL81-0518



46 Asphalt - Bitumen and Tar

Sampling and Preparation

Hubbard-Carmick Specific Gravity Bottles

ISO 3838; ASTM D70; AASHTO T228; BS 4699

Ordering Information

EL46-2190 Hubbard-Carmick Specific Gravity Bottle. Conical type 25 ml.

EL46-2191 Hubbard-Carmick Specific Gravity Bottle. Cylindrical type 24 ml.



Flash and Fire Point

There are a number of test methods using different equipment with closed or open cups. The Cleveland Flash Cup Apparatus is used to test cutback bitumen and may sometimes also be used to test penetration grade bitumen. The apparatus utilises the open cup test method. Note that results from different methods cannot be correlated.

Cleveland Flash Cup Apparatus Cleveland Open Cup Method

BS 2000-36, EN ISO 2592; ASTM D92; IP36

The ELE Semi-Automatic Cleveland Open Cup flashpoint Tester is equipped with an electrically heated cup (with a variable control to set temperature rise rate), a button-operated and electrically driven sweep arm and a test flame for use on natural gas. Bench mounted, the unit is incorporated in an easy to clean stainless steel case.

Specification	
Temperature range	Ambient to 400°C
Power	500 W maximum
Ramp rate	Variable, manually controlled
Voltage	220/240 V, 50/60 Hz
Size (HxWxD)	33 x 31 x 29 cm
Weight	6.5 kg

Ordering Information

EL46-3310/01 Cleveland Flash Cup Apparatus. For 220 – 240 V AC, 50 - 60 Hz, 1 ph.



46 Asphalt - Bitumen and Tar

Softening Point

The test is performed in duplicate under closely controlled conditions. Water is used as the bath medium for binders with softening points below 80°C. Above this temperature glycerol is used in place of water.

The softening point is a fundamental property of binders other than cutbacks and emulsions. The test is often referred to as the Ring and Ball test.

Ring and Ball Apparatus

EN 1427, BS 2000-58

Ordering Information

EL46-4605 BS/EN Ring and Ball Apparatus with 2 shouldered pattern rings, 2 ball-centring guides and 2 balls. The apparatus has a support frame and is retained in a heat resistant container. Weight 560 g.

EL46-4825/01 Magnetic Stirrer. Utilises a rotating magnetic field to induce variable speed stirring action. A built-in regulating transformer provides fine temperature control of liquid up to a maximum temperature of +150°C. The unit is suitable for use with the Ring and Ball Apparatus. Weight 2 kg.

For 220 – 240 V AC, 50 – 60 Hz, 1 ph.

Accessories

Thermometer see EL82-5272

Thermometer see EL82-5274



EL46-4605 with EL46-4825/01

Penetration Test

BS 2000-49, EN 1426, 13179-2, ASTM D5, AASHTO T49, IP 49

Ordering Information

EL46-5290 Standard Penetrometer. Penetration readings are quickly taken using this simple to operate apparatus. The 150 mm diameter dial is graduated in 400 divisions of 0.1 mm. Supplied without needles and penetration tins. Weight 6 kg.

EL46-5295/01 Semi-automatic Penetrometer. As EL46-5290 but incorporates Digital Automatic Controller which releases the needle assembly. The time set is displayed by a bright, easy to read display. Weight 8.6 kg. For 220 – 240 V AC, 50 – 60 Hz, 1 ph.

Accessories

EL46-5340/C Penetration Needle. Hardened steel, supplied with an NPL (National Physical Laboratory, UK) verification certificate. For testing to BS 2000-49 and ASTM D5. (Pack contains 1 needle only.) Weight 2.5 g.

EL46-5360/10 Penetration Needle (unverified), hardened steel.

EL46-5500/01 Constant Temperature Bath. A bench mounting bath specially designed for the conditioning of bitumen samples prior to penetration tests. Incorporating a highly accurate thermostat, the bath maintains a temperature between 21 and 56°C ± 0.1°C. An integral cooling coil, cover and deep tray for penetration testing are supplied as standard. Weight 18.2 kg. For 220 – 240 V AC, 50 Hz, 1 ph.

EL46-5800 Transfer Dish

EL46-5860 Penetration Tin for penetrations between 200 and 350, approximately 70 mm diameter x 45 mm deep. Weight 30 g.

EL46-5861 Penetration Tin for penetrations below 200, approximately 55 mm diameter x 35 mm deep. Weight 25 g.



EL46-5295/01 Semi-automatic Penetrometer

47 Asphalt - Temperature and Density

Temperature and Density

Delivery and compaction temperatures are probably the most common measurements taken during the placing of bituminous mixtures.

Digital Asphalt Thermometer

Supplied without probes the LCD display has large 12.5 mm characters and is powered by a standard PP3 battery or equivalent.

Specification	
Range	-50 to 1000°C
Resolution	Switchable 0.1 or 1.0°C
Weight	300 g

Ordering Information

EL47-0202 Digital Asphalt Thermometer

Accessories

	EL47-0202/10	EL47-0202/11	EL47-0202/14
	250 Asphalt Probe	535 Asphalt Probe	Surface Probe
Max reading	250°C	250°C	500°C
Length of probe	300 mm	500 mm	100 mm
Tip diameter (needle point)	6 mm	6 mm	4 mm

Probes are supplied with handle, 1 metre lead and K-type thermocouple plug as standard.



Percentage Refusal Density (PRD)

EN 12697-32, 13280-4, BS 598-104

Percentage Refusal Density (PRD) is defined as the ratio of the initial dried bulk density of the sample to the final density (refusal density) expressed as a percentage.

Ordering Information

EL47-0450 PRD Split Mould and Baseplate
Weight 10.7 kg.

Accessories

EL47-0455/01 Vibrating Hammer suitable for compacting asphalt samples. Weight 12.5 kg. For 220 – 240 V AC, 50 – 60 Hz, 1 ph.

EL47-0480 300mm Shank complete with tamping feet 102mm and 146mm dia.

Oven see EL78-0110/01

Buoyancy Balance. 15 kg x 0.5 g see EL34-8100/09.

Cradle see EL34-8105



47 Asphalt - Core Drilling

Core Drilling

Compact Core Drill Machine

This compact and portable core drilling machine is designed to cut cores up to 150 mm diameter from concrete, asphalt and similar hard construction material. The machine comprises a vertical support column which carries the drill head/motor assembly.

An integral water swivel is built into the drill head providing a 12 mm connection to an external water supply via 12 mm flexible hose (not supplied). The motor assembly comprises a 4 hp, 2-stroke petrol engine. Speeds of 800 rpm or 1200 rpm may be selected. A ball screw mechanism enables close control over drilling pressure and rapid return when drilling is completed.

The complete assembly is supplied on a rigid metal base frame with levelling facility and is suitable for vertically down drilling applications only.

Ordering Information

EL47-5175 Compact Core Drill with Petrol Motor Unit.

Special note:

Requires a continuous clean water supply via a 12 mm flexible hose (not supplied).

Core Barrels

Suitable for use with the Universal and Compact Core Drilling Machines, this range of core barrels comprise a thin-wall tube 450 mm long with a series of cutting segments formed from diamond abrasive set in a specially formulated hard matrix. The cutting face has been carefully designed to remove material rapidly and obtain the highest possible drilling rates.

The solid back end includes a threaded fitting to connect to the waterswivel assembly of the core drill.

Size (diameter)	Core barrel
100 mm	EL47-5565
150 mm	EL47-5605



47 Asphalt - Pavement

Surface Regularity

Travelling Beam Device

The 3 metre long Travelling Beam Device is used to check for any irregularities in both concrete and bituminous road surfaces. A sensing unit comprising a wheel connected to an indicator provides a magnification of 4:1. Deviation of the surface from a straight-line is shown on a scale calibrated in increments of 2 mm up to 10 mm and 5 mm up to 25 mm. A dye-marker is fitted which may be used to identify suspect areas. Outrigger wheels provide mobility on site. The device is supplied as three sub-assemblies which are quickly assembled on site.

The Travelling Beam is supplied fitted with an autographic recorder providing a permanent record of the surface profile. Records up to 1 kilometre can be recorded on the special chart paper rolls used.

Ordering Information

EL47-3025 Travelling Beam Device with Autographic Recorder, 3 metres long. Supplied without recorder charts (order separately). Weight 66 kg.

Accessories

EL47-3130 Charts for Autographic Recorder. Pack of 10 rolls complete with 10 fibre-tipped pens. The charts are calibrated in units of 2 mm up to 10 mm and units of 5 mm up to 25 mm and will record up to a continuous distance of 1 kilometre. Weight 2.3 kg.

Spares

EL47-3131 Fibre-tipped Pen for use with EL47-3025



Benkelman Beam

AASHTO T256

- ◆ *Lightweight construction*
- ◆ *Compact, telescopic design*
- ◆ *Direct reading of deflection*
- ◆ *Anti-vibration system*

Designed for maximum operator efficiency, the Benkelman Beam is manufactured from a lightweight, durable material which telescopes into a small, compact unit for ease of storage and transport.

Specification		
Dimensions	Main body (length)	1397 mm
	Arm (telescopic) extended	2400 mm
	Operating length, fully extended	3700 mm
Beam fulcrum ratio	2:1	
Weight	15.9 kg	

Ordering Information

EL47-1460 Benkelman Beam complete with Dial Gauge 25mm travel x 0.02 mm divisions.



47 Asphalt - Pavement

Surface Dressing

The main purpose of a surface dressing is to prevent weathering, disintegration of the pavement and to increase the resistance to skidding in wet weather. The rate of spread and application of the chippings and binder is specified for most applications. Test methods have been developed to determine the actual rate of spread and are described in British Standards.

Rate of Spread of Coated Chippings

EN 12272-1, BS 598-108

The equipment comprises a tray 300 mm square which, when used in conjunction with a specially calibrated spring balance, will determine the rate of spread of coated chippings in terms of kg/m^2 . The spring loaded balance will accept rates of spread between 4 and 16 kg/m^2 .

Between 5 and 10 trays are positioned in the path of the spreading machine and after the machine has passed over, each tray is lifted, together with the retained chippings, by means of four chains. The chains are hooked to the spring balance and the rate of spread is read directly from the balance scale.

Ordering Information

EL47-0011 Calibrated Spring Balance. Weight 800 g.

EL47-0012 Tray and Chains comprising one 300 mm square tray and four chains.



EL47-0011 Calibrated Spring Balance