Soil is one of the oldest forming structures that our planet is formed from. Soil is a loose rocky material that is vastly used in the construction industry. Hence it is very important to test the ground soil before construction and to know the type and classification of the soil before any project.

The type of soil can be identified by several parameters one of which the percentage of clay, silt or sand found in its composition. This classification will determine the characteristics of the soil used in the civil engineering project.

Other physical parameters such as moisture content, shear strength, elasticity, specific gravity, density, degree of compaction, penetration resistance, consistency, bearing capacity, hydraulic conductivity, permeability and consolidation can effect the soil characteristics and behaviour during construction.

The testing equipment described in this section are carefully designed and manufactured to the highest international standard necessary to achieve accurate and repeatable results in testing soil material.

The principle of soil mechanics requires the use of standard testing methods offered by our range of equipment and used by trained and qualified engineers and technicians.
CONDIÇÕES DE VENDA

Agradecemos que nos faça sempre que possível uma consulta de preços através do Email info@expt.pt e mencionando o equipamento pretendido (referência do equipamento e quantidade).

COMO ENCOMENDER:

Nota: Apenas aceitamos encomendas por escrito.

- Email ao cuidado de Rafael López info@expt.pt

Mencione na sua encomenda o seguinte:

- Número da nossa proposta ou descrimine o equipamento mencionado a referência do produto
- Dados para faturação com nome e endereço completo e NIF (obrigatório)
- Local de entrega.
- Nome e telefone de contacto do local de entrega

PREÇOS E PRAZO DE ENTREGA:

- Os preços indicados neste ficheiro não incluem IVA de 23% e estão sujeitos a alterações sem aviso prévio.
- Normalmente não fazemos stock deste equipamento, agradecemos que nos contacte mencionado o equipamento que pretende para informações do prazo de entrega que pode variar.
- Mais informações através do Email info@expt.pt

CONDIÇÕES DE VENDA PARA PARTICULARES:

- Local de entrega: vossas instalações com portes a debitar de 15,00€ + IVA.
- Encomendas inferiores a 100 euros impostos não incluídos, ficam a seu cargo despesas administrativas 30,00€ + IVA.
- Pagamento: antecipado no exato momento do pedido

CONDIÇÕES DE VENDA PARA INSTITUIÇÕES DE ENSINO (públicas ou privadas)

- Local de entrega:
  - Vossas instalações. Ficando os portes a cargo da EXPT para encomendas superiores a 300 euros impostos não incluídos.
  - Vossas instalações. No caso de encomendas inferiores a 300 euros impostos não incluídos, ficam a seu cargo os portes de 15,00€ + IVA
- Encomendas inferiores a 100 euros impostos não incluídos, ficam a seu cargo despesas administrativas 30,00€ + IVA.
- Pagamento: a 60 dias a contar da data da fatura
Soil Equipment

Soil Colour Chart

The Soil Colour Chart is used to judge the color of rocks, archaeological specimens and soil samples. 322 color chips are permanently mounted on 9 charts for basic collection of 7 hues (10R-5Y) and 2 grey charts with apertures between chips to make comparisons easier. The tropical soil colour chart Set of 2, for use with reddish tropical soils and recommended for tropical regions.

Soil Sampling Kit

The Soil Sampling Kit is designed to obtain samples for soil investigation and exploration purposes. Made of special galvanised steel the set provide all the items needed in a convenient carrying case. The complete kit is based on the most popular sizes used for undisturbed soil sampling including cleaning brush and user manual.

Power Auger Head

The Power Auger Head has an ergonomic designed for optimum comfort.

It comes with a 4.5 KW two stroke engine, equipped with a lever preventing accidental acceleration and a Quick-fit spigot-socket coupler for swift attachment and replacement of bits.

SL 0109
Power Auger Head

Accessories:
SL 0110
Auger 60 mm dia x 1 m long
SL 0111
Auger 80 mm dia x 1 m long
SL 0112
Auger 100 mm dia x 1 m long
SL 0113
Auger 150 mm dia x 1 m long
SL 0114
Auger 200 mm dia x 1 m long
SL 0115
Extension rod

Proctor Penetrometer (spring type)

Standards: ASTM D1558

The Proctor Penetrometer is used for determining the penetration resistance of fine-grained soils. The unit consists of a special calibrated spring dynamometer with a pressure-indicating scale on the stem of the handle. It comes with a stainless steel adaptor stem for larger needles. The pressure scale is calibrated to 100 lbs by 1 lb. subdivisions. There is a major division located at each 10 lb interval. A sliding ring on the stem indicates the maximum load obtained during the test.

SL 0116
Proctor Penetrometer complete set with needle point
SL 0117
Set of spare needle point (0.25, 0.5, 1, 1.5, 2, 3, 5, 6 cm²)

Proving Ring Penetrometer

The Proving Ring Penetrometer is used to determine the bearing strength, compacting degree of subgrades and also penetration resistance of soil.

It comes with a T handle 1 KN load ring, Maximum load pointer and calibration chart.

SL 0122
Proving ring Penetrometer complete set

Water Level Indicators

The Water Level Indicators are used to determine the water level in boreholes and wells. Drum mounted, with an ON/OFF switch indicator and audio signal when probe touches the water. The cable is marked at intervals and is battery operated.

SL 0116
Water Level Indicators 50 meters
SL 0117
Water Level Indicators 100 meters
SL 0118
Water Level Indicators 150 meters
SL 0119
Water Level Indicators 200 meters

Washable new edition features handy tabs for flipping to needed charts without getting pages dirty.

SL 0101
Soil Colour Chart
SL 0102
Tropical Soil Colour Chart

SL 0103
Soil Sampling kit
SL 0104
Soil Prospecting kit
SL 0105
Hand Auger Head 80 mm dia
SL 0106
Hand Auger Head 100 mm dia
SL 0107
Hand Auger Head 150 mm dia
SL 0108
Extended rod 1 m long

SL 0109
Power Auger Head

SL 0110
Auger 60 mm dia x 1 m long
SL 0111
Auger 80 mm dia x 1 m long
SL 0112
Auger 100 mm dia x 1 m long
SL 0113
Auger 150 mm dia x 1 m long
SL 0114
Auger 200 mm dia x 1 m long
SL 0115
Extension rod

SL 0116
Water Level Indicators 50 meters
SL 0117
Water Level Indicators 100 meters
SL 0118
Water Level Indicators 150 meters
SL 0119
Water Level Indicators 200 meters
Soil Equipment

Pocket Penetrometer
The Pocket Penetrometer is used in field exploration and in checking and comparing similar types of soil. Classifying cohesive soils in terms of consistency and estimation of approximate unconfined compressive strength and shear strength.

Dial Penetrometer
The Dial Penetrometer comes in three different versions, the dial has a maximum value holding system with 0 setting by push button. The Dial dia is 60 mm, with peak holding features.

Pocket Shear Vane
The Pocket Shear Vane can be used in the laboratory, at the end of sample tubes, etc. Supplied complete with:
- Standard 25 mm dia, vane range 0 to 10 N/cm²
- Sensitive Vane adaptor, range 0 to 2 N/cm²
- High capacity vane adaptor range 0 to 25 N/cm²

Field Inspection Vane Tester
The Field Inspection Vane Tester can be used to determine the maximum shearing force that can be exercised on a soil. Measurement in the field (on the surface, in profile pits or at the bottom of bore holes) as well as in the laboratory (on samples) are possible.

Dynamic Cone Penetrometer
The Dynamic Cone Penetrometer is used for rapid in situ measurement of structural properties of existing road pavement constructed with unbound materials.

Static Cone Penetrometer
The Static Cone Penetrometer is used to evaluate the consistency of soils, their level of compaction and the bearing capacity of shallow foundations and pavement subgrades.

Laboratory Vane Apparatus
The Laboratory Vane Apparatus is used to determine the shear strength in soft soil of undisturbed remolded samples. Both manual and motorised versions are available. Lightweight, compact, portable and self contained.

1. Pocket Penetrometer
   The cylindrical tip of 0.31 cm² area penetrate into the soil up to 6 mm marked point. A cursor on the scale reads directly unconfined compressive strength in kgf/cm².
   SL 0123 Pocket Penetrometer

2. Dynamic Cone Penetrometer
   Standards: BS 1377, 1924, 812, EN 932-1
   It consists of an 8 kg weight dropping through a height of 575 mm and 60° cone having a diameter of 20 mm. DCP measurements can be made down to a depth of approximately 850 mm.
   SL 0124 Dynamic Cone Penetrometer set

3. Static Cone Penetrometer
   The Static Cone Penetrometer is used to evaluate the consistency of soils, their level of compaction and the bearing capacity of shallow foundations and pavement subgrades.
   Specifically developed for use in fine grained soils, particularly soft soils, to depths of 30 feet. They use a 60° cone with a maximum area of 1.5 cm². An optional cone with a 3 cm² area is available for use in very soft soils. Dual rod construction isolates cone resistance from shaft friction. Pressure gauge ranging from 0 to 70 kg/cm² reads cone resistance directly, eliminating need for proving ring conversions. Stainless steel and anodized aluminium construction for reliable performance.
   Standard models include:
   - A 60° cone with a maximum area of 1.5 cm²
   - A Starter Rod Assembly designed to withstand an axial force of 250 lbf (340 N•m) maximum
   Pressure gauge marked in kg/cm²
   Operating Instructions and parts list
   SL 0125 Static Cone Penetrometer

4. Dial Penetrometer
   SL 0126 Range 0 to 5 kgf/cm², plungers dia is 6.35 mm
   SL 0127 Range 3 to 15 kgf/cm², plungers dia is 6.35 mm
   SL 0128 Range 0 to 6 kgf/cm², plungers dia is 6.35 mm - 10 - 15 - 20 - 25

5. Pocket Shear Vane
   SL 0129 Pocket Vane Complete set

6. Field Inspection Vane Tester
   Standards: ASTM D2573
   The shear stress measured can be read on a clearly readable scale ring. In soft soils it is not necessary to make a bore hole first. In order to determine the friction on the extension rods a dummy vane is available in these situations.
   SL 0130 Field Inspection Vane complete set

7. Laboratory Vane Apparatus
   SL 0132 Motorised Laboratory Vane Apparatus
   SL 0133 Vane 12.7 mm x 12.7 mm
   SL 0134 Vane 12.7 mm x 19 mm
   SL 0135 Vane 12.7 mm x 25.4 mm
   SL 0136 Attachment to hold a sample tube of 38 mm or 100 mm dia
Laboratory Mixer
Standards: BS 598-107, 1377-1, 1924-1, EN 12697-35

The Laboratory mixer is a planetary beater type, where the flat beaters rotate in the opposite direction to the orbit around the inside of the mixing bowl.

This ensures that the mixing is thorough and uniform. It has a direct gear drive transmission that may be set for three speeds with a control lever.

The hand lever can raise, lower and lock the bowl at the desired position. Adjustment is allowed for proper clearance between the bowl and the beater.

This Mixer is suitable for sample preparation of soils, bituminous concrete and cement mortars.

SL 0137 Laboratory Mixer 5 litre capacity complete with all accessories
SL 0138 Laboratory Mixer 10 litre capacity complete with all accessories
SL 0139 Spare stainless steel Bowl
SL 0140 Spare stainless steel Beater

Isomantle Heater

The Isomantle Heater is Used to heat the mixing bowl of (5 litres cap.) and (10 litres cap.) mixer.

It is fitted with an electronic temperature regulator and can be easily fitted to the mixer under the bowl. Max. temperature 180 °C

SL 0141 Isomantle Heater 5 litres cap
SL 0142 Isomantle Heater 10 litres cap.

Porcelain Mortar and Rubber Head Pestle

The Porcelain Mortar and Rubber Head Pestle is used for sample reduction by gently crushing individual particles.

SL 0143 Porcelain Mortar and Rubber Head Pestle complete set
SL 0144 Spare Porcelain Mortar 125 mm dia
SL 0145 Spare Rubber Head Pestle

Laboratory Soil Grinder

The Soil Grinder Prepares soil samples to designated particle size for accurate, repeatable test results. Grinds one-pint sample in 15 seconds. Stainless steel construction. Includes a No. 10 perforated stainless plate.

The Soil Grinder is used in place of a soil mortar and pestle to quickly reduce cakes of dry soil for particle-size analysis. It is intended to grind the fraction retained on a designated sieve until the aggregations of soil particles are broken up into separate grains.

Continuous grinding is ensured by using the gate below the hopper to feed the soil at a rate that does not stall the motor.

SL 0146 Laboratory Soil Grinder

Melting Pot

The Melting pot is used to melt wax, or asphalt material used to seal the soil samples and other materials.

The temperature is adjustable and maintained at the desired value through the thermostat controller. Supplier complete with aluminum cover.

Made from cast aluminum material with a heat resistant knob.

Specify Temp:
- 60 °C to 250 °C, 100 °C to 320 °C
- 60 °C to 450 °C, 150 °C to 550 °C

SL 0147 Melting Pot 1/2 litre
SL 0148 Melting Pot 1 litre
SL 0149 Melting Pot 2.5 litre
SL 0150 Melting Pot 4.5 litre
SL 0151 Melting Pot 9 litres

Sieve Shaker
Standards: EN 932-5, ISO 3310-1

The Sieve Shaker imparts a circular motion to the material being sieved so that it makes a slow progression over the surface of the sieve.

At the same time a feature of the rapid vertical movement agitates the sample which helps to clear the sieve apertures and avoid them blinding.

The shaker is fitted with timer which can be pre-set for any duration up to 60 minutes. This unit will accept 200mm and 300mm diameter sieves. Wet sieving kits in the appropriate sizes may be used with this shaker.

SL 0152 Sieve Shaker
Electromagnetic Sieve Shaker

The Sieve Shaker is powered by an electromagnetic drive which has no rotating parts to wear making it maintenance free and extremely quiet in operation.

The vibratory action produced by the power unit moves the sample over the sieve in a unique way producing faster more efficient sieving, while the rapid vertical movements also help keep the apertures from pegging.

SL 0153
Electromagnetic Sieve Shaker

Testing Sieves

Standards: EN 933-2, ISO 3310-1, ISO 3310-2, ISO 565

All test sieves are manufactured to National and International Specifications and are supplied with a “Certificate of Compliance”. Each sieve is individually serial numbered, ensuring full traceability. Particle Size Analysis is probably performed in all laboratories engaged in testing materials for civil engineering applications.

The range of sieves offered includes ISO, EN, BS and ASTM sieves. Woven wire test sieves are manufactured from stainless steel mesh while the Perforated plate test sieves are manufactured from tinned steel plate.

All test sieves unless otherwise indicated are supplied with full-depth frames. All our sieves are manufactured in the United Kingdom.

<table>
<thead>
<tr>
<th>Sieve Size 200 mm dia</th>
<th>Sieve Size 300 mm dia</th>
<th>Woven wire stainless steel mesh</th>
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</thead>
<tbody>
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<td><strong>Product code</strong></td>
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## Testing Sieves

Standards: EN 933-2, ISO 3310-1, ISO 3310-2, ISO 565

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<td>SL 0330</td>
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Soil Equipment

### Testing Sieves

Standards: EN 933-2, ISO 3310-1, ISO 3310-2, ISO 565

<table>
<thead>
<tr>
<th>Sieve Size 200 mm dia</th>
<th>Sieve Size 300 mm dia</th>
<th>Perforated plate mild steel plate sieve</th>
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<tr>
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<td>SL 0395</td>
<td>SL 0432</td>
<td>100.00 mm</td>
</tr>
</tbody>
</table>

### Testing Sieves

Standards: ASTM E11

ASTM E11 sieves are similar in construction to those used in the British Standard range. Two frame sizes are available as standard, 8 inch or 12 inch diameter.
### Testing Sieves

**Standards: ASTM E11**

<table>
<thead>
<tr>
<th>Sieve Size 8 inch dia</th>
<th>Sieve Size 12 inch dia</th>
<th>Woven wire stainless steel mesh</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product code</strong></td>
<td><strong>Product code</strong></td>
<td><strong>Mesh Size and description, ASTM</strong></td>
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<td>SL 0505</td>
<td>355 micron - no. 45</td>
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<td>SL 0469</td>
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<td>500 micron - no. 35</td>
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<td>600 micron - no. 30</td>
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<td>SL 0472</td>
<td>SL 0509</td>
<td>710 micron - no. 25</td>
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<td>SL 0473</td>
<td>SL 0510</td>
<td>850 micron - no. 20</td>
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</tr>
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**Testing Sieves**

**Standards: ASTM E11**

<table>
<thead>
<tr>
<th>Sieve Size 8 inch dia</th>
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<tbody>
<tr>
<td><strong>Product code</strong></td>
<td><strong>Product code</strong></td>
<td><strong>Mesh Size and description, ASTM</strong></td>
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<td>SL 0546</td>
<td>125mm - 5 inch</td>
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<td>SL 0542</td>
<td>SL 0547</td>
<td>Lid</td>
</tr>
<tr>
<td>SL 0543</td>
<td>SL 0548</td>
<td>Receiver</td>
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</tbody>
</table>

**Accessories:**

- **SL 0551**  Sieve Brush, double-ended, brass and nylon bristle
- **SL 0552**  Sieve Brush, nylon, double-ended

### Ultrasonic cleaning bath

**Standards: ASTM E11**

The Ultrasonic cleaning baths use cavitation to remove dirt from objects that are immersed in the cleaning liquid.

Cavitation is the sequential formation and collapse of vapour bubbles and voids in a liquid subjected to acoustic energy at high frequency and intensity.

Cavitation occurs wherever the liquid penetrates, ensuring that the smaller and larger aperture sieves are cleaned equally well. Ultrasonic baths are also useful for cleaning fragile items such as glassware.

Cleaning baths are manufactured from stainless steel, supplied complete with a 0 - 15 minute timer, lid and incorporate an ultrasonic generator which is suitable for continuous operation...

- **SL 0553**  Ultrasonic Cleaning Baths 25 lt capacity
- **SL 0554**  cleaning Liquid, 5 lt

The 25 litre cleaning bath has an internal diameter of 410mm and a height of 200mm, accommodating sieves of up to 400mm diameter.
Soil Equipment

**Speedy Moisture Meter**

**Standards:** BS 812, ASTM D4944, AASHTO T217

The Speedy Moisture is a portable system comprising a vessel with an integral pressure gauge, a weighing scale, and a carry case. A small sample of the material is prepared, weighed, and placed into the vessel. The reagent is then added, and the vessel is sealed and shaken to mix the reagent with the sample. Free moisture within the sample reacts with the reagent to produce a gas and pressure rise within the vessel that is proportional to the amount of moisture. The moisture content value is then read directly from the calibrated pressure gauge. The moisture content is then determined using the Moisture tester based on the calcium carbide method. The soil sample is introduced into the bottle with the reagent. The water reacts with calcium carbide and develops a gas pressure, which is indicated on the manometer and easily converted in percentage of moisture.

**Universal Carbide Meter**

**Standards:** BS 812, ASTM D4944, AASHTO T217

The moisture content can be determined using the Moisture tester based on the calcium carbide method. The soil sample is introduced into the bottle with the reagent. The water reacts with calcium carbide and develops a gas pressure, which is indicated on the manometer and easily converted in percentage of moisture.

**Liquid Limit Devices: Casagrande Method**

**Standards:** BS 1377:2, ENV 1997:2, ASTM D4318, AASHTO T89

Used to determine the moisture content at which clay soils pass from a plastic to a liquid state. It helps in the classification of soil when comparing the potential properties of soil material against empirical data. Consists of a removable brass cup, adjustable crank, mechanical blow counter, and base.

- **SL 0562** Manual Liquid Limit complete with counter, metal grooving tool and test gauge, BS Standard
- **SL 0563** Motorised Liquid Limit complete with counter, metal grooving tool and test gauge, BS Standard
- **SL 0564** Manual Liquid Limit complete with counter, less ASTM Standard
- **SL 0565** ASTM Metal Grooving Tool
- **SL 0566** AASHTO Casagrande Grooving Tool

**Cone Penetrometer Test**

**Standards:** BS 1377, 1924:2, EN DD ENV 1997:2

The Cone Penetrometer is used to carry on liquid limit tests on soil samples. It is a static test depending on the soil shear strength. The test is based on the relationship between moisture content and the penetration of a cone into the soil sample under pre-set conditions.

- **SL 0567** Manual operated Cone Penetrometer Supplied complete penetration needle and sample cups
- **SL 0568** Semi-Automatic Cone Penetrometer Supplied complete penetration needle and sample cups
- **SL 0569** Fully Automatic Cone Penetrometer

**Determination of Plastic Limit**

**Standards:** ASTM D4318, AASHTO T90, BS 1377:2

- **SL 0567** Plastic Limit complete test set
- **SL 0570** Glass Plate
- **SL 0571** Plastic Limit complete test set

**Determination of Shrinkage Limit**

**Standards:** ASTM D427, AASHTO T92, BS 1377

When the water content of a fine-grained soil is reduced below the plastic limit, shrinkage of the soil mass continues until the shrinkage limit is reached. This method of test covers the determination of the shrinkage limit, shrinkage ratio, volumetric shrinkage and linear shrinkage.

- **SL 0572** Shrinkage Limit complete test set
Soil Equipment

**Linear Shrinkage Mould**

*Standards: BS 1377:2*

The Linear Shrinkage test covers the determination of the shrinkage of soils and indicates the plastic properties of soils with low clay content.

Linear Shrinkage Mould 140 mm long, 12.5 mm radius; weight: 300 g.

**Voluvessel, 1/20 cu. ft. (1600ml) capacity**

*Standards: ASTM D2167; AASHTO T205*

The Voluvessel determine the in-place density of compacted or firmly-bonded soils using a rubber balloon apparatus viewed through a graduated, direct-reading clear plastic cylinder protected by metal casing.

The model features a plastic cylinder, which screws into the density plate with the pump assembly mounted to the base.

**Guelph Permeameter Apparatus**

*Standards: ASTM D5126*

The Guelph Permeameter is used for measuring in-situ hydraulic conductivity. Accurate evaluation of soil hydraulic conductivity, soil captures, and matrix flux potential can be made in all types of soils.

**Falling Head Permeameter Apparatus**

The Falling Head Permeameter apparatus is used to determine the permeability of clay-like or silty soils.

The specimen is confined within the permeameter which is connected to the manometer tube filled with water. The sample must be completely saturated with water before the test, and the operator will check the rate of fall of the water in the tube passing through the test specimen.

The set consists of Manometer tubes and stand with three tubes each dia. 3, 4 and 6 mm for the different degrees of permeability, soaking reservoir with cock, tubing and connectors.

**Constant Head Permeameter Apparatus**

*Standards: BS 1377:5 ; ASTM D2434 ; AASHTO T215*

The Constant Head Permeameter apparatus is used for testing the permeability of granular soils (sand and gravels). The specimen is formed in a permeameter cell and water is passed through it from a constant level tank.

Take off point located along the sides of the permeameter cell are connected to three manometer tubes mounted on a panel complete with a metre scale.

Water passing through the specimen is collected and measured, either for a specific quality or over a period of time. The reduction of head is noted from the variation of water level in the manometer tubes.
Gas Jar Method: End-Over-End Shaker

The End over End Shaker is used to determine the specific gravity of soils containing up to 10% particles retained on a 37.5 mm sieve, it rotates two gas jars at approx 50 rpm to satisfy BS Standard. The shaker is equipped with an original friction device.

220 V, 50-60 Hz, 1 ph

Mechanical End-over-End Shaker

The Particle density or specific gravity is a measure of the actual particles which make up the soil mass and is defined as the ratio of the mass of the particles to the mass of the water they displace. This method is suitable for soils containing up to 10% of particles retained on a 37.5 mm BS sieve.

Sedimentation Hydrometer Apparatus

The Sedimentation Hydrometer apparatus is used to determine particle size distribution in soil from the coarse sand size down to the smallest fractions.

In this method the sample is cleaned from organic matter after which it is dried and weighed. Next it is suspended in water and sieved. The solution that passes through the sieve is transferred to a measuring cylinder with water.

Hydrometer readings are taken after regular intervals. Sedimentation time and hydrometer readings are used to determine the grain sizes according to the Stoke’s Law.

Pyknometer Methods

The Pyknometer Method is used to determine the specific gravity of clays, sand and gravel of size smaller than 10mm. Specific gravity is the ratio of weight to volume of a specific material in air and in water at a constant temperature.

Magnetic Stirrer

The magnetic stirrer hotplates are specifically designed for laboratory usage. Available in a choice of either robust aluminium or chemically resistant ceramic top, each is equipped with a range of advanced safety and communication features. To alert the user, a “Hot” warning light will flash whenever the plate temperature is above 50°C. Powerful magnets and motor give stirring speed up to 1500rpm and volumes up to 15 litres. The units automatically detect when the contact thermometer is plugged in and is visible by an illuminated LED on the hotplate, providing reassurance that the temperature of the sample is precisely controlled at all times.
Soil Equipment

Sand Equivalent Test
Standards: EN 933–8, ASTM D2419, AASHTO T176

The Sand Equivalent Test indicates the relative portion of undesirable clay-like or plastic fines and dusts that occur in granular soils and fine aggregates passing the No. 4 sieve.

The sample to be tested is placed in a special solution of calcium chloride, formaldehyde and glycerine. After shaking the cylinder, it is allowed to stand for a 20-minute sedimentation period. Readings are then taken on the cylinder scale for the level of the top of the clay suspension and for the sand level. The “Sand Equivalent” is the sand reading divided by the clay reading x 100. When the water content of a fine-grained soil is reduced below the plastic limit, shrinkage of the soil mass continues until the shrinkage limit is reached.

SL 0604
Sand Equivalent Test Set

Sand Equivalent Shaker
Standards: EN 933–8, ASTM D2419, AASHTO T176

The Sand Equivalent Shaker is recommended for laboratories performing sand equivalent tests on a regular basis. The shaker is used for uniform shaking of Sand Equivalent Measuring Cylinders. Provides shaking action at the specified rate and stroke. Supplied complete with built in timer.

SL 0605
Sand Equivalent Shaker

Sand Cone Density
Standards: ASTM D1556, AASHTO T191

The Sand Cone Density is used for on site determination of the degree of compaction of sand. Complete set includes double cone, plastic sand jar, Sit capacity and metal tray.

SL 0606
Sand Cone Density complete set
SL 0607
Standard Sand, 600/300 μm, 50 Kg.

Sand Replacement
Standards: BS 1377:9, 1924:2

The Sand Replacement is used to determine the dry density of in-situ compact, fine, medium grained soils and for layers not exceeding 50 cm thickness. A circular hole is dug in the ground, all the soil from within it is collected, weighed and dried. The hole is then back-filled with standard uniform sand or fine gravel, poured from a calibrated container for calculating the volume of hole.

Complete set consists of pouring cylinder, calibration container and a tray. The sand pouring cylinder is made of cast aluminum and precisely machined. The calibration container and tray are made of plated sheet steel.

SL 0607
Sand Replacement Set 100 mm
SL 0608
Sand Replacement Set 150 mm

Riffle Boxes
Standards: BS 1377, 1924, 812, EN 932-1, 933-3, ASTM C72

Riffle Boxes are used for dividing soil aggregates into representative sample increment for testing. Heavy Duty Electrostatic painted and manufactured from heavy gauge sheet metal the slot widths and number of slots as required in the standards. Riffle boxes are supplied complete with 3 containers easy to handle.

Complete set consists of pouring cylinder, calibration container and a tray. The sand pouring cylinder is made of cast aluminum and precisely machined. The calibration container and tray are made of plated sheet steel.

SL 0611
Slot Width 7 mm 2,2 kg
SL 0612
Slot Width 13 mm 6,2 kg
SL 0613
Slot Width 15 mm 8 kg
SL 0614
Slot Width 19 mm 9,5 kg
SL 0615
Slot Width 25 mm 12,5 kg
SL 0616
Slot Width 30 mm 19,9 kg
SL 0617
Slot Width 38 mm 21 kg
SL 0618
Slot Width 45 mm 24,7 kg
SL 0619
Slot Width 50 mm 26,8 kg
SL 0620
Slot Width 64 mm 32,1 kg
SL 0621
Slot Width 75 mm 35,3 kg

Gilson Sample Splitter
Standards: ASTM D427, AASHTO T92, BS 1377

The Gilson Sample Splitter is rugged, large-capacity floor model for field or lab use. Features adjustable chutes and gate release hopper. Particle sizes from 60 microns to 6 inch. Includes 2 pans.

SL 0622
Gilson Sample Splitter
Soil Equipment

Plate Bearing Test Equipment
Standards: ASTM D 1194, D1195, D1196, BS 1377:9

The Plate Bearing Test is used to determine the bearing capacity of a soil under field loading conditions for a specific loading plate and depth of embedment. It is also used for load tests of soil and flexible pavement components. The Basic test set unit is supplied complete with 2.4 meter long datum bar. 3 dial gauges (50 mm) hydraulic cylinder 500 KN with hand pump, pressure gauge, connections and 300 mm diameter loading plate.

SL 0623 Plate Bearing Complete Set
SL 0624 300mm dia loading plate
SL 0625 450mm dia loading plate
SL 0626 600 mm dia loading plate
SL 0627 750 mm dia loading plate

Electrical Density Gauge
Standards: ASTM D6938, D2950, C1040 and AASHTO T310

The electrical density gauge measures pavement density indirectly by measuring its dielectric constant. It passes a small current through the pavement, which creates an electrical sensing field. Density is measured by the response of this electrical sensing field to changes in the pavement’s complex impedance (consisting of the pavement’s composite resistivity and dielectric constant).

SL 0628 Electrical Density Gauge

Nuclear Density Gauge
Standards: ASTM D6938, D2950, C1040 and AASHTO T310

The Nuclear Density Gauge that is better in performance than any other gauge on the market today with the lowest maintenance and operating costs. Operation is straightforward and uncomplicated. Menu options are easy to read and navigate. A backlit LCD screen and special scroll functions allow operators to easily read.

SL 0629 Nuclear Density Gauge

Consolidation Apparatus
Standards: BS 1377:5 / ASTM D2435, D3877, D4546, AASHTO T216

The One-dimensional Consolidation test is used to determine the consolidation characteristics of soils of low permeability. The consolidation is rigidly constructed to ensure minimum frame distortion. The frame is designed to load the specimen through a yoke assembly and one of three alternative beam ratios as 9:1 – 10:1 and 11:1. The beam is fitted with a counter balance weight and beam support check. The cell platform will accept the complete range of consolidation cells and is fitted with a central spigot to ensure accurate centering of the cell under the loading yoke.

The fixed ring consolidation cells are manufactured from corrosion-resistant materials and conform to the requirements of the relevant standards. An integral water reservoir is incorporated in the cell which allows the specimen to be inundated when required.

SL 0630 Consolidation Frame
SL 0631 Floor-mounting stand securing up to three Consolidation Frames
SL 0632 Set of weights (4x10 kg, 1x5 kg, 2x2 kg, 1x1kg)

Consolidation Cells
SL 0633 Consolidation cell, 50 mm complete
SL 0634 Consolidation cell, 75 mm complete
SL 0635 Consolidation cell, 2.5 inch complete
SL 0636 Floating Ring Consolidation Cell 63.5 mm (2.5 in) diameter sample.

Measurement of Movement
SL 0637 Dial Gauge BS, 10 x 0.001 mm div
SL 0638 Dial Gauge ASTM, 0.5 x 0.0001 inch div
SL 0639 Displacement Transducer, BS
SL 0640 Displacement Transducer, ASTM
SL 0641 Data Logger
Spare
SL 0642 Cutting ring
SL 0643 Calibration disc
SL 0644 Upper porous disc
SL 0645 Lower porous disc

Standards: ASTM D 1194, D1195, D1196, BS 1377:9

Standards: ASTM D6938, D2950, C1040 and AASHTO T310

Standards: ASTM D6938, D2950, C1040 and AASHTO T310

Standards: BS 1377:5 / ASTM D2435, D3877, D4546, AASHTO T216

Standards: BS 1377:5 / ASTM D2435, D3877, D4546, AASHTO T216
Direct Residual Shear Apparatus

Standards: BS 1377, EN 1997-2, ASTM D3080, AASHTO T236

The Digital Residual Direct Shear Apparatus is used for determination of the direct shear strength of soils specimen. The process is known as shear failure and occurs when shear stresses set up in the soil mass exceed the maximum shear resistance which the soil can offer, i.e., its shear strength.

Comprises:

- Direct Shear box, floor mounted with carriage assembly and load hanger with 10:1 lever loading device.
- Microprocessor controlled digital motor with digital keyboard display and return datum facility. Variable speed over the range of 0.00001 to 9.99999 mm/minute. Fast forward/reverse 10 mm per minute.

SL 0646
Digital Direct Residual Shear Apparatus, Supplied without shearbox, load ring, vertical and horizontal dial gauges.

SL 0647
Slotted Weights, 50 kg Set of Weights

Measurement of Load

- SL 0648
  Compression Load ring, 2 KN
- SL 0649
  Compression Load ring, 5 KN
- SL 0650
  S-type Load Cell, 5 KN

Measurement of Movement

- SL 0651
  Vertical Dial Gauge, 10 x 0.01mm
- SL 0652
  Horizontal Dial Gauge, 10 x 0.01mm
- SL 0653
  Displacement Transducer

Shear Box Assemblies

- SL 0654
  Shear Box Assembly BS 1377, 60x60x25mm, 2 Kg
- SL 0655
  Shear Box Assembly BS 1377, 100x100x25mm, 5.2 Kg
- SL 0656
  Shear Box Assembly ASTM D3080, 2.5 x 1inch, 2.8 Kg

Accessories and Spares

- SL 0657
  Specimen Cutter for 60mm
- SL 0658
  Specimen Extrusion Tool for 60mm
- SL 0659
  Porous Disc for 60mm
- SL 0660
  Specimen Cutter for 100mm
- SL 0661
  Specimen Extrusion Tool for 100mm
- SL 0662
  Porous Disc for 100mm
- SL 0663
  Specimen Cutter for 2.5inch
- SL 0664
  Specimen Extrusion Tool for 2.5inch
- SL 0665
  Porous Disc for 2.5inch

Automatic Soil Compactor


The Automatic Soil Compactors is designed to provide a uniform compaction of Standard, Modified and CBR specimens assuring conformity with the reference standard.

The Compactor is equipped with programmable digital counter which allows machine to stop at the preset numbers of blows. The height and weight of the rammer is adjustable to suit test requirements.

- The drop weight is adjustable to 300 mm drop height and is also adjustable to 450 mm drop height.
- The rammer is circular faced with a 50 mm diameter and is adjustable to 2.5 kg or 4.5 kg.
- An automatic blow pattern ensures effective compaction for each layer of soil and the rammer travels across the mould.

The table rotates the mould in equal steps and the number of blows per layer can be set at the beginning of the test by the digital counter.

- Drop Height: 300 mm, 305 mm, 450 mm, 457 mm (adjustable)
- Rammer Weight: 2.5 kg, 4.5 kg

Dimensions:

- 640 x 340 x 1506 mm (w x l x h)
- Power: 220 V, 50-60 Hz, 1 ph
- Weight (approx.): 135 kg

SL 0666
Automatic Soil Compactor BS/EN
SL 0667
Automatic Soil Compactor ASTM

Spare

SL 0668
Rammer BS/EN, 50 mm dia, adjustable to 2.5 kg or 4.5 kg weight
SL 0669
Rammer ASTM, 2 in dia, adjustable to 5.5 lb (2.5 kg) or 10 lb (4.5 kg)

Dry Density, Moisture Relationship, Standard and Modified Proctor Mould


The Moulds are used for determining the relationship between the moisture content and density of compacted soil. Made of plated steel, includes collar, mould body and base plate.

- SL 0670
  Standard Compaction Mould BS/EN 1 litre, 5.5 kg.
- SL 0671
  Compaction Rammer, 50 mm dia, 2.5 kg BS/EN
- SL 0672
  Compaction Rammer, 50 mm dia, 4.5 kg BS/EN
- SL 0673
  Proctor Compaction Mould, 1/30 ft³ 5.4 kg, ASTM
- SL 0674
  Proctor Compaction Rammer, 2 in dia, 5.5 lb, 4.1 kg, ASTM
- SL 0675
  ASTM Compaction Mould, 1/13.33 ft³, 8.2 kg, ASTM
- SL 0676
  ASTM Compaction Rammer, 2 in dia, 10 lb, 6.3 kg, ASTM
- SL 0677
  Straightedge, 300 mm
California Bearing Ratio Test Machine
Standards: BS 1377, 1924, EN 13286-47, ASTM D1883, AASHTO T193

The California Bearing Ratio or CBR test is used for the laboratory evaluation of the bearing value of highway sub-bases and sub-grade.

The CBR is composed by a robust and compact two-column frame with adjustable upper cross beam driven by an electromechanical ram with a maximum capacity of 50 kN and a data acquisition and processing system.

The CBR is designed to load the penetration piston into the soil sample at a constant rate to measure the applied load and piston penetration at pre-determined intervals.

The ram speed can be set between 0.5mm/min to 5mm/min by using Digital Readout Unit. This main feature allows user to perform tests complying to BS / EN or ASTM standards with the same machine.

Rapid adjustment of the platen is also provided.

Data Acquisition and Control System
Standards: BS 1377, 1924, EN 13286-47, ASTM D1883, AASHTO T193

The LCD graphics Data Acquisition and Controls System (DA/CS) is designed to control the machine and to process the data from linear potentiometric transducers, Load Cells, installed on the CBR machine frame.

The DA/CS compatible design satisfies the ergonomic requirements for various uses.

The digital graphic display allows real time Load vs. penetration graph and value readout. At the end of the test cycle the results can be stored in the large memory or to a PC by using the CBR software.

Dedicated real time CBR software package is available for testing and further data processing, database management and certificate printing.

Specification:
- Calculates corrected CBR value at 2.5mm and 5mm
- Large memory up to 100 tests
- RS232 connection serial port for connecting either PC or printer for data transmission
- Two analogical channels, for Load Cell Linear and potentiometer transducer

In-situ California Bearing Ratio Apparatus
Standards: BS 1377, 1924, EN 13286-47, ASTM D1883, AASHTO T193

The in-situ California Bearing Ratio is used for the evaluation of the bearing capacity of soil from a vehicle on site immediately and with less delay. Rigid and stable frame, made from corrosion-proof steel.

SL 0690
In-situ California Bearing Ratio
50 KN Conversion Frame BS/EN
SL 0691
50 KN Load Ring complete
SL 0692
Bracket and Adapter
SL 0693
50 kN Capacity Mechanical Jack
SL 0694
Datum Bar Assembly
SL 0695
4.5 kg Annular Surcharge Weight
SL 0696
4.5 kg Slotted Surcharge Weight
SL 0697
Set of Extension Rods
SL 0698
Ball Seating with Connections
SL 0699
CBR Penetration Piston
SL 0700
Penetration Dial Gauge

Multispeed Test Machine
Standards: BS 1377-7, -8 1924-2,ASTM D2850 D4767, AASHTO T296 T297

The Multispeed 50 kN capacity machine has been designed primarily for performing laboratory CBR and Marshall stability on one load frame.

It is particularly suitable for those laboratories carrying out a mix of these tests, e.g. for road construction. The compact bench mounting design comprises a twin column frame incorporated into the motorised drive system. The Upper beam can be adjusted in height.

A robustly constructed case houses the drive system with careful attention being given to the prevention of ingress of water or grit.

All operating controls are mounted on the front panel of the machine.

Multispeed 50 kN capacity Machine
SL 0688
Multispeed 50 kN capacity Machine
SL 0689
Multispeed 50 kN capacity Machine with digital display

The frame provides two fix speed ranges, easily selectable by a gear control switch. An emergency stop is installed as an extra safety feature. Foreseen electric end of stroke switches of the load plate to save the machine from wrong manipulations. Digital Display is also available.

Speeds of operation vary between:
- 1.27 mm/min. for CBR tests.
- 50.8 mm/min for Marshall tests.

SL 0688
Multispeed 50 kN capacity Machine
SL 0689
Multispeed 50 kN capacity Machine with digital display
**Soil Equipment**

**Expansion Swell Test Equipment**

- The Swell Test Equipment is placed on top of the soil sample to enable monitoring of swelling.
- The swell test consists of perforated plate with adjustable stem (swell plate) dial gauge tripod and dial gauge.

**CBR Mould and Accessories**

- The range of moulds and accessories specifically designed to meet the requirements of the relevant standards.
- The moulds and accessories are manufactured from high quality, long-lasting material and with proper maintenance will give years of satisfactory performance.

**CBR Mould BS/EN:**

- SL 0704 CBR Mould Body complete with collar and perforated baseplate BS/EN
- SL 0705 CBR Extension Collar, BS/EN
- SL 0706 CBR Solid Baseplate, BS/EN

**CBR Mould ASTM:**

- SL 0707 CBR Mould Body complete with collar and perforated baseplate ASTM
- SL 0708 CBR Extension Collar, ASTM
- SL 0709 CBR Solid Baseplate, ASTM

**Accessories For CBR Mould BS/EN:**

- SL 0710 CBR Perforated Baseplate, BS/EN
- SL 0711 CBR Cutting Collar to fit BS/EN mould body
- SL 0712 Pair of C-spanner to fit BS/EN CBR moulds and collars
- SL 0713 Baseplate Tool BS/EN
- SL 0714 Static Compaction Plug BS/EN
- SL 0715 2 kg Annular Surcharge Weight BS/EN
- SL 0716 2 kg Split Surcharge Weight, BS/EN
- SL 0717 Tamping Rod
- SL 0718 Filter Papers, 150 mm diameter. Box of 100

**Accessories For CBR Mould ASTM:**

- SL 0719 CBR Cutting Collar to fit mould body ASTM
- SL 0720 CBR Spacing Disc ASTM
- SL 0721 Baseplate Tool ASTM
- SL 0722 S lb Annular Surcharge Weight ASTM
- SL 0723 S lb Split Surcharge Weight ASTM
- SL 0724 Filter Papers, 150 mm diameter. Box of 100

**Triaxial Testing Apparatus**

- The Triaxial Testing Apparatus test soil samples for the following applications:
  - Unconsolidated Undrained (UU)
  - Consolidated Undrained (CU)
  - Consolidated Drained (CD)
  - Unconfined Compression (UC)

- The Triaxial Testing Apparatus consists of a 50 KN capacity Load Frame, Platen adaptors, dial gauge or digital transducer assembly, Triaxial Cell, Base and pressure system.

- The Triaxial Testing Apparatus provide variable speed from 0.399999” (9.99999 mm) per minute to as low as 0.000001” (0.00001 mm) per minute.

**Sample Preparation:**

<table>
<thead>
<tr>
<th>Sample Diameter</th>
<th>38 mm</th>
<th>50 mm</th>
<th>70 mm</th>
<th>100 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>O-Ring placing tool</td>
<td>SL 0741</td>
<td>SL 0750</td>
<td>SL 0759</td>
<td>SL 0768</td>
</tr>
<tr>
<td>Suction membrane device</td>
<td>SL 0742</td>
<td>SL 0751</td>
<td>SL 0760</td>
<td>SL 0769</td>
</tr>
<tr>
<td>Two-way split former</td>
<td>SL 0743</td>
<td>SL 0752</td>
<td>SL 0761</td>
<td>SL 0770</td>
</tr>
<tr>
<td>Two-part split mould</td>
<td>SL 0744</td>
<td>SL 0753</td>
<td>SL 0762</td>
<td>SL 0771</td>
</tr>
<tr>
<td>10 ml single-tube drainage burette</td>
<td>SL 0745</td>
<td>SL 0754</td>
<td>SL 0763</td>
<td>SL 0772</td>
</tr>
<tr>
<td>Valve complete with 6 mm connector</td>
<td>SL 0746</td>
<td>SL 0755</td>
<td>SL 0764</td>
<td>SL 0773</td>
</tr>
<tr>
<td>Tubing and Connector</td>
<td>SL 0747</td>
<td>SL 0756</td>
<td>SL 0765</td>
<td>SL 0774</td>
</tr>
<tr>
<td>Rubber membrane (pack of 10)</td>
<td>SL 0748</td>
<td>SL 0757</td>
<td>SL 0766</td>
<td>SL 0775</td>
</tr>
<tr>
<td>Membrane sealing ring (pack of 10)</td>
<td>SL 0749</td>
<td>SL 0758</td>
<td>SL 0767</td>
<td>SL 0776</td>
</tr>
</tbody>
</table>

**Accessories:**

- SL 0738 Grease Gun Supplied complete with one tube of silicone grease lubricant.
- SL 0739 Silicone Grease Lubricant Tube
- SL 0740 Piston Resistant Clamp
**Deaired Water Apparatus**

**Standards:** BS 1377

The compact self-contained unit will deair water quickly and efficiently down to levels of dissolved oxygen acceptable for the use in soil testing laboratories, triaxial tests, saturation and permeability tests.

It is particularly important that water from which dissolved air has been removed is used in the pore pressure measurement system.

Any dissolved air in the water will lead to errors in the measurement of pore pressure, particularly at low pressures.

The deair water apparatus remove air from the water by a vacuum system which continuously circulates the water in the tank. The unit is supplied with a clear water container which will hold a maximum of 15 litres of water. Input and output lines are formed using standard 6 mm tube connectors.

![Deaired Water Apparatus](image1)

**Air/Water Pressure System**

To distribute pressure water “up to 1700 kPa.” Simple, practical and extremely accurate to select tests pressure, it can also offer the possibility to further system expansions.

The cell set includes a high pressure air inlet attachment, “a high accurate regulator which enables to set the work pressure and 4 valves for pressure water outlet, water and air drain.” The cell membrane enables the use of deaerated water.

A suitable compressor, which can grant a pressure source, is necessary for using the air/water membrane cell. Air/Water panels are used with an interface to convert air pressure from a standard compressor into water pressure. Bladder Air/Water Cylinder.

**Microspear, Moisture and Temperature**

The instrument measures moisture and temperature of minerals and building materials at depths up to six feet (nearly 2 meters) - simply by insertion.

The digital readings are shown instantly. It has a built-in computer which gives it the flexibility to handle a wide range of materials and water contents.

This instrument will give you quick results and an alternative for sampling and testing using balances or ovens.

Any environment where minerals or building materials are being shipped, stored or processed

**Oil/Water Pressure System**

**Standards:** BS1377-7, BS1377-8

The Oil/Water Pressure System provides an infinitely variable constant pressure from 0 to 3500 kPa, by using a motorised hydraulic pump, an oil/water interchange vessel, piston/spring and valves with high viscosity oil.

Supplied complete with precision pressure gauge, range 0-3500 kPa. with a control accuracy of better than ± 2.0 kN/m² of the indicated set pressure.

![Oil/Water Pressure Apparatus](image2)

**Microspear, Moisture and Temperature**

The instrument measures moisture and temperature of minerals and building materials at depths up to six feet (nearly 2 meters) - simply by insertion.

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This instrument will give you quick results and an alternative for sampling and testing using balances or ovens.

Any environment where minerals or building materials are being shipped, stored or processed

**Specifications:**
- **Measurement Response:** 2 seconds
- **Moisture Range:** 0-25%
- **Moisture Resolution:** ±0.1%
- **Moisture Accuracy:** ±0.5% of reading
- **Temperature Range:** -20°C to 60°C
- **Temperature Resolution:** 0.1°C
- **Temperature Accuracy:** <0.5°C
- **Weight:** 1500g
- **Material Selections:** 6 (user configurable)
- **Power Requirements:** 4 x 1.5v AA alkaline cells (or equivalent)
- **Shaft Colour Options:** Grey / Orange / Yellow / Blue

![Microspear, Moisture and Temperature](image3)

**Deaired Water Apparatus**

- **SL 0777** Deaired Water Apparatus
- **SL 0778** Spare Water Tank
- **SL 0779** Nylon Tubing, 6mm bore dia 1 meter length

**Air/Water Pressure System**

- **SL 0780** Bladder-type Air/Water Pressure Assembly
- **SL 0781** Spare Bladder Membrain
- **SL 0782** Two-way Pneumatic Pressure Regulator Panel
- **SL 0783** Four-way Pneumatic Pressure Regulator Panel
- **SL 0784** Six-way Pneumatic Pressure Regulator Panel
- **SL 0785** Air Compressor, 1000 kpa
- **SL 0786** Filter Unit for Compressor

**Oil/Water Pressure System**

- **SL 0787** Oil/Water Pressure Apparatus
- **SL 0788** Universal Pump and Pressure Indicating Panel
- **SL 0789** Oil, 2 Litres

**Microspear, Moisture and Temperature**

- **SL 0790** Microspear, 1 meter long
- **SL 0791** Microspear, 2 meter long