### Civil engineering test equipment

**Edition 2011**

<table>
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<th>Category</th>
<th>Pages</th>
</tr>
</thead>
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Aggregates represent the mainly used product in the building industry. They are used in concrete, bituminous conglomerates, plasters, road and railways subgrades etc.

The different international standards together with the new European Standards EN are requiring many different checks on different features as mechanical, physical, geometrical, kind of density, strength, degradability etc.

A rock stratum will undergo alterations in the mechanical characteristics when it is exposed to excavations, handlings etc.

For above reasons a study of the mechanical characteristics of an intact rock becomes indispensable in order to analyze the relative characteristics when realizing underground or surface structures as galleries, quarries and foundations.
A007 Laboratory ovens
Specially designed for drying, conditioning and moisture determination. Sturdy manufacture, double walled with 60 mm thick glass fibre for thermal insulation. Exterior front part is stainless steel made, while interior chamber, grid shelves and external walls are made from zinc coated steel. Temperature range from ambient to 200°C, supplied with two grid shelves adjustable at various heights, pilot light, exhaust holes for fast cooling, 230 V, 50-60 Hz, 1 ph.

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity litres</th>
<th>Inside dimensions mm</th>
<th>External dimensions mm</th>
<th>Doors</th>
<th>Watt</th>
<th>Weight kg</th>
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</thead>
<tbody>
<tr>
<td>A007</td>
<td>50</td>
<td>350 x 360 x 390</td>
<td>590 x 460 x 620</td>
<td>1</td>
<td>750</td>
<td>34</td>
</tr>
<tr>
<td>A007-01 KIT</td>
<td>100</td>
<td>400 x 420 x 600</td>
<td>640 x 515 x 805</td>
<td>1</td>
<td>1200</td>
<td>40</td>
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<tr>
<td>A007-04 KIT</td>
<td>220</td>
<td>600 x 610 x 600</td>
<td>840 x 725 x 805</td>
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<td>1140 x 760 x 910</td>
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<td>3600</td>
<td>85</td>
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A006-08 Mercury control thermometer, 0-300°C, division 1°C.

A007-51 Additional grid shelf for oven A007
A007-52 Additional grid shelf for oven A007-01 KIT
A007-53 Additional grid shelf for oven A007-04 KIT
A007-54 Additional grid shelf for oven A007-08 KIT

A008 Laboratory ovens
Forced ventilation, digital thermostat
EN 932-5, EN 1097-5, ASTM C127
Particularly suitable for use where high accuracy and uniformity of temperature are required. The accuracy of the temperature and its uniformity are granted within the tolerances requested by the Standards. The interior chamber, the grid shelves and the exterior front part are stainless steel made; the external walls are made from zinc coated steel. Double walled with 60 mm thick glass fibre for thermal insulation, temperature range from ambient to 200°C, supplied with two grid shelves adjustable at various heights, pilot light, exhaust holes for fast cooling, 230 V, 50-60 Hz, 1 ph.

<table>
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<tr>
<th>Model</th>
<th>Capacity litres</th>
<th>Interior dimensions mm</th>
<th>Outside dimensions mm</th>
<th>Doors</th>
<th>Watt</th>
<th>Weight kg</th>
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<td>100</td>
<td>400 x 420 x 600</td>
<td>700 x 515 x 910</td>
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<td>1250</td>
<td>45</td>
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<td>A008-03 KIT</td>
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<td>900 x 725 x 910</td>
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<td>70</td>
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<td>95</td>
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<td>A008-07 KIT</td>
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<td>1250 x 700 x 1600</td>
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A008-51 Additional grid shelf for oven A008-01 KIT
A008-52 Additional grid shelf for oven A008-03 KIT
A008-53 Additional grid shelf for oven A008-05 KIT
A008-54 Additional grid shelf for oven A008-07 KIT

A006-01 Additional grid shelf for oven A008
A006-03 Additional grid shelf for oven A006-01 KIT
A006-05 Additional grid shelf for oven A006-03 KIT
A006-07 Additional grid shelf for oven A006-05 KIT

Ref. 1: A007
Ref. 2: A008
**Aggregates**

**Drying of samples**
Muffle furnaces, hot plate, Air drier, melting pot

**A022 - A024 Muffle furnaces**
EN 12697-1, EN 13108
Designed for high temperature heating. Structure made in sheet-steel, furnace frontal in diecasted steel to avoid the aggressive acid smokes. The thermic insulation is in ceramic fibre to avoid the smallest heating leakage and to obtain a great energetic saving. Electronic visualized regulation of the temperature is obtained by a digital thermostat. This furnace is also used for the determination of residual of mineral matter by incineration of bituminous mixtures to EN 12697-I clause C Standard. Inside dimensions 21x32x15 cm, (A024,14.5x25x10 cm), weight 88 kg.

<table>
<thead>
<tr>
<th>Model</th>
<th>Temperature litre</th>
<th>Voltage</th>
<th>Watt</th>
</tr>
</thead>
<tbody>
<tr>
<td>A022</td>
<td>1100° C</td>
<td>230 V, 50-60 Hz</td>
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<tr>
<td>A023</td>
<td>1100° C</td>
<td>400 V, 50-60 Hz, 3 ph</td>
<td>3900</td>
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<tr>
<td>A023-01</td>
<td>1100° C</td>
<td>400 V, 50-60 Hz, 3 ph</td>
<td>*3900</td>
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Other muffle furnace for higher temperatures at request.

<table>
<thead>
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<th>Model</th>
<th>Temperature litre</th>
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<th>Watt</th>
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<tr>
<td>A024</td>
<td>1200° C</td>
<td>230 V, 50 Hz</td>
<td>4200</td>
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(A024 corresponds to EN 196-2, 196-21, 459-2)
Other muffle furnace for higher temperatures at request.

* Also suitable for the determination of resistance to thermal shock of aggregates according to EN 1367-5.

**V200 - V200-06 Hot plates**
With thermoregulator, 230 V, 50 Hz.

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<thead>
<tr>
<th>Model</th>
<th>Dimension</th>
<th>Watt</th>
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<tr>
<td>V200</td>
<td>Round, Ø 185 mm</td>
<td>1500 W</td>
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<tr>
<td>V200-02</td>
<td>Round, Ø 220 mm</td>
<td>2000 W</td>
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<tr>
<td>B074</td>
<td>Round, Ø 160 mm</td>
<td>1000 W</td>
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<tr>
<td>V200-01</td>
<td>Rectangular 200x300 mm</td>
<td>1500 W</td>
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<td>V200-03</td>
<td>Rectangular 300x400 mm</td>
<td>2400 W</td>
</tr>
<tr>
<td>V200-05</td>
<td>Rectangular 400x500 mm</td>
<td>3400 W, up to 400°C</td>
</tr>
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<td>V200-06</td>
<td>Rectangular 400x600 mm</td>
<td>4000 W</td>
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**V201 Warm air drier**
For general laboratory purposes, to dry soil and aggregate samples. 230 V, 50 Hz, 1200 W.

**A106 Melting pot, capacity 5 l**
For melting wax and other materials, it maintains heat from room temperature to max. 350°C. Complete with adjustable thermostat range +50 to +350°C, diameter 200 x height 160 mm, accuracy ±1.5°C, 230 V, 50 Hz, 800 W, weight 3 kg.

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### Desiccators, climatic chamber

**A035 - A040-01 Desiccators borosilicate glass complete with perforated porcelain plate**

<table>
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<td>A035</td>
<td>Ø 200 mm</td>
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<tr>
<td>A036</td>
<td>Ø 250 mm</td>
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<tr>
<td>A036-01</td>
<td>Ø 300 mm</td>
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**Desiccators borosilicate glass complete with perforated porcelain plate and vacuum**

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<td>Ø 200 mm</td>
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<tr>
<td>A040</td>
<td>Ø 250 mm</td>
</tr>
<tr>
<td>A040-01</td>
<td>Ø 300 mm</td>
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<tr>
<td>V300-15</td>
<td>Silica gel box, 1000 g</td>
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</table>

**C314 Climatic chamber, capacity 520 l**

EN 196-1, EN 1367-1

This thermostatic climatic chamber is designed for all the research and control laboratories where known cold and/or hot temperatures with controlled humidity values are required for any type for freeze/thaw tests, accelerated curing tests, hot and cold tests in general. Used also to check the behaviour of aggregates during freeze and thaw cycle tests.

Temperature range -20°C +60°C accuracy ±0.5°C, humidity range 10-90%, dew point limits +2°C. Inside and outside frame totally in stainless steel. Digital display of actual and preset temperature, internal ventilation, forced circulation, inside dimensions 62x63x139 cm, overall dimensions 73x86x209 cm, with 3 adjustable shelves, RS 485 interface, 230 V, 50 Hz, 1000 W, 150 kg.

**C315 Climatic chamber, capacity 1200 l**

Same as model C314, capacity 1200 l

**C316 Climatic chamber, capacity 520 l**

**C316-01 Climatic chamber, capacity 1200 l**

Same as C314/C315 but without humidity setting and control, accuracy ± 0.1°C.

**C315-02 Microprocessor temperature programmer**

for the automatic execution of the set cycles for models C314 and C315.

**A103-10 Container for thermal and weathering properties of aggregates**

EN 1367-1/ EN 932-5

Stainless steel made, capacity 2000 ml with cover, for aggregates of 4 to 63 mm.

**A103-11 Ballast steel made**

Used for tests on lightweight aggregates
**Aggregates**

**Humidity**

Moisture meter, Moisture testers Speedy

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**A021 Moisture meter „Microlance“**

This electronic tester measures and visualizes directly on the display the moisture percentage and temperature of fine aggregates up to max. dia. of 10 mm and sand by simply inserting the crucible tip. Suitable for both site and laboratory test. Moisture range 0-35%, accuracy 0.5%, temperature range -20% to +60°C, accuracy 0.5°C. Measuring depth 1m, battery powered, dimensions 120x120x1200 mm, weight 2 kg.

**A021-01 Moisture meter „Microlance“**

Same as model A021, but with measuring depth up to 2 m, weight 3 kg.

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**A021-10 Moisture, digital microwave portable meter**

For accurate, fast and easy determination of moisture content in sand, fine and coarse aggregates up to 25 mm diameter. By utilizing the latest microwave and microprocessor technology, simply insert the 5 prongs into the material to be measured, the unit display the percentage of moisture content. Measuring range 0-20%, accuracy ±0.2%. Frequency: 50 MHz, RS232 data link, over 150 readings storage. Battery powered, dimensions, weight 1.8 kg.

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**A025 KIT Moisture Testers „Speedy“**

ASTM D4944, AASHTO 217, BS 812

For accurate moisture reading on site of soil, sand, aggregates. The test system arrives by the reaction between water and calcium carbide forming a gas. Complete with electronic balance, reagent tin, accessories, in a portable wooden case.

**A025 KIT Moisture tester „Speedy“, capacity 6 g, moisture range 0-20 %, weight 6 kg**

**A026 KIT Moisture tester „Speedy“ capacity 20 g, moisture range 0-20%, weight 8 kg**

**A027-01 Moisture tester reagent (one pound tin), 500 g**

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**A028 Universal carbide meter**

For the rapid and accurate determination of moisture content in sand, gravel, aggregates, soil etc. based on the calcium carbide method. Sample weight from 3 to 100g max., moisture range 0-20%, supplied with 20 carbide ampoules, small balance, in case.

**A028-01 Digital universal carbide meter**

Same as **A028** with digital manometer for more accurate readings 0.1%

**A028-02 Moisture tester universal digital**

Same as **A028-01** with high precision digital manometer and printer

**A028-11 Carbide Ampoules (pack of 100) for A028**
Aggregates

Humidity
Chapmann flask, moisture determination balance

A029 Chapman flask
ASTM C70 - AASHTO TI 42
Used for field determination of the amount of surface moisture in fine aggregates. Graduated to 200 ml between the two bulbs and from 375 up to 450 ml above the second bulb. Weight 500 g.

V023-01 Moisture determination balance
160 g/0.001/0.01 g sensitivity with tare up to 10 g.
Samples are dried by an infrared lamp with adjustable heat control. A built-in-timer 0-60 min. switches off the heater at the end of the drying cycle which is signalled by a bell. Moisture loss percentage and residual mass are read directly from the lighted scale. 230 V, 50/60 Hz.
**Aggregates**

**Bar/grid sieves, flakiness sieves**

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**A048 KIT Set of 13 bar (grid) sieves, openings 2.5-40 mm**

EN 933-3, NF P18-561

Used for the determination of the thickness of aggregates, stainless steel rod bars, dia. 5 to 15 mm, anodized aluminium frame, 300x300 mm, weight of one sieve about 4 kg.

<table>
<thead>
<tr>
<th>Model</th>
<th>Slot width (mm)</th>
<th>Model</th>
<th>Slot width (mm)</th>
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<td>A048-01</td>
<td>2.50</td>
<td>A048-08</td>
<td>12.50</td>
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<tr>
<td>A048-02</td>
<td>3.15</td>
<td>A048-09</td>
<td>16.00</td>
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<tr>
<td>A048-03</td>
<td>4.00</td>
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<td>A048-04</td>
<td>5.00</td>
<td>A048-11</td>
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<td>A048-05</td>
<td>4.00</td>
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<td>8.00</td>
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<td>40.00</td>
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<td>A048-07</td>
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<td>A048-21</td>
<td>Cover/Receiver</td>
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<td>A048-14</td>
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<tr>
<td>A048-21</td>
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</tbody>
</table>

A048-14 Slot width 9.5 mm used to check the wear of the spheres of the Micro-Deval having nominal size 10 mm

A048-21 Cover, anodized aluminium for A048

A048-22 Receiver, anodized aluminium for A059, A060-01

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**A049 KIT Set of 7 flakiness sieves, BS 812**

Used to determine if aggregate is flaky, i.e. if thickness is less than 0.6 of nominal size, heavy steel. Composed by A049-01-A049-07, slot widths 4.9-33.9 mm, length 30-100 mm.

<table>
<thead>
<tr>
<th>Model</th>
<th>Width (mm)</th>
<th>Length (mm)</th>
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<td>4.9</td>
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<td>7.2</td>
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<td>A049-04</td>
<td>14.4</td>
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<td>19.7</td>
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<tr>
<td>049-07</td>
<td>33.9</td>
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**A048-15 Gauge for aggregate flatness index**

UNI 8520 part 18

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**Ref. 18: A048 KIT**

**Ref. 19: A049 KIT**

**Ref. 20: A048-15**
Aggregates

Stainless steel test sieves

A050 - A054 Test sieves
Stainless steel woven wire Ø 200 - 250 - 300 - 315 - 400 - 450 mm - 8" and 12"
ASTM E11 - BS 410 - NF XII 504 - EN933-1, EN933-2.

A031 - A034 Test sieves
Stainless steel, square hole sieves Ø 200 - 300 - 400 mm
EN932-2

A037 - A038 Test sieves
Stainless steel, round holes Ø 200 - 300 mm
UNI 2334
### Aggregates

#### Sieves

Stainless steel test sieves

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<th>ASTM Number</th>
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### A056 - A057 -07 Receiver and lid

<table>
<thead>
<tr>
<th>Ø mm</th>
<th>200</th>
<th>300</th>
<th>250</th>
<th>315</th>
<th>8&quot;</th>
<th>400</th>
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<tbody>
<tr>
<td>Lid</td>
<td>A056</td>
<td>A056-01</td>
<td>A056-02</td>
<td>A056-03</td>
<td>A056-04</td>
<td>A056-06</td>
</tr>
<tr>
<td>Receiver</td>
<td>A057</td>
<td>A057-01</td>
<td>A057-02</td>
<td>A057-03</td>
<td>A057-04</td>
<td>A057-06</td>
</tr>
</tbody>
</table>

### V179 - V179-06 Brushes

- **V179** Bristle brush, dia. 35 mm
- **V179-02** Double ended, brass and nylon bristle
- **V179-03** Double ended soft/hard nylon
- **V179-05** Soft hair Brush, dia. 3 mm
- **V179-06** Hard nylon sieve Brush, flat 60 mm

Ref. 21: A056, A057

Ref. 22: V179, V179-06
Aggregates

Sieving
Wet sieving, cleansing bath, sieve shakers

A046 - A047 Wand sieving pan and lid, stainless steel
for all types of sieving

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>A046</td>
<td>Lid +pan Ø 200 mm</td>
<td>A046-11 Sand of 10 watertight seals</td>
</tr>
<tr>
<td>A046-02</td>
<td>Lid +pan Ø 8&quot;</td>
<td>A046-11 Sand of 10 watertight seals</td>
</tr>
<tr>
<td>A047</td>
<td>Lid +pan Ø 300 mm</td>
<td>A047-11 Sand of 10 watertight seals</td>
</tr>
<tr>
<td>A047-02</td>
<td>Lid +pan Ø 400 mm</td>
<td>A047-12 Sand of 10 watertight seals</td>
</tr>
</tbody>
</table>

Ref. 23: A046 - A047

A045 Wet washing sieves, stainless steel, dia. 200x h 200 mm
Opening 0.074 mm, ASTM E11
A045-02 Wet washing sieves, stainless steel, dia. 200x h 200 mm
Opening 0.063 mm, ASTM E11

A104 Ultrasonic cleansing bath, capacity 10 l
For safe and valid cleaning of sieves which could be damaged by ordinary cleaning methods, particularly for fine mesh sieves. Accepts sieves up to 250 mm, supplied with timer 0-15 min. frequency 38 kHz, Ø interior 260 x h180 mm, 230 V, 50 Hz, 300 W, weight 8 kg
A104-01 Ultrasonic cleansing bath, capacity 10 l
Same as A104 with capacity of 25 l, Ø interior 410 x h 200 mm
A104-02 Cleansing liquid, bottle of 25 l

A061N High capacity sieve shaker
Designed for sieving considerable quantities of any material. The screen shaker accepts up to 30 litres (60-70 kg) of sample. With dust pan, but without screen trays to be ordered separately. 230 V 50 Hz, 750 W, dimensions 585x790x850 mm, weight 180 kg.
A061-07 to A061-80 Screen trays, size 457x660x75 mm, opening 0.038 to 0.125 mm
A061-97 Safety doors, upper and frontal and microswitch
A061-98 Security cabinet, steel made with microswitch, with sound-proofing material for noise reduction.

A058-05N Air jet sieving machine
EN 933-10
For sieving from 5 to 4000 microns for sieves dia 200 mm, digital electronic microprocessor panel showing the sieving time 0-99 min., vacuum range from 0-99 bar, calibration function. 230 V 50 Hz, dimension 450x66x400 mm, weight 25 kg. With aspirator device, plexiglas cover, filter cartridge, 5 collecting plastic bags, accessories.
A058-20 to A058-96 Sieves, stainless steel, Ø 200 mm,
Openings from 5 to 4000 microns, includes airproof rubber seal.

Ref. 26: A061N

Ref. 24: A045 - A045-02

Ref. 25: A104

Ref. 27: A058-10
A058-01 Sieve shaker hand operated
For sieves Ø 200 mm and 8”.
For site tests or yard laboratory analysis where electricity is not available. By rotating the crank the shaker applies a vertical and rotational vibration action. It can hold up to 6 sieves Ø 200 mm or 8” plus pan and lid, dimensions 300x450x600 mm, weight 16 kg

A060-01 Sieve shaker motor operated
For sieves Ø 200, 250, 300, 315 mm, 8” and 12”, it holds up to 8 sieves Ø 200 mm or 7 sieves Ø 300 mm plus pan and lid, also for wet sieving tests, dimensions 350x400x950 mm, 230 V, 110 W, 50 Hz., weight 24 kg

A059-01 to A059-04 KIT Electromagnetic sieve shakers
EN 932-5
This sieve shakers are activated by electromagnetic impulses and thanks to its triple vibrating action (vertical, lateral and rotational) they are recommended to perform sieving tests where high precision and performance are important and where continual and intense uses are required. They are therefore suggested for accurate sieving tests, also on fine materials.
This electromagnetic shaker is of simple and sturdy construction, can hold up to 10 sieves and they are also suitable for wet sieving tests. The separate digital control panel can adjust: the sieving time from 1 to 99 min., the vibrating intensity, the pauses between the vibrations. 230 V 50 Hz, 450/750 W.

A059-01 KIT Electromagnetic sieve shaker
for sieves Ø 200 mm and 8”, dimensions 32x38x85 cm, 40 kg.

A059-02 KIT Electromagnetic sieve shaker
for sieves Ø 200, 250, 300, 315 mm, 8” and 12” dimensions 38x44x108 cm, weight 65 kg

A059-03 KIT Electromagnetic sieve shaker
for sieves Ø 200, 250, 300, 315, 350 and 400 mm, 8” and 12”, dimensions 43x46x115 cm, weight 80 kg

A059-04 KIT Electromagnetic sieve shaker
for sieves Ø 200, 250, 300, 315, 400 and 450 mm, 8”, 12” and 18”, dimensions 48x50x115 cm, weight 85 kg
Aggregates

Sampling
Sample splitters, flakiness, thickness, length, shape index

A062 to A067 Sample splitters (Riffle Boxes)
EN933-3 - ASTM C 136 - NF P18-553
For the precise division into two representative portions of materials such as aggregates, sand, gravel and similar.

<table>
<thead>
<tr>
<th>Model</th>
<th>Steel</th>
<th>Opening</th>
<th>Slot number</th>
<th>Weight kg</th>
<th>Spare pan</th>
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</thead>
<tbody>
<tr>
<td>A062</td>
<td>stainless steel</td>
<td>¼&quot; - 6.3 mm</td>
<td>12</td>
<td>0.8</td>
<td>A062-02</td>
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<tr>
<td>A063</td>
<td>stainless steel</td>
<td>⅜&quot; - 12.7 mm</td>
<td>12</td>
<td>1.2</td>
<td>A063-02</td>
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<tr>
<td>A064</td>
<td>painted steel</td>
<td>⅜&quot; - 19 mm</td>
<td>12</td>
<td>11</td>
<td>A064-02</td>
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<tr>
<td>A065</td>
<td>painted steel</td>
<td>1&quot; - 25.4 mm</td>
<td>12</td>
<td>11</td>
<td>A065-02</td>
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<tr>
<td>A065-01</td>
<td>painted steel</td>
<td>1 ½&quot; - 38 mm</td>
<td>8</td>
<td>11</td>
<td>A065-02</td>
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<tr>
<td>A066</td>
<td>painted steel</td>
<td>2&quot; - 50.8 mm</td>
<td>8</td>
<td>13</td>
<td>A066-02</td>
</tr>
<tr>
<td>A067</td>
<td>painted steel</td>
<td>2 ½&quot; - 63.5 mm</td>
<td>8</td>
<td>18</td>
<td>A067-02</td>
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</table>

A068 Large capacity sample splitter
Designed for the reduction of test samples which are too large in volume to be conveniently handled. It handles any material from sand sizes up to 108 mm. Each chute bar is 12 mm wide so that openings of 12 - 24 - 36 - 48 - 60 - 72 - 84 - 96 - 108 mm are possible. With two collecting pans. Clam shell hopper capacity 30 litres. Very sturdily constructed, it is totally cadmium plated for rust protection, weight 55 kg

A068-01 Collection pan for A068
A068-11 Kit of 4 wheels for A068

A069 Bulk density and voids measures
EN 1097:3, ASTM C29-97

<table>
<thead>
<tr>
<th>A069</th>
<th>Measure capacity</th>
<th>1 litre</th>
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<tbody>
<tr>
<td>A069-01</td>
<td>Measure capacity</td>
<td>5 litres</td>
</tr>
<tr>
<td>A069-02</td>
<td>Measure capacity</td>
<td>10 litres</td>
</tr>
<tr>
<td>A069-03</td>
<td>Measure capacity</td>
<td>20 litres</td>
</tr>
</tbody>
</table>

A070 Flakiness/thickness gauge
BS 812
To verify if aggregate is flay, i.e. if its thickness is less than 0.6 of its nominal size, stainless steel sheet, weight 600 g.

A071 Length gauge
BS 812
To determine if aggregate is elongated, i.e. if length is more than 1.8 of nominal size, mounted on a hardwood base, weight 1 kg.

A072 Shape gauge, shape index
EN 933-4, 933-5, 933-7
For measuring the length/thickness ratio of individual particles, weight 500 g.
V070 - V075 Electronic precision top lading and platform balances
Immediate and automatic zeroing and tare, automatic changeover of scale sensitivity (dual range models only). 230V, 50/60 Hz.

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Sensitivity</th>
<th>Ø Pan dim.</th>
<th>Optional acc.</th>
</tr>
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<tbody>
<tr>
<td>V070-02</td>
<td>160 g</td>
<td>0.001 g</td>
<td>Ø 110</td>
<td>A + F + G</td>
</tr>
<tr>
<td>V070-05</td>
<td>330 g</td>
<td>0.001 g</td>
<td>Ø 110</td>
<td>A + F + G</td>
</tr>
<tr>
<td>V070-06</td>
<td>500 g</td>
<td>0.001 g</td>
<td>Ø 110</td>
<td>A + F + G</td>
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<tr>
<td>V071-02</td>
<td>1200 g</td>
<td>0.01 g</td>
<td>Ø 130</td>
<td>E + F + G</td>
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<tr>
<td>V071-10</td>
<td>2200 g</td>
<td>0.01 g</td>
<td>Ø 160</td>
<td>A + F + G</td>
</tr>
<tr>
<td>V071-07</td>
<td>3100 g</td>
<td>0.01 g</td>
<td>Ø 160</td>
<td>A + F + G</td>
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<tr>
<td>V071-11</td>
<td>4100 g</td>
<td>0.01 g</td>
<td>Ø 160</td>
<td>A + F + G</td>
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<tr>
<td>V072-02</td>
<td>800g/5500g</td>
<td>0.01/0.1 g</td>
<td>Ø 160</td>
<td>A + F + G</td>
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<tr>
<td>V072-05</td>
<td>10 kg</td>
<td>0.1 g</td>
<td>175x200</td>
<td>E + F + G</td>
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<tr>
<td>V072-06</td>
<td>12 kg</td>
<td>0.1 g</td>
<td>320x360</td>
<td>E + G</td>
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<tr>
<td>V072-09</td>
<td>4500/16 kg</td>
<td>0.1/1 g</td>
<td>320x210</td>
<td>A + F + G</td>
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Other balances with other capacities on request.

<table>
<thead>
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<th>Sensitivity</th>
<th>Ø Pan dim.</th>
<th>Optional acc.</th>
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<tbody>
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<td>16 kg</td>
<td>0.1 g</td>
<td>320x360</td>
<td>E + G</td>
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<tr>
<td>V073-04</td>
<td>4.5/32 kg</td>
<td>0.1/1 g</td>
<td>320x360</td>
<td>A + F + G</td>
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<tr>
<td>V073-06</td>
<td>60 kg</td>
<td>1 g</td>
<td>425x535</td>
<td>E + G</td>
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<tr>
<td>V075-02</td>
<td>300 g</td>
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<td>Ø 116</td>
<td>E + G</td>
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<tr>
<td>V075-03</td>
<td>600 g</td>
<td>0.01 g</td>
<td>Ø 116</td>
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<tr>
<td>V075-06</td>
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<tr>
<td>V075-11</td>
<td>6 kg</td>
<td>0.1 g</td>
<td>225x300</td>
<td>E</td>
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<tr>
<td>V075-12</td>
<td>15 kg</td>
<td>0.2 g</td>
<td>225x300</td>
<td>E</td>
</tr>
<tr>
<td>V075-13</td>
<td>30 kg</td>
<td>0.5 g</td>
<td>225x300</td>
<td>E</td>
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<tr>
<td>V075-20</td>
<td>60 kg</td>
<td>2 g</td>
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</tr>
<tr>
<td>V075-22</td>
<td>300 kg</td>
<td>10 g</td>
<td>450x600</td>
<td>E</td>
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</tbody>
</table>

A : Power supply 230 V, 50/60 W
E : Power supply : rechargeable batteries and also 230V, 50/60 Hz
F : Under balance weighting facility for specific gravity tests
G: Interface RS 232 port

V031 - V034 Semi-automatic zero-centering balance
V031 Capacity 10 kg, sensitivity 1 g
V034 Capacity 30 kg, sensitivity 5 g

V057 - V059 Rotary automatic scales
Five pointer turns allowing a larger amplitude of the subdivision. Double quadrant and under quadrant sicking for multiples. Oil oscillation shock-absorber, with exterior adjustment. Displacement of the head in all positions without angulation limit. Pan, mass-produced, stainless steel.
V057 60 kg, sensitivity 20 g
V059 150 kg, sensitivity 50 g

V085 Specific gravity frame
EN 12390-7, BS 812:2, BS 1881:1
For details see page 39
A075 - A075-02 Los Angeles abrasion machine
EN 1097-2, EN 12697-17, EN 12697-43, ASTM C131, NF P 18-573
To determine the resistance of aggregates to abrasion. It comprises a heavy steel cylinder of 711 mm inside Øx508 mm inside length, mounted on a base frame. The cylinder rotates at 31-33 rpm. With an automatic digital counter which can be preset the required number of revolutions of the drum. Supplied without abrasive charges (to be ordered separately according to the standards the machine has to comply). Dimensions 100x80x100 cm, weight 370 kg.

Accessory:
A075-11 Security cabinet
A075-12 Security cabinet with sound-proofing material
A076-01 Set of 12 abrasive charges, ASTM
A076-02 Set of 12 abrasive charges, NF P18-573, EN 1097-2

A078N Micro-Deval testing machine
EN 1097-1, NF P18-572
Used to determine the resistance of aggregates by abrasion. Heavy steel frame on which four stainless steel cylinders Ø 200x154 mm are mounted. With separate control panel fitted with a digital automatic revolutions counter. Without cylinders and abrasive spheres. 230 V, 50 Hz, 750 W, dimensions 10x45x92 cm, 150 kg.

A078-02N Micro-Deval testing machine
Same as A078N but with security cabinet and lined with sound-proofing material for noise reduction.
A078-15 Cylinder standard, stainless steel, Ø 200x152 mm, needed 4 pieces
A078-11 Set of 20 kg spheres, stainless steel Ø 10 mm
A078-12 Set of 4 cylinder stainless steel Ø 200x400 mm for material of 25-50 mm according to NF P18-572
A078-13 Set of 12 spheres, stainless steel, Ø 30 mm, NF P18-576
A078-14 Set of 52 spheres, stainless steel, Ø 18 mm, NF P18-576
A048-14 Bar grid sieve, slot width 9.5 mm to check the wear of the spheres having nominal size of Ø 10 mm.

A079 Deval testing machine
NF P18-577, ASTM D2-33
Used to determine the quality of aggregates by abrasion both by dry and wet procedure. The machine essentially comprises a steel frame on which two cylinders are mounted. The machine is supplied complete with separate control panel fitted with a digital automatic revolution counter, two collecting pans. 230 V, 50 Hz, 750 W, dimensions 150x52x128 cm, weight 140 kg.

A079-01 Deval testing machine
Same as A079 but with security cabinet.
A079-02 Deval testing machine
Same as A079 but with security cabinet and lined with sound-proofing material for noise reduction.

A080-04 Aggregate impact value apparatus
NF P18-574
To determine the impact value of aggregates, supplied with cylindrical mould Ø 102x52 mm, dimensions 45x30x88 cm, weight 60 kg.

A080-03 Cylindrical mould, 102x52 mm, NF P 18-574
A080-02 Cylindrical mould, 102x50 mm, BS 812
Aggregates

**Mechanical and physical properties**

Efflux, resistance, crushing, jar, crusher

---

**A073 Efflux index apparatus**

EN933-6, NF P 18-564

To measure the efflux index of fine aggregates (shape and angularity), having dimensions up to 4 mm. Composed by a container, two polycarbonate funnels having 85 mm height, 60° conical part, which end has dia. 12 or 16 mm, base support, valve, decanter. Dimensions 200x240xh600 mm, weight 8 kg.

Ref. 47: A073

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**A081-01 Lightweight aggregates, crushing resistance determination**

EN 13055-1

To determine the crushing resistance of lightweight aggregate, composed by ring with adjustable height, upper and lower cylinder, piston, base. Made of steel, plated against corrosion. Dimension Ø180xh260 mm, weight 15 kg.

Ref. 48: A081-01

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**A082 Aggregate crushing value apparatus Ø 150 mm**

BS 812:110

With steel cylinder Ø 150 mm nominal, plunger, base plate, tamping rod and measurer Ø 115 x 180 mm deep. Used for aggregate passing 12.7 mm and retained by 9.52 mm sieve. The complete assembly is cadmium plated for corrosion protection, weight 20 kg.

Ref. 49: A082

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**A083 Aggregate crushing value apparatus, Ø 75 mm**

Same as A082 but for Ø 75 mm

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**A091-10 Jar mill**

Designed to reduce from 5 mm to powder granulometric materials like cement, stones, rocks, hard materials. This mill accepts jars having capacity 300 cc or 1000 cc. Jar is in prokorund material with relevant hard porcelain spheres. Noise reduction steel cabinet and microswitch, built in timer 400 rpm, 230V, 50 Hz, 750 W, dimensions 35x71x41 cm, weight 50 kg.

Ref. 50: A091-10

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**A091-10.01 Jar mill with jar capacity 300 g**

**A091-10.02 Jar mill with jar capacity 1000 g**

**A091-02 Jar mill with jar capacity 1500 g**

**A091-11 Jar of 300 cc capacity with spheres**

**A091-12 Jar of 1000 cc capacity with spheres**

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**A092 Laboratory jaws crusher**

Designed to crush any sort of material, also the hardest. The structure is of cast iron, the shaft of rectified steel, the jaws of manganese. Jaws opening is regulated from 2 to 15 mm by a wedge, jaw size 100x60 mm. Production 100 to 400 kg/hour. The crusher is suitable to prepare the material to be reduced to powder with the jar mill A091 series. With steel cabinet, dimensions 45x100x62 cm, 230 V, 50 Hz, 750 W, weight 115 kg.

Ref. 51: A092
Aggregates

Mechanical and physical properties

Abrasions, skid resistance

A109 Abrasimeter
EN 154, 10545-7
Suitable to determine the abrasion resistance of glazed ties and other materials. The instrument has three stations, and it can work either with wet (PEI) or dry (MCC) abrasive charges. Eccentric is 22.5 mm, revolutions per minute are 300, with cabinet to CE Safety directive. Dimensions 40x70x50 mm, weight 38 kg, 230 V, 50 Hz, 300 W.

A111 Abrasion machine (formerly Dorry)
BS 812:3, EN 1097-8
The test gives a measure of the resistance of aggregates to surface wear by abrasion. Inadequate abrasion of road-surfacing aggregates means an early loss of the texture depth required to maintain high-speed skidding resistance. Complete with heavy duty mainframe on adjustable antivibration pads, steel lap wheel Ø 610 mm precision machined steel shaft and sealed bearings, resilient mounted electric motor, gear box, scraper blades for sand removal, revolution counter, with two specimen moulds, two flat plates, two trays, 230 V, 50 Hz, dimensions 80x70x110 cm, weight 200 kg.

A112 Abrasion tester for natural stones and concrete
EN 1338, 1341, 1342, 1343, 14157
Used to determine the resistance to abrasion and wear of cement, concrete and similar material by measuring the length of a groove produced on the specimen surface by a disc with thickness of 70 mm that rotates at controlled speed and makes a constant pressure on the specimen. A charge of abrasive material must be interposed between the disc and the specimen. With aspirator to collect powders, electronic speed controller and with shutting off device, 1 kg abrasive material. Dimensions 45x42x80 cm, 230 V, 50 Hz, 500 W, weight 85 kg.

A125 Digital point load tester (Rock strength index)
ASTM D5731
To determine the strength values of a rock specimen in the field and in the laboratory. Loads up to 55 kN for specimens up to 4" (101.6 mm), digital display, div. 0.001 kN, accuracy ± 1%. In carrying case, weight 25 kg.

A125-02 Lower and upper plate with seat ball to modify the Point Load Tester into a portable compression tester, dia. 165 mm. Vertical daylight 110 mm.
Aggregates

Chemical analysis
Chloride/sulphate content, sulphate, calcium carbonate

Chloride and sulphate content
A019-01 Quantab Chloride Titrator Strips, type 1175
Range 0.005% to 0.1% (30 to 600 ppm) Na Cl, pack of 40 strips
A019-02 Quantab Chloride Titrator Strips, type 1176
range 0.05% to 0.1% (300 to 6000 ppm) Na Cl, pack of 40 strips
A019-03 Sulphate Test Strips
detection range 200 to 1600 mg/l, pack of 100 strips

A030 Reaction container
ASTM C289/NF P94-048
For the chemical determination of the potential reactivity of aggregates with alkalies in portland cement concrete. Capacity 60 ml, weight 2 kg.

A103.01 Equipment for magnesium sulphate test
EN 1367-2
A103 Basket, stainless steel dia. 120 x h. 160 mm, opening 3.35 mm
V172-05 Hydrometer calibrated at 20°C, range 1200-1300 g/ml, accuracy 0.001 g/ml
V125-03 Container, tinned steel with airtight lid, dia. 200 x h 200 mm

A105 Calcimeter Dietrich Frühling
Used for the determination of calcium carbonate (CaCo3) in certain products such as limestone and lime marl. It mainly consists of a glass container in which the reaction between the calcium and carbonate present in the product and a solution of hydrochloridric acid takes place. The gazed product is collected and measured by a device connected to the container, as the volume of the produced gas (Co2) is in relation to the CaCo2 amount contained in the materials. It is possible to calculate the percentage of CaCo3, dimensions 400x200x1100 mm, weight 13 kg.

V214 Digital pH meter and thermometer, BS 1377:3, ASTM D1067
Accurate, compact model, in plastic carrying case, designed for fast but precise operations also on field conditions. Measuring range 0-14 pH with resolution of 0.01 pH. Temperature range -50 +150 °C, division 0.1°C. Temperature compensation 0-100°C. Feeding: common 9 V battery. With combination electrode, temperature probe, buffer solution powders pH 4 and 7, plastic beakers, accessories, weight 3 kg

V217 pH meter-thermometer
BS 13773:3, ASTM D1067
Measuring range 0-14 pH with resolution 0.01 pH, supplied with electrode, buffer solutions pH 4 and 7. Temperature in °C and °F. Range 0-60°C, resolution 0.01°C. Automatic pH calibration and temperature compensation. Battery powered, weight 100 g

S132-01 - S132-03 Bottles
For the determination of the organic impurities in soils and fine aggregates.
S132-01 500 ml ASTM C40
S132-02 500 ml UNI 8020-14
S132-03 1000 ml ASTM C40

S132 Colour standard chart, original Hellige chart with 5 glass reference scales
Evaluation of aggregates
Sand equivalent, blue methylene

**S158-20 KIT Sand equivalent test set (complete)**
Assessment of fine aggregates, EN 933-8, NF XP18-598. Composed by:
- **S158-03** 5 plexiglas graduated measuring cylinders graduated at 100 + 380 mm
- **S158-02** Rubber stopper for cylinder (2 pieces)
- **V176-02** Graduated rule 500 mm, stainless steel
- **V136-01** Funnel, wide mouth
- **S158-05** Measuring can 200 ml capacity
- **V121** Plastic bottle, 5 litres capacity
- **S158-10** Irrigator tube with stopcock and syphon assembly EN/ASTM
- **S158-13** Weighted foot assembly for sand level
- **A052-37** Sieve, Ø 200 mm, opening 2 mm
- **S158-09** Concentrated stock solution, 1000 ml
- **V170** Stop watch, digital
- **S158-11** Clamp stand set to hold the syphon assembly with bottle
- **S158-12** Portable carrying case 550x250x400 mm
  Total weight 18 kg.

**S158 KIT Sand equivalent test set (complete)**
ASTM D2419/ AASHTO T176, Identical to S158-20 KIT except :
- **S158-01** Plexiglas graduated measuring cylinder (5 pieces)
- **S158-04** Measuring can 88 ml capacity
- **S158-07** Weighted foot assembly for sand level
- **A052-44** Sieve, Ø 200 mm, opening 4.75 mm

**S159-01 KIT Sand equivalent test set (simple)**
EN 933-8, NF XP18-598, composed by :
- **S158-03** 5 plexiglas graduated measuring cylinders graduated at 100 + 380 mm
- **S158-02** Rubber stopper for cylinder (2 pieces)
- **V176-02** Graduated rule 500 mm, stainless steel
- **V136-01** Funnel, wide mouth
- **S158-05** Measuring can 200 ml capacity
- **V121** Plastic bottle, 5 litre capacity
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- **S158-10** Irrigator tube with stopcock and syphon assembly EN/ASTM
- **S158-13** Weighted foot assembly for sand level
- **S158-09** Concentrated stock solution, 1000 ml

**S160N Motorized sand equivalent shaker**
EN 933-8, NF XP18-598, ASTM D2419, AASHTO T176
The unit provides a constant uniform shaking with automatic cycle test. Oscillating excursion is 203 mm at 175-180 strokes/min. rate, with timer that automatically stops the shaker at the end of the test. 230 V, 50 Hz, 250 W, dimensions 700x360x350 mm, weight 30 kg.

**S160-01N Motorized sand equivalent shaker**
Same as S160N with steel security cabinet, to CE Safety Directives

**S157 Blue methylene test set**
EN 933/9 - NF P94-068 - XP P18-592 - UNI 8520 UNE 83180
Utilized to determine the clay content in the fine portions of the aggregates.
- **S157-01** Electric stirrer adjustable from 400 to 700 rpm, with support and 70 mm \( \varnothing \) propeller. 230 V, 50 Hz
- **S157-06** Support base for burette
- **S157-02** Burette 50 x 0.1 ml with stopcock
- **S157-07** Support base for burette
- **S157-08** Pan 200x150x80 mm
- **S157-03** Filter paper 90 mm \( \varnothing \), pack of 100 pieces
- **S157-04** Glass rod \( \varnothing \) 8x300 mm
- **S157-05** 3000 ml capacity plastic beaker
- **V300-28** Methylene blue, 100 g
- **V300-29** Kaolinite, 500 g. Total weight 10 kg
Evaluation of aggregates
Masse, specific gravity, voids

A086 Volumeter for aggregates
Standard BS 812
Used to measure coarse aggregate density by water displacement method, formed by a cylindrical metal container Ø 150x350 fitted with a siphon tube at 250 mm form bottom, weight 3 kg

V103 Pycnometer, borosilicate glass
EN 1097-6
With capillary tube, stopper and funnel, used to determine the voids and bulk density of aggregates.

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>V103</td>
<td>500 ml</td>
</tr>
<tr>
<td>V103-01</td>
<td>1000 ml</td>
</tr>
<tr>
<td>V103-02</td>
<td>2000 ml</td>
</tr>
</tbody>
</table>

Specific gravity Gay-Lussac bottles

V108 25 ml  
V108-01 50 ml  
V108-02 100 ml  
V108-03 250 ml

S147 Cone pyknometer, 1000 g capacity
Standards BS 1377:2
For the determination of specific gravity and water absorption of sands and fine aggregates. Glass jar with aluminium cone and rubber seal. Capacity 1 kg

S144 Andreasen pipette, 25 ml
S144-01 Pipette stand for pipette Andreasen, weight 10 kg
**Aggregates**

*Cutting, polishing*

**Cutting machine, polishing machine**

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**A127 Splitting tensile test of rock core specimens**
ASTM D3967

Blade dia. 200 mm, suitable for cores up to 60 mm dia. Complete with cooling system, set of blades, precision clamp and specimen holder. Dim. 57x72x55 cm, 400 V, 50 Hz, 3 ph, 1.3 kW, 75 kg

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**C348 Specimen cutting machine**

With sliding support. The machine accepts blades up to ∅ 350 mm, useful cutting height 110 mm. The blade can be oriented for cuts at 45º, dimensions of the sliding table 500x450 m, blade rotation speed 2800 rpm, supplied without blade, 230 V, 50 Hz, 3 CV, dimensions 700x1100x680 m, weight 80 kg.

- C350-10 Abrasive blade Ø 350 mm
- C350-11 Abrasive blade Ø 400mm
- C350-12 Diamond blade Ø 450 mm
- C350-13 Diamond blade Ø 350 mm
- C350-15 Diamond blade Ø 500 mm

**A095 Polisher - grinder**

For the preparation of rock and metallurgical specimens from lapping to final polishing. The disc has 200 mm Ø and the rotation speed is 300 rpm. With bakelite working disc and 1 set of 25 abrasive silicon carbide discs, 230V 50 Hz, 200 W, dim. 370x500x300 mm, weight 31 kg

- A095-01 Abrasive silicon carbide disc, pack of 25

**A128 Accelerated polishing machine**

EN1097-8, EN1341, 1342, 1343, NF P 18-575

Measures the resistance of road aggregates to the polishing action of vehicle tiers on a road surface, paving stones and paving blocks. The specimen is located on the road wheel accepting 14 specimens. The wheel is now rotated and enters in contact with solid rubber tyre, spring loaded. Abrasive charges are continuously fed by mechanical feeders at fixed speed. The flour emery is loaded through a suitable opening. The water is supplied at a controlled rate through a water container. With four moulds, 230 V 50 Hz, 400 W, dimensions 152x72x74 cm, weight 175 kg.

- A128-01 Set of 4 moulds for preparing specimen
- A128-02 Corn Emery ungraded, 25 kg pack
- A128-03 Flour Emery ungraded, 6 kg pack
- A128-04 Control stones, ungraded, 50 kg bag
- A128-05 Friction Criggion stone, ungraded, 50 kg

- A049-02 Flakiness sieve, slot 7.2x40 mm
Aggregates

Mechanical and physical characteristics

Bottling roller, profilometer, compaction apparatus, geological hammers

Determination of the affinity between aggregate and bitumen
EN 12697-11, 13108

**B022 Bottle rolling machine**
Rotation speed adjustable from 0-85 rpm, for 3 bottles at the same time, 230 V, 50 Hz, dimensions 385x295x160 mm.

**B022-11 Test bottle**, borosilicate glass, 500 ml capacity, dia. 86 mm, height 176 mm, neck with dia. Opening 34 mm, according EN standard

**B022-12 Glass rod with a dia. 6 mm, with 35 mm long fitting rubber tube**

**Ref. 77: B022**

**A116 End-over-end shaker**
BS 1377:2
Used to determine the specific gravity of soils, it rotates two gas jars at approx. 50 rpm, supplied without jars, 230 V, 50 Hz, 150 W, weight 20 kg.

**A116-11 Gas jar**
To determine the specific gravity of soils, with glass cover Ø 75 mm by 300 mm height, 1.3 kg

**A116-12 Rubber bung for the gas jar A116-11**

**Ref. 78: A116**

**A122-10 Tilt Test**
Measures the roughness coefficient of a rock specimen or of a joint. Also to test the possible fluage tendency of bituminous mixtures covering a slope of a dam subject to high sun radiations. Consists of an inclined adjustable plane, inclination angle : 0-50°, max. sample dia. 100 mm, dim. 270x175x265 mm, weight 5 kg

**A122 Barton comb profilometer**
EN 1097-4
Used for the evaluation of the surface roughness. This simple device is 300x120 mm long

**A122-01 Barton comb profilometer**
Same to model A122 but 150 mm long.

**A124 Filler compaction apparatus**
EN 1097-4
Cylinder inside Ø 25.4 mm, plunger feely sliding into the cylinder with max. lateral play of 0.20 ±0.05 mm, four columns and metallic base, weight 4 kg.

**V175-02 Digital vernier caliper** 0-200 mm x 0.01 mm sensitivity

**A132 Geological hammer**, pointed tip, for preliminary rock identification, weight 600 g approx.

**A132-01 Geological hammer**, chisel edge, for preliminary rock identification, weight approx. 400 g.

**A115 Mohs KIT,**
EN 101
For the determination of the hardness of the surface of the materials, composed by a case containing 9 minerals of the Moh’s hardness scale and also copper strip, small glass and magnet bar, weight 500 g
Aggregates

Elastic modulus

**A150 Elastic modulus of rock specimens in uniaxial and triaxial tests**

ASTM 3148, D2938, D5407, D2264, UNI 9724-8/ISRM

Used with a high stability frame with capacity of 2000 or 3000 kN, coupled to the automatic servo-controlled system Servotronic Plus C104.

Automatic system with pace rate control also when releasing the load. Composed of hydraulic system and electronic measuring system, data acquisition and processing software UTM2 with licence for elastic modulus on rocks.

**A150-01 Software** to make Secant Compression Elastic Modulus tests on concrete
**A129 Portable rock shear box assembly**
Used to determine the strength and slope stability of rock size max. 115x125 mm or cores max. Ø 102 mm. With two horizontal rams for shear in two directions, vertical loading ram, two load gauge Ø 150 mm, with quick release couplings, calibrated 50 kN x 1 kN division and two hand pumps with hydraulic connections and dial gauge 25x0.01 mm, dimensions 600x250x460 mm, weight 46 kg.

**A129-01** Mould former to prepare the specimen
**A129-02** Pressure maintainer, complete with pump

**A137 - A139 Hoek cells for rock triaxial tests**
Used to measure the strength of cylindrical rock specimens which are subjected to triaxial compression. The basic Hoek cell consists of the following: cell body with two screwed end caps and two self sealing couplings, two spherical seats and pistons, hardened and ground, one specimen jacket.

**A136-01** Load spreader pads (pair)
**A137-02/A138-02/A139-02** Spare spherical seat + piston
**A137-03/A138-03/A139-03** Spare jacket

**A137-04** Core drilling barrel, Ø 38.10 mm, 200 mm long
**A138-04** Core drilling barrel, Ø 42.04 mm, 200 mm long
**A139-04** Core drilling barrel, Ø 54.74 mm, 200 mm long

**A137 Specimen Ø 38.10 x 75 mm**
**A138 Specimen Ø 42.04 x 85 mm**
**A139 Specimen Ø 54.74 x 100 mm**

**Permeability of rock with Hoek cells**
**A137-05** Specimen, dia 38.10 mm
**A138-05** Specimen, dia 42.04 mm
**A139-05** Specimen, dia 54.74 mm

**A142 Hydraulic constant isotropic cell pressure system**
Consists of a hand operated pump, complete with precision pressure gauge supplying pressures up to 70 MPa, complete with reservoir and connections, providing all round pressure source to the Hoek Cell, weight 18 kg
A144 Permeability constant oil/water pressure system
Providing an infinitely variable constant pressure from 0 to 3500 kPa. To be used with the Hoek Cell equipped with Permeability End Caps and Permeability Attachment, 230 V 50 Hz, weight 20 kg

Ref. 92: A144 + S275

A140-01 Core drill bench model
To obtain cores from irregular rock samples, to be used with the core drilling barrels (accessory mod. A 137-04 till A 139-04). 2 speed electric motor 1500/2700 rpm, complete with specimen’s clamp device, water cooling system and water tank, 230 V, 50/60 Hz., 1800 W, weight 50 kg. Without barrels

A137-04 Core drilling barrel dia. internal  75 mm, 200 mm long
A138-04 Core drilling barrel dia. internal  85 mm, 200 mm long
A139-04 Core drilling barrel dia. internal 100 mm, 200 mm long

Ref. 93: A140-01

A141 Extruder
Used to eject the rock sample from the rubber jacket, weight 12 kg, without adaptors

A141-02 Adaptor for extruder 38.10 x 75 mm
A141-03 Adaptor for extruder 42.04 x 85 mm
A141-04 Adaptor for extruder 54.74 x 100 mm

Ref. 94: A141
The use of bituminous materials is mainly addressed to roads construction.

The asphalt, named also bitumen, is mainly composed by aggregates and binder with an infinite variation of mixtures. It is therefore necessary to get suitable equipment to perform different test methods and to determine binder content, internal friction, cohesion, consistency, softening point, viscosity, quality of aggregates, voids percentage, Marshall test and many other parameters.

The equipment described in this section largely satisfies all these test procedures.
B005 Asphalt content furnace ignition method
Standards EN 12697-39, 13108, ASTM 6037 - AASHTO TP 53 - NCAT (National Centre for Asphalt Technology) BS (DD)

The unit provides asphalt content of bituminous paving mixtures accurate to 0.11%, with a fast accurate, environmentally friendly and cost effective method of determining asphalt content ignition method and reduces testing time when compared to solvent extraction. A 1200 - 1800 g sample of asphalt can be tested in 30 - 45 minutes using this content furnace. Unit can accommodate samples up to 5000 g.

The furnace has an internal scale, that automatically monitors the sample weight throughout the ignition process, saving valuable technician time and increasing productivity in the lab. The ignition method replaces the costly and time consuming solvent extraction method by eliminating the primary cost of solvent purchase and the secondary cost of solvent disposal.

The content furnace eliminates the exposure of the asphalt technician to harmful solvents. The automatic door lock feature prevents opening the chamber door during the critical test time. This feature provides operator safety and helps ensure testing integrity. This content furnace is the only system on the market containing a high temperature afterburner used in conjunction with a patented ceramic filter to reduce the emissions of the ignition process by up to 95%. Our system has the capability to accept positive or negative correction factors for use with mixes containing hydrated lime.

This unique furnace automatically detects endpoint within 0.1% of the sample weight. Furnace software allows you to choose between automatic and manual test mode. In the automatic mode, the endpoint is detected; the software ends the test, prints out the results and beeps. In the manual mode, the endpoint is detected; the unit begins to beep but will continue to test until the user presses "stop" to end it. Once the "stop" button has been pressed, the door will unlock and the results will be printed. Furnace software automatically compensates for weight change due to sample and basket assembly temperature change. This compensation is computed for each sample load tested, unlike competitive models that assign a fixed number to a given range of load sizes. An RS 232 port provides data interface with personal computer for graphical data analysis. The furnace is supplied with 4 baskets, 2 trays, 2 covers, handle, cooling cage, insulated plate, gloves, face shield, 4 rolls of printer tape, overall dimensions 552x654x933 mm. Chamber dimensions 355x355x355 mm, 230 V, 50 Hz, 4800 W, 20 A, temperature range 200 - 650°C, weight 120 kg.

Accessories for B005: basket, tray, cover, gloves, face shield, rolls of printer tape included in basic equipment
**B008 Automatic binder extraction unit**

Standards EN 12697-1, 13108, DIN 1996, ASTM D2172

Used to perform reliable analysis on bituminous mixtures utilizing the perchloroethylene (PCE) or tetrachloroethylene solvent which is classified: R40 not cancer producing, for quantitative determination of binder or bitumen contained in pavement samples and hot mixtures. The system performs in only one complete automatic cycle: the washing desegregation and separation of the bituminous mixture; the separation of the filler from the solution formed by solvent bitumen and filler; the recovery and distillation of solvent material allowing a further utilization. This unit, in a short time, performs out a series of analysis that normally require a long time and labour, by reducing extraction costs. The unit comprises: an electromagnetic sieving unit ensuring high quality double vibrating action (vertical/rotational), with solvent spraying cover for washing and disaggregation of the sample. A continuous flow filter less centrifuge having a rotation speed of 11'000 rpm equipped with a stainless steel beaker Ø 120 mm, filler capacity approx. 400 g. A solvent recovery unit having reclaiming capacity of approx. 50/lh, equipped with cooling system foreseen of devices switching On and Off the unit to fully automatically perform the test. A separate control panel allows to program all these functions in a fully automatic system. It is also possible to select the manual function allowing to activate each specific function previously analyzed.

This unit is supplied with two stainless steel beakers Ø 120 mm. Four stainless steel sieves Ø 200 mm openings 0.075 – 0.250, -0.800 –1.6 mm. One sieve frame Ø 200 mm to improve the capacity of the first sieve. Set of O ring gaskets for sieves. Sieves with different openings are available on request.

A complete extraction cycle is performed in approx. 25 minutes and the max. quantity of mixture per extraction is 3500 g. 400 V, 3 ph, 50 Hz, 5.5 kW, overall dimensions 140x68x182 cm, weight 185 kg.

Spare parts:

- **B008-01** Stainless steel beaker dia. Ø 120 mm
- **B008-02** Sieve Ø 200 mm water seal with O ring gasket (when ordering please specify mesh opening)
- **B008-05** Sieve frame only, dia. 200 mm
- **B008-06** Seal rings, Viton material, for 200 mm dia. sieves, pack of 10 pieces

**B008-03** Kit for use of B008 unit with dichloromethane solvent, not toxic, not cancer producing

To be connected to the automatic binder extraction unit B008. Allows the use of methylene chloride (dichloromethane CH2Cl2) which is classified as very volatile solvent, with low extraction value, not toxic, not cancer-producing, classified: « R40 ». Composed by a stainless steel solvent tank complete with cooling installation, vertical pump, metallic frame, piping, accessories, dimensions 360x430x810 mm, weight 45 kg

**B008-11** Lining paper for centrifuge cup, dimensions 370x200 mm, pack of 100 pieces
Bitumen-Asphalt

Extraction
Hot extraction, extraction Kumagawa

B016-10 Hot extractor set, paper filter method
EN 12697-1 clause B.I.1, EN 13108, 12697-14, BS 598:102
Used to extract the binder from bituminous mixtures and to determine the moisture content. Composed of a metallic pot complete with gauze basket and filter, Dean Stark collector, Liebig condenser, filter paper No. 5x400 mm dia. Dimension 48x48x90 cm, weight 22 kg

Accessory:
V200-02 Hot plate dia. 200 mm, 230 V, 50-60 Hz, 2000 W

B016-20 Soxhlet modified method
EN 12697-1 clause B.I.3, EN 13108
Composed by a flask 5000 ml, 2000 ml extractor, cock, vapour tube, condenser, all glass made, with 25 filtering cartridges dia. 75x200 mm, isomantle electric heater, stand and clamps, 230 V, 50 Hz, 1 ph, 900 W, dim. 400x400x1000 ml, weight 30 kg.

B017 KIT Hot extraction apparatus
EN 12697-1 clause B.I.2, 13108, CNIR a.VII No. 38 - DIN 1996
This apparatus consists of a cylindrical glass jar containing a stainless steel wire basket cloth, opening 0.063 mm. The asphalt sample (max. quantity 4000 g) is placed inside the wire basket, the solvent is poured inside the jar. Now, the wire basket is inserted into the jar which is covered by the metal condenser connected to a water supply. The apparatus is placed on a hot plate and the boiling solvent drips into the basket dissolving out the bitumen. The filler passing through the mesh basket must be separated using the centrifuge extractor, dimensions Ø 160x335mm, weight 5 kg.

B017-02 Wire basket stainless steel cloth opening 0.4 mm
B017-04 Wire basket stainless steel, double cloth 0.063 and 0.4 mm openings
V200 Hot plate dia. 185 mm, 230 V, 50-60 Hz, 1500 W
V173-03 Wire mesh with ceramic centre

B061 KIT Kumagawa extractor, capacity 1 litre
EN 12697-1 clause B.I.3, 13108, LCPC-CNR N.38
To extract the bitumen from mixtures, consisting of an electric heating device, balloon 1000 ml capacity, glass pipes, cooling unit and 25 filtering cartridges 58x170 mm. 230 V, 50 Hz.

B061-01 KIT Kumagawa extractor, capacity 2 litres
Identical to B061 KIT, but 2 litres capacity

B061-02 Filter cartridges, dia. 58x170 mm, set of 25 pieces
B061-03 Filter cartridges, dia. 80x200 mm, set of 25 pieces
**Bitumen-Asphalt**

**Extraction**
Reflux extraction to reflux, hot plates, muffle furnaces

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**B019 KIT Reflux extractor 1000 g capacity**
ASTM D 2172 - AASHTO T 164
Cylindrical glass jar containing a metal frame supporting two metal cones of stainless steel cloth and a metal condenser on top of the jar. After placing the asphalt sample on both cones and pouring the solvent into the jar, the apparatus is placed on a hot plate. The solvent boils and drips first into the top cone, then into the lower cone dissolving out the bitumen. Supplied with 100 filter paper and wire gauze. Dimensions Ø 16x51 cm, weight 5 kg.

**B020 KIT Reflux extractor, capacity 4000 g**
Same as B019 but capacity 4000 g, dim. 180x510 mm, weight 9 kg

**V200-02 Hot plate**, dia. 220 mm, 230V, 50-60 Hz, 2000 W

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**V200**
Hot plate round, dia. 185 mm, 230V, 50-60 Hz, 1500 W

**V200-02**
Hot plate round, dia. 220 mm, 230V, 2000 W

**V200-01**
Hot plate rectangular, 200x300 mm, 1500 W

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**A022 - A024 Muffle furnaces**
EN 12697-1 clause C, EN 13108
Designed for high temperature heating. Structure made in sheet-steel, furnace frontal in diecasted steel to avoid the aggressive acid smokes. The thermal insulation is of ceramic to avoid the smallest healing leakage and to obtain a great energetic saving. Electronic regulation of the temperature is obtained by a digital thermostat. This furnace is also used for the determination of residual of mineral matter by incineration of bituminous mixtures to En 12697-1 clause C Standard. Maximum temperature 1100°C. Inside dim. **A022** and **A023** 210x320x145 cm, **A024** 14.5x25x10 cm, outside dim. 500x750x650 mm, weight ca. 88 kg.

<table>
<thead>
<tr>
<th>Model</th>
<th>Temperature</th>
<th>Voltage</th>
<th>Watt</th>
</tr>
</thead>
<tbody>
<tr>
<td>A022</td>
<td>1100°C C</td>
<td>230 V, 50-60 Hz</td>
<td>3900</td>
</tr>
<tr>
<td>A023</td>
<td>1100°C C</td>
<td>400 V, 50-60 Hz, 3 ph</td>
<td>3900</td>
</tr>
<tr>
<td>A023-01</td>
<td>1100°C C</td>
<td>400 V, 50-60 Hz, 3 ph</td>
<td>*3900 *</td>
</tr>
<tr>
<td>A024</td>
<td>1200°C C</td>
<td>230 V, 50 Hz</td>
<td>4200</td>
</tr>
</tbody>
</table>

*(A024 corresponds to EN 196-2, 196-21, 459-2)*

Other muffle furnaces for higher temperatures on request.
* Also for the determination of resistance to thermal shock of aggregates according to EN 1367-5 specification.

**A023-01 Muffle furnace high capacity, 1100°C**
Floor mounting furnace, composed by 4 panels containing independent radiant resistors. Thermal insulation realized by microporous refractories in layers with progressive density. Automatic regulation given by an electronic visualized pyrometer double intervention with 0-24hours timer. Interior dimensions 300x500x220 mm, overall dimensions 750x1100x1650 mm, 400 V, 3 ph, 50 Hz, 9 kW, weight 400 kg.
**Bitumen-Asphalt**

**Analys of bitumen**

**Centrifuge, recovery**

**B011 Centrifuge extractor 1500/3000 g capacity**

EN 12697-1, clause B.1.5, 13108, ASTM D2172

Used for the determination of bitumen percentage in bituminous mixtures. Removable, precision machined aluminium rotor bowl (1500 or 3000 g) and cover housed in a cylindrical aluminium box. Separate control panel with electronic card fitted with AC drive, drives the bowl speed rotation ramp from 0 to 3600 rpm, with automatic fast stop bowl rotation at the end of the test. Without bowl and cover. 230 V, 50 Hz.

550 W, dimensions 55x38x50 cm, weight 50 kg.

**B011-10 Safety electromagnetic micro-switch system**

**B010-11 Bowl and Cover for mod. 1500 g**

**B010-12 Bowl and Cover for mod. 3000 g**

**B010-15 Filter disc, 1500g, pack of 100 pieces**

**B010-16 Filter disc, 3000g, pack of 100 pieces**

**B014 Continuous flow filterless centrifuge**

EN 12697-1 all.B.2.1., 13108 - ASTM D1856

For quick filterless separation of filler from binder solution or other mixtures containing sediments (cement, soil, clay), in suspension. As no filter is required, there is no dispersion of material so that the highest accuracy is assured. The solution is poured into the top funnel and falls into the rotating test container Ø 70x200 mm. With aluminium beaker, two sieves 0.149 mm and 0.074 mm mesh respectively. Rotation speed 11’500 rpm, automatic ramp and preset speed control. Extraction capacity is up to 100 g of filler per test. 230 V, 50 Hz, 600 W, dimensions 35x60x72 cm, weight 60 kg

**B021 Solvent recovery still, 10 litres/h**

This efficient and compact unit, easy to install, is totally self contained, it is provided of two tanks: one for the clean solvent and one for the used solvent and of a water cooling system which only needs to be connected to a tap. A safety cut out is also supplied, being activated when the solvent level becomes too low or once the process is completed. Fully stainless steel very high quality (AISI 316) made, 230 V, 50-60 Hz, 1300 W. Dimensions 32x40x65 cm, weight 17 kg.

**B018 Binder recovery apparatus, vacuum pump method**

EN 12697-1 Clause B.3.1, EN 13108, BS 598:102

For the separation of solvent from the binder/solvent solution, consists of thermostatic water bath 28x28x23 cm, two glass flasks having 250 ml with rubber bungs, tubing and cocks, pyrex flask, 1000 ml capacity, 230 V, 1 ph, 50Hz, 1000W, weight 25 kg. With vacuum pump down 220 mbar, ref. V203 + V205-10, 230 V, 1 ph, 50Hz, weight 5 kg.

Needed accessories:

**V203+V205-10** Vacuum pump, 220 mbar, with vacuum regulator, 230 V, 50 Hz., weight 5 kg

The analyses have to be made with dichloromethane.

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**Ref. 106: B011**

**Ref. 107: B010-11 + B010-15**

**Ref. 108: B014**

**Ref. 109: B021**

**Ref. 110: B018**

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B067N Vacuum pyknometer, capacity 10 l
EN 12697-5, 13108
Theoretical maximum specific gravity of uncompacted bituminous paving mixtures (Rice-test)
Transparent plexiglas made, with valve and gauge, it is utilized for a rapid determination of asphalt content, bulk specific gravity of aggregates, the max. theoretic specific gravity of bituminous uncompacted road mixtures and the percent air voids in compacted mixtures. Dim. dia. 300x450 mm, weight 8 kg.

Needed accessories:
A059-02 KIT Vibro-deaerator, electromagnetic, with adjustable vibrating intensity, with timer
B067-11 Elastics to fix the pyknometer to the vibro-deaerator
V205+V205-10 Vacuum pump, 220 mbar, with vacuum regulator, 230 V, 50 Hz., weight 5 kg
V230-03 Tubing for vacuum, 3 m long

Ref. 111: B067N

Ref. 112: B022

B022 Bottle rolling machine
Rotation speed adjustable from 0-85 rpm, for 3 bottles at the same time, 230 V, 50 Hz, dimensions 385x295x160 mm.

B022-11 Test bottle, borosilicate glass, 500 ml capacity, dia. 86 mm, height 176 mm, neck with dia. Opening 34 mm
B022-12 Glass rod
dia. 6 mm, equipped with 35 mm long fitting rubber tube.

Ref. 113: B022-11, B022-12

Ref. 114: B022-20 + B022-21

B022.01 Binder drainage basket method
EN 12697-18, 13108
B022-20 Drainage basket, dim. 100x100x100 mm, made from stainless steel sheet with 3 mm dia. Holes, weight 500 g
B022-21 Tray
Stainless steel made, dim. 160x160x10 mm, weight 500 g

Ref. 114: B022-20 + B022-21

B060 Bacon sampler, capacity 237 ml
EN 58, CNR No 81 and 98, ASTM D140, AASHTO T40
Dimensions 50x250 mm, weight 2 kg

Ref. 115: B060
B031 Automatic Marshall compactor
EN 12697-10/ EN 12697-30
Ruggedly constructed apparatus, automatically compacts the specimen and stops off the motor after the preset number of strokes has been completed on the automatic digital display counter. The trip mechanism is structured so that the hammer falls at the same height at every stroke. The drive mechanism lifts the 4.535 kg compaction hammer plated against corrosion, to the height of 457 mm and allows free fall at 50 blows per minute. The compactor is supplied complete with safety door, but without the mould which must be ordered separately. 230 V, 50 Hz., 300 W, Dimensions 50x50x189 cm, weight 220 kg,

B031-01 Cabinet for noise reduction
Dim. 80x80x200 cm, weight 100 kg

B033 Automatic Marshall compactor
ASTM D1559, CNR N°30, AASHTO T 245, NF P98-251-2
Ruggedly constructed machine, automatically compacts the specimen and stops off the motor after the preset number of strokes has been completed on the automatic digital display counter. The trip mechanism is structured so that the hammer falls at the same height at every stroke. The drive mechanism lifts the 4.53 kg compaction hammer plated against corrosion, to the height of 457 mm and allows free fall at 60 blows per minute. The compactor is supplied complete, but without the mould which must be ordered separately. 230 V, 50 Hz., 1 ph, 300 W, Dimensions 54x40x160 cm, weight 95 kg,

B033-01 Automatic Marshall compactor conforming to CE Safety Directive

B033-03 Soundproof security cabinet for B033
Dimensions 66x66x190 cm, weight 70 kg

B033-04 Steel plate
dia. 100x50 mm, to heat the compaction hammer

B032-KIT Marshall compactor, hand operated
ASTM D1559, AASHTO T245
Similar to B033, but the hammer is lifted and released manually. The moulds are held in position by a quick clamping device and they are easily inserted and removed from the compactor. The apparatus consists of a wooden compaction base, a steel frame, a compaction hammer plated against corrosion, guided on a shaft and a mould clamp device fitted on the steel frame. The apparatus is supplied without the mould which must be ordered separately. Dimensions 32x32x160 cm, weight 60 kg
Bitumen-Asphalt

Compaction, extrusion
Compactor Marshall, moulds. extruder

B034 Compaction hammer
with weight of 4.53 kg

B036 Compaction pedestal
Wooden block, capped with a steel plate, with mould clamp device, weight 42 kg

B037 Support and hammer guide

Ref. 121: B034

B031.01 Set of compaction moulds
EN 12697-10, EN 12697-30
Consists of:
B031-05 Mould body, weight 1.7 kg
B031-06 Filling collar, weight 1.5 kg
B031-07 Base plate with handles, weight 3.1 kg
B031-08 Distance piece

Ref. 122: B031-05 - B031-08

B029 KIT Marshall compaction mould, complete
ASTM D 1559 - AASHTO T245, CNR N° 0, NF P98-251-2
Internal dia. 101.6 mm (4”), steel manufactured, plated against corrosion, weight 3 kg
Consists of:
B030 Mould body, 1200 g
B030-01 Filling collar, weight 800 g (ASTM, AASHTO, CNR)
Or:
B030-01NF Filling collar, weight 800 g (NF)
B030-02 Base plate, weight 1000 g

Accessories:
B030-03 Extraction plate, to eject specimens from the mould, used together with B030-04, weight 1400 g
B030-04 Specimen receiver, used to receive specimens ejected by the B030-03, weight 1.3 kg
B030-05 Paper disc, Ø 100 mm, pack of 100.

Ref. 123: B029 KIT

S114 Manual extractor
For Marshall, Standard and modified Proctor specimens, hand operated, actuated by a 5 tons hydraulic jack, it is designed to extrude samples having Ø 4” and 6”, Ø 300x500 mm, weight 30 kg

Ref. 124: S114
**B042 KIT Marshall mechanical 50 kN load frame**
EN 12697-34, EN 13108, ASTM D1559 - BS 598:107, NF P98-251-2
Ruggedly constructed with frame to encompass the strain and loads, easy to use, it is designed to operate with the minimum of maintenance. Platen rate is 50.8 mm/minute also maintained under load thanks to an electric motor. The applied load is measured by a precision proving ring 30 kN capacity incorporating a stem brake holding the maximum reading and it is supplied with relevant calibration certificate. The machine includes electric device for automatic stop when reaching the max. capacity load of the proving ring so as to prevent any overload damage. Limit switches stopping it at max. and min. excursions. The unit is supplied with load ring 30 kN capacity, stability mould flow meter with dial gauge 230 V, 1 ph, 50 Hz, 750 W. Dimensions 41x40x111 cm, weight 110 kg.

**B046 Stability mould**
Open type having inside Ø of 4" (101.6 mm). The mould is completely open in the front and the introduction of the specimen becomes very easy thus avoiding disassembling operations, weight 6 kg.

**B047 Flow meter**
Mounted on top of the stable mould, holding the dial gauge and incorporating a stem-brake keeping maximum deflection, supplied without dial gauge, weight 0.5 kg.

**B047-01 Dial gauge**
Stroke 10 mm, division 0.01 together with B047

**B047-02 Tensile splitting device**
EN 12697-23, ASTM D4134
For Marshall specimen dia. 4" and 6" where a vertical load is applied, steel manufactured, plated against corrosion. Dimensions 248x270 mm, weight 14 kg

**B047-03 Dial gauges, 2 pieces**
Stroke 10 mm, division 0.01 mm, with adjustable supports

**B095.01 Duriez test set, 120 mm**
Consists of:
B095-01 Testing mould
B095-02 Penetration piston
B095-03 Penetration piston grooved
B095-04 Upper/lower piston
B095-05 Upper/lower piston grooved
B095-06 Two temporary supports
B095-07 Demoulding cylindrical container

**B096.01 Duriez test set, 80 mm**
Consists of:
B096-01 Testing mould
B096-02 Penetration piston
B096-03 Penetration piston grooved
B096-04 Upper/lower piston
B096-05 Upper/lower, piston, grooved
B096-06 Two temporary supports
B096-07 Demoulding cylindrical container
Bitumen-Asphalt

Marshall test

Digital Marshall tester, software

B043 KIT Digital Marshall Tester 50 kN
EN 12697-34, 12697-23, 12697-12, EN 13108, ASTM D 1559 - NF P98-251-2
The testing frame is the same as for model B042 but the load is measured by an electric cell with high precision strain transducers; the flow is measured by a displacement transducer 50 mm stroke and ±0.1% linearity. The Datatronic 5 channels digital display unit with microprocessor measures and displays at the same time the stability in kN and the flow in mm with pick hold features with the possibility to transfer them to a PC and a printer through a RS232 port, with stability mould, 230 V, 1 ph, 50 Hz, 900 W, dimensions 65x40x110 cm, weight 120 kg.

S213 - S214 Combined testing machine CBR/Marshall
See pages 142 and 143

B044-SET Datatronic 5 acquisition and data processing system
(without PC) to perform Marshall, indirect tensile, CBR and unconfined tests, determination of the water sensibility of bituminous specimens. 5 independent channels, LCD graphic display.

B043-01 Software UTM2
EN 12697-34/ASTM D1559, BS 598 :107, NF P98-251-2
For Marshall test, data processing program for „X-Y stability/flow”

B043-02 Software UTM2
EN 12697-23, ASTM D4123
For indirect tensile strength

To calibrate the linear displacement transducers
S336-43 Gauge block, nominal length 10 mm
S336-47 Gauge block, nominal length 50 mm

B046-01 Stability mould
EN, ASTM, NF
Internal diameter 101.6 mm/4”, suitable for S336-14

Determination of indirect tensile strength
EN 12697-23, ASTM D4123
B047-02 Tensile splitting device
For Marshall specimen dia. 4” and 6” where a vertical load is applied, steel manufactured, plated against corrosion. Dimensions 248x270 mm, weight 14 kg
B047-04 Set of two linear transducers, stroke 10 mm, ±0.3

B043-02 Software UTM2
EN 12697-23, ASTM D4123
For indirect tensile strength
B050-02 Giratory compactor
EN12697-10, 12697-31
Load is applied with a pneumatic cylinder controlled with a precision pressure regulator and height is measured with a linear transducer. Gyration motion is generated with a precise eccentric with angle of gyration at 0.82°. Number of gyrations, compaction depth and density are logged and displayed on screen. Machine is connected to the PC through high speed USB connection. PC is necessary and pressurized air, minimum 6 bar, 7 bar required for tests on 150 mm specimens, 230AC supply at 13A, dimensions 500x800xh2000 mm, working space required 750x1700x2000 mm, weight 350 kg.

B038 Wheel tracking apparatus
EN12697-22
To evaluate the deformation depth of a bituminous mixture subjected to cycles of passes of a loaded rubber wheel under constant and controlled temperature conditions. Frame of robust aluminium alloy, adjustable temperature of 30-65°C, travel of table 230 mm, adjustable frequency of 15 à 40 cycles/min., hard rubber tyred wheel, dia.200 mm, wheel load on the sample 700 ± 10 N, with two glass doors, data acquisition and processing system fully managed by microprocessor, 230V, 60 Hz, 2200 W, dimensions 1580x650xh1790 mm, weight 400 kg.

B038-10 Mould
Dimensions 305x305x50 mm
Other dimensions on request.

B038-11 Mould
Dimensions 305x305x100 mm

B039 Roller compactor
EN12697-33
To produce representative samples slabs of several dimensions of bituminous mixtures laid and compacted in the roads. The sample is performed through a segmented roller with alternated pneumatically operated rotation simulating the on-site action of a street roller. Steel frame with support table, pneumatic system for table displacement and vertical load up to 38 kN, data acquisition and processing fully automatic, 230V, 60 Hz, 550 W, dimensions 2200x1030xh1880 mm, weight 1300 kg.

B039-05 Roller for 500x400 mm mould
B039-06 Roller for 400x305 mm mould
B039-07 Roller for 305x305 mm mould
B039-15 Roller vibrating device

Moulds see B038-10 etc. above.

B039-30 Compressor
1200 Nl/min à 10 bar, 400 V, 3 ph, 50 Hz, 7500 W
Water baths for Marshall specimens

EN 12697-34, 13108, ASTM D 1559, AASHTO T245 - NF P98-251.2

For maintaining water Marshall specimens at constant temperature of 60°C ±1°C and asphalt specimens at 37.8°C ±1°C. These baths are also ideal for general laboratory use.

B051 Marshall water baths

The internal tank and cover are stainless steel made, outside box is from painted steel sheet with wool insulation. The specimens are held by a stainless steel shelf spaced from the bottom. Capacity 46 litres for 20 Marshall specimens, temperature range from ambient to 95°C, inside dimensions 615x505x150 mm, outside dimensions 66x54x23 cm, 230 V, 50 Hz, 1500 W, weight 20 kg. Sans thermostat.

B051-01 Thermostat analogic heating system with immersion heating element 1500 W

B051-02 Thermostat digital heating system with immersion heating element, ensures better temperature accuracy control of the water at 60 +/- 1°C or 37.8 +/- 1°C, 1500 W

B052 Digital water bath

High quality model, fully double walled stainless steel made with wool insulation. The specimens are held by a shelf spaced from the bottom. With digital thermostat and electric stirrer, ensuring a constant and uniform water temperature of 60 ±1°C or 37.8 ±1°C as prescribed by the standards. The bath can hold up to 20 Marshall specimens, capacity 60 litres, temperature range from ambient to 95°C, inside dimensions 700x550x165 mm, outside dimensions 90 x 64 x 34 cm, 230 V, 1 CV, 50 Hz, 1500 W, weight 28 kg.

B052-01 Digital water bath

Identical to mod. B052 but inside dimensions are 43x42x16 cm, outside dimensions 62x50x33 cm. Capacity 30 litres, can hold up to 9 specimens, weight 15 kg.

B052-02 Digital water bath with cooling device

Identical to model B052 but with cooling unit housed under the bath for controlling water temperature where the ambient temperature is quite higher. Temperature range form + 3 to 95°C, capacity 42 litres for 12 specimens. Interior dimensions 51x35x23 cm, outside dimensions 68x42x95 cm, 230 V, 50 Hz, 2000 W, weight 60 kg.

B052-10 Mercury control thermometer 0-100°C, division 1°C, for mod. B050, B052-02, B050, B052-02.

B016 Air bath, capacity 600 g

Inner vessel 600 g capacity, stainless steel, with thermoregulator, pilot lamp, 500 W, 230 V, 50-60 Hz, dimensions 14x14x35 cm, weight 5 kg
B025N Mixer, capacity 20 litres
EN 12697-35, BS 598:107
This large capacity mixer has been designed to mix bituminous samples for compaction tests, Marshall and tensile splitting tests and for other tests where uniformity is required. Thanks to the planetary action, this mixer ensures a complete and uniform mixing. The machine is provided with a variable speed drive allowing to set different speeds. The plastic cover can be lifted to inspect the box, and in this case, the motor automatically turns off to prevent accidents. The mixer is supplied with stainless steel bowl, but without whisk beater and electric heater, that must be ordered separately. 400 V, 50 Hz, 3 pH, 0.5 CV. Dimensions 26 x 76 x 86 cm, weight 160 kg.

B025-01 Electric heater with thermoregulator, 230 V, 50 Hz, 1000 W
B025-03 Whisk thin wire beater conforming EN/BS
B025-06 Whisk thick wire beater conforming EN/BS
B025-08 Coupling beater/shaft

B027 Mixer, capacity 20 litres
EN 12697-35
Planetary action to ensure a complete and uniform mixing. Variable speed to set different speeds, with steel bowl 20 l capacity. Without whisk beater and electric heater which must be ordered separately. 400V, 3 ph, 50 Hz, 0.5. (230 V 1 ph on request). Dimensions 260x760x860 mm, weight 160 kg.

B027-03 Whisk thin wire beater, conforming to EN/BS specifications.
B027-06 Whisk thick wire beater conforming to EN/BS specifications
B027-08 Coupling beater/shaft
B027-01 Electric heater with thermoregulator, 230 V, 50/60 Hz, 1000W

E094 Mixer, capacity 5 l
EN 12697-35, BS 598:107
Bench mounting mixer, utilized for mixing samples of bituminous materials. Thanks to its double mixing action (shaft and planetary) it ensures uniform mixing. Double speed selection (140 or 285 rpm). Complete with stainless steel bowl, but without whisk (to be ordered separately). 230 V, 50 Hz, 800 W, dimensions 45x40x48 cm, weight 50 kg.

E095 Mixer, capacity 5 l
Identical to E094 but with security protection, conforming to CE safety directive

B028-01 Isomantle electric heater with thermoregulator, 230 V, 50-60 Hz, 800 W
B028-03 Whisk beater thin wire, conforming to EN
E095-03 Beater, stainless steel
E095-01 Bowl, stainless steel, capacity 5 l

B063-05 Storage stability of asphalt emulsions
NF T66-022
Used for the determination of the storage stability of emulsions by decantation. Consists of a 12 V current stabilized source, cylindrical electrode, base with holder, stainless steel vessel 500 ml capacity, watch glass. 230 V, 50 Hz, dimensions 200x200x500 mm, weight 5 kg
Bitumen-Asphalt

**Bituminous analyses**
Specific gravity frame, permeameter, indentationmeter, abrasion

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**V085 Specific gravity frame**
EN 12390-7, 1097-6, BS 812, 1881 :14
Used for specific gravity determination of concrete, aggregates etc. with a suitable electronic balance fitted with an under-hook facility. Robust steel frame, on its lower part a platform adjustable in height, holding a water container, allowing the specific gravity test. The balance is not included and must be ordered separately. Dimensions 510x510x1150 mm, weight 50 kg.

**V085-01 Cradle for holding concrete cube and cylinder specimens**

**V041 Density basket, stainless steel, dia. 200 mm x h 200 mm , mesh 3.35 mm**

**V072-02 Electronic balance**
capacity 5500 g, precision 0.01/0.1 g

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**B024 Permeameter**

Used in situ to perform and to check the permeability and drainage on road carpets, concrete pavements, tamped earth etc. Composed of bottomless plexiglas cylinder Ø 140 mm fitted on a base. Dimensions 26x26x42.5 cm, weight 8 kg.

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**B059-10 Indentation test for cubes or Marshall specimens**
EN 12697-20, 13108
For determining the depth of indentation of mastic asphalt and rolled asphalt, when force is applied to them via a cylindrical indentor pin with a circular flat ended base. The test applies to aggregates of max. nominal size less or equal to 16 mm. Performed on mastic and road constructions asphalts, on waterproofing and floor screeds in building constructions. Condition the specimens together with their moulds for at least 60 min under water at the test temperature of 40° C or 22°C, respectively with ±1°C accuracy.
Stainless steel water bath complete with water discharge cock, two metallic discs total weight of 500 N, two interchangeable penetration pistons having 1 or 5 cm², dial gauge 30 x 0.01 mm. Heater, cube mould test mould are not included. Dimensions 53x60x82 mm, weight 160 kg.

**B059-21 Thermostat digital heating system, to hold the temperature of 22°C or 40°C according the standards.** 230 V, 50 Hz, 1500 W., weight 3 kg.

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**B059-15 Cube mould for indentation test, stainless steel, 70.7 mm**
weight 4350 g

**B059-16 Penetration test mould, aluminium, 69 mm, weight 1850 g**

**B059-17 Base, steel made the fix the Marshall specimen into the penetrometer**

**B059-18 Calibration device for the indentation penetrometer**
**C319 Pavement core drilling machine 5 HP, 4-stroke petrol engine**
Is used for pavement core sampling where it is not easy to get electrical power. With vertical screw feed, Briggs & Stratton model, dim. 850x580x1230 mm, weight 135 kg.

**C319-02 Pavement core drilling machine 12.5 HP, 4-stroke petrol engine**
Identical to C319 but with engine of 12.5 CV, Briggs & Stratton model, weight 150 kg

See also page 80/81.

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**C340-05 - C341-09 Bits to cores**

<table>
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<tr>
<th>Cores bitumen</th>
<th>Cores concrete</th>
<th>Outside Ø</th>
<th>Interior Ø</th>
<th>Expander coupling</th>
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<td>C341-09</td>
<td>210</td>
<td>200</td>
<td>C343-04</td>
</tr>
</tbody>
</table>

C344  Strap wrench useful for unblocking the bits
C345  Extension rod, 300 mm, used for deep holes

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**S148 Sand absorption cone and tamper**
EN 12274-3
For the determination of the specific gravity and water absorption of fine aggregates, weight 600 g.

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**B053 Binder adhesion test “Vialit”**
EN 12272-3 - NF P 98-274-1
Used to evaluate the global adhesion and the active adhesion between bitumen and aggregates for road surfaces realization. The equipment is formed by six steel test plates, steel ball weighing 512 g, metallic base with three vertical support points and metallic rod 500 mm high, metallic hand operated roller, rubber lined with lead shots ballast, weight 40 kg.

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**B053-05 Rate of speed device**
EN 12272-1, BS 598 :108
Used to determine the rate of spread of coated chippings on the road surface. The device consists of a 300 mm square tray, lifted by 4 chains which are fixed on a spring balance. The rate of spread is directly measured in kg/m2, weight 1.5 kg
**Bitumen-Asphalt**

**Road analyses**
Deformation, deflexion, density, compaction

---

**B099 MOT straight edge**
EN13036-7
Manufactured from aluminium alloy, it is utilised to measure irregularities on road pavement floors, concrete pavement, length is 3 m, with two graduated measuring wedges, weight 10 kg

**B099-01** Set of 2 graduated wedges

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**B100 Benkelmann beam**
CNR no. 141 - AASHTO T256.77
Aluminium alloy made, with dial indicator and accessories, it is utilized to measure the deflection of the road surface when loaded by the wheels of vehicles. The beam is put in contact with the pavement under test between the tires of the vehicle. The measurement of the deflection is performed when the vehicle passes over the test area. Length of the Benkelman beam is 250 cm. Beam fulcrum ratio 4:1 Supplied with wooden carrying case, weight 15 kg.

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**B102 Benkelmann beam, NF P98-200/2**
Basically similar to mod. B100 but manufactured according to the French specifications, beam fulcrum ratio 2:1.

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**B100-02** Benkelman indicator gauge calibration unit for model B100 and B102.

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**B101 Plate bearing equipment 100 kN**
NF P94-117
Utilised with the Benkelman beam B100 or B102, to measure the static deflection in the centre of the plate from an independent point of the local load deflections: EV1/EV2 (roads) and Westerguard (platforms) The equipment consists of bearing plate Ø 300 mm with central measuring device, 100 kN capacity hydraulic ram with hand pump, manometer range 0-100 kN, extension rods, spherical bearing, coupling hoses, accessories, wooden carrying case, weight 72 kg

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**B103KIT Plate bearing equipment 200 kN**
NF P94-117-1
Same as mod. 101 but having capacity of 200 kN
**S226-02** Bearing plate, dia. 600 mm

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**B110T Pavement quality indicator PQI380**
This technically advanced "non-nuclear" instrument is designed for road contractors, highway agencies, laboratory technicians and local authorities to measure asphalt densities during and after laying. Achieving consistent compaction across asphalt material longitudinal and transversely during lay-down is the most important variable in constructing a quality hot mix asphalt pavement. The instrument is easy to use, does not require expensive special training and it is "non nuclear". Sampling time 5 sec. Measuring depth 25-100 mm, operating temperature and humidity. 7°C to +52°C, max. surface temperature 175°C, rechargeable batteries. Dimensions 270x270x280 mm, weight 7.5 kg.

---

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**A113 Skid resistance and friction tester**
XP P18-578, EN 1097-8, EN 1338, EN 13036-4, ASTM E103
For measuring pavement surface frictional and skid resistance properties and for polished stone value tests on aggregates from accelerated polishing tests. Complete with additional incorporated scale for tests on polished stone value specimens, rule, plexiglas made, for sliding length verification, thermometer range -10 to +110°C for surface temperature measurement, stool, wash bottle, bristle, tool set for machine use, carrying case, calibration certificate conforming to EN 1097-8, 73x73x33 cm, weight 32 kg. Without rubber sliders.

A110-03 Mounted rubber slider for site use (pavement surface)
A110-01 Mounted rubber slider for polished stone value test (laboratory)
A110-11 Metal base plate for polished stone value tests in laboratory and natural stones/concrete block pavers
A110-12 Clamping device for polished stone value tests in laboratory
A110-13 Clamping device for tests on natural stones (EN 1341, 1342), for concrete block pavers (EN 1338) and skidding tests on wooden floor (EN1339)

**B099-10 Sand patch equipment**
EN 13036-1, NF P98 216-1
Road and airfield surface characteristics, measurements of pavement surface to determine the average macrotexture depth using a volumetric patch technique. Complete with spreader disc with handle and rubber coated surface, wind shield, soft and wire brushes, screw-adjusted compass 300 mm graduated rule, metallic cylinder for spheres volume measurement, two glass pyknometers with metallic screw top an pouring hole, three graduated cylinders 10, 25 and 50 ml capacity, knee-guard, carrying case, weight 4 kg

**B098-01 Travelling beam device with autographic recorder**
To detect and check any irregularity in both bituminous and concrete road surfaces. Consists of a 3 meter long beam, fixed on two rigid wheels at the extremities. In the middle of the beam a sensing unit comprising a wheel connected to an indicator provides a magnification of 4 :1 and measures deviations of the surface. The deviations are shown on a scale calibrated in increments of 2 mm up to 10 mm and 5 mm up to 25 mm. With an autographic recorder providing a permanent record of the surface profile. It record up to 1000 metre surface on the special chart paper rolls. The beam is supplied as three sub-assemblies which are quickly assembled on site, weight 60 kg

B098-11 Pack of 10 chart rolls for approx. 1000 metre run
B098-12 Fibre-tipped pen for use with the recorder
B056 KIT Standard dial penetrometer
EN 1426 - ASTM D 5 - BS 2000 - NF T66 004 - UNI 4162 –
Used to determine the consistency of a bituminous sample under fixed conditions of load, time and temperature. The penetration is expressed in distance of tenths of millimetres vertically penetrated by a stand needle. The standard penetrometer is ruggedly constructed, with a base table in light alloy with levelling screws, plated vertical rod, micrometric vertical adjustment device. The slider is brass made with free fall. The dial, graduated in 360°, division 0.1 mm, dia. 150 mm. With stop and release push button, automatic zero set, micrometer adjustment set of weights 50 and 100 g, penetration needle, brass sample cups Ø 55x35 mm and 70x 45 mm. Dimensions 22x17x41 cm, weight 11 kg.

B056-01 KIT Standard digital penetrometer
Same to model B056 KIT but with digital readout of the penetration values.

B057 KIT Automatic dial penetrometer
Same as model B056 KIT but with a magnetic controller device with electronic digital programmable timer that automatically releases the plunger head and ensure free falling of the needle during the 5-seconds test.

B056-02 KIT Automatic digital penetrometer
Same as model B057 KIT but with digital readout of the penetration values

B057-01 Penetration needle, 2.5 ±0.05 g
B057-02 Mirror, for easier setting of the needle
B057-03 Transfer dish, made from glass, with support
B057-04 Weight of 50g
B057-05 Weight of 100 g
B057-07 Penetration needle hardened steel, 2.5 ±0.05 g, EN specification
B057-08 Thermometer IP 38C, +23° - +26°C, graduation 0.1°C
B057-08 Thermometer EN, +19° - +27°C, graduation 0.1°C – ASTM 17C
V122-05 Sample cup, brass made, Ø 55x35 mm
V122-06 Sample cup, brass made, Ø 70x45 mm

B058 Thermostatically controlled water bath for penetrometer
Provides water at the required temperature of 25°C ± 0.1°C. 10 litres capacity, 230V, 50/60 Hz, 1050 W, dim. 375x335x420 mm, weight 12 kg

B059 Automatic digital penetrometer
EN1426
Digital measure of the penetration values, measuring range 50 mm, division. 0.01 mm, motorized approach of the needle, driven by camera (needle Ø = 5 mm on the monitor), electric control of the approach, electro-mechanical release and locking device of the needle, motorized return of the needle, with needle, weights, sample cups, 230 V, 50 Hz, dimensions 26 x 32 x 54 cm, weight 23 kg.

B075-01 Graduated cylinder with side tubes and stopper
EN 12847, IP 485
For the determination of settling tendency. Cylinder has 600 ml capacity, division to 500 ml, weight 0.8 kg. To perform this test you need model B075

B075-08 Glass tube with glass filter
EN 12849, IP 487
For the determination of penetration power. Glass tube dia. 41.5 x h 115 mm with fused-on glass filter with holes size between 0.160 and 0.250 mm, weight 300 g

Ref. 162: B056 KIT, B056-01 KIT
Ref. 163: B058, B056 KIT
Ref. 164: B059
Ref. 165: B075-01, B075-08
Bitumen-Asphalt

Softening
Ring and Ball

B072 Ring and ball softening point apparatus
EN1427
The softness of bitumen depends, amongst other factors, on the temperature of the substance, where, as the temperature is raised, the softness of the bitumen increases. The unit consists of a pyrex breaker, brass frame, two tapered rings, two ball centring guides and two balls, weight 900 g.

B072-01 Thermometer -2 to +80°C / 0.2°C
B072-02 Thermometer +30 °C to 200°C / 0.5°C
B073-01 Hot plate with magnetic stirrer with thermoregulator for temperature adjustment from 100 to 1200 rpm. Suitable for tests in distilled water with softening point between 30 to 80°C. 230 V, 50 Hz, 700 W, weight 4 kg
B073-02 Hot plate with magnetic stirrer with thermoregulator for temperature adjustment from 100 to 1200 rpm. Suitable for tests in distilled water and glycerine with softening point over +80°C up to +150°C. 230 v, 50 Hz, 1000 W.

B074 Hot plate with thermoregulator for temperature adjustment
230 V, 50 Hz, 1000 W, weight 6 kg

B074-01 Electric stirrer
For B074, 230 V, 50 Hz, 100 W, weight 3 kg

B070N Automatic digital ring and ball apparatus
EN427, ASTM D36 - AASHTO T 53 - NFT 66-008
For determining the softening point of asphalts and pitches. The determination of the rise of temperature and the whole procedure of testing is controlled by the microprocessor. The tester is composed by a ceramic-glass heating plate with automatic cut off at the end of the test cycle. The microprocessor controls the heater/stirrer, temperature probe, laser sensors, pre-heating phase of the plate, records all results in its permanent memory, storing up to 300 tests. 230 V, 50 Hz, 700 W, dimensions 50x35x55 cm, weight 20 kg

Ref. 166: B072
Ref. 167: B074+B072+B072-01
Ref. 168: B070N
B072-20 Wilhelmi softening point apparatus
EN 1871
To determine the softening point of bituminous materials for road construction, according to Wilhelmi method. Composed by a ring divide in two halves on a metal support frame, glass beaker, steel ball 15 mm dia, weight 2 kg.

B075 Water in bitumen emulsions (Dean-Stark)
EN 1428, 12847, NF T66-023, T66-113
To determine the water in petroleum products or bituminous materials, by distilling them with a water immiscible, volatile solvent. Composed by a glass balloon 500 ml, a glass receiver 25 ml capacity with 0.1 ml grad., a glass reflux condenser. Electric heater with thermoregulator, clamps, 230 V, 50 Hz, 500 W., weight 8 kg.

B076 Water in bituminous materials (Dean-Stark)
ASTM D95, D244
Identical to B075 except for the receiver having 10 ml capacity.

B076-21 Sieve, stainless steel dia. 75 mm, opening 0.5 mm, EN 1429
B076-22 Sieve, stainless steel dia. 75 mm, opening 0.16 mm, EN 1429
B076-24 Pan and cover, stainless steel, dia. 75 mm, EN 1429
B063-10 Particle charge tester
EN 1430, ASTM D244
To identify the particle charge of bitumen emulsions. Consists of a millimeter scale up to 10 mA on support base, variable resistor, two stainless steel electrodes, insulating device, beaker 500 ml capacity, glass rod. Dimensions 200x200x600 mm, weight 3kg.

B077 KIT Fraass apparatus
EN 12593
This apparatus is used to determine the breaking point of semisolid and solid bitumen. It consists of a flexure device with two concentric sliding resin tubes, jaws for the test specimen, flexure system with handle, cooling device with three containers, plate in special harmonic steel, thermometer IP 42 C. 4 kg.

B077-02 Thermometer IP 42 C

B063 KIT Emulsified asphalt distillation apparatus
EN 1431, ASTM D 244 - CNR No. 100
For the determination of the cut-back asphaltic materials by the distillation test. Formed by aluminium still container, glass connectors with condenser, stands, graduated cylinder, 2 thermometers ASTM7C, -2 to +300°C, gas ring burner with gas stop valve controlled by a flame sensor, weight 12 kg.

B075-05 Determination of solubility of bituminous binders
EN 12592, ASTM D2042
The set comprises gooch crucible complete with funnel and rubber ring, filter flask 500 ml capacity with rubber stopper, Whatman filter fibreglass discs, 25 mm dia. (pack of 100), weight 1 kg.

B065 Rotary Evaporation Apparatus
EN 12697-1, 12697-3, 13108
To evaluate the hardening effect of a treated bituminous binder sample. The test is performed by introducing 100 g of bituminous binder into the rotating flask. The sample is heated at 165°C and ambient temperature air is blowed into the flask containing the binder hardening the same. The hardening effect is evaluated by penetration, viscosity and softening point tests. Composed by a distillation flask 1000 ml capacity rotated by a speed motor at an adjustable rate of 20 to 270 rpm, condenser, solvent recovery flask, heated oil bath. The angle of the rotary/distillation flask is 15°. 230 V, 50 Hz, weight 27 kg.

B065-13 Distillation flask 2000 ml, ASTM D54-04
Effects of heat
Asphalt oven, Rolling oven, cabinet with aspirator, cohesion tester

B064 KIT Asphalt oven with rotating shelf
TFOT version EN 12607-2, EN 13303, ASTM D6, NF T66-011
Internal chamber and external frame all made from stainless steel, double wall insulation with fibreglass, double door. Temperature controlled by digital thermoregulator. The plate rotates at 5-6 rpm. With glass control thermometer ASTM 13C, +155 to +170°C subdivision 0.5°C. The oven is supplied without rotating shelf and accessories, that must be ordered separately. 230 V, 50 Hz, 1200 W, internal dimensions 33x33x33 cm, outside dimensions 46x45x70 cm, weight 40 kg, without shelves.
The oven can be equipped in two versions with the following accessories:

B064-01 KIT Rotating shelf with 9 containers Ø 55x35 mm for the determination of loss on heating to EN 13303 - ASTM D 6 - BS 2000 - NF T066-011 - AASHTO T47
B064-02 Rotating shelf, with 2 containers Ø 140x9.5 mm for the Determination of thin film to EN 12607-2 - ASTM D 1754 - AASHTO T 179 - UNE 7110 standards
B064-04 Stainless steel container dia. 140 x9.5 mm

B066 KIT Rolling Thin-Film Oven
ASTM D2872 - AASHTO T240 - CNR No. 54
To measure the air and heat effect on a moving film of asphalted semisolid materials. External frame and internal chamber are stainless steel made with insulated fibreglass intermediate chamber. The oven must be connected to a suitable air pressure supply. With precision digital thermostat to maintain 163°C temperature, control thermometer ASTM 13C, ventilation device, set of eight glass containers Ø 64x40 mm, 230 V, 50 Hz, 1300 W, dim. 62x62x91 cm, weight 55 kg
B064-03 Thermometer ASTM 13C, +155 to 170°C, division 0.5°C
B066-02 Glass container Ø 64x140 mm
V122-05 Brass container 55x35 mm

B079 Cabinet with aspirator
To exhaust vapours and toxic gas. Complete with electric aspirator, electric lighting, switches, electric and water installation, windows, shelves. The front door, made with transparent material can be lifted for an easy access to the operation desk. Dimension 1250x750x2600 mm, 230 V, 50 Hz, 350 W, weight 180 kg

B053-10 Cohesion tester
EN 12274-4, ASTM D3910
For cohesion tests on the mix and the proper consistency or mix design for a slurry seal mixture. A hand torque tester supplied with the cohesion tunit, measures the torquing strength by determining the complete solidification of the mix. Supplied complete with 5 moulds dia. 60 x h10 mm, dim. 40x25x30 cm, weight 20 kg. (To perform the test an air pressure source is needed)
B053-12 Mould 140x140x6.3 mm
B053-13 Mould 140x140x10 mm
B053-14 Mould 200x200x13 mm
B053-15 Mould 250x250x19 mm
B053-16 Mould dia. 60 mm x height 6 mm (5 pieces)
B053-17 Mould dia. 60 mm x height 10 mm (5 pieces)
V206 Air compressor, 230 V, 50 Hz
Bitumen-Asphalt

Viscosity
Viscosimeter Engler and Saybolt

B080 Engler digital viscometer
ASTM D 940, D 1665 - AASHTO T54 - BS 2000 - NFT 66-020
Used to compare the specific viscosity of road-oils and tars to the viscosity of water. It consists of a water bath with digital precision thermoregulator, electric stirrer, cooling device, Engler flask, 230 V, 50 Hz, 300 W, dimensions 265x270x550 mm, weight 12 kg

B081 Engler digital viscometer « two elements »
Identical to B080 but with two elements, weight 20 kg

B082-01 Thermometer ASTM 23 C, range +18/ +28°C, division 0.2°C
B082-02 Thermometer ASTM 24 C, range +39/ +54°C, division 0.2°C
B082-03 Thermometer ASTM 25 C, range +95/ +105°C, division 0.2°C
B082-04 Thermometer NF T 66-020, range 0-55°C, division 0.2°C
B082-06 Kohlrausch calibration flask, capacity 200 ml
B082-07 Filter screen ASTM no. 50

B084-01 KIT Standard TAR, BRTA, Redwood digital viscometer
EN 12846, UNI EN 13357, IP 184, NF T66-005, BS 2000
Used to determine the viscosity of cut-back bitumen and road oil. Consisting of a stainless steel bath, agitator, rheostat, immersion electric heater with digital thermostat, cooling coil. Supplied with control glass thermometer IP 8 C, range 0-45°C, subdivision, 0.2ºC, graduated glass cylinder 100 ml capacity. Without cup, go/not go gauge, ball valve (to be ordered separately), 230 V, 50 Hz, 300 W, dimensions 265x270x550 cm, weight 12 kg.

B084-02 KIT “Two Places“ Standard TAR, BRTA, Redwood digital viscometer
Identical to B084-01 KIT but with two places
B083-01 Go/not go gauge for Ø 4 mm orifice
B083-02 Cup with orifice Ø 4 mm
B083-03 Ball valve Ø 4 mm

Set of go/not go gauge, cup with orifice and ball valve of Ø 10 and 2 mm available.

B087 Saybolt digital viscometer
ASTM D88 - D244 - AASHTO T72 - UNE 7066, 51021
Used to determine the viscosity of petroleum products at specified temperatures between 70- 210°F, stainless steel made, the Saybolt viscometer is supplied with two interchangeable orifices "Furol" and "Universal", oil bath, electric heater with digital thermoregulator, stirrer, cooling coil, viscosity flask. Thermometers, filter funnel, withdrawal tube are not included and must be ordered separately. 230V, 50 Hz, 500 W, dimensions 27x27x55 cm, 12 kg.

B087-01 Two tube Saybolt viscometer
Identical to B087 but with two tubes

B089 Thermometer ASTM 17 C +19 + 27°C 0.10°C
B089-01 Thermometer ASTM 18 C +34 + 42°C 0.10°C
B089-02 Thermometer ASTM 19 C +49 + 57°C 0.10°C
B089-03 Thermometer ASTM 20 C +57 + 65°C 0.10°C
B089-04 Thermometer ASTM 21 C +79 + 87°C 0.10°C
B089-05 Thermometer ASTM 22 C +95 + 103°C 0.10°C
B087-11 Filter funnel complete with wire filter ring mesh
B087-12 Withdrawal tube complete
**B092 KIT Tag closed-cup viscometer**

**Flash point**

ASTM D56 - API 509

Suitable for testing volatile flammable flashing between 0 and 175°F (except fuel oils), with cup, water bath, lid, slide, thermo-regulated heating device, thermometer ASTM 9C range, -5 to +110°C and thermometer ASTM 57C, range -20 to +50°C. 230 V, 50 Hz, 600 W, dim. 20x30x40 mm, weight 6 kg.

**Ref. 186: B092 KIT**

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**B093 KIT Tag open-cup viscometer**

**Flash Point**

ASTM D 1310, D 3143

For the determination of open cup flash points of volatile flammable materials having flash points between 0 and 175°F, with cup, water bath, thermo-regulated heating device, thermometers ASTM 9C -5 to +110°C and ASTM 57C, -20 to +50°C. 230 V, 50 Hz, 600 W, dim. 20x30x40 mm, weight 6 kg.

**Ref. 187: B093 KIT**
Bitumen-Asphalt

B090 Breaking value of cationic bitumen emulsions. Mineral filler method
EN 13075-1, IP 494
To determine the breaking value of cationic emulsions. Consists of filler feeding pan with support base and clamp, nickel spatula, two round porcelain dishes, weight 2 kg.
Accessories for automatic version:
B090-10 Electric stirrer with base support, having 260 rpm, 230 V, 50 Hz, 1 ph
B090-11 Propeller for electric stirrer for B090-10
B090-12 Metallic container, capacity 500 ml
B090-20 Reference filler, bag of 50 kg

B094 KIT Pensky-Martens digital flash point tester
EN 22719, ASTM D93 - AASHTO T73
Used for the determination of the flash point of petroleum products by the closed cup test, with a flash point between 40°C and 360°C. With stirrer, shield for radiations, cast iron bath, electric heater with thermo-regulator, two thermometers ASTM 9C, -5 +110°C div. 0.5°C and ASTM 10C, +90 /+ 370°C div. 2°C. 230V, 50 Hz, 600 W, weight 6 kg.

B086 KIT Cleveland open cap flash and fire point tester
EN 22592 - BS 4689 - ASTM D92- AASHTO T48 - UNI 4160 - IP 36/67
To measure the flash and fire points of lubricated oils and petroleum products. Complete with brass cup, thermometer IP 28C (ASTM 11C) range -6/+400°C, electric heater with thermoregulator, double line fuse. Without flame gas device (to be ordered separately). 230 V, 50 Hz, 600 W, weight 10 kg
Needed accessories:
B086-02 Flame gas device

B069 KIT Distillation of cut-back asphalts
ASTM D402, AASHTO T78, NFT 66-003
Used to measure the amount of the most volatile constituents in cut-back asphaltic products. The apparatus consists of electric heater with thermoregulator, distillation flask, condenser tube, adapter, shield, receiver, supports, graduated cylinder, thermometer ASTM 8C -2 to + 400°C division 1°C, 230 V, 50 Hz, 750 W, weight 12 kg.
Bitumen-Asphalt

Ductility, specific gravity, ageing
Ductilometer, Hubbard-Carmick specific gravity, pressure ageing vessel

**B054 Ductilometer**

EN 13398, 13398, ASTM D 113 - NF T66-006

Used to determine the bituminous ductility, that is to say, the distance to which a briquette of molten bitumen can be extended under controlled conditions, before its breaking. The ductilometer basically consists of a moving carriage travelling along guide ways. The carriage is driven by an electrical motor, inside a large tank which is fitted with digital thermostat, immersion electric heater, cooling coil for cold water circulation and pump unit. This model works in an automatic way at a speed of 50 mm/min. and its max. stroke is 1500 mm. The tank and the external frame are all made from stainless steel with fibreglass insulation. Water bath temperature is maintained constant at 25°C ±0.5°C by a digital thermoregulator. Max. traction force: 300N, accuracy ±0.1N. It can accept up to 3 specimens simultaneously. Supplied complete except for the briquette mould and base plate that must be ordered separately. 230 V, 50 Hz, 1000 W. Dimensions 214x35x40 cm, weight 95 kg.

Ref. 193: B054+B055

**B055 Ductilometer with cooling system**

Identical to B054, but with incorporated refrigerating unit for tests with water temperature from +5° to +25°C. Dimensions 2140x350x750 mm, weight 130 kg

Ref. 194: B054-01 - B054-02

**B054-01** Ductility briquette mould, ASTM/AASHTO to prepare the specimen. Brass made, without base plate

**B054-03** Ductility briquette mould, EN 13398

**B054-04** Ductility briquette mould, EN 13589

**B054-02** Base plate for ductility briquette mould

Ref. 195: V111

**V111 - V111-01 Hubbard-Carmick specific gravity**

NF T66 007, EN ISO 3838

**V111** Cylindrical type, 24 ml

**V111-01** Conical type, 25 ml

Ref. 196: B091

**B091 Pressure aging vessel PAV**

ASTM PS36, AASHTO PP-I/SHRP

To simulate the ageing of asphalt mixtures after 5 to 10 years. The sample is exposed to high pressure and temperature for 20 hours, to simulate the effect of a long time oxidative ageing by verifying the penetration and softening point characteristics. Supplied complete with accessories, software, RS232 with cable to PC connection. To perform the test a compressed air source must be provided. 230 V, 50 Hz, 550 W, dim. 66x45x41 cm, weight 76 kg
V150 - V152 Digital thermometers
Complete with depth stainless steel probe, for temperature measurements of liquid, fluid, semisolid, granular materials, air. The probe is directly connected to the digital unit.

<table>
<thead>
<tr>
<th>Model</th>
<th>range C°</th>
<th>resolution C°</th>
<th>accuracy C°</th>
<th>probe Ø x length</th>
</tr>
</thead>
<tbody>
<tr>
<td>V150</td>
<td>-50/+150</td>
<td>0.1</td>
<td>± 0.3</td>
<td>3x105 mm</td>
</tr>
<tr>
<td>V151</td>
<td>-50/+220</td>
<td>0.1</td>
<td>± 0.3</td>
<td>5x125 mm</td>
</tr>
<tr>
<td>V152</td>
<td>-40/+550</td>
<td>1.0</td>
<td>± 2</td>
<td>3x130 mm</td>
</tr>
</tbody>
</table>

V153 Digital thermometer
Including remote probe connected to the instrument with 1 m cable. Temperature range: -50/+150°C, resolution 0.1°C, accuracy ± 0.3°C, stainless steel probe Ø 3x160 mm

V154 Digital microprocessor thermometer, -50 to +1350°C
Rugged, easy to use portable instrument with K-type sensor for high temperature measurements, it is equipped with a membrane keyboard and microprocessor with memory functions of: hold, min/max temperatures measured in the cycle, °C/F readings. Dual temperature range -50/+200 °C/ 0.1 °C, +200/ +1350°C/1°C, accuracy ± 0.5% full scale, power supply 1x9 V battery. Supplied without probe to be selected and ordered separately.

V154-01 Penetration probe, dia. 3x120 mm, temperature max. 900°C
V154-02 Surface probe, dia. 16x260 mm, temperature max. 650°C
V154-03 Air probe, dia. 3x245 mm, temperature max. 300°C
V154-04 General purpose probe, dia. 5x220 mm, temperature max. 900°C
V154-05 K type thermocouple, 5 m long
V154-06 Coupling unit

V155 Infrared thermometer
To measure surface temperatures without touching the object. Measuring range -50/+750°C, accuracy 0.1°C up to 200°C, with battery 9 V.

V160-02 - V160-06 Dial thermometers
For temperature measurement of freshly mixed concrete, bituminous mixtures and general purpose use. Stainless steel made.

<table>
<thead>
<tr>
<th>Model</th>
<th>range C°</th>
<th>Sub-divisions C°</th>
<th>Dial Ø mm</th>
<th>Stem length mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>V160-02</td>
<td>0/+100</td>
<td>2</td>
<td>50</td>
<td>250</td>
</tr>
<tr>
<td>V160-03</td>
<td>0/+250</td>
<td>5</td>
<td>50</td>
<td>250</td>
</tr>
<tr>
<td>V160-04</td>
<td>0/+400</td>
<td>10</td>
<td>50</td>
<td>250</td>
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<tr>
<td>V160-05</td>
<td>0/+60</td>
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<td>75</td>
<td>600</td>
</tr>
<tr>
<td>V160-06</td>
<td>0/+250</td>
<td>5</td>
<td>75</td>
<td>600</td>
</tr>
</tbody>
</table>

Other models on request.
The accurate and satisfactory test of fresh and hardened concrete are essential elements for any type of building realization.

The final quality of the concrete utilized in the structure depends on many variables like workability, consistency, setting, time, volumic mass, air content, compressive strength, temperature, linear variations. We propose a complete range of testing and research equipment on concrete to satisfy practically all the above quality variables, in compliance with the EN, ASTM, NF, BS and the most known international standards.
Concrete Compression machines – basic design
Compression/flexion machine

Load frame
The load frame is extremely strong and oversized to grant high rigidity and stability. The upper head holds the precision lapped ball-seating and the compression platen. They are surface hardened HRC 60 and ground. Design emphasis has been placed on simplicity both of construction and operation so that our machines are rugged, easy to use and maintain and designed for heavy continue use. They are designed to conform to International Specifications as EN, ASTM, AASHTO, BS, NF, DIN, UNI, UNE. They are available in 1300 kN, 1500 kN, 2000 kN, 3000 kN, 5000 kN capacity, both hand-operated and motorized, at one or two gauges with electronic digital display measuring system and with automatic servo-controlled console with microprocessor. The different versions give the possibility to test cubes, cylinders, blocks. All the machines can be equipped with safety guards.

Hydraulic system
Piston has large diameter, this allows the hydraulic circuit to work at low pressure with longer life of working components and higher precision in the results. Piston is ground and lapped and a packing high quality set of three elements is utilized. Motorized models have a dial device to visualize, pre-select and control the flow allowing an uniform load rate as requested by standards. A fast approach ram action device is foreseen to avoid dead times during stroke of the ram. Power pump is multipiston, assuring continuity of delivery. A movement indicator visualizes instant by instant the piston’s excursion during the compression test. A hopper is foreseen avoiding the powder of the broken specimen to enter into the cylinder of the press damaging the packing set.

Load measuring systems
Gauge
The gauges are Bourdon tube type with max. load pointer, zero adjustment and mirror face to avoid parallax errors. Low pressure gauge is fully protected from overload by a pressure control device.

C104N Digital measuring system SERVOPLUS
For fully automatic tests throughout all phases: data acquisition, display, processing, pace rate adjustment and software for print out of results and certificate and elastic modulus determination. 312 MHz, 64 MB RAM, 32 MB flash memory, touch screen VGA, 320x240 pixel, keyboard with 5 crosswise keys, 1 analogical output, 8 analogical inputs, ethernet 100 Mbit, USB connection, slot SD card, RS232, integrated printer on request.

C109N Digital measuring system CYBERPLUS
For acquisition, visualization, processing and saving of the test dates. Full colour touch screen display with icons, high resolution, 5 keys for traditional use, QWERTY virtual keyboard, USB port and SD card slot, 8 analogue inputs to connect up to 8 cells or transducers, reading unit selectable (kN, kg, lb, t etc.). Different languages possible.

Calibration and precision
All the compression machines are calibrated with high accuracy electronic instruments and they are guaranteed in class “1” (max. error less than ±1%). A calibration certificate is supplied along with the machine.
Concrete

Compression machines

C036 - C067 Compression machine hand operated
Opening between compression plates 336 mm

C036 Compression machine hand operated with one gauge, 1500 kN
C051 Compression machine hand operated with one gauge, 2000 kN
C066 Compression machine hand operated with one gauge, 3000 kN

C037 Compression machine hand operated with two gauges, 1500 kN
C052 Compression machine hand operated with two gauges, 2000 kN
C067 Compression machine hand operated with two gauges, 3000 kN

C038 - C068 Compression machine motorized with one gauge
Opening between compression plates 336 mm

C038 Compression machine motorized with one gauge, 1500 kN
C053 Compression machine motorized with one gauge, 2000 kN
C068 Compression machine motorized with one gauge, 3000 kN

C039 - C069 Compression machine motorized with two gauges
Opening between compression plates 336 mm

C039 Compression machine motorized with two gauges, 1500 kN
C054 Compression machine motorized with two gauges, 2000 kN
C069 Compression machine motorized with two gauges, 3000 kN

Ref. 205: C036, C051, C067
Ref. 206: C038, C053, C068
Ref. 207: C039, C054, C069
Concrete Compression machines, digital display Cyberplus C109N

C040 - C070.02 Compression machine with digital display
Cyberplus C109N
Max. vertical daylight between the platens 336 mm
C040 Compression machine motorized, 1500 kN
C055 Compression machine motorized, 2000 kN
C070 Compression machine motorized, 3000 kN

Compression machine with digital display Cyberplus C109N
Opening between the compression platens 336 mm
Integrated printer

C040.01 Compression machine motorized, 1500 kN
C055.01 Compression machine motorized, 2000 kN
C070.01 Compression machine motorized, 3000 kN

Compression machine with digital display Cyberplus C109N
Max. vertical daylight between the platens 336 mm
Integrated printer and software C109-10

C040.02 Compression machine motorized, 1500 kN
C055.02 Compression machine motorized, 2000 kN
C070.02 Compression machine motorized 3000 kN

C040.05 - C070.07 Compression machine with digital display
Cyberplus C109N
Max. vertical daylight between the platens 376 mm
Set of capping retainers and 10 sets of neoprene pads
(to avoid the use of sulphur)

C040.05 Compression machine motorized, 1500 kN
C055.05 Compression machine motorized, 2000 kN
C070.05 Compression machine motorized, 3000 kN

Compression machine with digital display Cyberplus C109N
with integrated printer C127, 10 sets of thermo paper,
Max. vertical daylight between the platens 376 mm, set of capping retainers
and 10 sets of neoprene pads

C040.06 Compression machine motorized, 1500 kN
C055.06 Compression machine motorized, 2000 kN
C070.06 Compression machine motorized, 3000 kN

Compression machine with digital display Cyberplus C109N
with integrated printer C127, 10 sets of thermo paper,
Max. vertical daylight between the platens 376 mm, set of capping retainers
and 10 sets of neoprene pads, software C109-10

C040.07 Compression machine motorized, 1500 kN
C055.07 Compression machine motorized, 2000 kN
C070.07 Compression machine motorized, 3000 kN
Concrete Compression machines, digital display Servoplus C104N

C041 - C071.02 Compression machine with digital display Servoplus C104N
Max. vertical daylight between the platens 336 mm

C041 Compression machine motorized, 1500 kN
C056 Compression machine motorized, 2000 kN
C071 Compression machine motorized, 3000 kN

Compression machine with digital display Servoplus C104N
Max. vertical daylight between the platens 336 mm
integrated printer

C041.01 Compression machine motorized, 1500 kN
C056.01 Compression machine motorized, 2000 kN
C071.01 Compression machine motorized, 3000 kN

C041 - C071.07 Compression machine with digital display Servoplus C104N
Max. vertical daylight between the platens 376 mm
Set of capping retainers and 10 sets of neoprene pads
(to avoid the use of sulphur)

C041.05 Compression machine motorized, 1500 kN
C056.05 Compression machine motorized, 2000 kN
C071.05 Compression machine motorized, 3000 kN

Compression machine with digital display Servoplus C104N
integrated printer C127, 10 sets of thermo paper;
Max. vertical daylight between the platens 376 mm
Set of capping retainers and 10 sets of neoprene pads

C041.06 Compression machine motorized, 1500 kN
C056.06 Compression machine motorized, 2000 kN
C071.06 Compression machine motorized, 3000 kN

Compression machine with digital display Servoplus C104N
integrated printer, 10 sets of thermo paper,
Max. vertical daylight between the platens 376 mm
Set of capping retainers and 10 sets of neoprene pads
software C109-10

C041.07 Compression machine motorized, 1500 kN
C056.07 Compression machine motorized, 2000 kN
C071.07 Compression machine motorized, 3000 kN
C104N Digital measuring system SERVOPLUS
For fully automatic tests throughout all phases: data acquisition, display, processing, pace rate adjustment and software for print out of results and certificate and elastic modulus determination. 312 MHz, 64 MB RAM, 32 MB flash memory, touch screen VGA, 320x240 pixel, keyboard with 5 crosswise keys, 1 analogical output, 8 analogical inputs, ethernet 100 Mbit, USB connection, slot SD card, RS232, integrated printer on request.

C127 On board graphic printer for thermo paper (to be ordered separately)

C109N Digital measuring system CYBERPLUS
For acquisition, visualization, processing and saving of the test dates. Full colour touch screen display with icons, high resolution, 5 keys for traditional use, QWERTY virtual keyboard, USB port and SD card slot, 8 analogue inputs to connect up to 8 cells or transducers, reading unit selectable (kN, kg, lb, t etc.). Different languages possible.

C109-10 – C109-12 Software for the remote control for compression tests
C109-10 Software for the remote control of the press by PC for compression
C109-11 Software for the remote control of the press by PC for flexion
C109-12 Software for the remote control of the press by PC for tensile splitting

C123 Software SERVONET
for the remote control of the press by PC for compression and flexure tests on concrete and mortar specimens
General features of the UTM2 software:

1. Automatic identification of the appliance connected.
2. Easy setting of the sequence of operations concerning the test to be made settable by the operator. The realization of a personalized testing profile saveable and reusable allowing to operate following his own need setting data and cycle test, the analogical measuring channels and the speed charts.
3. Memorization of the test in the database with the possibility to process it again.
4. Remote and interactive control of the machine.
5. Visualization of the instant loads, instant definition of the load/deformation/stroke graph, remote control of the main functions of the machine. It can also visualize the emergencies, the alarms and the eventual errors, it calculates and saves all the parameters of the test made with the possibility to process again, and to manage the test files.
6. The data test can be commented by means of test titles to be reported on the certificate or on the graph desired.
7. The user can select the calculation algorithms and using them the Software will process all the results required by the Standards.
8. The colours and the graph scales of the activated windows can be freely selected by the user as well as zooming on the main interested graphic points.
9. The test certificate can be personalized with the following variables: name of the company, kind of test, date, kind of graph and number of pages.
10. Possibility to have a remote control of the machine calibration and the related automatic calibration.
Available in three different designs: hand-operated or motorized with gauge Ø 250 mm, digital Cyberplus C109N or servo-controlled automatic system Servoplus C104N.


C090 Flexure testing machine hand-operated with one gauge, 150 kN
C090-01 Flexure testing machine motorized with one gauge, 150 kN
C090-02 Flexure testing machine motorized with Cyberplus, 150 kN
To perform flexural tests on concrete beam specimens having max. dimensions of 15x15x75 mm.

C091-01 Flexure testing machine motorized with one gauge, 150 kN
C091-02 Flexure testing machine motorized with Cyberplus, 150 kN
To perform flexural tests on concrete beam specimens having max. dimensions of 20x20x80 cm, conforming to the a.m. Specifications and in addition to perform tests on flat blocks (max. width 600 mm, BS 6073-1), flagstones and kerbs conforming to EN 1340:2004/BS 7263-1, kerbs conforming to NF P98-302, any type of beam having max. size 600xh250 mm (lower rollers max. length 1325 mm).

C093-01 Flexure testing machine motorized with Cyberplus, 150 kN
Series to perform flexural tests on concrete beam specimens having max. dimensions 200x200x800 mm and to perform tests on any kind of other product with max. dimensions 550xh550 mm (adjustable distance between lower rollers up to max. 1325 mm).

C095 Flexural testing machine, 50 kN capacity
EN 491, EN 538, BS 6073
For testing concrete, clay and hollow tiles, flat blocks, paving slabs, roof, floor and terrazzo tiles, ceramics and bricks. Steel frame with one upper bearer and two lower adjustable bearers, mechanical hand-operated screw jack, 10 kN capacity proving ring to measure the applied load, distance between lower bearers adjustable from 50 to 500 mm, bearer’s dimensions dia. 25x500 mm, accuracy 1% of the applied load, dimensions 710x610x1520 mm, weight 120 kg.
Concrete

The combined two frame group offers the advantage to perform compression tests on concrete cube, cylinder and block specimens, flexural test on concrete beams and by using suitable accessories to test also mortar specimens.

A hydraulic two ways distribution valve may activate the standard frame or the second combined frame by utilizing only one hydraulic pressure source. The two frames group can be combined with may different solutions, according to the specific exigencies of the customer. Suitable accessories for the following tests:

- Compression on portions of 40.1x40x160 mm mortar broken in flexure EN 196 DIN 1164 (Models E170, E170-O1)
- Compression on 50 mm mortar cubes, conforming to ASTM C109 (Model E171)
- Compression on 70 mm mortar cubes conforming to BS 4550 (Model E171-O1)
- Splitting tensile on cylindrical specimens Ø 100, 150, 160 mm, EN 12390/6 – NF P18.408 - BS 1881:117 - ASTM C496 - UNI 6135 (Model C100)
- Splitting tensile on concrete cubes and concrete block pavers conforming to EN 12390-6, 1338 (Model C103)

A group is composed by a compression machine of 1500, 2000 or 3000 kN with Cyberplus or Servoplus system (see compression machine) and

**C092 Flexural frame of 150 kN**
With dial gauge used in conjunction with compression testing machine dial gauge reading

**C092-01 Flexural frame of 150 kN**
Complete with pressure transducer, used in conjunction with Cyberplus C109N compression machine

**C092-02 Flexural frame of 150 kN**
Complete with pressure transducer used in conjunction with an automatic servocontrolled Servoplus C104N compression machine

**C092-11 Flexural open sided frame, 150 kN**
Complete with pressure transducer, used in conjunction with a Cyberplus C109N compression machine

**C092-12 Flexural open sided frame, 150 kN**
Complete with pressure transducer, used in conjunction with an automatic servocontrolled Servoplus C104N compression machine

**C092-15 Flexural high stiffness frame, 200 kN**
Complete with pressure transducer, used in conjunction with a Cyberplus C109N compression machine

**C092-16 Flexural high stiffness frame, 200 kN**
Complete with pressure transducer, used in conjunction with an automatic servocontrolled Servoplus C104N compression machine

**C092-05 Compression frame on mortar specimens, 250 kN or 500 kN**
Complete with pressure transducer used in conjunction with a Cyberplus C109N concrete compression machine

**C092-06 Compression/flexural frame on mortar specimens, 250 kN and 15 kN**
Complete with two pressure transducers used in conjunction with a Cyberplus C109N concrete compression machine

**C092-07 Compression frame on mortar specimens 250 kN or 500 kN**
Complete with pressure transducer, used in conjunction with an automatic servocontrolled Servoplus C104N compression machine

**Load reduction for Cybertronic or Servotronic systems**

**C097** Dual low capacity digital range of 1/3 of the nominal range
**C097-01** Dual low capacity digital range from 1/3 to 1/20 of the nominal range
**C097-02** Dual low capacity digital range 0 - 300 kN with strain gage load cell
**C105** Device with central screw to adjust the light between the compression platens according to the height of the specimen to be tested
Concrete Accessories for compression and flexural testing machines
Splitting tensile test, flexural test

To perform this test, a compression machine of low capacity has to be used or with a flexural frame.
EN 12390-6 - ASTM C496 - NF P18-408 - UNI 6135 - BS 1881:117

C100 Splitting tensile test device for cylindrical specimens
Ø 150x300 mm and 160x320 mm, 6” and 12”, weight 30 kg

C101 Splitting tensile test device for cylindrical specimens
Ø 100x200 mm, 110x220 mm, 4” and 8”, weight 15 kg.

C102 Splitting tensile test device for cylindrical specimens
40x80 mm, weight 1 kg.

C101-01 Splitting tensile test device
For cylindrical specimens from Ø 10x20 cm, 4”x8”, 16x32 cm and 6”x12”. The base is equipped with flat springs centring and keeping in position the specimen. Two columns with adjustable height sustain the upper plate by two springs. This item is an alternative solution to model C100 and C101, weight 17 kg.

C103 Splitting tensile test device
EN 12390/6, 1338
To perform tests on concrete cube specimens 100 and 150 mm and on concrete block pavers, dim. 350x250x264 mm, weight 17 kg

C100-01 Packing strips, hard wood made, EN 12391-6
4x10x350 mm to be used for splitting tensile tests with models C100, C101, C101-01, C103. Pack of 100 pieces.

C100-02 Packing strips, hard board made, EN 1338
4x15x350 mm to be used for splitting tensile tests with the device model C103. Pack of 100 pieces.

C107 Auto-centring device
For cubes 100 and 150 mm side and cylinders dia. 100 and 150 mm to be used with compression machine having platen ø 216 mm (1300, 1500 and 2000 kN).

C107-01 Auto-centring device
For cubes up to 200 mm side to be used with compression machine having platen ø 287 mm (3000 kN).

C106 Flexural device for two point and centre point tests
EN12390-5, NF P18-407, ASTM C78
Equipped with two lower rollers, one of them articulated and two upper rollers for third point tests. It is possible to place in the centre only one upper roller for centre point tests. To perform the flexural test, this device has to be used with a concrete compression machine foreseen of low capacity measuring range (mod. C097-01, C097-02). For concrete beams 100x100x400/500 and 150x150x600/750 mm. Dimensions 610x200xh320 mm, weight 27 kg
Concrete Accessories for concrete compression machine
Compressometer, extensometer

C130 N - C132 N Compressometer for static elastic modulus of concrete
ASTM C469
To determine the strain and deformation characteristics of concrete specimens. It comprises two steel rings for clamping to the specimen, two gauge length bars, and spherically-seated lever unit (without dial gauge or strain transducer, to be ordered separately)
C130 N Compressometer for cylinders Ø 150x300, 160x320 mm
C131 N Compressometer for cylinders Ø 100x200, 110x220 mm
C132 N Compressometer for cubes 150x150 mm side

Accessories for C130 N:
C133 Compressometer-Extensometer (see below)
Needed accessory:
S375 Dial gauge, div. 0.001 mm

C130N + S336-11 Digital compressometer for cylinders 16x32 cm
With linear strain transducer S336-11, travel 10 mm, with cable.

C134 Electric universal extensometer/ compressometer
ASTM C469
To be used for cylinder specimens. Extensometer, length adjustable from 50 to 160 mm, feeding up to 10 V, travel +/-1.5 mm, sensitivity less than 0.01 micron, with reducing block for mortar prisms, elastic straps, carrying case, weight 1 kg.

The test us usually performed by using 3 extensometers (see photo).

C134-10 Aluminium scale for adjusting the base

C133 Compressometer-Extensometer
With compressometer-extensometers C130, to measure both axial deformation and diametrical extension of cylinder specimens dia. 150x300 mm, 160x320xmm, 8”x12” under compression stress, by determining the elastic modulus.
Needed accessories:
S336-11 Linear strain transducer (needed 2x)
S335 Datatronic with 7 channels
Concrete Accessories for concrete compression machine
Universal group of compression and flexion machine

C107-12 Capping retainers (set of 2) for cylinders Ø 16 x 32 cm
C107-10 Capping retainers (set of 2) for cylinders Ø 15 x 30 cm

C107-25 Neoprene pads (set of 2) for cylinders Ø 16 cm, 60 shore A
C107-26 Neoprene pads (set of 2) for cylinders Ø 16 cm, 70 shore A, to use for a
load of more than 1000 kN
C107-20 Neoprene pads (set of 2) for cylinders Ø 15 cm, 60 shore A
C107-21 Neoprene pads (set of 2) for cylinders Ø 15 cm, 70 shore A, to use for a
load of more than 1000 kN

C115-01 Two-way hydraulic valve
Installed on the pumping unit mod. C114, to activate alternatively two testing
frames by suing the same pumping unit.

C119 Fragment guards at all four sides with hooks for mod. 1500 kN
C119-03 Fragment guards at all four sides with hooks for mod. 2000 kN
C119-05 Fragment guards at all four sides with hooks for mod. 3000 kN
C121 Fragment guards at all four sides with hooks and lock for
mod. 1500 kN
C121-05 Fragment guards at all four sides with hooks and lock for mod. 2000 kN
C121-07 Fragment guards at all four sides with hooks and lock for mod. 3000 kN

C110 - C112 Distance pieces dia. 140 mm
C111-30 Distance piece, height 20 mm
C111-21 Distance piece, height 50 mm
C111-03 Distance piece, height 100 mm
C111 Distance piece, height 176 mm
C111-02 Distance piece, height 226 mm

Other distance pieces are available on request.
Concrete Calibration
Universal digital tester, load cells

C138 Universal digital tester with microprocessor
EN 12390-4
Three memorized cycle verification program composed by ten measurements each, showing the effective applied load, measured load, average measured load, accuracy in %, repeatability, relative readability, max. error. The testers accuracy is ±0.5%. Big digital display of 320x240 pixel, serial output RS 232, software administration up to ten load cells, cells configuration, load measuring range in N, daN, kN, g, kg etc. execution up to 30 verification test, temperature, programmable full scale test, calculation of all the fundamental parameters required: repeatability and accuracy percentage error, residual error on the 0 point, max relative resolution a class of the device under verification, different languages available, compatible with Matcal and Microsoft Hyper Terminal, weight 5 kg.

C138-01 Software "MATCAL"
For data acquisition and processing of calibration values with certificate printing. Supplied on CD Rom for PC installation.

C154-01 Positioning device for the load cell on the lower platen of the compression frame.

C140 - C140-09 Standard load cells
EN ISO 376 :2002, Class 2
These load cells are suitable for the calibration of compression testing machines. They consist of a high quality steel block, where some strains have been fitted.

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity kN</th>
<th>Dimension Ø x height mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>C140</td>
<td>25</td>
<td>82x59</td>
</tr>
<tr>
<td>C140-01</td>
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<td>C140-02</td>
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</tr>
<tr>
<td>C140-09</td>
<td>5000</td>
<td>180x200</td>
</tr>
</tbody>
</table>

C142 - C142-07 Strain load cells «high performance»

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity kN</th>
<th>Dimension Ø x height mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>C142</td>
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<td>C142-06</td>
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<td>135x200</td>
</tr>
<tr>
<td>C142-07</td>
<td>5000</td>
<td>158x258</td>
</tr>
</tbody>
</table>
Concrete

**Fresh concrete, workability, consistence, flow**

**Slump cones**

**C178 - 182 KIT Slump cone test sets**

EN 12350-2 - BS 1881:102 - ASTM C143 - NF P18-305, P18-451

To evaluate the deformability of fresh concrete through free flow and the time needed to spread a 500 mm dia. Applicable to concrete with aggregates of 25 mm max. size.

**C180-KIT Slump cone, complete set, stainless steel**

Consists of:

- **C180-01** Slump cone, stainless steel
- **C180-02** Tamping rod, galvanized Ø 16x600 mm
- **C180-03** Cone funnel, galvanized
- **C180-06** Graduated slump scale «engraved in 0.5 cm» increments
- **C180-07** Base, galvanized steel, complete
- **V184** Aluminium scoop, 500 cc
- **V178-01** Fine wire brush

weight total: 10 kg

**C182-KIT Slump cone, complete set, galvanized steel**

Consists of:

- **C181** Slump cone, galvanized steel
- **C180-02** Tamping rod, galvanized steel Ø 16x600 mm
- **C180-04** Base plate, galvanized steel
- **C176-01** Stainless steel rule, 300 mm long
- **V184** Aluminium scoop, 500 cc
- **V178-01** Fine wire brush

weight total: 5 kg

**C178-KIT Slump cone, complete set, portable, galvanized**

Consists of:

- **C181** Slump cone, galvanized steel
- **C179-02** „Graduated“ steel tamping rod, galvanized Ø 16x600 mm
- **C179-01** Base, heavy duty galvanized steel with clamps and measuring bridge

weight total: 8 kg

**C179-KIT Slump cone, complete set, portable, stainless steel**

Consists of:

- **C180-01** Slump cone, stainless steel
- **C179-02** „Graduated“ steel tamping rod, galvanized Ø 16x600 mm
- **C179-01** Base, heavy duty galvanized steel with clamps and measuring bridge

weight total: 8 kg

**V185-03 Scoop, stainless steel**

EN 12350-I

Dia. 125 mm, length 250 mm, volume 5 kg of concrete, used to sample fresh concrete
Concrete

**C183 Vébé consistometer**
EN 12350-3
It is based on the same principle of the simple slump cone test method for the determination of the workability of concrete, but it has the advantage of a mechanized action. After removing the slump cone, the concrete undergoes a vibration to determine its slump. Supplied complete. 230 V, 50 Hz, 250 W, dimensions 26x38x70 cm, weight 90 kg.

**C184 Vibrating table**
ASTM C1170-92
Similar to C183 with weight of 50 lbs, 230 V, 50 Hz, 250 W, dimensions 28x40x90 cm, weight 110 kg

**C185 Compacting factor apparatus**
BS 1881:103 - BS 5075
To undertake a more precise and sensitive test procedure than the simple slump test. The apparatus consists of two conical hoppers mounted on a cylinder. Each hopper has a hinged flange with quick release mechanism and all is mounted on a rigid steel stand. With tamping rod Ø 16x600 mm long, 50x40x51 cm, weight 55 kg.

**C186 Kelly ball apparatus**
ASTM C360
Consisting of a hemispherically ended cylinder with guiding frame and a handle graduated in inch and mm, it is used to determine the workability of fresh concrete. The ball is lowered into the concrete and the penetration measured. Cadmium plated for rust protection

**C187 "K-Slump" tester**
ASTM C13
To determine the degree of compaction and the workability of fresh concrete. Used for in-situ measurements or inside test moulds. Test result can be correlated against the slump values, weight 500 g.

**C189 Concrete workability meter (plastometer)**
NF P18-452
The concrete workability meter is designed to test concrete for dynamic workability. It is suitable for field and laboratory tests to check:
- concrete mix for consistency, especially water content
- optimum proportioning of concrete constituents (sand, gravel, water, cement)
- possible improvement when adding a plastifier
- comparing two concrete types.
The unit consists of a prismatic receiver divided into two unequal volumes by a removable partition and an electric vibrator. The fresh concrete is poured into the large volume space, the separating partition is removed and the vibrator starts automatically. The test consists in measuring the time required for the concrete to reach an uniform distribution in the receivers. 230, 50 Hz, 300 W, dim. 820x420x410 mm, weight 80 kg.
Concrete

**C188 Walz consistometer**
EN 12350/4 - DIN 1048 - UNI 9420
To measure the consistency of fresh concrete. It consists of a metal box with handles 200x200 mm, height 400 mm, painted for rust protection, weight 6 kg.

**C181 Free flow and time flow determination «Spray-Test»**
EN 12350-2
Consists of slump cone, galvanized steel and a galvanized steel plate 905 x 905 mm (C170-01) with engraved two circles having dia. 200 and 500 mm.

**C171 Flow time determination «V-funnel test»**
SCC/Ernco-Efnarc/ Rilem report N23
To evaluate the segregation resistance of self-compacting freshly mixed concrete through the flowing speed from a stainless steel 10 litres funnel. Applicable to concrete with aggregates of 25 mm max. size. With plastic box (C127).
Dimensions 64x34x105 mm, weight 40 kg.

**C174 Confined flowability determination «J-Ring apparatus»**
EN 12350-2
To determine the flowability, i.e. the flow time and the capability of the self compacting concrete to pass through obstacles. Consists of J-Ring apparatus, galvanized steel, having rectangular section 30x25 mm and dia. 300 mm, Cylindrical bars of dia. 10x100 mm are fixed into the holes, slump cone galvanized steel and base plate 905 x 905 mm (C170-01).

**C190 Plasticity meter**
Used for quick and easy measurements of the plasticity of mixtures, especially concrete and so to detect rapidly any excess of water. The measuring system is related to the shear strength applied by a three blade head to the mixture under test. It is possible to measure the plasticity at several different points and directly in the mixture, with multiple checking. Obtained values can be easily compared with the values got by the Abrams slump cone test. Dimensions Ø 130x180 mm, weight 2 kg.

**C192 KIT Flow table**
EN 12350-5 - BS 1881:105
The apparatus comprises a galvanized steel conical mould, Ø 130/200xh200 mm, double wooden flow table with galvanized steel top plane, guide device, wooden tamper, used to determine the workability of concrete. The top table has a square surface of 700x700 mm, hinged on one side, weight 30 kg.

**C192-01 Conical mould Ø 130/200x h 200 mm.**
**C192-02 Wooden tamper**
Concrete flow tables
ASTM C124 - UNI 8020/A - UNE 7102
Used to determine the flow of concrete. The apparatus consists of a flow table, stainless steel flow mould, tamping bar.

C208 Flow table hand operated
With crack handle, table Ø 762 mm, weight 100 kg.

C210-02 Flow mould, cast bronze made to UNI 8020-A

C208-01 Motorization kit for flow table C208
Complete with separate control panel and automatic digital drops counter, 230 V, 50 V, 750 W, weight 15 kg.

C211 Joisel apparatus, LCPC-Method
Ø 140x220 mm high. Used to separate the various elements of the fresh concrete such as cement, sand, aggregates. All made from stainless steel, weight 2 kg.

C199 Unit weight measure, 10 litres capacity
EN 12350-6, 1097-3, BS 1881:107, EN 1097/3
Used to determine the weight per cubic meter of freshly mixed and compacted concrete. Made from steel, 4 mm thick, with inside radius between wall and base of 20 mm, with machined rim and base. Inside dia. 200xh320 mm, weight 9 kg.

C200 - C205-01 Unit weight measures
EN 1097-3, BS 812, 1881
Made of heavy steel, they are used to determine the weight per cubic meter of freshly mixed and compacted concrete. It is used also for the determination of loose bulk density and voids of aggregates.

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Ø Interior mm</th>
<th>Weight en kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>C200</td>
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<td>108.3</td>
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<tr>
<td>C201</td>
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<td>345.6</td>
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</tr>
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</table>
Concrete

Air entrapment, setting time by penetration
Air entrapment meters, penetrometers

**C195 Air entrapment meter, 5 litres capacity**
EN12350-7 - BS 1881:106 - ASTM C231 - NF P18.353 - UNE 7141
Made of cast aluminium alloy. It records directly the percentage of air enclosed in freshly mixed concrete by operating according to the air pressure principle. It is supplied with pressure gauge tamper rod and hand pump. Air content range 0-8%, division 0.1%, dimensions Ø 250x700 mm, weight 13 kg.

**C195-01 Calibration cylinder**
To check and calibrate the air meter mod. C195

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**C196 Air entrapment meter, 8 litres capacity**
EN 12350-7, DIN 1048, ASTM C231, type B
It consists of an aluminium vessel with built in hand operated pressure pump connected to the measuring gauge showing directly the air content in percentage. Air content range 0-10% division 0.1% up to 8% and 0.5% over. Dimensions 250x450 mm, weight 12 kg.

**C197 Air entrapment meter, 8 litres capacity**
Identical to model C196 but with built in automatic electric air compressor giving air pressure and keeping it constant along the test, 230 V, 50 Hz, dimensions 250x450 mm, weight 14 kg.

**C197-01 Filling hopper for the air entrapment meters mod. C196 and C197**

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**C198 Air entrapment meter, 7 litres capacity**
Air content range 0-100%, gauge graduations 0.1% up to 6%, 0.2% from 6-10% of the scale. Dimensions dia. 250xh500 mm, weight 10 kg

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**C194 Concrete pocket penetrometer**
ASTM C403
Used for the evaluation of the initial set of the concrete mortar. The penetration plunger has a tip area of 32 mm². It is plunged into the mortar to a depth of 25.4 mm indicated on the plunger. The resistance expressed in KPa and Lbf/sq. inch, is shown on the marked reading scale. Dimensions 25x210 mm, weight 400 g.

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**C213 Concrete penetrometer**
ASTM C403 - AASHTO T197 - UNI 7123, 7927
Used to determine the setting time of the mortar fraction in concrete mixes with slump greater than zero, by testing mortar sieved from mix. The apparatus consist of a spring penetrometer (capacity 100 Kg, precision 1 Kg) and six interchangeable stainless steel needle pointers of 16, 32, 65, 160, 32 and 650 mm² area. A sliding ring indicates the reached load on the handle of the penetrometer, in case. Dimensions 450x160x70 mm, weight 5 kg.

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**C194-01 Concrete pocket dial penetrometer**
To evaluate the initial set of concrete and the effect of the retarders in the setting time. The plunger has dia. ¼" (32.3 sq.mm.), the dial has dual scale : 0-700 p.s.i. and 0-50 kg/sq.cm. with plastic case, weight 300 g
C161 Drum type mixer
Suitable for field mixes of low/medium strength concrete. Drum volume 130 litres, yield 75 litres, with electric motor, 230 V, 50 Hz, 0.3 CV, dimensions 72x132x128 cm, weight 60 kg.

C162 Pan type mixer, capacity 56 litres
EN 12390-2
This multi-flow mixer absorbs fewer airs during mixing, requires shorter mixing time and grants a perfect homogeneity in mixtures having a low water cement ratio. The pan is easily removable by means of a trolley (accessory). The blades are hardened against wear. Mixing pan Ø 640x330 mm deep, with electric motor, 230 V, 50 Hz, weight 250 kg.

C162-01 Trolley
For fast and easy removal of the mixing pan of the multi-flow mixer.

C163 - C165 Turbo forced mixers, pan type with vertical axis
EN 12390-2
Of easy and practical utilisation, wear-resistant steel cylinder, adjustable mixing blades. 230 V, 1 ph, 50 Hz (C165) ; 230 V, 3 ph, 50 Hz (C163, C164, C164-01).

<table>
<thead>
<tr>
<th>Model</th>
<th>C163</th>
<th>C164</th>
<th>C164-01</th>
<th>C165</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td>150 l</td>
<td>200 l</td>
<td>300 l</td>
<td>100 l</td>
</tr>
<tr>
<td>Capacity</td>
<td>70/80 l</td>
<td>130 l</td>
<td>220 l</td>
<td>55 l</td>
</tr>
<tr>
<td>Ø Cylinder</td>
<td>70x43 cm</td>
<td>80x40 cm</td>
<td>110x40 cm</td>
<td>70x30 cm</td>
</tr>
<tr>
<td>Motor</td>
<td>2 kW</td>
<td>5.5 kW</td>
<td>7.5 kW</td>
<td>1 kW</td>
</tr>
<tr>
<td>Dimensions</td>
<td>71x150 cm</td>
<td>110x115 cm</td>
<td>130x135 cm</td>
<td>71x115 cm</td>
</tr>
<tr>
<td>Weight</td>
<td>130 kg</td>
<td>250 kg</td>
<td>420 kg</td>
<td>115 kg</td>
</tr>
</tbody>
</table>

C166 Concrete mixers, pan type, forced speed, 200 l
EN 12390-2
Pan dia. 960 mm, pan volume 350 l, mixing capacity 200 l, gears are from hardened and rectified steel, with electric motor, 400 V, 3 ph, 50 Hz, dimensions 1400x1000x1500 mm, weight 350 kg.

C166-01 Concrete mixer, pan type, forced speed, 110 l
Pan dia. 800 mm, pan volume 200 l, mixing capacity 110 l, gears are from hardened and rectified steel, with electric motor, 400 V, 3 ph, 50 Hz, dimensions 1200x1000x1300 mm, weight 260 kg.

C166-02 Concrete mixer, pan type, forced speed, 60 l
Pan dia. 550 mm, pan volume 100 l, mixing capacity 60 l, with two wells and drawbar, with electric motor, 230 V, 50 Hz, dimensions 900x700x900 mm, weight 140 kg.
C270 - C273 Poker vibrators
EN 12390-2 - BS 1881 :108 - UNI 6137
Suitable for the internal compaction of concrete specimens.

C270 Poker vibrator, heavy duty
Portable, electric, tip dim. 25 mm, by 290 mm long, flexible shaft 2 meters long.
Frequency 12000/min, 230 V, 50 Hz, 2300 W, dim. 200x300x350 mm, weight 10 kg.

C271 Poker vibrator, portable, petrol operated 0.75 HP
Tip dim. 22 mm by 250 mm long, flexible shaft 2 meters long, frequency 12000/min, dimensions 300x300x400 mm, weight 9 kg.

C274 Poker vibrator, portable, 12V DC battery operated
With connector for car lighter, dip dim. 22 mm by 250 mm long, flexible shaft 2 meters long, frequency 12000/min, weight 10 kg.

C290-01 to C292-01 Cylinder capping equipment, Sulphur method
EN 12390-3 - ASTM C617, C31, C192 - AASHTO T23, T126 - NF P18.416
The above mentioned specifications require that the two faces of the concrete core or cylinder specimen must be made perfectly flat and parallel, by using sulphur capping equipment.

C290-01 Cylinder cappers for specimen 15x30 cm
C291-01 Cylinder cappers for specimen 16x32 cm
C292-01 Cylinder cappers for specimen 10x20 cm
C290-02 Cylinder carrier for Ø 15x30 and 16x32 cm
C290-03 KIT Melting pot, capacity 4 litre, 230, 50 Hz, 1500 W
C290-06 Capping compound, bag of 22.5 kg for Concrete standard ASTM C617
C290-07 Capping compound of sulphur and mineral powder mixture with min. strength of 55 Mpa, bag of 20 kg

V186-01 Ladle, stainless steel made
C296 Steel capping plate for concrete block up to 50x30x2 cm. The plate surface is accurately machined, dim. 500x300x20 mm, 30 kg

C300-10 Specimen grinding machine
EN 12390-2
To grind and polish cubic and cylindrical specimens of concrete, rocks, natural stones etc. Grinding wheel Ø 330, vertical span width 90 to 370 mm, mm, protection against abrasive dust, with collecting and water decantation tank 50l, with motor pump. Without locking stirrups and diamond grinding sectors.

C301-10 Automatic grinding machine
Identical to C300-10 but equipped with motorised system for the automatic radial movements in both directions of the grinding head.

C300-02 Diamond grinding sector (needed 8 pieces for the machine)
C300-03 Locking stirrups for specimen Ø 100, 110, 150 and 160 mm, can only be used in conjunction with C300-06
C300-06 Locking stirrups for cube specimens side 100, 150 and 200 mm
Concrete
Preparing the specimens
Hard plastic moulds

C222 - C234-03 Plastic cube and cylinder moulds
These one-piece moulds, made of hard plastic, strong, light, undeformable, resistant to vibration shocks and wear, do not require mounting and dismounting operations, thus saving time and labour. The specimen is expelled from the mould by compressed air or water. They just require a simple clean and demould oiling before being ready for use again for many times. Nominal moulds dimensions meet to EN 12390/1 standard requirements

C222 Cube mould side 150 mm, with "X" reinforced band on the base, upper rounded corners, weight 1250 g
C223 Cube mould side 150 mm, with "X" reinforced band on the base, weight 1300 g
C224 Cube mould side 150 mm, with "X" reinforced band on the base, upper rounded corners, high density, weight 1600 g
C228 Cylinder mould Ø 150x300 mm, weight 2150 g
C229 Cylinder mould Ø 160x320 mm, weight 2200 g
C230 Cube mould 150x150x150 mm, weight 1250 g
C232 Cube mould 100 mm side, two-gangs, weight 1050 g
C230-01 Filling hopper, stainless steel, for easier filling of fresh concrete into moulds C230 and C234
C230-02 Cover, plastic, for mould C230, set of 10 pieces.
C230-03 Grasping pliers for mod. C230, C234 for easier carriage
C230-04 Stopper, plastic, to plug the hole of the mould C230, pack of 10 pieces.
C230-05 Gun to connect to a water or air pressure, to eject the specimen from the mould
C234-02 Cover, plastic for C234, pack of 10 pieces
C234-03 Stopper, plastic, to plug the hole of the mould C234, pack of 10 pieces

C231 - C231-01 Polystyrene cube moulds
This cube mould, polystyrene made, is utilized, only for one test because it must be broken when the specimen is demoulded. It offers different advantages:
- it is provided with a top cover keeping inside heat and humidity constant and acting as a curing room
- it protects the specimen as a packing during transport of the same
- it is extremely light
- any trouble concerning the cleaning, demoulding and maintenance of the mould are eliminated.

C231 Polystyrene cube mould, 150 mm side, one gang, pack of 40 pieces
C231-01 Polystyrene cube mould, 200 mm side, one gang, pack of 20 pieces

C222 – C224 Cube mould, hard plastic with reinforced base and corners
C222 Cube mould 15x15x15 cm, weight 1.250 kg
C224 Cube mould 15x15x15 cm, weight 1.600 kg, best durability
C122-10 Cover for mould C222/C224
C238 Mould 150x150x600 mm, weight 4400 g
Concrete

Preparing the specimens
Steel moulds en steel, accessories for moulds

C247 - C254-05 Steel cube and beam moulds
These moulds are extremely sturdy and the inside surfaces are accurately machined.

- C247: Cube mould 100 mm side, one gang, weight 6 kg
- C247-01: Cube mould 150 mm side, one gang, weight 13 kg
- C247-02: Cube mould 200 mm side, one gang, weight 25 kg
- C247-03: Cube mould 300 mm side, one gang, weight 90 kg
- C248: Cube mould 100 mm side, two gangs, weight 11 kg
- C248-01: Cube mould 150 mm side, two gangs, weight 30 kg
- C248-03: Cube mould 100 mm side, three gangs, weight 17 kg
- C248-04: Cube mould 140 mm side, three gangs, weight 30 kg
- C248-05: Cube mould 150 mm side, three gangs, weight 38 kg
- C249: Cube mould 100 mm side, four gangs, weight 20 kg
- C249-01: Cube mould 150 mm side, four gangs, weight 45 kg
- C254: Beam mould 100x100x400 mm, weight 20 kg
- C254-01: Beam mould 100x100x500 mm, weight 23 kg
- C254-02: Beam mould 150x150x600 mm, weight 44 kg
- C254-03: Beam mould 150x150x750 mm, weight 47 kg
- C254-04: Beam mould 200x200x800 mm, weight 86 kg
- C254-05: Beam mould 140x140x560 mm, weight 38 kg

C230-01 Filling hopper, stainless steel

C258 - C258-06 Steel cylinder mould

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimension Ø x height</th>
<th>Weight en kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>C258</td>
<td>100 x 200 mm</td>
<td>8</td>
</tr>
<tr>
<td>C258-01</td>
<td>112.8 x 220 mm</td>
<td>8</td>
</tr>
<tr>
<td>C258-02</td>
<td>150 x 300 mm</td>
<td>15</td>
</tr>
<tr>
<td>C258-03</td>
<td>6” x 12”</td>
<td>15</td>
</tr>
<tr>
<td>C258-04</td>
<td>159.6 x 320 mm</td>
<td>17</td>
</tr>
<tr>
<td>C258-05</td>
<td>250 x 500 mm</td>
<td>80</td>
</tr>
<tr>
<td>C258-06</td>
<td>150 x 150 mm</td>
<td>10</td>
</tr>
<tr>
<td>C180-02</td>
<td>Tamping rod Ø 16 mm x 610 mm long</td>
<td></td>
</tr>
<tr>
<td>C261</td>
<td>Tamping bar, 25 mm2 x 380 mm long</td>
<td></td>
</tr>
<tr>
<td>C262</td>
<td>Straight edge, 460 mm long</td>
<td></td>
</tr>
<tr>
<td>V178-01</td>
<td>Wire brush, to clean moulds</td>
<td></td>
</tr>
<tr>
<td>C265</td>
<td>Demoulding oil, can of 25 litres</td>
<td></td>
</tr>
</tbody>
</table>

C258-04CO

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimension Ø x height</th>
<th>Weight en kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>C258-04CO</td>
<td>159.6 x 320 mm, fast clamping</td>
<td>18</td>
</tr>
</tbody>
</table>

Beratest AG
Aussertfeldstrasse 9
CH-5036 Oberenthal
Suisse/Switzerland
## Preparing the Specimens

### Moulds, accessories for moulds

**C253 - C253-03 Cast iron cube moulds, one gang**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>C253</td>
<td>Cube mould 100 mm, «four part design», weight 8.3 kg</td>
<td></td>
</tr>
<tr>
<td>C253-01</td>
<td>Cube mould 150 mm, «four part design», weight 15.5 kg</td>
<td></td>
</tr>
<tr>
<td>C253-02</td>
<td>Cube mould 100 mm, «two V shaped design», weight 8.3 kg</td>
<td></td>
</tr>
<tr>
<td>C253-03</td>
<td>Cube mould 150 mm, «two V shaped design», weight 15.5 kg</td>
<td></td>
</tr>
</tbody>
</table>

**Accessories for moulds:**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C180-02</td>
<td>Tamping rod Ø 16 mm x 610 mm long</td>
</tr>
<tr>
<td>C261</td>
<td>Tamping bar, 25 mm² x 380 mm long</td>
</tr>
<tr>
<td>C262</td>
<td>Straight edge, 460 mm long</td>
</tr>
<tr>
<td>V178-01</td>
<td>Wire brush, to clean moulds</td>
</tr>
<tr>
<td>C265</td>
<td>Demoulding oil, can of 25 litres</td>
</tr>
<tr>
<td>V184-01</td>
<td>Scoops round, aluminium, 1000 ml</td>
</tr>
<tr>
<td>V187</td>
<td>Trowel stainless steel 120x260 mm</td>
</tr>
<tr>
<td>V195</td>
<td>Rubber mallet, head, Ø 50 mm</td>
</tr>
<tr>
<td>V182</td>
<td>Mixing tray, galvanized 600x600x80 mm</td>
</tr>
</tbody>
</table>

These instruments are to be used for dimensional and tolerance verification of the mould and the specimens got from the same.

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>V175-02</td>
<td>Vernier caliper, digital, 200x0.01 mm</td>
</tr>
<tr>
<td>C250-10</td>
<td>Rule right angle (square), steel, 150x100 mm, rectangular section</td>
</tr>
<tr>
<td>C250-12</td>
<td>Feeler gauge, set of strips from 0.05 to 0.5 mm, with blade 100 mm long</td>
</tr>
<tr>
<td>C250-14</td>
<td>Rule (straightedge) 300 mm long</td>
</tr>
<tr>
<td>C250-16</td>
<td>Go-not go gauge for 100 mm cube moulds</td>
</tr>
</tbody>
</table>
Concrete Vibrating tables

C278 - C279-03 Vibrating tables
EN 12390-2 - BS 1881:108 - UNI 6127
For compaction of concrete specimens in laboratory, they are manufactured from rugged steel sheet. With motor-vibrator having 3000 vibrations/min. It is possible to vary the vibration intensity by acting on the excentric masses. The height of the table is 410 mm, 230 V, 50 Hz.

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimensions table</th>
<th>Weight/kg</th>
<th>Clamping device</th>
</tr>
</thead>
<tbody>
<tr>
<td>C278</td>
<td>600 x 400 mm</td>
<td>60</td>
<td>C281-01</td>
</tr>
<tr>
<td>C278-01</td>
<td>800 x 400 mm</td>
<td>85</td>
<td>C281-02</td>
</tr>
<tr>
<td>C278-02</td>
<td>800 x 800 mm</td>
<td>115</td>
<td>C281-03</td>
</tr>
<tr>
<td>C279</td>
<td>1100 x 550 mm</td>
<td>145</td>
<td>C281-04</td>
</tr>
</tbody>
</table>

C279-01 Additional motor-vibrator for C279 model to obtain an unidirectional vibration and a vibrating power of 300 kg of mass.

C279-02 Separate control panel, complete with « On/Off » switch and timer.

C281N Vibrating table, portable, 12 V
Table dimensions 400x300 mm, height 200 mm, battery 12 V, with « On/Off » switch, connexion to car lighter, weight 16 kg.

C282 Vibrating table for laboratory use
Table dimensions 400x300 mm, height 200 mm, 230 V, with « On/Off » switch, connexion to car lighter, weight 16 kg.

Accessories:
C279-04 Pedal switch, alternatively to control panel C279-02
C279-02 Separate control panel
C281-05 Clamping device to fix the mould.
Concrete Conservation, curing
Curing tanks

C302 KIT Curing tank, heavy plastic, capacity 650 l
EN 12390-2, ASTM C31, C192, NF P18-404
Made from heavy stable and robust polyethylene, base rack. Inside dimensions 104x104x60.5 cm, weight 60 kg. Without thermostat heating system.

C302-10 KIT Curing tank, heavy plastic, capacity 550 l
Identical to C302 KIT, with water discharge cock incorporated into the tank. Inside dimensions 1100x710x690 mm, without thermostat heating system, weight 55 kg.

C304 Curing tank, capacity 1000 l
Made of zinc coated steel sheet to prevent it from corrosion, complete with base rack and stopper for an easy water discharge. Without thermostat heating system. Inside dimensions 150x75x75 cm. The tank can accommodate up to 64 cubes 150 mm side or up to 48 cubes 200 mm side. weight 120 kg.

C302-01 Thermostat analogic heating system for C302
C304-01 Thermostat analogic heating system for C302-10 and C304

C304-02 Thermostat digital heating system for C302, C302-10, C304, ensuring better temperature accuracy

C306-03 Separate control panel, complete with switch and electric protections to get the tanks to CE safety Directives

C306-05 Thermostat analogic, with heating element, used to thermostatise any type of tank form 300 to 1000 litres, 230 V, 50 Hz, 2000 W.

C307 Accelerated concrete curing tank
ASTM C684 - BS 1881
This tank has been designed for accelerated concrete strength curing. It comprises a fully insulated double wall tank with cover, inside all of stainless steel, outside from steel painted sheet with an intermediate layer of insulating mineral wool. This tank can hold up to 16 cubes 150 mm side specimens or 16 cylindrical Ø 150 mm specimens or 8 cubes 200 mm side specimens. The test consists essentially in curing the concrete specimens with water heated by 3 electric elements of 1500 W each, temperature range from ambient to 100°C. The separate control panel is provided with a thermostator, timer, pilot lights, main switch. Inside dimensions 91x66x68 cm. Overall dimensions 97x72x90 cm, 230 V, 50 Hz, 4500 W, weight 130 kg.

C308 Accelerated concrete curing tank with automatic curing cycles
Identical to C307 but with digital control panel, fully automatic system
Concrete Climatisation, freeze and thaw tests
Climatic chambers

C314 Climatic chamber, 520 l
EN 196-1, 1367-1
Designed for all the research and control laboratories where known cold and/or hot temperatures with controlled humidity values are required for any type for freeze/thaw tests, accelerated curing tests, hot and cold tests in general. Used also to check the behaviour of aggregates during freeze and thaw tests. Temperature range -20°C +60°C accuracy ±0.5°C, humidity range 10-90%, accuracy ±0.5°C, dew point limit +2°C. Inside and outside frame totally in stainless steel. Digital display of actual and preset temperature, internal ventilation, forced circulation, inside dimensions 62x63x139 cm, overall dimensions 73x86x209 cm, with 3 adjustable shelves, RS 485 interface, 230 V, 50 Hz, 1000 W, 150 kg.

C315 Climatic chamber, 1200 l
Same as model C314 but having capacity 1200 l. Double entrance door, inside dimensions 124x73x139 cm, overall dimensions 1460 x 860 x 2090 mm, with 4 adjustable shelves, weight 230 kg.

C315-02 Microprocessor temperature programmer for the automatic execution of the set cycles

C316 Climatic chamber, 520 l
Identical to model C314, but without humidity setting and control

C316-01 Climatic chamber, 1200 l
Identical to model C315, but without humidity setting and control
Concrete
Cutting machines

**C348 Specimen cutting machine**
With sliding support. The machine accepts blades up to ∅ 350 mm, useful cutting height 110 mm. The blade can be oriented for cuts at 45°, dimensions of the sliding table 500x450 m, blade rotation speed 2800 rpm, without blade, 230 V, 50 Hz, 3 Hp, dimensions 700x1100x680 m, weight 80 kg.

**Ref. 294: C348**

**C350 Specimen cutting machine**
Used to cut concrete specimens and any type of construction material like blocks, tiles, pipes, rock cores etc. The machine is equipped with an electro-pump for water cooling, pedal guide for vertical cutting, safety device against breakage of blade. The machine accept blades up to ∅ 450 mm, without blade, 400 V, 3 ph, 50 Hz, 3 Hp, dimensions 1220x700x1360 mm, weight 125 kg.

**C349 Specimen cutting machine**
Identical to mod. C350, but it can accept blade having max. ∅ 500 mm, 400 V, 3 pH, 50 Hz, 4 Hp.

**C350-01 Specimen cutting machine**
Identical to mod. C350, but with power supply of 230 V, 1 ph, 50 Hz, 3 Hp

**Ref. 295: C350**

**C351 Specimen cutting machine, bench type**
The machine accepts blades up to ∅ 350 mm. Shear capacity 120 mm, blade rotation speed 3900 rpm, complete with abrasive blade dia. 350 mm, 230 V, 1 ph, 50 Hz, 2000 W, dimensions 560x460x390 mm, weight 20 kg.

**C350-10 Abrasive blade** ∅ 350 mm
**C350-11 Abrasive blade** ∅ 400 mm
**C350-12 Diamond blade** ∅ 450 mm
**C350-13 Diamond blade** ∅ 350 mm
**C350-15 Diamond blade** ∅ 500 mm
**C352 Device** for cylinders and cores

**Ref. 296: C351**

**C353 Device for irregular shapes**
To clamp and to cut irregular shaped specimens, like rocks, stones etc. The device is fixed to the table of the cutting machine model C348, C350, C350-01, C349, weight 5 kg.

**Ref. 297: C353**
C318 - C318-01 Core drilling machines «Lightweight, portable»
These drilling machines are extremely practical, lightweight easy to use. The base is from aluminium alloy, the steel column can be tilted up to 60-75°, the motor support is fixed on rollers and ball bearings. The motor incorporates a water swivel to cool the diamond bit. The machine is supplied complete except diamond bit, expander coupling and spanner which have to be ordered separately.

C318 Core drilling machine, electric motor
With 3 speeds 670, 1140, 1580 rpm, with speed reducer, provided with friction device. The machine accepts bits Ø50 to 150 mm, 230V, 50 Hz, 2200 W, dimensions 450x290x860 mm, weight 35 kg.

C318-01 Core drilling machine, petrol driven
Petrol engine power 2500 W, speed 390 to 920 rpm. The machine accepts bits Ø50 to 200 mm, dimensions 450x290x1060 mm, weight 40 kg

C318-10 Water collecting ring for C318

C318-05 Trolley
Accessory for C318 and C318-01, to improve the machine stability during pavement coring, dimensions 800x700 mm, weight 25 kg

C319 Pavement core drilling machine
Is used for pavement core sampling where it is not easy to get electrical power. With vertical rectified screw feed. Drilling excursion 550 mm, Cores up to 200 mm dia. Petrol engine 5 HP, 4-stroke Briggs & Stratton model, dimensions 850x580x1230 mm, weight 135 kg.

C319-02 Pavement core drilling machine
Identical to C319 but with motor of 12.5 HP, weight 150 kg

C324 Electric core drilling machine with vacuum facility
With 3 speeds 670, 1140, 1580 rpm, with speed reducer, provided with friction device. The machine accepts bits Ø50 to 150 mm, with lubricated vacuum pump of 4m³/h, pressure accumulation reservoir, coring angle 0 to 360°, 230V, 50 Hz, 2200 W. Dimensions 870x290x1100 mm, weight 38 kg + pump 15 kg.
Concrete Drilling
Drilling machines

C321 KIT Universal core drilling machine, petrol driven
Coring angle 0 to 360°, petrol engine, 3.3 Hp, two speeds 300 and 600 rpm with speed reducer, with friction device. The group is rectified to assure a very soft and accurate drilling movement, excursion is 550 mm, height of vertical column is 1000 mm, prebuilt for extension column connection, 230 V, 50 Hz, 2200 W, dimension 750x440x1300 mm, weight 90 kg.

C322 KIT Universal electric core drilling machine
Coring angle 0 to 360°C, electric motor, 3 speeds 670, 1140, 1580 rpm with speed reducer. The group is rectified to assure a very soft and accurate drilling movement, excursion is 550 mm, height of vertical column is 1000 mm, prebuilt for extension column connection, 230 V, 50 Hz, 2200 W, dimension 440x750x1300 mm, weight 85 kg.

C322-01 Extension column, 1000 mm long for C321 KIT and C322 KIT, with clamping devices, cadmium plated for rust protection

C332 Portable electric generator 4000 W, 230 V, 50 Hz; weight 60 kg

C341-05 - C340-09 Diamond bits and accessories
Diamond core drill bits are designed for making holes and to get cores from hard materials like concrete, reinforced concrete, rock, stones, bituminous. The diamond utilized for these bits is quality impregnated sinterized type. The diamond sector is 8 mm high. All bits are 500 mm long. The coupling between the bit and the drilling machine requires a suitable expander coupling. Two basic models are available:
- to core concrete, rock, stones, hard materials
- to core bituminous materials.

<table>
<thead>
<tr>
<th>Bits to core bitumen</th>
<th>Bits to core concrete</th>
<th>Outside Ø mm</th>
<th>Inside Ø mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>C340-05</td>
<td>C341-05</td>
<td>57</td>
<td>50</td>
</tr>
<tr>
<td>C340-06</td>
<td>C341-06</td>
<td>83</td>
<td>75</td>
</tr>
<tr>
<td>C340-07</td>
<td>C341-07</td>
<td>108</td>
<td>100</td>
</tr>
<tr>
<td>C340-08</td>
<td>C341-08</td>
<td>160</td>
<td>152</td>
</tr>
<tr>
<td>C340-09</td>
<td>C341-09</td>
<td>210</td>
<td>200</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expander coupling</th>
<th>Core extractor</th>
<th>Inside Ø mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>C343</td>
<td>C346</td>
<td>50</td>
</tr>
<tr>
<td>C343-01</td>
<td>C346-01</td>
<td>75</td>
</tr>
<tr>
<td>C343-02</td>
<td>C346-02</td>
<td>100</td>
</tr>
<tr>
<td>C343-03</td>
<td>C346-03</td>
<td>152</td>
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<td>C343-04</td>
<td>C346-04</td>
<td>200</td>
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</table>

C344 Strap wrench useful for unblocking the bits
C345 Extension rod 300 mm long
Concrete Extension, strain, shrinkage

C 360 KIT - C362-02 Mechanical strain gauges
ASTM C426 - BS 1881 : 206
Used to determine the strain in concrete specimens and structures, rock strata etc. in remote areas and under adverse conditions using a single instrument. Different models are available with analogic or digital gauge, 100, 200, 300 mm measuring length. The instrument can also be used for other structures like steel and wood.

Analogic gauges, 0.001 mm graduation

- **C360 KIT** Strain gauge, 100 mm measuring length, complete
- **C360-01** Strain gauge, 200 mm measuring length, complete
- **C361 KIT** Strain gauge, 300 mm measuring length, complete

C363 - C363-02 Digital gauges
battery fed, with reading values in mm, sensitivity 0.001 mm and in inch, sensitivity 0.0001", with battery and RS 232

- **C363 KIT** Strain gauge, 300 mm measuring length, complete
- **C363-01 KIT** Strain gauge, 100 mm measuring length, complete
- **C363-02 KIT** Strain gauge, 200 mm measuring length, complete

S382-11 Cable to connect the digital strain gauge to PC
S382-12 Software

C365 Hydraulic shrinkage determination
UNI 6555 - ASTM C426
This test covers the determination of the hydraulic axial shrinkage of concrete specimens having l00x100x500 mm (or l00x100x400) mm, with aggregates up to \( \phi \) 30 mm. The specimen is prepared with a special mould and after housed in the measuring apparatus that determines the axial shrinkage. The equipment consists of:

- **C365** Shrinkage mould 100x100x500 mm
- **C364** Measuring apparatus for specimens 100x100x500 mm, with reference bar
- **S375** Dial gauge, 5 mm stroke, 0.001 mm sensitivity
- **S376** Dial gauge, 10 mm stroke, 0.01 mm sensitivity

- **S382-01** Digital dial indicators, precision 0.001 mm
- **C366-11** Stainless steel inserts, pack of 10 units
Concrete

Humidity, vaporisation

C214 Cementometer
For the rapid determination of moisture content in wet cement and concrete. Fast and easy to use, accurate and instantaneous readings, digital portable meter, ratio range: 0.35 to 0.70 water/cement. Memory of over 150 readings, RS 232, 4 batteries, weight 2 kg.

C374 Moisture meter “Surveymaster”
To measure the damp conditions in concrete structures, masonry, gypsum, both on surface and at depth with non-destructive method. Measuring range 6 - 100% with +/- 0.1% accuracy, digital reading of values, audible alarm, battery operated, dimensions 170x54x42 mm, weight 200 g.

C374-06 Aquameter, universal moisture meter
To measure the quantity of water in various solid materials such as: concrete, masonry, gypsum, brick, woods, mortars etc. Non destructive method, resolution: +/- 0.1%, accuracy: +/- 0.2% at constant temperature, sensing field volume approx. 90 cm3, battery operated, dimensions 110x70x50 mm, weight 250 g.

C312-02 Curing room vaporiser up to 500 m3
Used to humidify curing rooms for concrete and mortar specimens, complete with level regulator with antioverflow, direct connection to the water net, for a continuous use of the vaporiser, 230 V, dimensions 420x350 mm, weight 8 kg.

C312-10 Humidistat, automatic control of the room humidity, range 30-100%
**Concrete Pull-off**

C416-01P - C416-02P Pull off testers
These dynamometer measures the adhesive strengths of two layers of materials: concrete facing plasters, mortars, building plasters, lime, etc. and is particularly suitable for applications concerning testing repairs of any structure where the bond strength between two layers is an essential factor.

C416-01P Pull off tester DYNA Z6
With digital manometer, force up to 6 kN.

C416-02P Pull off tester DYNA Z16
With digital manometer, force up to 6 kN.

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E142 Digital pull-off strength tester, capacity 16 kN
EN 1542, EN 1348, EN1015-12, EN 13687-2, NF P18-858
Dimensions 410x210x270 mm, weight 3.5 kg

E142-01 Pull-off digital tester capacity 0-5 kN
Identical to E142 but for low strength values

Accessories:
- E143 Adhesion test aluminium disc, Ø 20 mm x 20 mm thickness
- E143-01 Adhesion test aluminium disc, Ø 50 mm x 20 mm thickness
- E143-10 Adhesion test stainless steel disc, Ø 50 mm x 20 mm thickness
- E143-11 Cylindrical ring, having truncated cone shape, inside dia. 50 mm, EN 1015-2
- E143-02 Drill bit with centring bit, Ø 20 mm
- E143-03 Drill bit with centring bit, Ø 50 mm
- E143-12 Acrylic adhesive glue, 300 ml, cartridge, complete with small pump and nozzles

Ref. 314: E142, E143

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C376 Pull-out test apparatus
ASTM C900 - BS 1881 part 207 - EN 1542, 12504-3
Used to evaluate the concrete resistance as per the strength applied to extract an insert embedded in concrete. Standard equipment comprises hydraulic extraction unit 50 kN with pump, manometer, bearing ring, 10 steel inserts Ø 30 mm, carrying case, weight 18 kg.

C376-01 Pull-out inserts, Ø 30 mm, pack of 25 pieces

Ref. 315: C376

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V176-10 Electronic measuring instrument for thin layer

Ref. 316: V176-10
Concrete Non-destructive tests
Test hammers, anvil

C380 - C390 Rebound concrete test hammers
Designed for non-destructive tests on concrete structures. It gives an immediate indication of the compressive strength of the concrete using the calibration curve supplied with.

C380 Concrete test hammer
Spring impact energy 0.225 mkg (2.207 joule), suitable for finished concrete structures and buildings having strength resistance from 10 to 70 N/mm². The hammer has aluminium frame and a very accurate manufacture processing and selected components which ensure high precision test results, complete with calibration curve chart in N/mm² values, abrasive stone, carrying case, dimensions 330x100x100 mm, weight 2 kg.

C382-01P Original "Schmidt" test hammer, Model N
For normal concrete casting, impact energy 2.207 joule

C384P Original "Schmidt" test hammer, Model L
Impact energy 0.735 joule

C383P Original "Schmidt" test hammer, Model NR
For normal concrete casting, impact energy 2.207 joule, having an automatic incorporated device recording on diagram the impact values


C386N Digital concrete test hammer
Impact energy 2.207 Nm, measuring range 10 to 120 N/mm², memory up to 15'000 tests, RS 232, automatic conversion of rebound index to equivalent compression strength in psi, N/mm², kg/cm², with carrying cage, dimensions 330x180x120 mm, weight 3 kg

C382P SilverSchmidt ST/N digital concrete test hammer
For normal concrete, energy 2.207 joule, measuring range 10-70 N/mm² (1'450 -14'500 psi)

C382-02P SilverSchmidt PC/N concrete test hammer digital
For normal concrete, energy 2.207 joule, measuring range 10-70 N/mm² (1'450 -14'500 psi) with software for transfer to PC

C390 Anvil
EN 12504:2
For the verification of the calibration of the concrete test hammers, dimensions Ø 150x230 mm, weight 16 kg.
C372-05P Ultrasonic pulse velocity test apparatus Pundit Lab/Tico 2  
EN12504-4, ASTM C597-02  
For non destructive testing of concrete, 2 transducers of 54 kHz, range 0.1-9999 µs, bandwidth 20-500 kHz, basic measurements of pulse velocity or path length, remote control of all Pundit Lab features, on-line data acquisition, waveform analysis, manual triggering and data upload, waveform visualization and analysis, interactive adjustment of trigger point, memory, non volatile, more than 500 measured values, with software, electric power rating, 230 V/battery or USB, calibration rod 25 µs, coupling, with carrying case.

C386N + C372N Ultrasonic pulse velocity tester combined with test hammer  
Test hammer: Impact energy 2.207 Nm, measuring range 10 to 120 N/mm², memory up to 15'000 tests, RS 232, automatic conversion of rebound index to equivalent compression strength in psi, N/mm², kg/cm², with carrying cage, dimensions 330x180x120 mm, weight 3 kg  
Ultrasonic pulse velocity tester: Digital display 320x240 mm, infinite filling capacity of the test dates and the graph tracing of the tests on SD card, RS 232. With 2 probes 55 kHz, calibration cylinder, battery, charger, in carrying case, dimensions 400x300x180 mm, weight 3 kg.

C370-08 Exponential couple of transmitting and receiving probes, 55 kHz  
C370-09 Cable of 10 m to connect the transducers
Concrete Non-destructive tests
Rebar locator, Profometer, Profoscope

C396P - C397P Rebar detector
BS 1881:204 - DIN 1045
For locating rebars, measuring concrete cover, storing of single cover values and statistical evaluation, determination of rebar diameters.

Rebar locator, type Profometer
The lightest instrument in its class. Displays reinforcing bars and concrete covers on a LCD monitor with an X/Y meter scale, even with close rebar interspacing. An user-guiding menu technique and just 9 keys for all function ensure the simplest possible operation. The easily readable display shows up to 240 concrete covers in grey shades. Measures bar Ø to an accuracy of ±1 mm. Two models are available:

C396P Rebar locator 5+, Model S
For high performance. Displays reinforcing bars and concrete covers on a LCD monitor with an X/Y meter scale, even with close rebar interspacing. Display unit with non-volatile memory of 1 Mbit capacity for 100’000 test, dividable of 72 objects, RS 232, software for printing statistical values and downloading to PC, with probe for locating rebars, carrying case, dimensions 320x285x105 m, weight 2 kg.

C397P Rebar locator 5+, Model Scanlog
Identical to model 5+, but with more elaborated performances, with "CyberScan" function for displaying the reinforcement in grey, direct impression without PC, with "Measurement with grid" function for grey-scale display of concrete cover. Probe carriage ScanCar with path measuring device and transfer cable. In carrying case, with disc 3.5" with macro to transfer the data to Excel.
C400-01P Diameter probe with integrated electronics
C400-02P Dept probe for concrete covers up to 300 mm

C398P Rebar locator Profoscope
To localize and visualize the rebars and to measure the covering, digital LCD display, integrated probe, measures to a depth of 180 mm, with battery 2x1.5 V, in carrying cage.
Concrete

**Corrosion analysis and resistivity**

**Canin**

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**C420P Corrosion analyzing instrument with rod electronic Canin Plus**

UNI 9535 - ASTM C876 - BS 1881 :201

For the non destructive detection of non destructive of corrosion in concrete. Big graphic display, simple 9 figure keyboard and simple operation. Memory 120'000 data’s. With rod electrode, interface RS232, software, cables, copper sulphate CuSO₄, citric acid. Dimensions 300x100x50 mm, weight 5 kg.

C420-01P with rod and wheel electrode
C420-02P with Wenner probe
C420-03P with rod, wheel electrodes and Wenner probe

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**Accessories:**

C420-10P 1-wheel electrode
C420-11P 4-wheel electrode
C420-13P Rod electrode copper/copper sulphate Cu/CuSO₄, width 150 mm

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C420-14P System with 4 wheels for horizontal surfaces, width 150 mm
Concrete

Deflexion, crack detection

Deflectometers, crack width gauges

C405N - C407-02 Deflectometer

Used to determine the deflection on bridges, ceilings or any suspended structure, possibility to use the deflectometer with pressure or with traction. Direct reading on the dial gauge. Available in one or three sets, to be completed with dial gauges stroke from 10 to 50 mm. One set is composed of swing-arm with clamp for complete orientation in any position, inextensible wire coil 20 metres long, plumb weight, carrying case. Supplied without dial gauge.

C405N  No. 1 set of deflectometer (without dial gauge)
C406N  No. 3 sets of deflectometers (without dial gauges)

Accessories:

S376  Dial gauge, 10 mm stroke, sensitivity 0.01 mm
S377  Dial gauge, 25 mm stroke, sensitivity 0.01 mm
S378  Dial gauge, 30 mm stroke, sensitivity 0.01 mm
S379  Dial gauge, 50 mm stroke, sensitivity 0.01 mm

C407-02  Inextensible wire coil, 20 m

C408 - C408-03 Crack width gauges

For monitoring, measuring and recording the crack width of a building structure, internal or external use, in vandal resistant polycarbonate, with crack record card each gauge to simplify monitoring, they are suitable for vertical and horizontal movement measurements

C408  Crack width gauge for walls
To monitor vertical and horizontal movements, also simultaneous, on a plane surface, pack of 5 pieces.

C408-01  Crack width gauge for corners
To monitor corner cracks with two directional and simultaneous movements, pack of 5 pieces

C408-02  Crack width gauge for floors
To monitor floor settlements to a wall, column etc., pack of 5 pieces

C408-03  Crack width gauge for difference in levels
To monitor the loss of levelness of any cracked surface, pack of 5 pieces.

C399 Crack detection microscope

BS 1881:206

To measure crack width in concrete structures, by operating via an adjustable light source, high definition unit provided by power batteries, carrying case. The eyepiece scale can be turned through 360° C to align with the direction of the crack under detection. Measuring range 4 mm, division 0.02 mm, magnification 35x, weight 600 g

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Concrete
Permeability
Permeameter Torrent and Karsten

C436 Permeameter Torrent
Allows the evaluation of the durability of concrete structures especially of high compressive strength concrete.
During the measuring procedure, the measuring instrument and the upper concrete layer are placed in a vacuum under a vacuum cell. The pressure increase inside of the chamber cell given by the permeability of the concrete is measured. An important characteristic is the outer chamber of the cell. It protects from lateral air streams, which gives an important measuring accuracy. Basic equipment consists of non-volatile memory for 200 measured objects, display 128x128 LCD, interface 232C, integrated software for printing out, batteries 9V, control unit with membrane pressure regulator and pressure sensor, vacuum connection: small flange 16 KF, carrying case, dimensions 33x30x11 cm, weight 2.1 kg

V204 Vacuum pump, portable
Volume sucked 5 m³/h, max. vacuum 730 mm/Hg (40 mbar), 230 V, 50 Hz, dimensions 220x260x190 mm, weight 12 kg.

C420-12P Wenner probe
With cable of 1.5 m, to determine the electric resistance of concrete.

C437 - C437-01P Porositester according Karsten system
For measuring the water ingress on façade surfaces
C437 Vertical porosity tester
With plate with vacuum pump for connection 12 V DC, 3 test tubes for vertical surfaces, 2 seals for vacuum plate (reserve), 6 seals for test tubes (reserve), weight 0.850 kg
C437-01P Horizontal porosity tester
With plate with vacuum pump for connection 12 V DC, 3 test tubes for horizontal surfaces, 2 seals for vacuum plate (reserve) 6 seals for test tubes (reserve), weight 0.850 kg
Concrete Permeability
Concrete water permeability apparatus

C430 Automatic concrete water permeability apparatus at four cells
This fully automatic apparatus is designed to carry out water permeability tests on cubic concrete specimens max. 150 mm side and cylinder specimens max. Ø 160 mm. The specimens are submitted to hydrostatic stress for a pre-set period. The water filtering through the test specimen is directly collected and measured into a graduated cylinder. It is therefore possible to determine the permeability coefficient in cm/sec (Darcy coefficient) by the following formula:

\[ K = \frac{cc \times h}{A \times t \times P} \]

where
- cc = permeated water in cm3
- h = height of the specimen (cm)
- A = surface area of the specimen (cm2)
- t = time to permeate (sec.)
- P = hydrostatic pressure in cm of water column

The equipment consists of a strong metallic frame holding four cells which are hot galvanized for anticorrosion protection. Each cell includes a pressure control manometer. A rechargeable compensation plenum chamber is included as part of the test. The pressure is adjustable from 0 to 30 bar and it is supplied by an automatic pump of variable supply to achieve the most suitable installation for the specimen under test. Water feed is direct from water inlet. Seal pressure obtained through special and practical seal devices which maintain and simplify the use of the machine. It is possible to use one or more cells together and specimens also of different size (cube/cylinders). The specimen’s sealing system is achieved with a practical and speedy, user-friendly device. Supplied complete with four cells, four graduated cylinders, epoxy resin and accessories. The sealing devices are not included in the standard package and must be ordered separately.

230 V, 50 Hz, dimensions 2500x500x1300 mm, weight 240 kg.

Needed accessories for C430:
C432-01 - C433 Sealing devices
Complete with rubber latex packing which is between the two hot-galvanized steel collars, complete with bolts.

C432-01 Sealing device for cubes 10x10 cm
C432-02 Sealing device for cubes 15x15 cm
C432-04 Sealing device for cylinders Ø 10 cm
C432-05 Sealing device for cylinders Ø 15 cm
C432-06 Sealing device for cylinders Ø 16 cm
C433 Epoxy resin, to isolate the lateral surfaces of the concrete specimen. Can of 5 kg.

C435 Concrete water impermeability apparatus, three places
EN 12390-8
Apparatus to determine the depth of penetration of the water into the concrete (impermeability) under known time and pressure. For up to 3 concrete cubic, cylindrical or prismatic specimens having max. dimensions of 20x20x20 cm. Dimensions 140x75x170 cm, weight 280 kg.

C435-01 Concrete water impermeability apparatus, six places
Identical to C435 with 6 cells, dimensions 140x75x185 cm, weight 430 kg.

V206 Air compressor, capacity 70 l, 230 V, 50 Hz
E138-11 Tubing and accessories for connect the impermeability apparatus to the air compressor
Concrete

Chemical tests
Water test set, chloride field test system

C220 Water test set for concrete mixing water
EN 1008, 206, DIN 4030
This kit, utilized to test the water mixing concrete, is composed of different dropping bottles, water-proof colour scales, test strips. It is suitable, to carry out more than 50 analysis of e.g. total or momentaneous pH, magnesium, ammonium, chloride, odour, sulphate, lime dissolving CO2, carbonate hardness, total hardness etc, in case, weight 2 kg.

C375-01 Chloride field test system
ASTM C114
To determine the chloride ion concentration in concrete, the concentration of acid soluble chlorides is measured. Range 0.002 to 2% chloride by weight, digital display, automatic compensation. The test system includes electric meter, high impedance with temperature compensation and microprocessor for direct conversion to percentage of chloride, battery powered, chloride combination electrode with temperature sensor, 12 jars each with 20 ml of extraction liquid, 5 jars of coloured calibration liquid, scale for 3 g samples weighing, accessories, carrying case, weight 5 kg.
The raw materials like limestone, chalk, shale, clay etc. mixed with water are crushed, ground and blended. They are now submitted to a chemical process in a rotary kiln until they combine into clinker. From the clinker appropriately mixed with gypsum, the cement factories obtain the modern Portland cement that may be modified in more and more sophisticated binders like expensive mortars, premixed cements etc.

In this section we propose a complete range of equipment for fineness, consistency, setting time, workability, soundness, flow, fly ash, mixing, moulding, curing, strength and chemical tests to satisfy all the above quality variables in compliance with the most know international standards like EN, ASTM, AASHTO, NF, UNE, BS etc.
Compression and flexural testing machines

For cement and mortar specimens, bricks, rocks, refractories etc.

EN 196-1, BS 3892, ASTM C109, NF P18-411

These testing machines foresee a dual measuring range in the same testing chamber. The two ranges can be used alternatively. For flexural tests on cement prism 40.1x40x160 mm, compression tests on portions of prism 40.1x40x160 mm broken in flexure, cubes side 40,50,70,100 mm, 2", cores of max. height of 180 mm. Max. vertical daylight between platens 185 mm, ram travel 45 mm, platens dia. 153 mm, 230 V, 50 Hz, 750 W, (motorized models), weight 310-340 kg.

E155 Motorized testing machine, 300 kN with one gauge, dia. 200 mm, range 0-300 kN, subdiv. 2.5 kN
E156 Motorized testing machine, 300 kN, with two gauges Range 0-300 kN, subdivision 2.5 kN and 0-50 kN, subdivision 0.5 kN
E159 Motorized testing machine, 500 kN With digital load measuring system Cyberplus C109N
E159-01 Motorized testing machine, 250 kN Identical to E159 but with max. load of 250 kN.
E160 Motorized testing machine, 0-500 kN and 0-15 kN With digital load measuring system Cyberplus C109N, for compression tests of 40x40x160 mm specimens (utilizing 0-500 kN) and flexion test (utilizing 0-15 kN).
E160-01 Motorized testing machine, 0-250 kN and 0-15 kN Identical to E160 but with max. load of 250 kN.

E161 Motorized testing machine, 0-250 kN Digital load measuring system Servoplus C104N, for completely automatic tests during all stages of the test, above all the control of the load and the speed. Printing of the results and certificate.
E161-02 Motorized testing machine, 500 kN Identical to E161 but with capacity of 500 kN
E161-01 Motorized testing machine, 0-250 kN and 0-15 kN Identical to E161 but with capacity of 250 kN and 15 kN
E161-03 Motorized testing machine, 0-500 kN and 0-15 kN Identical to E161 but with capacity of 500 kN and 15 kN

E181 Compression and flexural testing machine « High performance»
0-250 kN and 0-15 kN
EN 196-1, NF P18-411, P15-451, BS 3892, 4550, 4551 Dual loading chamber compression and flexure, max. capacity load in compression 250 kN, max. capacity load in flexure 15 kN. Ram travel 50 mm. Dual loading chamber, ranges 250 kN and 15 kN by utilizing the digital measuring system Cyberplus C109N. Load is measured by two electric strain cells. Accuracy and repeatability ±0.5%. Max. vertical daylight 189 mm, platens dia. 165 mm, 230 V, 50 Hz, 750 W, dimensions 1300x400x1500 mm, weight 800 kg.
E183 Compression and flexural testing machine « High performance»
0-250 kN and 0-15 kN
Identical to E181 but with digital load measuring system Servoplus C104N for the remote control by PC, data acquisition, display, processing pace rate adjustment, printing, saving, certificates on PC.

Compression and flexure devices
E170, E170-01, E171, E171-01, E172-01 and E172-02 have to be ordered separately, see page 96.
C127 Graphic printer for digital system Cyberplus C109N
E163 Software UTM2, licence for compression tests,
to utilize with PC for E181
E164 Software UTM2, licence for flexural tests,
to utilize with PC for E181
C123 Software UTM2 SERVONAND, licence for compression and
flexural tests,
to utilize with PC for E183

H009-01 PC with LCD 17" monitor, keyboard, mouse, cables

Ref. 348: C127

General features of the UTM2 software:

1. Automatic identification of the appliance connected.
2. Easy setting of the sequence of operations concerning the test to be made
settable by the operator. The realization of a personalized testing profile
saveable and reusable allowing to operate following his own need setting
data and cycle test, the analogical measuring channels and the speed charts.
3. Memorization of the test in the adatabase with the possibility to process it
again.
4. Remote and interactive control of the machine.
5. Visualization of the instant loads, instant definition of the
load/deformation/stroke graph, remote control of the main functions of the
machine. It can also visualize the emergencies, the alarms and the eventual
errors, it calculates and saves all the parameters of the test made with the
possibility to process again, and to manage the test files.
6. The data test can be commented by means of test titles to be reported on the
certificate or on the graph desired.
7. The user can select the calculation algorithms and using them the Software
will process all the results required by the Standards
8. The colours and the graph scales of the activated windows can be freely
selected by the user as well as zooming on the main interested graphic
points.
9. The test certificate can be personalized with the following variables: name of
the company, kind of test, date, kind of grap and number of pages
10. Possibility to have a remote control of the machine calibration and the related
automatic calibration.

C128 Graphic printer, format A4

Ref. 349: C128
**E170 Compression device for portions of prism 40.1x40x160 mm**
EN 196, EN/ISO 679, ASTM C349, NF P 15.451
Hardness 60 HRC. The upper platen is seat ball assembled. The centring plug is distant 10 mm form the compression platen. Cadmium plated for rust protection.
Dimensions 153x153x185 mm, weight 12 kg

**E170-01 Compression device for portions of prism 40.1x40x160 mm**
DIN 1164
Identical to E170 but with compression platens having 40x62.5 mm, dimensions 153x153x185 mm, weight 9 kg

**E171 Compression device for cubes of 50 mm and 2” side**
ASTM C109
Platens dia. 75 mm, upper platen is seat ball assembled, dimensions 153x153x185 mm, weight 12 kg

**E171-01 Compression device for cubes of 70.7 mm side**
BS 4550
Dimensions 150x130x185 mm, weight 9 kg

**E172-01 Flexure device for 40.1x40x160 mm**
EN 196-1, NF P15.451 - DIN 1164
Upper bearer is seat ball assembled. The distance between lower bearers is 100 mm and one of them has a spherical seat. Cadmium plated for rust protection.
Dimensions 160x153x185 mm, weight 11 kg

**E172-02 Flexure device for 40x40x160 mm**
ASTM C348
Identical to E172-01 but lower bearers have distance of 119 mm, dimensions 153x153x185 mm, weight 11 kg
Cement- Mortar

Physical features
Sampler, relative density

E020 Bulk cement sampler
EN 196-7, ASTM C183
To sample cement in bulk storages or shipment. Made of brass, it consists of two concentric tubes with slots. Inside tube volume 3 litres. Dimensions Ø 40x1500 mm, weight 5 kg

E021 Packaged cement tube sampler
EN 196/7, ASTM C183
Used to sample cement homogeneously from cement bags, dimensions Ø 32x1050 mm, weight 3 kg

E014 Le Chatelier flask
EN 196-6, ASTM C188
To determine the relative density (specific gravity) of hydraulic cement and lime. Capacity 250 ml. The neck is graduated from 0 to 1 ml and from 18 to 24 ml with divisions of 0.1 ml, weight 500 g

Ref. 354: E020 + E021
Ref. 355: E014
E064 Le Chatelier water bath
EN 196-3, BS 6463, NF P15-432
Inside stainless steel chamber and exterior in painted steel sheet, it can hold up to 12 Le Chatelier moulds in the removable rack. The bath reaches the boiling point in approx. 30 minutes. Now a device keeps the bath temperature at the boiling point. Le Chatelier moulds remain covered by the water during all the test execution, 230 V, 50 Hz, 1800 W, dimensions 405x265x205 mm, weight 7 kg.

E066 Le Chatelier mould
Made from a brass spring tensioned split cylinder having internal $\varnothing$ 30x30 mm high, with two pointers 150 mm long, chromed finishing. Used to determine the cement expansion (soundness) either in cold and in boiling water, weight 30 g

E065 Le Chatelier individually tested
Identical to E066, but with two pointers bigger sized, granting a higher number of test utilisations (about 10x more), chromed finishing. The moulds are checked one by one with engraved a serial number for an easier identification.

E066-01 Glass plate 50x50 mm, pack of 2 pieces
E066-02 Weight de 100 g
E066-03 Extensibility of mould apparatus to check the elasticity of the split cylinder of the mould, complete with weight of 300 g
E066-04 Tamping rod, dia. 17 mm, weight 70 g

E081-10 Le Chatelier water bath
EN 459-2
For the determination of the soundness of building limes subjected to steam action at atmospheric pressure for 180 minutes time. Stainless steel, holds up to 12 Le Chatelier moulds, approx. 50 mm over the water level. Two heating elements of 1200 and 200 W reach the water boiling point in 30 min. Now a timer disconnects the 1200 W element and the water temperature is maintained by the second element. 230 V, 50 Hz, 1400 W, outside dimensions 455x215x350 mm, inside dimensions 300x150x260 mm, weight 9 kg

E082 Pat test
EN 459-1
For determination of the soundness of hydrated lime, gypsum and building plasters. Brass ring mould $\varnothing$ 100x5 mm deep. With glass plate. The mould has an inside taper of 5°. Supplied complete with glass base plate. To carry out one test, three moulds are required.

E082-01 Water retention
EN 413-2
Brass chromed mould having dia. 100x25 mm deep, to determine the water retention of masonry cements, weight 300g

E082-11 Circular plastic container
EN 1015-19
For the determination of the permeability of hardened mortar, dia.. 240xh60 mm, weight 1 kg
Cement- Mortar

Length variations, expansion
Length comparator, autoclave, moulds

E077 Length comparator
EN 12617-4, 1367-4, 12808-4, NF P15-433, P18-427, BS 1881:5
To measure the length variations of 25x25x250 mm cement specimens after autoclave soundness tests. It can also be used to measure linear shrinkage of specimens 40x40x160 mm, 70x70x280 mm, 50x50x250 and 80x80x240 mm. The top beam is adjustable to suit the specimen’s length. Supplied without reference rod and gauge.

S375  Dial indicator 5 mm travel x 0.001 mm divisions
S382-01 Digital dial indicator 12 mm travel x 0.001 mm divisions, with battery and RS 232
S282-12 Software for S382-01
E078-01 Reference rod, Invar, for 25x25x250 mm and 75x75x254mm, conform to la ASTM C490 and BS 1881
E078-03 Reference rod, Invar, 70x70x280 mm, NF P18-427
E078-04 Reference rod, Invar, 40x40x160 mm, EN 12617-4,12808, NF P15-433
E078-06 Reference rod, Invar, 50x50x200 mm, EN 1367-04

E070 Autoclave, soundness (expansion) of Portland cement
ASTM C151, C14.
It consists of a high pressure boiler made from special alloy steel, inside ø 154x430 mm high, receiving a holding rack for 10 cement specimens. The heating system is achieved by electric resistances. The control unit encloses a digital thermometer to visualize the boiler temperature, pressure gauge scale 0-600 psi with built in pressure regulator and power switches. Supplied with safety valves. 230 V, 50 Hz, 3500 W, 295 psi, dimensions 450x475x1080 cm, weight 75 kg.

E072 – E 113 Moulds for soundness (expansion) and shrinkage tests

E072 Two gang prism mould for 25x25x250 mm, with 4 steel inserts
ASTM C490, weight 6 kg

E073 Two gang prism mould for 75x75x254 mm with 4 steel inserts
BS 1881, 6073, weight 9 kg

E072-01 Contact points, stainless steel, pack of 0 pieces, for E072 and E073

E075 Three gang prism mould for 40.1x40x160 mm
EN 12617-4
Hardness over 200 HV, with 6 steel inserts and fixing screws, weight 8.6 kg
E075-01 Contact points, stainless steel, with fixing screw, pack of 12 pieces
E075-10 Spacer, Teflon made, dim. 10x40x160 mm
E075-11 Inserts for 10x40x160 mm specimens
Cement- Mortar

**Finesse, density**
Blaine air permeability apparatus, bulk density

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**E009 KIT Blaine air permeability (fineness) apparatus**
EN 196-6 - ASTM C204 - NF P15:442
To determine the fineness of Portland cement in terms of the specific surface expressed as total surface area in square centimetres per gram of cement. The apparatus is supplied with glass U-tube manometer with valve, steel stand, test cell with disk and plunger all in stainless steel, rubber aspirator bulb, 1000 filter paper discs, manometric liquid, Vaseline grease, funnel, brush, dimensions 220x180x470 mm, weight 12 kg.

**E010-02 Standard reference cement 114 g**
to ASTM/SRM/EN to calibrate the Blaine, 15 g
**E055-08 Glass thermometer -10 to +50ºC**

Spare:
**E10-03 Manometric liquid 250 ml bottle**
**E010-04 Filter paper discs, porosity: 2 micron, pack of 1000 pieces**

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**E011 Automatic electronic Blaine air permeability apparatus**
EN 196-6, NF P15-442
To determine the fineness of cement. It consists of a flat enclosure with a manometer column and with a 3-component measuring cell. The test procedure is executed automatically. The defining of the final Blaine value must be done manually. The equipment consists of the electronic Blaine air-permeability apparatus, measuring cell, digital thermometer, filling oil, cone grease, funnel, filter paper, brush, 230 V, 1 ph, 50 Hz, 10 W, dimensions 170x290x450 mm, weight 3.5 kg

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**E025 Bulk density of cement**
This apparatus is used for the measurement of the apparent density (bulk density) of powders and non-cohesive materials. It consists of sieve funnel with tripod, unit weight measure 1 litre capacity, spatula, straight edge, aluminium scoop. The discharge hole of the funnel has 8 mm dia., dimensions 350x520 mm, weight 5 kg.
**E039 N Cement water retention apparatus**

ASTM C91, C110

To determine the water retention value of cement and lime putty. Consists of water aspirator, mercury column manometer, three-way stopcock, metal perforated dish, glass funnel, mercury valve, pack of filter paper, accessories, the whole assembled on stand. The mercury and the vacuum pump are not included. Dimensions 400x300x600 mm, weight 8 kg.

Accessories:

**V205+V205-10+V230-03** Vacuum pump with accessories, 230 V, 50 Hz

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**E017 Fineness of fly ash by wet sieving**

EN 451-2

Brass made, consists of sieve dia. 50 mm, stainless steel mesh opening 0.045 mm, spray nozzle 17.5 mm ID with 17 holes dia. 0.5 mm, pressure gauge dia. 80 mm, range 0-160 kPa, div. 5 kPa, fittings and connectors, weight 3 kg.
E136 Water baths for cement curing, capacity 40 l
EN 196-1, EN ISO 679, ASTM C109, C511
Double walled all stainless steel made, with wool insulation and water circulation electric stirrer, the bath ensures an uniform and constant temperature. Temperature range from ambient to +60°C with accuracy of 0.4°C at 20°C. Equipped with digital thermostat and a dual safety thermostat with higher thermic threshold. The specimens are held by a perforated shelf spaced from the bottom. It can hold over 60 specimens de 40.1x40x160 cm. Inside dimensions 510x350x230 cm, outside dimensions 680x420x420 cm, 230 V, 50 Hz, 2000 W, weight 28 kg. Without water refrigerator E141.

E136-01 Water bath, capacity 200 l
Identical to E136 but with inside dimensions 900x600x360 mm, outside dimensions 1050x680x430 mm, 230 V, 50 Hz, 2400 W, weight 55 kg

E136-10 Mercury control thermometer 0-50°C, div. 0.5°C

E138 Large capacity curing cabinet
EN 196-1, EN ISO 679
For curing large quantities of mortar and concrete specimens, at controlled humidity and temperature. Aluminium and polycarbonate made, it is complete with precision digital thermostat and four robust shelves. Humidity range from 90% to saturation. Temperature range from ambient to +30°C, accuracy ±1°C. Inside dim. 1090x470x1200 mm, overall dimensions 1370x540x490 mm, 230V, 50 Hz, 2000 W, weight 100 kg

Needed accessories:
V206 Air compressor, air displacement, 240 l/min, capacity 50 l
V206-01 Air compressor, air displacement, 250 l/min, capacity 100 l
V206-02 Air compressor, air displacement, 400 l/min, capacity 200 l
E138-11 Tubing and accessories to connect the E138 cabinet to the air compressor
E134-11 Pan, polythene made, 240x300x70 mm, it accepts up to six 40.1x40x160 mm prisms for curing in water

E139 Curing cabinet
EN 196-1 - ASTM C87, C109, C190, C191
Both external and internal walls are stainless steel made and insulated by a 50 mm thick glass wool. The cabinet has an inner inspection glass door. Temperature range from ambient to 70°C, humidity range 90% to saturation. 230V, 50/60 Hz, 1000W. Inside dimensions 620x440x400 mm, overall dimensions 900x700x800 mm, weight 60 kg.

E141 Water refrigerator
To cool the water from room temperature up to +10°C, with supply capacity of 2 litre/minute. Stainless steel made, complete with motor pump, digital thermostat sens. 0.1° C. 230 V, 50 Hz, 750 W, dimensions 55x55x88 cm, weight 55 kg

Ref. 370: E136
Ref. 371: E138
Ref. 372: E139
Ref. 373: E141
Cement- Mortar

Heat of hydration, loss on heat, conservation
Calorimeter, muffle furnace, climatic chamber

**E061N Calorimeter**
EN 196-8, ASTM C186
Used to determine the heat of hydration of low heat Portland and hydraulic cement. The apparatus consists of a Dewar flask contained in an insulated material and housed in a wooden box which is hinged so that the flask can be easily removed or replaced. Supplied complete with constant speed electric stirrer, filler glass funnel. Not included is the thermometer and the propeller. 230 V, 50 Hz, 150W, dimensions 350x250x680 m, 12 kg.

Needed accessories:
**E062-02 Beckman centesimal glass mercury thermometer**
**E062-04 Digital centesimal thermometer**
**E061-11 Propeller ASTM C186**
**E061-12 Propeller EN196-8**

**A024 Muffle furnace**
EN 196-2, EN 196-21, EN 459-2
To determine the loss on ignition of cement and lime, chloride, carbon dioxide, alkali content of cement. Max. temperature 1200°C. The heat insulation is made of ceramic fibre. Heating muffle, unthreaded from the back, in an only cast of refractory. Lateral opening door with pressure wedge and with stop device. Inside dimensions 145x250x100 mm, overall dimensions 500x650x650 mm, weight 88 kg.

<table>
<thead>
<tr>
<th>Model</th>
<th>Temperature</th>
<th>Voltage</th>
<th>Watt</th>
</tr>
</thead>
<tbody>
<tr>
<td>A024</td>
<td>1200°C</td>
<td>230 V, 50 Hz</td>
<td>4200</td>
</tr>
</tbody>
</table>

**C314 Climatic chamber, capacity 520 l**
EN 196-1, EN 1367-1
This thermostatic climatic chamber is designed for all the research and control laboratories where known cold and/or hot temperatures with controlled humidity values are required for any type for freeze/thaw tests, accelerated curing tests, hot and cold tests in general. Used also to check the behaviour of aggregates during freeze and thaw cycle tests. Temperature range -20°C +60°C accuracy ±0.5°C, humidity range 10-90%, dew point limits +2°C. Inside and outside frame totally in stainless steel. Digital display of actual and preset temperature, internal ventilation, forced circulation, inside dimensions 62x63x139 cm, overall dimensions 73x86x209 cm, with 3 adjustable shelves, RS 485 interface, 230 V, 50 Hz, 1000 W, 150 kg.

**C315 Climatic chamber, capacity 1200 l**
Same as model C314, capacity 1200 l

**C316 Climatic chamber, capacity 520 l**
**C316-01 Climatic chamber, capacity 1200 l**
Same as C314/C315 but without humidity setting and control, accuracy ± 0.1°C.

**C315-02 Microprocessor temperature programmer**
for the automatic execution of the set cycles for models C314 and C315.
E044N Automatic recording apparatus Vicatronic
To determine the initial and final setting time determination of cement or mortar pastes. Fully automatic test with very precise and repeatable results. They are printed on the incorporated printer. Large high contrast LCD display. The Vicatronic is supplied with the standard programmes as mentioned above.
Further programmes can be developed by the operator using the specific menu “free tests”. The mobile probe weighs 300 g (1000 g following EN, NF standards) the penetration needles has 1.13 mm diameter (1 mm ASTM standard). Its fall can be programmed in free fall or in guided fall. Totally flexible as far as time is concerned, penetration time can be set between 0.5 min and 999 minutes or can be changed during test up to 5 different phases with different interval times. The Vicatronic calculates, visualizes and prints: time from the moment of sample preparation, starting time, residual time to the next penetration, residual time to the end of the test, number of penetrations made and the residual penetrations to be made. All parameters and results are memorized. USB connection port for separate printer with standard format., RS232 port for connecting a PC. Supplied with incorporated printer, two needles (1 mm/1.13 mm), two conical moulds EN and ASTM, glass plate. 230 V, 50 Hz, 50 W, dimensions 400x200x470 mm, weight 13 kg

E044-20 Thermostatically controlled heating/cooling system
This device produces water at controlled temperature of 20°C, ±1°C and circulated into the tank E043 by ensuring the test execution at humidity and controlled temperature, only for one single Vicatronic, 230 V, 50 Hz, 1150 W, dimensions 615x375x400 mm, weight 24 kg.

E044-25 Thermostatically controlled heating system with cooling coil
To heat water to 20°C, ±0.1°C, stainless steel water bath 10 litres capacity, temperature range from room to 35°C, ±1°C, 230 V, 50 Hz, 1050 W, weight 12 kg

E044-11 Software VICAT-WIN
With connection cable, RS 232 to download, process, print and manage the data directly from the PC.

E044-12 KIT VICAT-NET
To connect up to 20 Vicatronic on a net by means of two connectors RS485 managed by PC, with software, cables

E042 - E055 Accessories to E044N
E042N Needle for final setting EN / BS Ø 1.13 mm
E042-01N Needle for final setting ASTM Ø 1.0 mm
E042-02N Consistency probe dia. 10x50 mm
E043 Mould tank, EN 196-3
E044-20 Thermostatically controlled heating/cooling system
E044-21 Thermostatically controlled heating/cooling system for 2 Vicatronics
E044-30 Needle cleaning device
E044-40N Conical penetration needle, dia. 8 mm, 50 mm long for gypsum tests
E044-41N Probe 100 g to make test on gypsum EN, DIN 1168
E044-45 Additional 700 g weight (NF, EN)

Spares:
E046N Needle Ø 1.13 mm, hardened EN
E046-01N Needle Ø 1 mm, hardened ASTM
E055-05 Plastic mould Ø 60/70x40 mm, ASTM
E055-07 Glass base plate
E055-10 Plastic mould Ø 70/80 x 40 mm, EN
E042-06N Probe 300g, EN
Cement- Mortar

Setting time and consistency, penetration
Vicat, Plunger penetration and dropping ball apparatus

**E055N Vicat apparatus**
EN 196-3-2005, EN 13279-2 (gypsum), EN 480-2, NF P15-414, P15-431
The instrument consists of a metallic frame, graduated scale with index, sliding probe of 300 g, consistency plunger Ø 10 mm. The needle and conical mould are not included and have to be ordered separately. Dimensions 160x200x300 mm, weight 5 kg.

**E042N - E055 Accessories for E055N.01 and E055N.02**

- E046N Needle, hardened Ø 1.13 mm, EN, NF
- E046-01N Needle, hardened Ø 1 mm, ASTM
- E055-10 Conical plastic mould Ø 70/80 x 40 mm, EN
- E055-05 Conical plastic mould Ø 60/70x40 mm, ASTM
- E055-06 Additional weight 700 g, NF/EN
- E042N Final needle EN / BS Ø 1.13 mm
- E042-01N Final needle, ASTM Ø 1 mm
- E055-08 Glass thermometer -10 to +50°C
- E044-40N Conical penetration needle, dia. 8 mm by 50 mm long for gypsum tests
- E055-15 Probe 100g for tests on gypsum, EN 13279-2

**E083 Plunger penetration apparatus**
EN 413-1, 459-2, 1015-4
Used to determine the consistency of fresh mortar, lime and masonry cement. The base is foreseen of a device to locate the test cup. The height of the drop can be accurately adjusted to 100 mm, with test cup and tamper, both anodized aluminium made, dimensions 200x200x700 mm, weight 8 kg.

**E059 Funnel groove**
EN 13395-2
To determine the consistency of the expansion premixed cement mortars for anchorages, mixed with water, classified of super-fluid type, supplied complete, weight 20 kg

**E031 Dropping ball apparatus**
BS 4551-1, 6463-4
To measure the consistency of cement mortars. Consists of a dropping device mounted on a stand, acrylic ball, mould dia. 100x25 mm, chromed finishing, weight 8 kg

**E031-01 Ball penetration measuring device**
Tripod with dial gauge 25x0.01 mm, chromed finishing, weight 1 kg.

Ref. 381: E055N
Ref. 382: E042N-E055
Ref. 383: E083
Ref. 384: E059
Ref. 385: E031
**Cement- Mortar Consistency**

**Flow tables**

**E086 KIT - E090 KIT Flow tables**
To perform this test, a specimen contained in a cone mould is placed on a metal surface which is then raised and dropped from a known height, after releasing the specimen from the mould. The equipment consists of a circular top table with spindle, bronze flow mould and tamper. The apparatuses to EN standards are equipped also with filling hopper. Motorized models foresee an automatic digital drop counter, 230 V, 50 Hz, 150 W, weight 25 - 60 kg.

<table>
<thead>
<tr>
<th>Models</th>
<th>Standard</th>
<th>Table Ø mm</th>
<th>Drop height in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>E087 KIT</td>
<td>ASTM C230</td>
<td>254</td>
<td>12.7</td>
</tr>
<tr>
<td>E090-01 KIT</td>
<td>EN 459-2</td>
<td>300</td>
<td>10.0</td>
</tr>
</tbody>
</table>

**Hand operated flow tables**

<table>
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<th>Standard</th>
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<td>E090 KIT</td>
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<td>300</td>
<td>10.0</td>
</tr>
</tbody>
</table>

**E087-01 Flow calliper**
ASTM and BS
For measuring the diameter of the sample, brass made, weight 450 g

**E090-08 Flow calliper**
EN 459-2, EN 1015-3
Cement- Mortar

E034 Apparatus for lime testing reactivity
EN 459-2, NF P98-102
To determine the reactivity on slaking of ground quicklime. It consists of a Dewar vessel 1000 ml capacity complete with cover, electric stirrer 300 rpm. With stirring paddle, base with stand, digital thermometer range -50° to +200°C, subd. 0.1°C, accessories, 230 V, 50 Hz, 1 ph, dimensions 400x250x750 mm, weight 10 kg.

E037-10 Sand content of drilling muds
It is a simple, accurate and inexpensive sieve analysis apparatus for determining the sand content of drilling muds. It consists of a special 200-mesh sieve 2.5” dia., fastened inside a collar upon which a small funnel is fitted on either end. This is used with a 10 ml glass measuring tube, graduated to read from 0 to 20% the percentage sand by volume. With 500 ml wash bottle and carrying case. Weight 1.5 kg.

E037-05 Filter press for muds
API 13B-1 and 2
Most effective means for determining the filtration properties of drilling muds and cement slurries. It consists of a mud reservoir mounted in a frame, a pressure source, a filtering medium and a graduated cylinder for receiving the measuring filtrate, pack of 100 filter paper, nitrogen pressurized cartridges, dimensions 210x240x500 mm, weight 12 kg.

E067 Cracking test mould
NF P15-434
To produce shaped specimens designed for cracking tests on hydraulic binders. This test consists of measuring the formation time of a crack on the test specimen, weight 8 kg.

A105 Calcimeter Dietrich Frühling
Used for the determination of calcium carbonate (CaCo3) in certain products such as limestone and lime marl. It mainly consists of a glass container in which the reaction between the calcium and carbonate present in the product and a solution of hydrochloridric acid takes place. The gazed product is collected and measured by a device connected to the container, as the volume of the produced gas (Co2) is in relation to the CaCo2 amount contained in the materials. It is possible to calculate the percentage of CaCo3, dimensions 400x200x1100 mm, weight 13 kg.

E080 Plaster extensometer
BS 1191
To measure the linear expansion of a paste of standard consistence. It comprises an horizontal cradle 100 mm long x 600 mm wide x 25 mm deep closed at one end and open to the other. The open end is in contact with a dial gauge spindle, so that the lateral expansion of the specimen is measured. The dial gauge has 10 mm travel and 0.01 mm graduation, dimensions 250x80x80 mm, weight 3 kg.
E027 - E028-02 Air content meters

E027 Air content meter, capacity 1 l
EN 459-2
To determine the air content in cement mortar, cement paste and lime mortar. Cast aluminium made, the test pot and the upper part are airtight sealed. The whole is connected to a dial gauge indicating directly the air entrainment in percentage, with range 0-50%. With built-in operated air pump. Dimensions Ø 200x320mm, weight 3.5 kg.

E027-01 Air content meter, capacity 0.75 l,
EN 413-2
Identical to E027 but capacity 0.75 l

E028 Air content meter, electric, capacity 1 l
EN 459-2
Identical to E027 but with incorporated electric mini-compressor giving air pressure and keeping it constant all along the test. 230 V, 50 Hz

E028-02 Air content meter, electric, capacity 0.75 l
EN 413-2
Identical to E028 but capacity 0.75 l

E028-01 Filling hopper for the meters E027 and E028

E029 Measurer 400 ml capacity
ASTM C185-85 - AASHTO T137
To determine the air content of freshly mixed mortars by the density method. Steel made, internal Ø 76.2 x 88.1 mm height
E030-01 Hard plastic tamper, dia. 37.5 ±0.5 mm, weight 250 g
E055-07 Glass plate Ø nominally 120 mm
V192-08 Chattaway spatula
Cement- Mortar

**Fluidity, density, swelling, viscosity**

Flow cone apparatus, Baroid balance, Marsh viscosimeter

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**E038 Flow cone apparatus**

EN 445, NF P 18-358, NF P18-507

For viscosity and fluidity determinations of mortars, muds, grouts, fluid materials etc. Cone top $\varnothing$ is 155 mm, total length 290 mm, capacity 1700 cc. Mortar fluidity is considered suitable when the flow time of 1000 cc of mortar is comprised between 17 to 25 seconds. Entirely brass made, it is supplied with four interchangeable nozzles $\varnothing$ 8-9-10-11 mm, stand adjustable in height, plastic graduated cup, weight 10 kg.

**E038-01** Interchangeable nozzle, $\varnothing$ 12.5 mm

**E038-02** Sieve $\varnothing$ 150 mm, mesh opening 1.5 mm

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**E037-01 Baroid mud balance**

It provides a simple method for the accurate determination of mud density. The balance consists of a base and graduated arm with cup, lid, knife edge, rider, built-in spirit level and counter-weight, carrying case. The constant volume cup is affixed to one end of the graduate arm and the counterweight on the opposite end, weight 5 kg.

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**E091 Bulk density of lime**

EN 4592 - DIN 1060

The apparatus allows a sample to fall from a known height into a volumetric container, consisting of a hopper, one litre cylindrical container and spring loaded trap, 5 kg

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**E036 KIT Settling and swelling ration apparatus of grouts**

EN 445

Container method. The equipment consists of a 3 containers (stainless steel), 3 covers (airtight, ballast, stainless steel), 3 plexiglas discs, measuring bridge, vernier caliper, filling graduated measurer, weight 4 kg

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**E037 Marsh funnel viscometer**

For viscosity determination on drilling muds and fluid materials. Orifice opening 4.7 mm. Half part of the funnel mouth is foreseen of sieving cloth, 2 mm mesh. Plastic break-resistant made. Supplied with graduated cup, weight 1 kg.

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Ref. 399: E038

Ref. 400: E037-01

Ref. 401: E091

Ref. 402: E036 KIT

Ref. 403: E037

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**E092 KIT Mixmatic automatic programmable computerized mortar mixer**

EN 196-1, EN 196-3:2005, EN 413-2, 459-2, 480

Sturdy and durable construction, planetary transmission, automatic sand dispenser, transparent protection of mixing area, stainless steel polished mixing bowl and beater, different automatic programmable mixing cycles conforming to standards, large LCD display, storage of up to 100 tests and to transfer the data via RS232 to PC. 230 V, 50 Hz, dimensions 530x620x780 mm, weight 85 kg

**E092-06** Dispenser with hopper for automatic introduction of water into the bowl, also during the mixing phase.

**E092-10** Bowl stainless steel, capacity 4.7 l

**E095-04** Beater, polished, stainless steel

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**E093 Automatic mortar mixer**

EN 196-1, E196-3:2005, 413-2, 459-2, 480-1, ASTM C305 - NF P15-413

For the efficient mixing of cement pastes and mortar with three automatic sequence of mixing cycles, bowl capacity is 4.7 litres. Two speeds can be selected: 140 or 285 rpm for the revolving action, 62 or 125 rpm for the planetary action. It is possible to select the manual working or one of the three automatic programs. By operating automatically on changes of speed, stops and mixing sequences, outlined by acoustic signal, the unit performs the mixing cycle. Equipped of an automatic sand dispenser which fills the sand into the mixing bowl for a period of 30 seconds (only EN 196 / 1 program), with safety door conforming to CEE directive; if opened, it automatically stops the machine. With stainless steel bowl but without beater which has to be ordered separately, 230 V, 50 Hz, dimensions 34x46x70 cm, weight 45 kg.

**E094 Mortar mixer**

Identical to E093, but without automatic program, sand dispenser and safety door, dimensions 340x460x500 mm, weight 40 kg

**E095 Mortar mixer**

Identical to E094, but complete with sand dispenser and safety door to CE directive. Dimensions 340x460x500 mm, weight 44 kg

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**E095-01 - A097 Accessories for mixers**

**E095-01** Stainless steel bowl

**E095-03** Stainless steel beater with bayonet fittings

**E095-04** Stainless steel beater with bayonet fittings, polished

**E095-05** Bayonet coupling between beater and shaft

**E096-01** Dispenser with hopper to add water, additives etc. to the bowl

**E097-01 Reference sand, size 0.08 - 2.0 mm, EN 196-1**

Bag of 1350 g, 20 bags = 27 kg,
Cement- Mortar

Preparation of the specimens

Molds

**E102 Three gang mould for 40.1x40x160 mm**
EN 196-1, EN ISO 679
Steel made with hardness of inside walls over HV 200. All surfaces are ground and all parts are marked with an identification number for a correct assembling, with certificate of conformity, weight 8.560 kg

**E075 Three gang prism mould for 40.1x40x160 mm**
EN 12617-4
Steel made with hardness over 200 HV. All surfaces are ground and all parts are marked with an identification number for a correct assembling, with certificate of conformity. Complete with 6 steel inserts and fixing screws, weight 8.6 kg

*E075-01* Contac points, stainless steel, pack of 12 pieces
*E075-10* Spacer, Teflon made, dimensions 10x40x160 mm, pack of 6 spacers
*E075-11* Inserts for 10x40x160 mm, pack of 12 inserts

**E103 Three gang mould for prisms 40.1x40x160 mm**
EN 196-1, EN ISO 679
Steel made, with hardness of inside walls over 500 HV. All parts are marked with an identification number for a correct assembling. Each mould is individually verified in the dimensional tolerances, hardness, squareness, flatness and roughness with instruments periodically certified by Namas centre or equivalent, with certificate of conformity, weight 8.560 kg

**E105 Three gang mould for prisms 40x40x160 mm**
NF P15.413 - ASTM C348 - DIN 1164, 1060
Steel made, hardness 55 HRB, weight 8 kg

**E112 Three gang mould for 70.7x70.7x282.8 mm**
NF P18-401
Steel made, weight 17 kg

**E107 Three gang prism mould to produce 40x40x160 mm specimens**
NF P15-434
Made from steel 55 HRB, with 6 inserts, weight 8 kg

**E110 Three gang cube mould, 50 mm**
ASTM C109 - AASHTO T106
Steel, hardness 55 HRB, it can be also used for soil and other materials, weight 7 kg.

**E111 Briquette mould**
ASTM C190, C307 - AASHTO T132
Accurately machined, easily collapsible, with base, weight 3 kg.

**E106** Feed hopper for E102, 103, 105, cast aluminium, weight 1 kg
**E102-02** Large and small scraper to EN 196-1
**E102-03** Glass plate 220x190x6 mm
**S200-11** Straight edge, 300 mm long
Compaction of moulds, maniability, homogeneity

Jolting apparatus, vibration machine, mortar workability meter

**E130 Jolting apparatus for 40x40x160 mm prisms**
EN 196-1 - NF P15-413 BS 3892
To compact cement mortar prisms 40x40x160 mm in the three gang mould. It consists of a table holding the mould, seated on a rotating cam driven at 60 revolutions per minute. The jolting group is connected to the table by bayonet joints for quick checking of the weights. The drop height (15.0 mm) is adjustable to keep it correct also after intensive uses. With separate control panel including main switch, automatic digital drop counter start/ top push button, 230 V, 50 Hz, 500 W, dimensions 1000x380x420 mm, weight 65 kg.

**E132 Vibrating machine for 70.7 mm cube moulds**
BS 4550
The mould is mounted on a vibration platform with excentric mechanism. Complete with separate control panel with timer, but without cube moulds to be ordered separately. 230 V, 50 Hz, 250 W, weight 100 kg.

**E081 Mortar workability meter**
EN 413-2, NF P18-452
To test concrete mortar for dynamic workability and also to ensure optimum proportioning of mortar constituents (sand, water, cement, as well as cement/sand and water/cement ratios) compatible with given applications. Suitable also for checking possible improvement when admixing a plastifier, or for comparing two mortar types. It consists of a prismatic receiver divided into two unequal volumes by a removable partition and by an electric vibrator. The fresh mortar is poured in the large volume place, the separating partition is removed and the vibrator starts automatically. The mortar flows from the large volume to the small one, in a time which is a function of the workability of the mortar. 230 V, 50 Hz, 110 W, dimensions 400x200x200 mm, weight 18 kg.
**Cement- Mortar**

**Strength, adherence**

**E142 Digital pull-off (bond) strength tester, capacity 16 kN**

EN 1542, 1348, 1015-12, 13687-2, 13963, 14496 - BS 1881: 207 - ISO 4624 - NF P18-853

This dynamometer measures the adhesive force and the tensile strength of two layers of materials: lime, facing plasters, mortars, building plasters, concrete etc. Compact, light, for use in any location, with load cell. Load capacity 16 kN, resolution 10 N, working range 0.25 to 16 kN, accuracy and repeatability better than ± 1%. With traceable calibration certificate, hand wheel rounds 60 with mechanical round/counter, seat ball assuring axial/central load application. Supplied complete, without accessories to perform the test. To perform the test a common electric drill is required. Dimensions 410x210x270 mm, weight 3.5 kg

**E142-01 Digital pull-off (bond) strength tester, capacity 0-5 kN**

Identical to E142 but with load cell and digital display range 0-5 kN

**Accessories:**

E143 Adhesion test aluminium disc Ø 20 mm, pack of 10 pcs.
E143-01 Adhesion test aluminium disc Ø 50 mm, pack of 10 pcs.
E143-10 Adhesion test stainless steel disc Ø 50 mm, pack of 10 pcs.
E143-11 Cylindrical ring, having truncated cone shape, inside Ø 50 mm
E143-02 Drill bit with centring bit, Ø 20 mm
E143-03 Drill bit with centring bit, Ø 50 mm
E143-12 Acrylic adhesive glue, 300 ml with small pump and nozzles

**Procedure of use:**

1. Using the bit, make a round notch to the dimensions of the disc, up to the base material. This is intended to define exactly the testing surface.

2. Stick over the surface to be tested a disc of the relevant diameter. This is achieved using the adhesive metolux glue.

3. The test consists in pulling out the notched part with the instrument. The result is provided in kN.
For the realization of civil engineering structures, the engineer during the design stage must base his calculations according to the soil properties where the structure will have to integrate.

This section studies and analyses a soil sample to evaluate and to know its characteristics, by proposing a complete range of testing equipment for sampling, preparation, classification, consolidation, shear strength, triaxial, compaction, penetration, bearing capacity, permeability, density, geotechnical and chemical tests, in compliance with the EN, ASTM, BS and the most known international standards.
Soil evaluation, prospection, soil investigation

**Dynamic penetrometer, vane tester, water level indicator**

**S051 Dynamic cone penetrometer DCP**

This portable hand operated equipment is designed to obtain a direct and rapid in-situ evaluation of the structural strength of road pavement layers constructed with unbound materials. Performed with continuous penetrations at approx. 800 mm depth with max. depth of 2 m by using extension rods. Consists of drop sliding hammer 8 kg weight, falling height of 575 mm, impact anvil with driving rod, penetration rod with conical 60° point and 20 mm dia, bar wrench, spanners, accessories, carrying case. Dimensions 1200x350x200 mm, weight 30 kg

**S051-01 Mackintosh prospecting kit**

For initial site investigation work, depth down to 10-12 m. Complete set with 12 boring rods, 1m, in wooden box, weight 45 kg

**S057 Field inspection pocket vane tester**

ASTM D2573

Used to determine shear strength of undrained (CU) cohesive soft soils to firm non-fissured soils on site. It consists of a T-handle cylindrical body where a torsional spring is housed, three interchangeable vanes of different sizes, used depending to the expected strength. The vane is inserted into the soil for 60 mm and the max. torque value is measured on a collar attached to the shaft.

Measuring range 0 to 200 kPa, stainless steel made, complete with 3 vanes 16x32, 20x40, 25.4x50.8 mm (Øx height), extension rod 500 mm long, tools, carrying case, dimensions 500x300x100 mm, weight 4 kg

**S057-01 Extension rod, 500 mm long**

**S057-01 Vane borer H-70G**

Used to measure the undrained shear strength. Instrument with vane 60x120 mm and vane 75.8x151.5 mm with slip-coupling, 10 extension rods Ø 25x1000 mm, 12 connection pieces M18x1.5, drive head, spanner. With extractor for Ø 22 and 25 mm rods, ball cone clamp, 21-28 mm, handle, in carrying case, dimensions 133x28x20 cm, weight 62 kg

**S050 Lightweight dynamic penetrometer**

DIN 4094

Used to analyse the thickness of different strata, when testing compaction works and to determine the relative density of fills and naturally deposited non-cohesive soils. In general, if the ground is not too compact, penetration tests can be carried of down to 8 to 12 m depth. The penetrometer set consists of 10 kg drop rammer, 500 mm, fall and anvil, 11 sounding rod Ø 22 m x 1 m length with threaded collar and guiding rod. Grooved rod to extract samples, 2 drive points 90°, 5 cm2 and 10 cm2 surface. Lifting device for sounding rod. Carrying case, dim. 108x36x22 cm, weight 72 kg

**S061 - S061-02 Water level indicator**

To measure the water level in boreholes, wells and any open underground structures, battery operated, the cable is marked at cm, intervals, drum mounted and the stainless steel tip has dia. of 10 mm

S061 cable length of 50 m
S061-01 cable length of 100 m
S061-02 cable length of 200 m
For the determination of the thickness of different subsoils and its portance. Penetration depth down to approx. 20 m.

**S020 Dynamic penetrometer Geotool**
NF P 94-115/EN  
On two wheels, folding mast, hydraulic motor, drop weights in three parts of 10, 30 and 13.5 kg (total weights 63.5 kg), falling height 50 or 75 cm, blow rate 15 to 25 times/min., blow counter, hand crank for adding rods, 3 stabilisation feed, tool kit, weight 135 kg

**S020 KIT Dynamic penetrometer Geotool**
Same as G020 but with 15 penetration rods, 50 lost tips and 5 tips retrievable

**S020-01 Dynamic penetrometer Geotool**
Same as S020 but on wheels.

**S020-02 Dynamic penetrometer Geotool**
Same as S020 but tractable.

**S020-10 Manual extractor, 2 t, for one person**
**S020-11 Manual extractor, 5 t, for two persons**

**S020-13 Hydraulic extractor 14 t**

**S020-101** Lost tips 20 cm²  
**S020-102** Retrieval tips 20 cm²  
**S020-100** Penetration rod 32 x 1000 mm graduated fixing M20 (on request 3/8")  
**S020-30** Set of spare parts
Soil Preparation and classification of soil on site
Augers, soil samplers

S092 KIT - S095 Hand augers
ASTM D420, D1452 - AASHTO T86, T202
For soil investigations and explorations, complete with T-handle
S092 KIT Hand auger, Ø 8 x 100 cm, weight 4 kg
S093 KIT Hand auger, Ø 10 x 100 cm, weight 5 kg
S094 KIT Hand auger, Ø 15 x 100 cm, weight 6 kg
S095 Extension rod for above, 1m long, weight 2 kg

S096 Auger power head
Motor capacity 1.5 kW, two strokes, without speed inverter. Fitted with two handwheels, to be used just by one operator, drilling holes up to dia. 200 mm and max. depth of 1000 mm. It does not accept extension rods, weight 10 kg.

S097 Auger power head
Motor capacity 4.5 kW, two strokes, equipped with speed inverter. Fitted with two handwheels, to be utilized just by two operators. Drilling holes up to dia. 200 mm and max. depth of 3 m for soft ground, by using the extension rods, weight 30 kg.

Augers, length 100 cm

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Size</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>S097-01</td>
<td>Ø 60 mm</td>
<td></td>
</tr>
<tr>
<td>S097-02</td>
<td>Ø 80 mm</td>
<td></td>
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<tr>
<td>S097-03</td>
<td>Ø 100 mm</td>
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<tr>
<td>S097-04</td>
<td>Ø 150 mm</td>
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<tr>
<td>S097-05</td>
<td>Ø 200 mm</td>
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<tr>
<td>S097-06</td>
<td>Extension rod, 1m long</td>
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</tbody>
</table>

Surface soil samplers
ASTM D 2937
Used to take field samples of compacted fill or undisturbed soils and to evaluate density of compaction samples as the ground surface. The set consists of a drop hammer sliding on the drive rod and falling on the drive head where the sampling tube is hold. Cadmium plated against corrosion.

S084 Surface soil sampler
ASTM D2937/CNR N° 22
With sampling tube Ø 73 inside x66 mm long, 5 kg drop hammer, weight 10 kg.

S085 Surface soil sampler
BS 1377:9
With sampling tube 100 mm Ø by 130 mm height, capacity 1/30 cu.ft., 10 kg drop hammer, weight 16 kg.

Spare parts

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>S084-01</td>
<td>Sampling tube Ø 73 mm x 66 mm long</td>
</tr>
<tr>
<td>S085-01</td>
<td>Sampling tube Ø 100 mm, capacity of 1/30 ft³</td>
</tr>
</tbody>
</table>

S053 Soil sampler
Used to obtain undisturbed soil samples of Ø 1⅜" (38 mm). The sampler is formed by T-handle with extension rod, 900 mm long. Jarring link ¾", stainless sample tube Ø 1½”x9" (38x230 mm), weight 7 kg.

S053-04 Spare stainless sample tube dia. 1 ½ x9”

S054 Hand extruder for specimens dia. 1 ½ from the sample tube
Soil Penetration
Pocket penetrometer, proving ring, Proctor penetrometers, shear vane device

S065 Dial pocket penetrometer
For the classification of cohesive soils in terms of consistency, shear strength and approximate unconfined compression strength. Direct value read in Kgf/cm² on the dial graduated 0 to 6 Kgf/cm². Peak hold feature, zero setting by push button, weight 300 g

S066 Dial pocket penetrometer
Identical to S065, with dial range 1-14 Kgf/cm² suitable for very compacted soils

S068 Geopocket dial penetrometer
For a quick determination of the foundation soils, from clay to sandy soils. It indicates the angle of internal friction (sandy soils), the cohesion “C” (clay soils) and the approx. unconfined compressive strength, peak hold feature; zero setting by push button, with 5 plungers Ø 6.4 - 10 - 15 - 20 - 25 mm, weight 400 g.

S070 Pocket penetrometer
For the rapid determination of soil consistency, shear strength and approx. unconfined compression strength. Scale range 0-4.5 Kgf/cm² with direct reading strength values. Plunger Ø 6.35 mm, weight 300 g.

S071 Pocket penetrometer
Identical to S070 but having a range of 0-16 kgf/cm², suitable for very compacted soils, weight 800 g.

S086 Proving ring penetrometer
Used to determine the bearing strength, compaction degree of subgrades and also for determining the penetration resistance of soil. Supplied with T-handle, proving ring 100 kgf (1 kN) with maximum load pointer and calibration chart, extension rod 500 mm long graduated every 100 mm, removable cone point 30° with 1 sq in. top area. Cadmium plated, 5 kg.

S088 Proctor penetrometer
ASTM D 1558

S075 Pocket shear vane device
Range 0-1 kg/cm². Designed for the rapid determination in the field or in the laboratory of shear strength of cohesive soils. The dial indicates directly the strength in kg/cm², with interchangeable stainless steel vane, 10x20 mm (dia.x height), weight 300 g.

S076 Pocket shear vane device
Range 0-2 kg/cm², identical to S075
Soil

Resistivity

Moisture condition value, resistivity meter, enhancement seismograph

S088-10 Moisture condition value (MCV) and chalk crushing value (CCV)
EN 13286-46
To measure the minimum comparative effort required to produce near full compaction of a soil, and the rate at which a sample of chalk lumps are crushed. Used to classify chalk as a fill material with saturated moisture content. Consists of a robust frame where a rammer falls, mould, scale, counter, accessories, weight 60 kg

Ref. 435: S088-10

S077 Earth resistivity meter
ASTM G57
Used for ground water researches even to great depths, gravel deposit evaluation, geological surveys for the construction of roads, pipelines etc., study and prevention of landslides. The system consists of resistivity measuring instrument, 3 unpolarizable electrodes, 2 current electrodes, 2 cable reels with 300 m of cable, 2 cable reels with 100 m of cable, 2 hammers, set of standard accessories.

Ref. 436: S077, S078-01

S078-01 Power energiser
Energy source for geoelectrical surveys (in alternative to dry batteries or generators), dimensions 35x25x24 cm, 6 kg

S079 Enhancement seismograph, three channels
Used for depth determination of bedrock, foundation, investigations, evaluation of grave, sand, clay etc. deposits. Instrument managed by a micro-processor. Incorporated printer. Complete with set of accessories, dimensions 35x29x28 cm, weight 9 kg.

Ref. 437: S079
S060H Nuclear moisture density gauge, Model HS-5001 EZ122
ASTM D 2922 - D 2950 - D 3017 - BS 1337, 1924
It provides a rapid method of on-site determination of moisture density content of soils, aggregates and asphalt concrete. The microprocessor displays all functions directly. Wet and dry density, moisture percent, moisture content, percent compaction for both soils and asphalt concrete, void ratio and percent air voids. Measuring depth 200 mm with index rods for direct transmission depths in 25 mm increments. Stores up to 320 field tests, transferable to PC or printer. Gage dimensions 40x20x14 cm, weight 14 kg.

S059T Non-nuclear soil density gauge SDG200
Up to 30 cm of depth, measuring time 3 seconds, display of humid density, try den density, Proctor % of water, GPS position. Memorisation of all datas, exit RS232. With battery 7.5V, 4 ampere. With battery charger. In Carrying case.
(This is a alternative for the nuclear gauge or the plate bearing instrument)
Soil

Plate bearing test
ASTM D 1194, 1195, 1196 - BS 1377:9
This test is performed for the determination of the bearing capacity of a soil in-situ on road constructions, foundations, road subgrades, airport and highway pavements. A wide range of plate bearing test equipment are available, together with many accessories according to the different standards and specific end-user needs.

S222 KIT Plate bearing test equipment, 100 kN
CNR no. 146, method "A"
Hydraulic jack 100 kN capacity, with hand pump, rubber pipe and connections, set of extension rods, pressure gauge range 0-100 kN, div. 0.5 kN, load plate Ø 300 mm, device for centre dial gauge measure with spherical seat, datum bar assembly 2.5 m long, telescopic, aluminium made, base supports, plumb and spirit level, dial gauge 25x0.01 mm, articulated dial gauge support, weight 60 kg.

S223 KIT Plate bearing test equipment, 100 kN
CNR no. 146, method "B" - BS 1377:9
Identical to S222 KIT, but with 3 dial gauges de 25x0.01 mm, with base, 3 articulated dial gauge supports and upper spherical seat, weight 60 kg.

Accessory for S222 KIT and S223 KIT:
S223-01 Pressure gauge, range 0-50 kN, div. 0.25 kN with large dial Ø 200 mm, with fast connector, used for accurate readings at low loads, as for ex. pre-load of 0.5 kg/cm².

S225 Plate bearing test equipment, 200 kN with 3 gauges
CNR no. 146, method "B" - BS 1377:9
Similar to S223 KIT, but with hydraulic jack of 200 kN, division 1 kN, 3 dial gauges 25x0.01 mm, hand pump, load plate Ø 300 mm, datum bar assembly, 2.5 m long, weight 70 kg.

Accessory for S225 KIT:
S223-02 Pressure gauge, range 0-50 kN, div. 0.25 kN with large dial dia. 200 mm, with fast connector, used for accurate readings at low loads, as for ex. pre-load of 0.5 kg/cm².

S226 KIT Plate bearing test equipment, 500 kN, 3 dial gauges
CNR no. 146, method "B" - BS 1377:9
Similar to S225, but with hydraulic jack of 500 kN, weight 110 kg

S223-03 «Y» measuring system – Swiss method
SNV 70312
Aluminium alloy made, lightweight and very easy to use, alternative solution to the datum bar assembly S222-03. This system is applicable to the plate bearing equipment models S223 KIT, S225 KIT, S226 KIT, S224 KIT, S224-01 KIT and S224-02 KIT, weight 7 kg.
Soil Bearing
Digital plate bearing test equipment

S224 KIT Digital plate bearing test equipment, 100 kN
CNR no. 146, method "B" - BS 1377:9
Consisting of hydraulic jack 100 kN, with hand pump rubber pipe, set of extension rods, upper spherical seat, datatronic 7 for data acquisition, visualization, processing and storing, RS232 to PC, software, load plate 300 mm dia., intermediate plate 160 mm dia., datum bar assembly 2.5 long, telescopic, aluminium made, with base supports, plumb and spirit level, 3 linear displacement transducers, 50 mm travel, 3 articulated transducer supports, weight 60 kg.

S224-01 KIT Digital plate bearing test equipment, 200 kN
Identical to S224 KIT, with 200 kN capacity, weight 70 kg

S224-02 KIT Digital plate bearing test equipment, 500 kN
CNR no. 146, method "B" - BS 1377:9
Identical to S224 KIT, with 500 kN capacity, weight 110 kg.

S226-01 - S226-08 Loading plate
S226-01 Loading plate Ø 450 mm
S226-02 Loading plate Ø 600 mm
S226-03 Loading plate Ø 760 mm
S226-09 Set of telescopic extension rods, aluminium made, to be connected to the datum bar S222-03 (2.5 m long), to obtain a max. adjustable length of 5.5 m

C405-15 Datatronic 7
Automatic data acquisition 7-channel system, RS232 port, with cable and connector to the vehicle cigar lighter, 230 V, 1 ph 50 Hz

Examples of display
S229 Dynamic plate load test
German code TB BF-StB part B 8.3/2003
Used in earthwork and road construction to determine the soil bearing capacity and the compaction quality of soils and non-cohesive subbases and for soil improvement applications. It is suited for coarse-grain and mixed-grain soil having max. grain size of 63 mm. Max. impact force 7.07 kN, duration of the impact 18 ms, load plate dia. 300x20 mm, settlement measuring range 0.1 to 2.0 mm, batteries, complete with loading unit, load plate with acceleration transducer, electronic settlement meter, carrying case, weight 30 kg

S229-13 Transport cart, collapsible, for long distances at the site
S229-14 Base plate with magnet

S239D Impact soil test
For the measuring and controlling soil strength and consolidation levels during trench re-instatement. It is also used to confirm uniform compaction over wide areas, ineffective rolling of materials and correlation of CBR. The tester consists of a 4.5 kg compaction hammer operating within a vertical tube. When the hammer is released from a fixed height, it falls through the tube and strikes the surface under test, decelerating at a rate determined by the stiffness of the material with the region of impact. A precision accelerometer mounted on the hammer generates an electrical charge which is fed by a cable to a hand-held digital readout unit.
Soil

Density in-situ
Balloon density apparatus, sand density cone

S230 KIT Balloon density apparatus, 1600 ml
ASTM D2167 - AASHTO T 205 - CNR VI n.22
Used to determine the in-situ density of fine graded compacted or bonded soil. The apparatus is placed over the hole excavated in the soil, and water is pumped into a rubber balloon and forced into the hole. The amount of water displaced into the balloon is measured from the graduation of the scale. The instrument consists of a graduated plexiglas cylinder 1600 ml housed within an aluminium alloy casting, rubber pump with stop valve, density plate and 12 rubber balloons, dimensions 34x34x70 cm, 8 kg.
S230-01 Rubber balloons
Pack of 12 pieces

S232 KIT Balloon density apparatus, 3000 ml
NF P94.061.2
Used to determine the in-situ density of fine graded compacted or bonded soil. Same as S230 but with 3000 ml capacity as requested by French specification. A hand-driven piston forces the water into the rubber membrane. A dial gauge measures the water pressure so to execute all the test at the same pressure. An index engraved on the stem of the piston measures the volume of water filling the hole. With 6 reinforced rubber membranes, 4 locking clamps, base plate, accessories. Dimensions 36x36x70 cm, 10 kg.
S232-01 Reinforced rubber membrane for S232 KIT
Pack of 6 pieces

S233 KIT Balloon density apparatus, 6000 ml
Identical to S232 KIT, but with capacity of 6000 ml, weight 18 kg
S233-01 Reinforced rubber membrane
Pack of 6 pieces

S231 Sand density cone apparatus 305 mm/12"
ASTM D1556, NF P94-061-3
To determine the in-situ density of fine grained compacted soil. Recommended for coarse grained soil and gravel (over 38 mm dia.) Consists of metal double cone assembly with valve, base with centre hole, 2 plastic jars, 5 litres, dimensions 305x305x600 mm, weight 20 kg
S231-01 Calibrating container

S234 KIT Sand density cone apparatus 165.1 mm/6.5"
Identical to S231, but with cone dia. 165.1 mm. Consists of metal double cone assembly with valve, base with centre hole, 2 plastic jars, 5 litres, dimensions 305x305x600 mm, weight 6 kg
S234-01 Calibrating container

S236 Sand replacement apparatus, Ø 100 mm
BS 1377:9, 1924:2
Used to determine the in-situ density of fine grained compacted soil. The apparatus consists of sand pouring cylinder Ø 100 mm with shutter made of cast aluminium and accurately machined, upper cylinder, metal tray with centre hole, calibrating container, weight 10 kg.

S237 Sand replacement apparatus, Ø 200 mm
Identical to S236 but with cone dia. of 200 mm, weight 24 kg

Accessories
S235 Standard sand, for density tests, passing 600µ and retained on 300µ, bag of 50 kg
S235-01 Standard sand, 0.4 to 2 mm, CNR no. 22, bag of 50 kg
Soil

Accessories for balloon density apparatus

S240-01 - V125-03 Accessories for levelling, digging, collecting and maintaining the soil samples
S240-01 Scraper to level the ground
S240-02 Metal dibber tool
S240-05 Metal pointed rod
V193 Steel hammer 300 g
V194 Steel hammer 2 kg
V195 Rubber mallet 50 mm Ø
V198 Chisel 300 x 25 mm wide
V199 Density pick
V186 Density spoon
V188 Trowel, 100x200 mm
V183 Aluminium scoop 325 cc
V125-03 Tinned can 5 litre

S235 Standard sand, for density tests, passing 600µ and retained on 300µ, bag of 50 kg

S235-01 Standard sand, CNR no. 22, 0.4 to 2 mm, bag of 50 kg
Soil Classification of soil
Sedimentation, determination of particles, blue methylene test set

S143 KIT Particle size distribution, Pipette method, complete set
BS1377
S144 Andreasen pipette for an accurate extraction of the quantities of soil in suspension for analysis. Capacity 25 ml.
S144-01 Pipette stand for accurately raise and lower the Andreasen Pipette with no transmission of vibrations
S144-02 Sedimentation cylinder 500 ml capacity
S144-03 Rubber bung for cylinder
S144-04 Evaporating dish, glass, 90x50 mm height
V172-03 Soil hydrometer, long stem, 0.995 to 1.030 g/ml (BS, NF)
S155-04 Glass tank, dimensions 600x300x380 mm
S155-09 Heater, thermostat, cooling coil, circulation unit, 230V, 50 Hz, 1000W
S155-10 Thermometer, range 0-50°C, subdiv. 0.5°C
Total weight 40 kg

Accessories:
S144-10 Andreasen pipette, capacity 10 ml
C306-03 Separate control panel, according to CE directives

S155 KIT Particle size analysis of soils, Hydrometer method
ASTM D422 - AASHTO T88 - BS 1377/2
To determine the quantitative size distribution of very fine particle in soils such as clay and silt. The set consists of:
S155-01 6 sedimentation cylinders 1000 ml capacity
V172 Soil hydrometer, 151 H, range 0.995-1.038 g/ml with division 0.001.
S155-04 Glass tank, dimensions 600x300x380 mm
S155-09 Heater, thermostat, cooling coil, circulation unit, 230V, 50 Hz, 1000W
S155-10 Glass thermometer, range 0-50°C, subdiv. 0.5°C
V104-03 Beaker, pyrex, 250 ml capacity
V300-23 Sodium hexametaphosphate, 1000 g
S156-01 High speed stirrer, 10000 rpm, with cup, paddle, anti-splash baffle, 230 V, 50 Hz
Total weight 60 kg

Accessories:
V172-02 Soil hydrometer 152H, range -5 to 60 g/l
S155-02 Bung, rubber, for the cylinder S155-01
S156-03 Stirrer, manual, for cylinders, capacity 2000 ml, NF P94-057
C306-03 Separate control panel, according to CE safety directive

S157 KIT Blue methylene test set
EN 933/9 - NF P94.068
Utilized to determine the clay content in the fine portions of the aggregates. The set comprises:
S157-01 Electric stirrer adjustable from 400 to 700 rpm, with 70 mm propeller.
230 V, 50 Hz
S157-06 Support base for stirrer
S157-02 Burette 50 x 0.1 ml with stopcock
S157-07 Support base for burette
S157-08 Pan 200x150x80 mm
S157-03 Filter paper 90 mm, pack of 100 pieces
S157-04 Glass rod 8x300 mm
S157-05 3000 ml capacity plastic beaker
V300-28 Methylene blue, 100 g
V300-29 Kaolinite, 500 g
Total weight 10 kg

S157-10 Automatic dispenser, 0-10 mlx0.1 ml grad, 1000 ml
(as an alternative to the burette S157-02 and S157-07)
Soil Classification of soil
Sand equivalent test sets

To determine the quantitative size distribution of very fine particle in soils, like clay and silt.

S158-20 KIT Sand equivalent test set (complete)
EN 933-8, NF XP18-598
The set comprises:
S158-03 Plexiglas measuring cylinder graduated at 100 and 380 mm, 5 pieces
S158-02 Rubber stopper for cylinder, 2 pieces
V176-02 Graduated rule 500 mm, stainless steel
V136-01 Funnel, wide mouth
S158-05 Measuring can 200 ml capacity
V121 Plastic bottle, 5 litre capacity
S158-10 Irrigator tube with stopcock and syphon assembly EN/ASTM
S158-13 Weighted foot assembly for sand level
A052-37 Sieve, Ø 200 mm, opening 2 mm
S158-09 Concentrated stock solution, 1000 ml
V170 Stop watch, digital
S158-11 Clamp stand set to hold the syphon assembly with bottle
S158-12 Portable carrying case, 550x250x400 mm
Total weight 18 kg.

S158 KIT Sand equivalent test set (complete)
ASTM D2419
Identical to S158-20 KIT except:
S158-01 Plexiglas measuring cylinder graduated in mm and inch, 5 pieces
S158-02 Rubber stopper for cylinder, 2 pieces
V176-02 Graduated rule 500 mm, stainless steel
V136-01 Funnel, wide mouth
S158-04 Measuring can 88 ml capacity
V121 Plastic bottle, 5 litre capacity
S158-10 Irrigator tube with stopcock and syphon assembly EN/ASTM
S158-07 Weighted foot assembly for sand level
A052-44 Sieve, Ø 200 mm, opening 4.75 mm
S158-09 Concentrated stock solution, 1000 ml
V170 Stop watch, digital
S158-11 Clamp stand set to hold the syphon assembly with bottle
S158-12 Portable carrying case, 550x250x400 mm
Total weight total 18 kg

S159-01 KIT Sand equivalent test set (simple)
EN 933-8 - NF XP18-598
The set comprises:
S158-03 Plexiglas measuring cylinder graduated at 100 and 380 mm, 4 pieces
S158-02 Rubber stopper for cylinder, 2 pieces
V176-02 Graduated rule 500 mm, stainless steel
V136-01 Funnel, wide mouth
S158-05 Measuring can 200 ml capacity
V121 Plastic bottle 5 litre capacity
S158-10 Irrigator tube with stopcock and syphon assembly EN/ASTM
S158-13 Weighted foot assembly for sand level
S158-09 Concentrated stock solution, 1000 ml
Total weight 5 kg.

S159 KIT Sand equivalent test set (simple)
Identical to S159-01 but conforms to ASTM D2419/AASHTO T176

Accessory:
S158-08 Metallic funnel, conforming to EN 933-8, NF XP18-598
**Soil Classification of soil**

*Sand equivalent shaker, Liquid limit Casagrande method*

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**S160N Motorized sand equivalent shaker**

EN 933-8 - ASTM D2419 - NF XP18.598  
Provides a constant uniform shaking with automatic cycle test. Oscillating excursion is 203 mm at 175-180 adjustable strokes/min. rate. Complete with digital timer that automatically stops the shaker at the end of the test. 230 V 50 Hz 250 W, dimensions 70x36x35 cm, 30 kg.

Ref. 462: S160N

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**S160-01N Motorized sand equivalent shaker**

EN 933.8 - NF XP18.598  
Identical to S160 N but with steel security cabinet conforming to CE safety directive

Ref. 463: S160-01N

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**S161 Sand equivalent shaker hand operated**

EN 933.8 - NF P 94.051  
Hand operated working through handwheel. Complete with mechanical strokes counter, dimensions 70x35x42 cm, weight 20 kg

Ref. 464: S161

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**Liquid limit: Casagrande method**

BS 1377 - NF P 94.051  
- Test is based on the relationship between the moisture percentage of soil sample and the number of blows. To determine when a clay soil changes from a plastic to a liquid state. It is composed removable brass cup which through a cam complete with drops counter, without grooving tool. Available in two versions: hand operated through crank (left or right side) or motor operated at 120 drops/min speed, ensuring better uniformity and accuracy

Ref. 465: S170-01

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**S170 Liquid limit device, hand operated, ASTM D4318/BS1377:2**

Left side crank and hard rubber base, brass cup  
**S170-01 Liquid limit device, hand operated, NF P94-051**  
With bakelite base, chromed cup, weight 3 kg.  
**S170-05 Liquid limit device, hand operated, ASTM D4318/BS1377:2**  
Right side crank and hard rubber base, brass cup  
**S172 Liquid limit device, motor operated, ASTM D4318/BS 1377:2**  
With hard rubber base, brass cup, weight 4.5 kg  
**S172-01 Liquid limit device, motor operated, NF P94-051**  
With bakelite base, chromed cup, weight 4.5 kg.

Ref. 466: S170-01
Soil Classification of soil

Shrinkage limit, plastic limit

Accessories
S173-02 Rough brass cup, with central smooth band 10 mm wide, as requested by NF P94-051, used for soils having low plasticity
S173-03 Grooving tool, UNI 10014, AASHTO T79
S173-04 Grooving tool, ASTM D4318
S173-05 Grooving tool, NF P94-051
S173-06 Grooving tool, BS 1377
S173-01 Brass cup (included in the set)
S173-07 Chromed cup NF

S175 Shrinkage limit
ASTM D427 UNE 7016 - NF P94 .060 - BS 1377
Used to determine the maximum moisture content at which the soil does not shrink after drying the sample. The set comprises:
V122-04 Shrinkage dish, Ø 45x12.7 mm, 2 pieces
V122-03 Crystallizing dish, Ø 57x32 mm
S175-03 Shrinkage prong plate, plexiglas with three metal prongs
S175-04 Glass evaporating dish, Ø 120 mm flat bottom
V100-01 Graduated cylinder 25 ml capacity
V192 Flexible spatula, 100 mm blade,
V175-01 Plastic carrying case,
Total weight 2 kg

S178 Plastic limit
NF P94.051, ASTM D4318, BS 1377:2
The plastic limit determines the lowest moisture content of a soil, by which a sample can be rolled into threads 3 mm Ø without breaking the same neither longitudinally or transversely. With carrying case.
The set comprises:
S178-01 Glass plate 300x250x10 mm
S178-02 Rod caliper 3 mm Ø
V114-03 Mixing porcelain dish 120 mm Ø
V192 Flexible spatula, 100 mm. blade
V122 Aluminium moisture tins Ø 55x35 mm, 6 pieces
V178-03 Plastic carrying case
Total weight 5 kg

Accessories:
S178-06 Glass plate 105x50 mm, graduated each 10 mm with brass spacer 5 mm to measure the dia. Of the soil sample to 3 mm ±0.5 according to NF P94-051
S179 Glass plate 500x500x10 mm
Soil

Water content, specific gravity
Desiccators, pycnometers

A035 - A040-01 Desiccators borosilicate glass
complete with perforated porcelain plate

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>A035</td>
<td>Ø 200 mm</td>
</tr>
<tr>
<td>A036</td>
<td>Ø 250 mm</td>
</tr>
<tr>
<td>A036-01</td>
<td>Ø 300 mm</td>
</tr>
</tbody>
</table>

Desiccators borosilicate glass
complete with perforated porcelain plate and vacuum

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>A039</td>
<td>Ø 200 mm</td>
</tr>
<tr>
<td>A040</td>
<td>Ø 250 mm</td>
</tr>
<tr>
<td>A040-01</td>
<td>Ø 300 mm</td>
</tr>
<tr>
<td>V300-15</td>
<td>Silica gel box, 1000 g</td>
</tr>
</tbody>
</table>

V108 - V108-02 Specific gravity Gay-Lussac bottles

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>V108</td>
<td>25 ml</td>
</tr>
<tr>
<td>V108-01</td>
<td>50 ml</td>
</tr>
<tr>
<td>V108-02</td>
<td>100 ml</td>
</tr>
<tr>
<td>V108-03</td>
<td>250 ml</td>
</tr>
</tbody>
</table>

S147 Cone pycnometer, 1000 ml
BS 1377:2
For the determination of specific gravity and water absorption of sands and fine aggregates. Glass jar with aluminium cone and rubber seal, capacity 1 kg.
Soil

Specific gravity, absorption, specific gravity, relative density, moisture
Sand absorption, soil hydrometers, moisture determination balance

S148 Sand absorption cone and tamper
BS 812
For the determination of the specific gravity and water absorption of fine aggregates, weight 500 g

V202 Aspirator pump
To be connected to the water net with a minimum pressure of 0.7 kg/cm2, it produces a moderate vacuum pressure, weight 100 g

V172 - V172-04 Soil hydrometers
BS 1377-2
Model Graduation
V172 Range 0.995–1.038 g/ml, div. 0.001, 151 H
V172-02 Range -5 +/- 60 g/litre, 152 H
V172-03 Range 0.995–1.030 g/ml , BS 1377, long stem
V172-04 Range 1.000–1.200 g/ml for additives
V172-05 Range 1200 to 1300 g/ml for aggregates, EN 1367-2

V023-01 Moisture determination balance
160 g, capacity x 0.001/0.01 g sensitivity with tare up to 10 g. Samples are dried by an infrared lamp with adjustable heat control. A built-in-timer 0-60 min. switches off the heater at the end of the drying cycle which is signalled by a bell. Moisture loss percentage and residual mass are read directly from the lighted scale. 230 V, 50 Hz.

A025 KIT Moisture Testers „Speedy“
ASTM D4944, AASHTO 217, BS 812
For accurate moisture reading on site of soil, sand, aggregates. The test system arrives by the reaction between water and calcium carbide forming a gas. Complete with electronic balance, reagent tin, accessories, in a portable wooden case.

A025 KIT Moisture tester „Speedy“, capacity 6 g, moisture range 0-20 %, weight 6 kg
A026 KIT Moisture tester „Speedy“ capacity 20 g, moisture range 0-20%, weight 8 kg
A027-01 Moisture tester reagent (one pound tin), 500 g
S165 KIT Cone dial penetrometer
NF P94-051-1, BS 1377:2
To determine the liquid limit and shear strength. It consists of cast aluminium base
with levelling screws and spirit level, chromed vertical rod with micrometric vertical
displacement device, dial gauge 150 mm dia., graduated in 360°, div. 0.1 mm or
digital readout of the penetration values, slider, brass made, with free fall, stop
and release push button, automatic zero set, stainless steel penetration test cone
35 mm long, 30° angle, two brass cups dia. 55x35 mm and 70x45 mm, weight
13 kg.

S166 KIT Semiautomatic cone dial penetrometer
Identical to S165, but with a magnetic controller device with electronic digital
programmable timer that automatically releases the plunger head and ensures
free falling of the cone during the 5-seconds test. Supplied complete, 230 V,
50 Hz, 200 W, weight 15 kg.

S165-01 KIT Cone digital penetrometer
NF P94-051-1, BS 1377:2
Identical to S165 KIT, but equipped with digital readout of the penetration values.
Readings in mm and inch, with 0.1 mm resolution, LCD 5 digits display, with zero
set in any position, 1.5 V battery, supplied complete, weight 13 kg.

S165-02 KIT Semiautomatic cone digital penetrometer
Identical to S166 KIT, but equipped with digital readout of the penetration values.
Readings in mm and inch, with 0.1 mm resolution, LCD 5 digits display, with zero
set in any position, 1.5 V battery, supplied complete, weight 15 kg.

S166-03 Test gauge to check the condition of the cone point 30° angle
B057-02 Mirror to facilitate the height adjustment of the cone
S166-04 Test cone 60° angle and 60 g weight
S166-05 Test gauge, to check the condition of the cone point 60° angle
S166-06 Weight 320 g to be added to the cone 30° angle to get a total weight of
400 g
E093 Automatic mortar mixer
EN 196-1, E196-3:2005, 413-2, 459-2, 480-1, ASTM C305 - NF P15-413
For the efficient mixing of cement pastes and mortar with three automatic sequences of mixing cycles, bowl capacity is 4.7 litres. Two speeds can be selected: 140 or 285 rpm for the revolving action, 62 or 125 rpm for the planetary action. It is possible to select the manual working or one of the three automatic programs. By operating automatically on changes of speed, stops and mixing sequences, outlined by acoustic signal, the unit performs the mixing cycle. Equipped of an automatic sand dispenser which fills the sand into the mixing bowl for a period of 30 seconds (only EN 196 / 1 program), with safety door conforming to CEE directive; if opened, it automatically stops the machine. With stainless steel bowl but without beater which has to be ordered separately, 230 V, 50 Hz, dimensions 34x46x70 cm, weight 45 kg.

E094 Mortar mixer
Identical to E093, but without automatic program, sand dispenser and safety door, dimensions 340x460x500 mm, weight 40 kg

E095 Mortar mixer
Identical to E094, but complete with sand dispenser and safety door to CE directive. Dimensions 340x460x500 mm, weight 44 kg

E093-01X Mixer
For the mixing and preparation of samples for Proctor tests. Steel, aluminium and stainless steel design. 230 V, 50 Hz, 1500 w, dimensions 68x51.5x43 cm, weight 45 kg
Chemical tests
Chloride, sulphate, acidity, ion exchange, organic matter test, pH-meter

Chloride and sulphate content
A019-01 Quantab Chloride Titrator Strips, type 1175
Range 0.005% to 0.1% (30 to 600 ppm) Na Cl, pack of 40 strips
A019-02 Quantab Chloride Titrator Strips, type 1176
range 0.05% to 0.1% (300 to 6000 ppm) Na Cl, pack of 40 strips
A019-03 Sulphate Test Strips
detection range 200 to 1600 mg/l, pack of 100 strips

S140 Ion exchange device
This device is used to know the sulphate content of ground water and water soil extracts. Consisting of a ion exchange glass tube 400 mm long, connector and bottom flask 500 ml capacity. The unit is assembled on a stand. Dimensions 19x11x60 cm, weight 5 kg.

Accessory:
V300-30 Ion exchange resin, 500 g

S138 Organic matter test set
BS 1377
Different bottles, reagents and accessories to perform about 50 tests for each of the soil factors on the following tests: pH - pH Nitrate - Ammonia - Nitrate Nitrogen etc.

S135 Acidity test kit of water
To evaluate the potential corrosive. The set comprises different graduated containers, reagents, syringe, pipette, instructions.

S136 Chloride test kit of water
The set comprises different reagents, graduated containers, pipette, syringe, instructions.

S137 Hardness test kit of water
For calcium and magnesium percentage determination. The set comprises different reagents and graduated containers, syringe, pipette, instructions.

V214 Digital pH meter and thermometer
BS 1377:3
Accurate, compact model, in plastic carrying case, designed for fast but precise operations also on field conditions. Measuring range 0-14 pH with resolution of 0.01 pH. Temperature range -50 +150 °C, division 0.1°C. Temperature compensation 0-100°C. Feeding common 9 V battery. With combination electrode, temperature probe, buffer solution powders pH 4 and 7, plastic beakers, accessories, weight 3 kg.
**Soil**

**Universal extruders**

Extruders, soil sampler, hollow punches and tampers

---

**S112 Screw extruder, hand operated**

ASTM D 698, D 1587, D 1883 - BS 598:107, 1377:4, 1924:2

Used for extruding samples from \( \Phi \) 35 to 101.6 mm with max. stroke of 650 mm. With adaptors to extrude samples of \( \Phi \) 38.1, 83, 100 mm, supporting bench. Dimensions 170x70x120 cm, 90 kg.

---

**S114 Universal extruder**

ASTM D698, D 1587, D 1883, BS 598:107, 1377:4, 1924:2

To extrude samples having \( \Phi \) 4", 6", 100, 150 mm. It can therefore extrude CBR, Marshall and Proctor specimens. The extruder is actuated by a 50 kN hydraulic jack, having ram travel of 190 mm + 170 mm screw. Dimensions \( \Phi \) 300x500 mm, weight 30 kg.

---

**S118 Die cutting soil sampler**

To compress loose soils to prepare samples and to hollow punch and extrude soil specimens for consolidation, shear, triaxial and unconfined tests. The sampler is used with the hollow punches S122 to S122-16 and tampers S123 to S123-16, upper plate dia. Is 120 mm and max vertical daylight is 470 mm, dimensions 500x300x900 mm, weight 30 kg.

---

**S122 - S123-16 Hollow punches and tampers**

Used to prepare soil samples and to fit them into the relevant cells to perform triaxial, consolidation, shear, unconfined tests. The punch has thin walls with cutting rim and the tamper expels the specimen from the hollow punch by inserting it directly into the cell without disturbing the same.

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Cell</th>
<th>Hollow Punch</th>
<th>Tamper</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \Phi ) 50.47 xh 20 mm</td>
<td>Consolidation</td>
<td>S122</td>
<td>S123</td>
</tr>
<tr>
<td>( \Phi ) 71.40 xh 20 mm</td>
<td>Consolidation</td>
<td>S122-01</td>
<td>S123-01</td>
</tr>
<tr>
<td>( \Phi ) 75.00 xh 20 mm</td>
<td>Consolidation</td>
<td>S122-17</td>
<td>S123-04</td>
</tr>
<tr>
<td>( \Phi ) 79.80 xh 20 mm</td>
<td>Consolidation</td>
<td>S122-02</td>
<td>S123-02</td>
</tr>
<tr>
<td>( \Phi ) 112.80 xh 25 mm</td>
<td>Consolidation</td>
<td>S122-03</td>
<td>S123-03</td>
</tr>
<tr>
<td>( \Phi ) 50.47 xh 20 mm</td>
<td>Consolidation/permeability</td>
<td>S122-04</td>
<td>S123</td>
</tr>
<tr>
<td>( \Phi ) 71.40 xh 20 mm</td>
<td>Consolidation/permeability</td>
<td>S122-05</td>
<td>S123-01</td>
</tr>
<tr>
<td>( \Phi ) 75.00 xh 20 mm</td>
<td>Consolidation/permeability</td>
<td>S122-18</td>
<td>S123-04</td>
</tr>
<tr>
<td>( \Phi ) 79.80 xh 20 mm</td>
<td>Consolidation/permeability</td>
<td>S122-06</td>
<td>S123-02</td>
</tr>
<tr>
<td>( \Phi ) 112.80 xh 25 mm</td>
<td>Consolidation/permeability</td>
<td>S122-07</td>
<td>S123-03</td>
</tr>
<tr>
<td>( \Phi ) 50 xh 25 mm</td>
<td>Shear</td>
<td>S122-08</td>
<td>S123-08</td>
</tr>
<tr>
<td>( \Phi ) 60 xh 25 mm</td>
<td>Shear</td>
<td>S122-09</td>
<td>S123-09</td>
</tr>
<tr>
<td>( \Phi ) 100 xh 25 mm</td>
<td>Shear</td>
<td>S122-10</td>
<td>S123-10</td>
</tr>
<tr>
<td>60x60 xh 25 mm</td>
<td>Shear</td>
<td>S122-11</td>
<td>S123-11</td>
</tr>
<tr>
<td>100x100 xh 25 mm</td>
<td>Shear</td>
<td>S122-12</td>
<td>S123-12</td>
</tr>
<tr>
<td>( \Phi ) 38 xh 76 mm</td>
<td>Triaxial and unconfined</td>
<td>S122-13</td>
<td>S123-13</td>
</tr>
<tr>
<td>( \Phi ) 50 xh 100 mm</td>
<td>Triaxial</td>
<td>S122-14</td>
<td>S123-14</td>
</tr>
<tr>
<td>( \Phi ) 70 xh 140 mm</td>
<td>Triaxial</td>
<td>S122-15</td>
<td>S123-15</td>
</tr>
<tr>
<td>( \Phi ) 100 xh 200 mm</td>
<td>Triaxial</td>
<td>S122-16</td>
<td>S123-16</td>
</tr>
</tbody>
</table>

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**BeraTest**

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Suisse/Switzerland

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Fax +41 062 723 43 58
e-mail: info@beratest.com
www.beratest.com
S185 - S194-02 Proctor moulds

Used for determining the relationship between the moisture content and density of compacted soils. Steel made, with mould body, collar and base; plated against corrosion.

Norm ASTM D558, D559, D560, D698, D1557, BS 1377:4, 1924:2, NF P94-093, P94-078 - DIN 18127

<table>
<thead>
<tr>
<th>Models</th>
<th>Description</th>
<th>Standards</th>
<th>Ø Inside mm</th>
<th>Height</th>
<th>Volume ml</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>S185</td>
<td>Standard Proctor mould</td>
<td>NF/ASTM</td>
<td>101.6</td>
<td>116.4</td>
<td>944</td>
<td>8</td>
</tr>
<tr>
<td>S186</td>
<td>Modified Proctor mould</td>
<td>ASTM</td>
<td>152.4</td>
<td>116.4</td>
<td>2124</td>
<td>10</td>
</tr>
<tr>
<td>S189</td>
<td>Split Standard Proctor mould</td>
<td>NF, ASTM</td>
<td>101.6</td>
<td>116.4</td>
<td>944</td>
<td>8</td>
</tr>
<tr>
<td>S190</td>
<td>Split modified Proctor mould</td>
<td>ASTM</td>
<td>152.4</td>
<td>116.4</td>
<td>2124</td>
<td>10</td>
</tr>
<tr>
<td>S190-01 KIT</td>
<td>Modified Proctor mould</td>
<td>NF</td>
<td>152</td>
<td>152</td>
<td>2758</td>
<td>10</td>
</tr>
<tr>
<td>S190-02 KIT</td>
<td>Split modified Proctor mould</td>
<td>NF</td>
<td>152</td>
<td>152</td>
<td>2758</td>
<td>11</td>
</tr>
<tr>
<td>S191</td>
<td>Standard Proctor mould</td>
<td>BS</td>
<td>105</td>
<td>115.5</td>
<td>1000</td>
<td>8</td>
</tr>
<tr>
<td>S194</td>
<td>Standard Proctor mould</td>
<td>EN</td>
<td>100</td>
<td>120</td>
<td>942</td>
<td>9</td>
</tr>
<tr>
<td>S194-01 KIT</td>
<td>Modified Proctor mould</td>
<td>EN</td>
<td>150</td>
<td>120</td>
<td>2120</td>
<td>13</td>
</tr>
<tr>
<td>S194-03 KIT</td>
<td>Split Standard Proctor mould</td>
<td>EN</td>
<td>100</td>
<td>120</td>
<td>942</td>
<td>9</td>
</tr>
<tr>
<td>S194-04 KIT</td>
<td>Split Standard Proctor mould</td>
<td>EN</td>
<td>150</td>
<td>120</td>
<td>2120</td>
<td>13</td>
</tr>
<tr>
<td>S194-02</td>
<td>Proctor mould large size</td>
<td>EN</td>
<td>250</td>
<td>200</td>
<td>9817</td>
<td>32</td>
</tr>
</tbody>
</table>

S187 - S188-02 Proctor rammers

Used to compact the soil sample into the mould. The spherical hand knob is from bakelite with metal screw and protection ring nut, guide sleeve with vent holes. The rammers are steel made, plated against corrosion.

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Standards</th>
<th>Rammer Ø mm</th>
<th>Fall, height mm</th>
<th>Rammer weight kg</th>
<th>Total weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>S187</td>
<td>Standard Proctor</td>
<td>ASTM - AASHTO</td>
<td>50.8</td>
<td>304.8</td>
<td>2.495</td>
<td>6</td>
</tr>
<tr>
<td>S187-01</td>
<td>Standard Proctor</td>
<td>EN - NF</td>
<td>50</td>
<td>305</td>
<td>2.5</td>
<td>6</td>
</tr>
<tr>
<td>S188</td>
<td>Modified Proctor</td>
<td>ASTM - AASHTO</td>
<td>50.8</td>
<td>457.2</td>
<td>4.536</td>
<td>8</td>
</tr>
<tr>
<td>S188-01</td>
<td>Modified Proctor</td>
<td>EN - NF</td>
<td>50.0</td>
<td>457.2</td>
<td>4.5</td>
<td>8</td>
</tr>
<tr>
<td>S188-02</td>
<td>Proctor large size</td>
<td>EN</td>
<td>125.0</td>
<td>600.0</td>
<td>15</td>
<td>23</td>
</tr>
</tbody>
</table>
Soil Compaction Proctor/CBR
Automatic compactor, moulds

S199 Automatic programmable Proctor/CBR compactor
EN 13286-2, ASTM D698, D1557, D1883, NF P94-093, P 94-066, BS 1377:4
To compact Proctor and CBR specimens, extremely uniform for reliable and repeatable test results, fully automatic system, with turnable rotation and rammer displacement through photoelectric cell sensors and microprocessor. Separate digital control panel, the user can select and memorize up to 10 personalized test cycles. The original lift system of the rammer can be selected at 12” or 18”, or at 3000 or 450 mm, granting a correct and constant fall height. Rammer drop speed: 1 blow each 2 seconds. The compactor accepts moulds of dia. 4”, 6”, 100 and 150 mm, supplied complete without rammers. 230 V, 50 Hz, 500 W, dimensions 610x470x1710 mm, weight 165 kg.

S199-11 Safety guards according to CE Directive
S199-12 Soundproof security cabinet according to CE Directive

S199-06 Standard rammer, dia. 50mm, weight 2500g, EN 13286-2
S199-07 Modified rammer, dia. 50 mm, weight 4535 g, EN 13286-2
S199-08 Standard rammer, dia. 50.8 mm, weight 2491.25 g, NF P94-066/93
S199-09 Modified rammer, dia. 50.8 mm, weight 4537 g, NF P94-066/93

Example of the display of the compactor S199

Ref. 493: S199

S195-01 – S195-02 Determination of strength of stabilized soil

S195-01 Mould Ø 50x122 mm, for specimens of 50x50 mm, fine and medium grained soil (NF)
S195-02 Mould Ø 50x172 mm, for specimens of 50x100 mm, fine and medium (EN, BS) and of coarse soil (NF)

S197 Vibrating compaction hammer
EN 13286-4
Alternative method for the compaction of soil samples, also usable for the compaction of asphalt, 230 V, 50 Hz, 750 W. Without tampers and support frame, dimensions 105x430x270 mm, weight 7 kg.

S197-01 Supporting frame, steel made, weight 45 kg
B097-02 CBR and Proctor tamping foot, dia. 145 mm
B097-03 Shank 300 mm long

Ref. 494: S195-01 + S195-02

Ref. 495: S197
Soil CBR Equipment

Ref. 496: S202
Ref. 497: S203 KIT

**S200 - S202-09 California bearing ration - CBR**

EN 13286-47, 13286-4, ASTM D 1883, NF P94-078, P94-093 - BS 1377:4, 1924:2

This method has been developed by the California State Highway Department and is now accepted by almost all the international standards. The test is aimed to the evaluation of the bearing capacity of soil for flexible pavement design in road construction.

<table>
<thead>
<tr>
<th>Complete equipment</th>
<th>S200.KIT</th>
<th>S201.KIT</th>
<th>S203.KIT</th>
<th>S202.KIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBR equipment, steel made, plated against corrosion, consists of:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mould CBR with collar and perforated base</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 6''/152.4x7''/177.8 mm height</td>
<td>S200-01</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 150x120 mm height</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 152x152 mm height</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 152x127 mm height</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S203 KIT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Split CBR mould with collar and perforated base</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 6''/152.4x7''/177.8 mm height</td>
<td>S200-13</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 150x120 mm height</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 152x152 mm height</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid base plate for CBR mould</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perforated base plate for CBR mould</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Filter screen, stainless steel made, Ø 149 mm, mesh 0.15 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spacer disc with T-handle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 150.8x61.4 mm height</td>
<td>S200-03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 149.5x36 mm height</td>
<td></td>
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<tr>
<td>Ø 151.25x20.4 mm height</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 151x36 mm height</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ø 150x50 mm height</td>
<td></td>
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<tr>
<td>S203-01 KIT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perforated (swell) plate with adjustable stem</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Plain swell plate</td>
<td></td>
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</tr>
<tr>
<td>Tripod (dial gauge support)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dial gauge, range 10 mm, subdivision 0.01 mm</td>
<td>S376</td>
<td>S376</td>
<td>S377</td>
<td>S377</td>
</tr>
<tr>
<td>Dial gauge, range 25 mm, subdivision 0.01 mm</td>
<td>S377</td>
<td>S377</td>
<td>S377</td>
<td>S377</td>
</tr>
<tr>
<td>Annular surcharge weight 2270 g / 2300 g / 2000 g</td>
<td>S200-07</td>
<td>S200-07</td>
<td>S200-08</td>
<td>S200-08</td>
</tr>
<tr>
<td>Slotted surcharge weight 2270 g</td>
<td>S200-08</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slotted surcharge weight 2300 g</td>
<td>S201-04</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slotted surcharge weight 2000 g</td>
<td>S202-09</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cutting edge</td>
<td>S200-09</td>
<td>S200-09</td>
<td>S202-09</td>
<td>S202-09</td>
</tr>
<tr>
<td>Compaction rammer Ø 50.8mm, fall height 457.2mm, weight 4.54kg</td>
<td>S188</td>
<td>S188-01</td>
<td>S188-01</td>
<td>S188-01</td>
</tr>
<tr>
<td>Compaction rammer Ø 50 mm, fall height 457.2 mm, weight 4.54kg</td>
<td>S188</td>
<td>S188-01</td>
<td>S188-01</td>
<td>S188-01</td>
</tr>
<tr>
<td>Straight edge, cutting rim 300x30x3 mm</td>
<td>S200-11</td>
<td>S200-11</td>
<td>S200-11</td>
<td>S200-11</td>
</tr>
<tr>
<td>Straight edge</td>
<td>S200-06</td>
<td>S200-06</td>
<td>S200-06</td>
<td>S200-06</td>
</tr>
<tr>
<td>Filter paper Ø 150 mm, set of 100 pieces</td>
<td>S200-14</td>
<td>S200-14</td>
<td>S200-14</td>
<td>S200-14</td>
</tr>
<tr>
<td>Soaking tank 600x400x400 mm</td>
<td>S201-05</td>
<td>S201-05</td>
<td>S201-05</td>
<td>S201-05</td>
</tr>
</tbody>
</table>

Beratest AG
Ausserrifelderstrasse 9
CH-5036 Oberentfelden
Suisse/Switzerland
Soil CBR testing machines, hand-operated, CBR ratio indicator

S209 KIT CBR loading machine, hand-operated, laboratory model, 50 kN
Load is applied through a mechanical jack and hand-wheel. Upper beam can be adjusted in height. Fast approach device of the base plate. Load ring 50 kN capacity, penetration piston, dial gauge with holder 10x0.01 mm, 230 V, 50 Hz, 750 W, dimensions 430x380x1180 mm, weight 80 kg.

S210-11 CBR rate indicator
To apply the correct rate of 1.27 mm/min penetration to hand operated CBR machines, 230 V, 50 Hz, (see picture below)

S374 Brake device, holds the max. applied load on the dial gauge of the load ring

S220 KIT Field CBR test set, 50 kN
BS 1377 :7, 1924:2 - ASTM D1883, D 4429
Used to determine quickly and efficiently the bearing capacity of soils on road constructions, foundations, road subgrades etc. The set consists of mechanical jack 50 kN capacity, load ring 40 kN capacity, CBR penetration piston, dial gauge 25x0.01 mm with holder, set of extension rods 2x100 mm, 1x300, 600, 1000 mm, datum bar 1.4 m long, slotted surcharge weights 4.5 and 9 kg and annular 4.5 kg, accessories, wooden carrying case, weight 70 kg.

S210 KIT CBR loading machine, hand-operated, field model, 50 kN
ASTM D1883, NF P94-078
The load is applied through a mechanical jack with handwheel. The upper beam can be adjusted in height. It consists of mechanical jack 50 kN, load ring 50 kN, CBR penetration piston, dial gauge 10x0.01 mm with holder, conversion frame, dimensions 430x370x1180 mm, weight 65 kg.

S210-02 CBR ratio indicator
To apply the correct rate of 1.27 mm/min penetration to hand operated CBR machines, 230 V, 50 Hz

Ref. 498: S209 KIT
Ref. 499: S220 KIT
Ref. 500: S210 KIT
Ref. 501: S210-02
Testing machines with load ring

S211 KIT CBR loading machine motorized, 50 kN, version ASTM
Load is applied through a screw jack driven by an electric motor at a constant penetration rate of 1.27 mm/min achieved by a built in gear box. Upper beam can be adjusted in height. Fast approach device of the base plate, electric end of stroke switches of the load plate to save the machine from wrong manipulations. It consists of CBR motorized frame, CBR penetration piston, load ring 50 kN capacity, dial gauge 10x0.01 mm with holder. 230 V, 50 Hz, 750 W, dim. 430x380x1180 mm, weight 98 kg.

S211-01 KIT CBR loading machine motorized, 50 kN, version BS
Identical to S211, but with penetration rate of 1 mm/min and dial gauge 25x0.01 mm

S213 CBR/Marshall 2 speeds frame, 50 kN, version ASTM
The frame is provided of two fix speed ranges: 1.27 mm/min for CBR tests and 50.8 mm/min for Marshall tests, upper beam can be adjusted in height, electric end of stroke switches of the load plate to save the machine from wrong manipulations. Without load ring and accessories, must be ordered separately, 230 V, 50 Hz, 750 W, dimensions 450x400x1200 mm, weight 130 kg

S212 Universal multispeed load frame, 50 kN
Motorized with electronic digital control by microprocessor. Max. load 50 kN, speed rate 0.5 to 63 mm/min for CBR, unconfined test, quick triaxial, Marshall, splitting tensile test and Duriez test. Upper beam can be adjusted in height. Electric end of stroke switches of the load plate to save the machine from wrong manipulations. Without load ring and accessories, must be ordered separately, 230 V, 50 Hz, 750 W, dimensions 650x500x1350 mm, weight 180 kg

S212-01 - S374 Accessories for S212 and S213
For the following tests:

CBR test
S212-01 Penetration piston
S370-10S Load ring 50 kN
S374 Brake device to hold max. load
S376 Dial gauge 10 x 0.01 mm
S212-03 Dial gauge holder

Marshall test
S212-05 Load piston
B046 Stability mould
B047 Flow meter
B047-01 Dial gauge for flow meter
S370-08S Load ring 30 kN with electric stop safety device
S374 Brake device to hold max. load

Unconfined test
S212-08N Upper + lower compression plates, Ø 100 mm + distance piece with rod
S212-03 Dial gauge holder
S376 Dial gauge 10 x 0.01 mm
S370-02S Load ring 2 kN with electric stop safety device
S374 Brake device to hold max. load
Load test frames: CBR, 2 speeds, universal multispeed, combined with Datatronic 5, computerized digital display system

The frame is the same as for S211-213, but the load is measured by an electric 50 kN cell with high precision strain transducers. The deformation is measured by a displacement transducer 50 mm stroke and ± 0.1% independent linearity. The Datatronic 5 computerized multichannel digital display system measures and displays at the same time the load (stability) in kN and the deformation (flow) in mm with pick hold features and possibility to transfer them to PC and printer through RS232 port.

**S216 KIT CBR digital computerized loading machine 50 kN, version ASTM**

Technical details of the frame see S211, speed rate 1.27 mm/min, supplied complete, dim. 43x38x118 cm, weight 98 kg

**S216-01 KIT CBR digital computerized loading machine 50 kN, version BS**

Identical to S216 KIT but with speed rate 1 mm/min, BS

**S215 KIT Universal multispeed load frame digital, computerized 50 kN**

Technical details of the frame see S212, supplied complete with Datatronic 5 system, load cell and displacement transducer, but without accessories for CBR, Marshall, unconfined tests, must be ordered separately, dimensions 65x50x135 cm, weight 180 kg

**S214 KIT CBR/ Marshall 2 speed load frame digital, computerized 50 kN, ASTM**

Technical details of the frame see S213, speed rate for CBR 1.27 mm/min, supplied complete with Datatronic 5 system, load cell and displacement transducer, but without accessories for CBR and Marshall tests, must be ordered separately, dimensions 45x40x120 cm, weight 130 kg

**S214-01 KIT CBR/ Marshall 2 speed load frame digital, computerized 50 kN, BS**

Identical to S214, speed rate for CBR 1 mm/min, but for BS specification, supplied complete with Datatronic 5 system, load cell and displacement transducer, but without accessories for CBR and Marshall tests, must be ordered separately, dimensions 45x40x120 cm, weight 130 kg

**S335 Automatic Data acquisition and processing system Datatronic**

For oedometer, direct and residual shear tests, triaxial UU, CU, CD, CBR, unconfined and Marshall tests. Can receive up to 7 different independent signals, all of which can be calibrated and zeroed independently. Data logging (from PC using Windows based program) is facilitated by included software. All data is saved on the RAM memory. 320x240 mm display, simultaneously visualizes all the 7 channels. 230 V, 50 Hz

**Accessories for**

- **CBR tests**
  - S212-01 Penetration piston
  - S212-05 Load piston
  - B046-01 Stability mould
- **Marshall tests**
  - B043-01 Stability mould
- **Unconfined tests:**
  - S212-08N Upper + lower compression plates, dia. 100 mm + distance piece with rod

**Software**

- S218 Software UTM2 for CBR tests
- S218-01 Software UTM2 for unconfined tests
- B043-01 Software UTM2 for Marshall tests
- B043-02 Software UTM2 for tensile splitting tests

**B044 Set Datatronic 5**

Digital display, memory, 5 independent channels
S205 Universal multipurpose testing machine Unitronic 50 kN
for compression, flexural, splitting tensile test with automatic load or displacement/deformation control. Capacity max. 50 kN, variable speed from 0.01 to 51 mm/min, approach speed 51 mm/min, adjustable pace rate from 1 to 15000 N/sec., max. ram travel 100 mm, daylight 850 mm, daylight between the columns 380 mm, 230 V, 50 Hz, 1500 W, dimensions 500x450x1750 mm, weight 130 kg
Soil Accessories for universal testing machine S205 Unitronic

For CBR tests:
S212-01 Penetration piston
S337-04 Strain gauge load cell 50 kN
S218 Software for CBR tests

For Marshall tests:
S337-04 Strain gauge load cell 50 kN
S212-05 Loading piston
B046 Stability mould
B043-01 Software for Marshall tests

For splitting tensile tests:
S337-04 Strain gauge load cell 50 kN
S212-05 Loading piston
B047-02 Splitting tensile device for samples dia. 4" and 6"
B047-04 Set of two displacement transducers with accessories
B043-02 Software for splitting tensile tests

For unconfined compression tests:
S337-31 Strain gauge load cell 2.5 KN
S212-08N Upper + lower compression platens, Ø 100 mm with accessories
S218-01 Software for unconfined compression tests

For quick triaxial tests:
S337-31 Strain gauge load cell 2.5 KN
S205-11 Loading piston with ball
S305 Triaxial cell with accessories

For uniaxial splitting tensile tests of rock core specimens:
S337-34 Strain gauge load cell 50 KN
S212-05 Loading piston
E171 Compression device

For flexural tests with centre point on concrete beams and clay tiles:
S337-34 Strain gauge load cell 50 kN
S205-18 Flexure device for centre point loading, composed by lower beam with two bearers + upper central articulated bearer fixed to the load cell
C109-11 Software for flexure tests on concrete beams

For compression tests on mortar specimens:
S337-04 Strain gauge load cell 50 kN
S212-05 Loading piston
E170 Compression device on portion of 40x40x160 mm specimens
E163 Software for compression tests

For flexural tests on mortar prisms:
S337-32 Strain gauge load cell 10 kN
S212-05 Loading piston
E172-01 Flexure EN device for 40x40x160 mm specimens
E164 Software for flexural tests
Oedometers – Consolidation test

The one-dimensional consolidation test of a soil sample enables to ascertain the settlement characteristics over a given period of time. The soil specimen under test is axially loaded and laterally contained.

**S260.02 Front loading oedometer with digital display**

ASTM D2435, D3877, D4546, BS1377:5

Rigidly manufactured from aluminium alloy casting to provide a high degree of accuracy with any frame distortion under load. The beam provides three loading ratios: 9:1 10:1 11:1 and the beam assembly is fitted with an adjustable counterbalance weight. Maximum load 170 kg of slotted weights, corresponding to 1870 kg using 11:1 beam ratio. The oedometer accepts cells up to 100 cm².

Complete with rod holding the weights and coupling block holding the dial gauge or transducer. With *Datatronic S335*, 7-channel automatic data acquisition system with software, transducer, linear vertical displacement transducer S336-11, set of 50 kg of slotted weights S273 KIT, extension cable of 2 m S336-30. Without consolidation cell and holding bench which have to be ordered separately, weight 25 kg

**S260.05 Software report oedometer**

S260.01 Front loading oedometer with digital display

Identical to S260.02, but with dial gauge 10x0.01 mm for vertical displacements instead of transducer, weight 25 kg

**S265 Holding bench for one apparatus**

**S265-01 Holding bench for three apparatuses**

**S268 - S268-03 Consolidation cells, fixed ring**

Made from brass, with specimen holding fixed ring having cutting rim so as to be utilized also to sample undisturbed specimens. Accurately manufactured these cells are supplied complete with loading piston, couple of porous stones and plexiglas transparent water jacket.

<table>
<thead>
<tr>
<th>Model</th>
<th>Specimen Ø mm</th>
<th>Specimen area cm²</th>
<th>Specimen thickness mm</th>
<th>Specimen tamper</th>
</tr>
</thead>
<tbody>
<tr>
<td>S268</td>
<td>50.47</td>
<td>20</td>
<td>20</td>
<td>S123</td>
</tr>
<tr>
<td>S268-01</td>
<td>71.40</td>
<td>40</td>
<td>20</td>
<td>S123-01</td>
</tr>
<tr>
<td>S268-04</td>
<td>75.00</td>
<td>44.16</td>
<td>20</td>
<td>S123-04</td>
</tr>
<tr>
<td>S268-02</td>
<td>79.80</td>
<td>50</td>
<td>20</td>
<td>S123-02</td>
</tr>
<tr>
<td>S268-03</td>
<td>112.80</td>
<td>100</td>
<td>25</td>
<td>S123-03</td>
</tr>
</tbody>
</table>

**S376 Dial gauge, 10 x 0.01 mm**

S122-04 Hollow punch dia. 50.47 mm

S122-18 Hollow punch dia. 75.00 mm

S122-07 Hollow punch dia. 79.80 mm

**S272 - S272-03 Consolidation cells with permeability attachment**

Similar to consolidation cells, brass made, provided of a pipe connector with cock and graduated glass burette 10 ml for permeability tests.

<table>
<thead>
<tr>
<th>Model</th>
<th>Specimen Ø mm</th>
<th>Specimen area cm²</th>
<th>Specimen thickness mm</th>
<th>Specimen tamper</th>
</tr>
</thead>
<tbody>
<tr>
<td>S272</td>
<td>50.47</td>
<td>20</td>
<td>20</td>
<td>S123</td>
</tr>
<tr>
<td>S272-01</td>
<td>71.40</td>
<td>40</td>
<td>20</td>
<td>S123-01</td>
</tr>
<tr>
<td>S272-04</td>
<td>75.00</td>
<td>44.16</td>
<td>20</td>
<td>S123-04</td>
</tr>
<tr>
<td>S272-02</td>
<td>79.80</td>
<td>50</td>
<td>20</td>
<td>S123-02</td>
</tr>
<tr>
<td>S272-03</td>
<td>112.80</td>
<td>100</td>
<td>25</td>
<td>S123-03</td>
</tr>
</tbody>
</table>

**S273 Set of 50 kg of slotted weights**

Consists of 4x10 kg, 1x5 kg, 2x2 kg, 1x1 kg, steel made, painted against corrosion
Direct/residual shear test apparatus
ASTM D3080 - BS 1377:7
Used to determine the resistance to shearing of all types of soil specimens both consolidated and drained, undisturbed or remoulded samples. The machine can accommodate specimens $\varnothing$ 50, 60, 100 mm and square 60x60, 100x100 mm. Equipped with control closed loop motor with epicycloid reducers. All data are stored. RS232, Display of speed and displacement with 0.0001 mm resolution, shear speed between 0.00001 to 9.99999 mm/min, max shear effort 5000 N, possibility of direct vertical load or with a lever arm ration 10:1. max. vertical direct load 5000 N, with lever arm 5500 N. Without shear box, hollow punch and tamper.

S277-01 Digital shear testing machine with incorporated data acquisition system
Consists of digital shear frame with microprocessor, with beam loading device, shear box case with adaptors, dial gauge or transducers supports, load cell 3000 N with cable, linear potentiometric vertical transducer 10 mm travel, linear potentiometric horizontal transducer 25 mm travel, firmware for data acquisition, set of 50 kg of slotted weights, 230 V, 50 Hz, 100 W. Dimensions 104x42x135 cm, weight 120 kg.

S277-KIT Digital shear testing machine
Consists of digital shear frame with microprocessor, with beam loading device, shear box case with adaptors, dial gauge or transducers supports, load ring 3000 N with electric safety stop device, dial indicator for horizontal displacement 25x0.01 mm (S377), dial indicator for vertical displacement 10x0.01 mm (S376), set of 50 kg of slotted weights, 230 V, 50 Hz, 100 W. Dimensions 104x42x135 cm, weight 120 kg.

S282 - S285 Shear boxes
Made from brass, accurately machined, with carriage, walled round or square hole, base plate, two grids, two perforated grids, two porous stones, adapters to fit the box holder.

<table>
<thead>
<tr>
<th>Model</th>
<th>Shear box</th>
<th>Porous stones (spare)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Round $\varnothing$ 50 mm</td>
<td>S282</td>
<td>S286-03 KIT</td>
</tr>
<tr>
<td>Round $\varnothing$ 60 mm</td>
<td>S283</td>
<td>S286 KIT</td>
</tr>
<tr>
<td>Round $\varnothing$ 100 mm</td>
<td>S281</td>
<td>S286-04 KIT</td>
</tr>
<tr>
<td>Square 60x60 mm</td>
<td>S284</td>
<td>S286-01 KIT</td>
</tr>
<tr>
<td>Square 100x100 mm</td>
<td>S285</td>
<td>S286-02 KIT</td>
</tr>
</tbody>
</table>

S122-08 - S123-12 Hollow punch and tamper
The hollow punch with cutting rim is used to prepare the soil sample, and the tamper ejects the specimen filling it directly into the shear box without disturbing it.

<table>
<thead>
<tr>
<th>Models</th>
<th>Hollow punch</th>
<th>Tamper</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\varnothing$ 50x h25 mm</td>
<td>S122-08</td>
<td>S123-08</td>
</tr>
<tr>
<td>$\varnothing$ 60x h25 mm</td>
<td>S122-09</td>
<td>S123-09</td>
</tr>
<tr>
<td>$\varnothing$ 100x h25 mm</td>
<td>S122-10</td>
<td>S123-10</td>
</tr>
<tr>
<td>Square 60x60x h25 mm</td>
<td>S122-11</td>
<td>S123-11</td>
</tr>
<tr>
<td>Square 100x100x h25 mm</td>
<td>S122-12</td>
<td>S123-12</td>
</tr>
</tbody>
</table>

S277-40 Software report shear tests
To use with PC or Datatronic S335 or S336
Soil Permeability

Constant and falling head permeameters

**BS 1377:5 - ASTM D2434 - AASHTO T215**

Used to determine the permeability of granular, gravel and sand soils. The specimen is formed in an acrylic permeability cell, water is passed through it from a constant level tank. The permeability cell has pressure points at different levels which are connected to the manometer tubes fixed on a stand with graduated scale. Two constant head permeability cells are available: Ø 75 mm and Ø 114 mm.

**S245-01 Constant head permeability cell Ø 75 mm**

With three pressure take-off points, acrylic plexiglas body held between two aluminium anodized end plates, weight 3 kg.

**S245-02 Constant head permeability cell Ø 114 mm**

With six pressure take-off points + additional six blanked-off pressure points, acrylic plexiglas body held between two aluminium anodized end plates, needed accessories are two monometer tube stands S245-03 to be ordered separately, weight 7 kg.

**S245-03 Manometer tubes and stand**

Comprising three tubes of constant bore, graduated scale, tubing and connectors, Dimensions 210x50x1160 mm, weight 5 kg.

**S245-04 Constant level tank**

Acrylic plexiglas, wall mounting, the inlet, outlet and overflow pipes can be adjusted for height within the tank, weight 3 kg.

**S246 KIT Falling head permeameter**

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 Ø 3, 4 and 6 mm for the different degrees of permeability, soaking reservoir with cock, tubing and connectors. Permeameter Ø 4” complete with perforated plates and stainless steel gauze, dimensions 170x22x5 cm, weight 18 kg.

Accessories:

- S253 Permeameter Ø 6” with perforated plates and stainless steel gauze
- S355 De-airing tank 20 l, acrylic plexiglas
- S355-01 Water trap to collect the water condensation
- V203 Portable vacuum pump, 230 V, 50 Hz.
- S230-03 Rubber tubing for vacuum, 3 m long

**S248 Permeameter stand 4 cell capacity for constant and falling head tests**

This 4 cells capacity stand is designed to perform both constant head and falling head permeability tests on compacted granular soil samples. The stand consists of a metal frame with water tank adjustable in height between 1350 and 3450 mm. Supplied with tubes, graduated rules, piping, connectors and cocks, but without permeameters to be ordered separately.

The stand can hold up to 4 permeameters having Ø 4", 6" to perform different types of tests at the same time, dimensions 1050x900x2000/3850 mm, weight 75 kg.
Soil Permeability
Compaction permeameters, Pinhole test equipment

S252 - S253 Compaction permeameters
Used for determining permeability to water of soil gravel, clay, sand samples. With clamped upper and lower plate giving the possibility to perform permeability tests also on compacted samples, water inlet with valve, water outlet, two perforated upper and lower plates, two stainless steel screens. Steel made, galvanized against corrosion.

S252 Compaction permeameter Ø 4"
The permeameter body is the same of a Proctor Standard mould, weight 8 kg

S253 Compaction permeameter Ø 6"
The permeameter body is the same of a CBR or Proctor modified mould, weight 16 kg

S185-01 Cutting collar, coupled to the permeameter body, dia. 4"
S200-09 Cutting collar, coupled to the permeameter body, dia. 6"

S244 Pinhole test equipment, dispersibility determination
(Pinhole test)
BS 1377:5, ASTM D4647
Utilized to evaluate the erosion on soil samples having high degree of sodium content, the Pinhole apparatus reproduces the water flowing in a cavity obtained from a soil specimen. The apparatus consists of a cylindrical container equipped at its ends of water inlet/outlet connectors, tube with graduated scale, base support with rod, weight 4 kg.

Ref. 523: S252 - S253
Ref. 524: S200-09
Ref. 525: S244
Triaxial tests
The application of local loads or pressures on soils determines the deformation, the settlement and the yield of the same. Triaxial tests are normally made to determine the relationship between these loads and the consequent deformations, in order to establish the soil shear strength. The triaxial tests are made to evaluate: Excavation works, design of bridges, earth dams, trestle bridges, slope stability, piled foundation works, anchored walls, bearing allowable load capacity for shallow foundations. An undisturbed soil sample is gradually stressed up in order to change its condition from zero to the maximum shear strength at its breaking. The soil sample, previously placed in a rubber membrane to avoid any drainage, and placed in the triaxial cell, is subjected to a constant consolidation pressure and to a load/buckling to a known constant speed through one press. The triaxial tests can be performed in some different ways among the most known are the following:

UU Unconsolidated, undrained tests
Determines the shear strength in undrained conditions. No structural variation is allowed. When pressure in the cell has achieved no specimen volume decrease in allowed. The same specimen is then stressed up to the failure. This test is normally performed on three specimens taken from the same sample and subjected to three different confining pressures. Load and settlement values of the specimen, normally required to evaluate the soil, features in the foundation works, bearing, piled foundations, diaphragms, shear angle, slopes stability, can be determined.

“CU” - Consolidated, undrained test
Determines the shear strength and enables the volume variation of the specimen up to the stabilization of the consolidation pressure. During the failure, the water drainage from the specimen is stopped and the pore pressure is measured, owing to the increase of the axial load. “CU” test is performed to define the cohesion parameters and long-term angle of friction (strength values of foundation soils) and to evaluate improved applications of preconsolidation, tempering, compacting, excavations.

“CD” - Consolidated drained test
Determines the shear strength and the angle of friction and enables to the specimen the volume variation during the axial load. The test execution is very slow, in order to avoid the increase of the pore pressure inside the specimen. This kind of test reproduces, in the best ways, the different geotechnical aspects and soil conditions and is particularly indicated to evaluate sandy or highly permeable soils.

Accessories for triaxial cells
S301 Digital triaxial load frame 50 kN
ASTM D 2850, D4767, BS 1377:8, NF P94-074
Thanks to its large structure it can accommodate all standard triaxial cells for testing soil specimens up to 100 mm \( \varnothing \) by 200 mm length. The test feed speed can easily be set thanks to a microprocessor and conversation system with alphanumeric display and keyboard with self-learning. Infinitesimal resolutions are, in this way, granted in real time. The machine comprises limit switch of position security upper and lower platen.
- Maximum load capacity 50kN
- Infinitesimal testing speed from 0.00001 to 6 mm/min.
- Speed accuracy: ± 0.5 %
- RS 232 port for connection to PC
- Vertical daylight 0-790 mm (0-530 mm with ring)
- Distance between columns 305 mm
- Platen \( \varnothing \) 177 mm
- Power supply 230 V 1ph 50 Hz 750 W
- Dimensions 420x580x1410 mm
- Weight 105 kg
Note: The machine is supplied with load piston and sphere, but without proving rings, triaxial cell, dial gauges, which must be ordered separately.

S301-01 Digital triaxial frame, 50 kN
ASTM D2850, NF P94-070, P94-074
Same as S301 but with transducers

S336 Datatronic 16 channels
Expandable up to 128 channels

S335 Datatronic 7 channels
Supplied with 7 channels and RS232 cable

S305 - S306 Triaxial cells
The top and low caps are made from aluminium corodal alloy. The cell cylinder is manufactured from high resistant clear acrylic material. Easily assembling and disassembling through quick clamping rods. The load piston is finely worked to reduce as much as possible the friction during the slip. The base of the cell includes four valves: back pressure, low drainage, pore pressure, cell pressure inlet. Supplied with an adjustable dial gauge or displacement transducer holder to measure the axial deformation of the specimen.
The triaxial cell is supplied without accessories like: caps, plinths, membranes, membrane sealing rings, porous stones, dial gauges, etc. which must be ordered separately.
The cell S305 can be also used for specimens \( \varnothing \) 50x100 and 38x76 mm and cell S306 can be used for specimens \( \varnothing \) 70x140, 50x100 and 38x76 mm, both with accessories of suitable \( \varnothing \).

<table>
<thead>
<tr>
<th>Model</th>
<th>S305</th>
<th>S306</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. specimen size mm</td>
<td>( \varnothing ) 70 x 140</td>
<td>( \varnothing ) 100 x 100</td>
</tr>
<tr>
<td>Max. cell pressure</td>
<td>1700 kpa</td>
<td>1700 kpa</td>
</tr>
<tr>
<td>Overall dimensions</td>
<td>( \varnothing ) 280 x 480</td>
<td>( \varnothing ) 310 x 540</td>
</tr>
<tr>
<td>Weight</td>
<td>8 kg</td>
<td>8 kg</td>
</tr>
</tbody>
</table>

Beratest AG
Aussertelfstrasse 9
CH-5036 Oberentfelden
Suisse/Switzerland
Soil

Accessories for triaxial tests

S357 Single burette volume apparatus
Composed by a measuring burette, capacity 100 ml, sensitivity 0.2 ml.
Dimensions 18x27x86 cm, weight 4 kg

S358 Double burette volume change apparatus
The burette tubes are connected directly to a reverse valve system.
Dimensions 23x27x86 cm, weight 5 kg.

S348 Distribution panel
It delivers water or pressure to various systems. Provided with 5 inlet/outlet valves
with null variation of volume. Assembled on an aluminium support.
Dimensions 200x200x55 mm, weight 3 kg.

S350 Air/Water bladder 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 membrane enables the use of de-aerated water. A suitable
compressor, which can grant a pressure source, is necessary for using the
air/water membrane cell. 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. Dimensions 270x300x425 mm,
weight 9 kg.

S338 Volume change instrument
Consists of a volume change cylinder with capacity of 100 ml. It has to be used
with linear strain transducer or dial gauge. Accuracy 0.1 ml, easy de-airing of top
and bottom chamber, without measuring device and mounting block, dimensions
18x18x24 cm, weight 4.5 kg

S338-01 Automatic volume change instrument
Consists of a top volume change cylinder, which has a capacity of 100 ml and the
bottom change over valve box, which provides unlimited capacity. To be used with
linear strain transducer, accuracy 0.1 ml, easy de-airing of top and bottom
chamber, without displacement transducer and mounting block, dimensions
36x27x21 cm, weight 7.6 kg
Soil

Triaxial
Accessories for triaxial tests

S353 Null indicator
ASTM D2453, D3877, D4546
Used as a balancing device to measure the pore pressure of the specimen. It avoids any flow of water inside or outside the sample. Normally used with S340, S341 control panel and S356 differential mercury manometer.

S355 De-airing tank 20 litres
Connected to the vacuum pump, it produces de-airing water, specially used to measure the pore pressures. Consists of a perspex cylinder where a spray water inlet and an air outlet is fitted. Water, coming into the spray, is leaked inside the cylinder, while a vacuum pump is connected with an air outlet. The outlet of the de-airing water is placed in the lower part of the tank.
Dimensions 320x320x520 mm, weight 15 kg.
Accessories:
V205 Vacuum pump with V205-10, V205-12, V230-03

A144 Oil/water constant pressure system
Provides an infinitely variable constant pressure from 0 to 3500 kPa by using a motorized hydraulic pump, an oil/water interchange vessel, piston/spring valves, high viscosity oil. 230 V 50 Hz, dimensions 320x320x410 mm, weight 20 kg.

S345 Screw pump
Connected to the pressure measuring panel, is used to measure and to balance the pore pressure indicated by the null indicator, to create and to measure the cell pressure and the back pressure, weight 3 kg.

S340 Pressure measuring panel at 4 inlet/outlet null displacement valves
Supplied complete with inside an accurating gauge dia. 200 mm, having scale 0-1700 kPa, dimensions 410x350x110 mm, weight 6 kg

S341 Pressure measuring panel at 8 inlet/outlet null displacement valves
Enables the best versatility for connecting the pressure of the system, of the pressure measuring points and of the different units commonly used, supplied complete, dimensions 410x460x110 mm, 8 kg.
Soil Consolidation, Load frame, accessories

S359.01 Three-place consolidation load frame
ASTM D2859, D4767, BS 1337:7
Used to apply a constant load to the piston of the triaxial cell, reduces the consolidation testing times leaving available the compression machine. Measures the axial strain of the specimens and performs simultaneously the anisotropic consolidation stage of up to three specimens. Load can be applied through a hanger with a direct ratio 1:1 or 5:1. Max. load of 250 kg at each place. Metallic frame, specimens dia. 35 to 100 mm, with set of slotted weights of 50 kg (S273 KIT) and dial gauge 25x0.01 mm (S377) or 50x0.01 mm (S379) for 70x140 mm specimens (to be indicated when ordering), without cells. Dimensions 2300x400x1800 mm, weight 150 kg.

S273 KIT Set of slotted weights 50 kg

S377 Dial gauge 25x0.01 mm
S379 Dial gauge 50x0.01 mm
S336-12 Linear displacement transducer, travel 25 mm
S336-14 Linear displacement transducer, travel 50 mm
S336-31 Extension cable, 5 m long, for transducer

V207 Laboratory air compressor
Max. pressure 10 bar, reservoir capacity 50 l, for continuous working pressure up to 800 kPa. 230 V, 50 Hz., weight 40 kg

S351 Laboratory air compressor
Max. pressure 17 bar, reservoir capacity 5 l, to be used with the air/water bladder cell. With tubings and couplings for cell connection, 230 V, 50 Hz, dimensions 520x 310x400 mm, weight 35 kg.
In this section a wide range of universal electromechanical and hydraulic machines to perform tensile, elongation, flexural, bending, resilience tests on metallic materials are proposed with the possibility to extend these test applications on plastics, rubber, composed materials, wires, ropes, paper, textiles etc. This range of machines satisfies both control tests on steel bars for reinforced concrete, and quality tests in the iron metallurgy, metals, plastics etc.
H003 Universal hydraulic servo-controlled machine 600 kN capacity
with computerized control system to perform static tensile tests on metallic materials
EN 1002 - ASTM A370
It basically consists of:
- Strong loading frame with a reading cell built into the piston
- Hydraulic servo-controlled unit, for the data acquisition, control and processing, all built in a console
The frame is designed to carry out tensile tests using the grips placed in the clamping heads. In the upper part, between the head and traverse, it is possible to carry out flexion, compression, bending, hardness, dishing tests, according to the international standards by using the suitable (see accessories) devices.
The hydraulic servocontrolled unit regulates the load rate by the computer. An emergency device stops the machine in any moment as per the international safety standards.
A control pedal situated on the frame governs the movement of the lower tensile head for an easier positioning of the specimen according to its length. The machine is supplied with loading frame, control console and bed frame, while the software (mod. H009, H009-02), the PC (mod. H009-01), the extensometers (mod. H014) the grips and the printer are options and must be ordered separately according to the needs of the user.

Ref. 542: H003

Technical features:

<table>
<thead>
<tr>
<th></th>
<th>600 kN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity</td>
<td></td>
</tr>
<tr>
<td>Max. crosshead stroke</td>
<td>200 mm</td>
</tr>
<tr>
<td>Max. distance between the jaws</td>
<td>465 mm</td>
</tr>
<tr>
<td>Width flexion joke</td>
<td>190 mm</td>
</tr>
<tr>
<td>Max. distance between flexion knives</td>
<td>1000 mm</td>
</tr>
<tr>
<td>Distance between compression plates</td>
<td>235 mm</td>
</tr>
<tr>
<td>Load reading sensing by loading cell, resolution</td>
<td>0.01 % U.V.</td>
</tr>
<tr>
<td>Accuracy: Class 1 EN 10002/2 only reading scale</td>
<td>1:1 - 1:20 U.V.</td>
</tr>
<tr>
<td>Stroke reading, sensing by linear transducer resolution</td>
<td>0.01 mm</td>
</tr>
<tr>
<td>Deformation reading, sensing by electronic extensometer, resolution</td>
<td>0.001 mm</td>
</tr>
</tbody>
</table>

Accuracy class B 2 (B1 for base up to 50 mm) ASTM E83
Needed height     3900 mm
Frame weight      approx. 2600 kg
Rack dimensions   61x63xh160 cm
Power supply      400 V, 3 ph+neutral+earth, 50 Hz, 2 kW
Steel

**Flexure, bending, compression**
Accessories for universal hydraulic servocontrolled machine

**H003-03 – C128 Accessories for model H003**
Set of round and flat grips. One set consists of two double pairs that must be placed into the upper and lower tensile heads.

**H003-03** Grips for flat specimens 2-18 mm and round specimens Ø 5-12 mm
**H003-04** Grips for flat specimens 18-36 mm
**H003-07** Grips for round specimens Ø 12-24 mm
**H003-08** Grips for round specimens Ø 25-40 mm
**C128** Graphic printer A4 format

**Accessories for test on metals:**

**H003-11 Flexure test**
UNI 559
The equipment is composed by a couple of lower bearers with adjustable supports and an upper blade. Maximum load 200 kN, maximum distance between the lower bearers 1000 mm. Width of the bearers 120 mm, Ø of the bearers 90 mm, weight 70 kg.

**H003-12 Bending test**
UNI 564 - ASTM E290
The equipment is composed by a couple of lower bearers with adjustable supports and an upper blade. Maximum load 200 kN, maximum distance between the lower bearers 1000 mm. Width of the bearers 120 mm, Ø of the bearers 90 mm, weight 70 kg.

Note: bearers with different Ø are available on request.

**H003-13 Compression test**
UNI 558
The equipment is composed by an upper plate with seat ball assembly and by a lower plate. Maximum load 600 kN, Ø of the compression plates 90 mm, weight 25 kg.

**H003-14 Test on electro welded wire nets**
Device for the seizing of electro welded wire nets must be used with the grips for flat specimens, weight 5 kg

**Accessories for tests on concrete:**

**H003-21 Compression test**
On concrete cube specimens, max. 150 mm side. The appliance is composed by an upper compression plate Ø 287 mm with seat ball assembly, a lower compression plate Ø 287 mm. Maximum distance between the compression plates 185 mm, weight 60 kg.

**H003-22 Flexure test**
EN 12390-5, ASTM C78, C293, NF P18-407
On concrete beams with dimensions 100x100x400/500 mm and 150x150x600/750 mm, composed by two lower and one upper bearers. Maximum load 200 kN, maximum distance between the lower bearers 1000 mm, width of the bearers 160 mm, weight 40 kg.

**H014 Electronic extensometer**

**H014-06 Extensometer for round specimens from dia. 5.4-11 mm, course 25 mm**
**H014-07 Extensometer for round specimens from dia. 10-19 mm, course 50 mm**
**H014-08 Extensometer for round specimens from dia. 18-25 mm, course 50 mm**
**H014-10 Extensometer for flat specimens, width max. 25x10 mm, course 50 mm**
Steel

Servo-controlled electromechanical universal testing machine

Traction

**H004 - H008 Servo-controlled electromechanical universal testing machine**

This appliance is designed to be used in laboratories for quality control and research on metals, plastics, composed materials, wires, ropes, paper, textiles etc. The machine is suitable to make tensile and elongation tests on different materials following the EN 10002 and ASTM A370 standards.

The machine is composed by a strong base containing the transmission components and the hardware control instruments. The base carries two columns that guide the cross-bar. They are made of high resistance steel with ground hard chrome surfacing. The big diameter and the position where the columns are fitted grant a high lateral rigidity. The system is suitable to realise both tests with single direction or dual direction. In order to grant no clearance, the transmission of the movement to the mobile cross-bar takes place through two recirculating spheres screws with pre-loaded female screws. High attention is given to the assembling system of the screws and their groups, bearings put in the base and in the upper head. The mobile cross-bar with big section together with all other elements of the machine being properly dimensioned grant a very good rigidity of the machine (see UNI ISO 5893 Standards). The moving up and down of the cross bar on the columns happens through sintered bushes with low friction coefficient.

On the mobile cross-bar there are some holes for the mounting of the load cells. The load cell is made in stainless steel and reads both tensile and compression loads with a very high precision, conforming to EN 10002/2 standards.

Features of the load cell to ISO 376 standards.

- **Accuracy class**: 1
- **Repeatability error**: < ± 0.145%
- **Interpolation error**: < ± 0.090 %
- **Error on zero**: < ± 0.03 %
- **Reversibility error**: < ± 0.240%
- **Non linearity error**: < ± 0.04 %
- **Maximum overload capacity**: 200%

In order to follow the specific needs of each single application, different load cells with different capacities within the nominal capacity of the machine can be installed on the frame. Different connections for the installation of the seizing devices are on the mobile cross-bar and on the base (see accessories at following pages). The machine is delivered with different safety devices limiting the maximum travel of the cross-bar. There is also an adjustable device that allows setting a personalised upper and lower travel limit following the used appliances. The control section is made by a series of cards inside the base of the machine that are managing the control units and the reading units positioned on the machine. The acquisition card, with a powerful microprocessor and converter AD 24 bits, takes all the working dates and through a RS232 connection it sends all these dates to the personal computer, which controls all the functions of the machine and makes the elaboration of all the calculations through the program UTM2.

**Ref. 548: H004 - H008**

<table>
<thead>
<tr>
<th>Models</th>
<th>H004</th>
<th>H005</th>
<th>H006</th>
<th>H007</th>
<th>H008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load in kN</td>
<td>10</td>
<td>50</td>
<td>100</td>
<td>200</td>
<td>600</td>
</tr>
<tr>
<td>Test speed mm/min</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Maximum</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>480</td>
<td>300</td>
</tr>
<tr>
<td>Cross bar travel mm</td>
<td>1130</td>
<td>1130</td>
<td>1180</td>
<td>1150</td>
<td>1500</td>
</tr>
<tr>
<td>Opening of chamber</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertical mm</td>
<td>1253</td>
<td>1251</td>
<td>1310</td>
<td>1280</td>
<td>1510</td>
</tr>
<tr>
<td>Horizontal mm</td>
<td>421</td>
<td>421</td>
<td>600</td>
<td>600</td>
<td>713</td>
</tr>
<tr>
<td>Max. distance between tensile heads mm</td>
<td>630</td>
<td>612</td>
<td>510</td>
<td>480</td>
<td>550</td>
</tr>
<tr>
<td>Dimensions in mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>1708</td>
<td>1845</td>
<td>2340</td>
<td>2340</td>
<td>3000</td>
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<tr>
<td>Width</td>
<td>550</td>
<td>810</td>
<td>1370</td>
<td>1370</td>
<td>1465</td>
</tr>
<tr>
<td>Depth</td>
<td>683</td>
<td>670</td>
<td>700</td>
<td>700</td>
<td>930</td>
</tr>
<tr>
<td>Weight in kg</td>
<td>250</td>
<td>370</td>
<td>1000</td>
<td>1150</td>
<td>2600</td>
</tr>
<tr>
<td>Power supply</td>
<td>230 V</td>
<td>230 V</td>
<td>400 V 3 ph</td>
<td>400 V 3 ph</td>
<td>400 V 3 ph</td>
</tr>
<tr>
<td>Absorbed power W</td>
<td>1000</td>
<td>1200</td>
<td>2000</td>
<td>3000</td>
<td>3000</td>
</tr>
</tbody>
</table>

**BeraTest AG**

Aussertfeldstrasse 9
CH-5036 Oberentfelden
Suisse/Switzerland
Universal tensile/compression machine
BS 1610 - ASTM C39.E4 - NF P 18-411
- Tensile tests on steel reinforced bars, up to 500 kN max. capacity load
- Compression test on concrete cube and cylinder specimens up to 1500 kN max. capacity load

This machine of compact design, is utilized to carry out tensile tests on steel reinforced bars from Ø 6 to 25 mm and flat max. 25x15 mm, compression tests on concrete cube specimens max. side 150 mm and cylinders max. Ø 160x320 mm.

The four columns loading frame is over dimensioned to assure high rigidity and stability. The loading piston, double action, is rectified and lapped. The piston is foreseen of an hydraulic maximum and minimum piston stroke’s security device, by avoiding any damage risk due to wrong manipulations of the unit. An analogical device is foreseen to visualize, preselect and adjust the applied speed rate. A fast ram approach is foreseen to avoid losses of time. The hydraulic pump is multipiston in order to insure continuity of oil delivery. A displacement device visualizes instant by instant the piston’s excursions during the tests.

A hydraulic selector allows to select the tensile or the compression test. The heads holding the jaws are obtained from only one block of high tungsten steel, while the jaws are hardened over 65 HRC. The “V” autoclamping form allows a quick and practical churking of the specimen. A calibration certificate is supplied along with the machine. The machine is supplied with pair of jaw-holders, but without accessories for the tensile and compression tests, which must be ordered separately (see accessories).

Technical specifications:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. tensile load</td>
<td>500 kN</td>
</tr>
<tr>
<td>Max. compression load</td>
<td>1500 kN</td>
</tr>
<tr>
<td>Distance between the jaws</td>
<td>min. 300 mm/max. 400 mm</td>
</tr>
<tr>
<td>Distance between the compression platens</td>
<td>340 mm</td>
</tr>
<tr>
<td>Distance between the columns</td>
<td>270 mm</td>
</tr>
<tr>
<td>Piston’s stroke</td>
<td>100 mm</td>
</tr>
<tr>
<td>Precision and repeatability</td>
<td>±1% of read value</td>
</tr>
<tr>
<td>Power supply</td>
<td>230 V, 50 Hz, 750 W</td>
</tr>
<tr>
<td>Dimensions</td>
<td>78x42x170 cm</td>
</tr>
<tr>
<td>Weight</td>
<td>900 kg</td>
</tr>
</tbody>
</table>

H010 Universal tensile/compression machine with manometer
Motorized, measuring system with precision manometer Ø 250 mm. Bourdon type, double reading range, foreseen of max. load pointer.

H011 Universal tensile/compression machine with Cybertronic unit
Motorized, measuring system with digital display unit Cybertronic with microprocessor, dual range to measure the load and the deformation by the extensometers mod. H014 (accessory), with graphic display of large dimensions, possibility to be connected to PC by RS232 link (remote control).

H013-01 Upper compression platen for concrete cube and cylinder specimens
H014 Electronic extensometer

H012-01 Set of 4 jaws
For round specimens dia. 6-15 mm
H012-02 Set of 4 jaws
For round specimens dia. 15-25 mm
Steel

Mechanical tests
Cutting, marking, broaching, pendulum Charpy, bending

C351 Specimen cutting machine, bench type
The machine accepts blades up to Ø 350 mm. Shear capacity 120 mm, blade rotation speed 3900 rpm, complete with abrasive blade dia. 350 mm, 230 V, 1 ph, 50 Hz, 2000 W, dimensions 560x460x390 mm, weight 20 kg.

C350-10 Abrasive blade Ø 350 mm
C350-11 Abrasive blade Ø 400 mm
C350-12 Diamond blade Ø 450 mm
C350-13 Diamond blade Ø 350 mm
C350-15 Diamond blade Ø 500 mm
C351-11 Cutting blade for metal dia. 350 mm
C352 Device for cylinders and cores

H020 Marking-off machine
UNI 556
Used to mark off specimens with round, square shape and with improved bond for the measurement of the percentage elongation after their breaking, in accordance with the standards.
The machine can mark specimens as follows:
- Round from 4 mm up to 50 mm diameter
- Flat from 4 mm up to 50 mm thickness.
- Square from 4 mm to 45 mm side
Useful length 300 mm. Marking steps 5 or 10 mm, selectable with lateral graduation. Marking speed 60 marks per minute, 400 V, 3 ph 50 Hz, dimensions 530x480x445 mm, weight 58 kg.

H057 Broaching machine
Used to make notchings on impact test bars for resilience tests. The piston with rack grants a correct alignment of the broach to the specimen and a perfect axial thrust.
H057-10 Broach for “V” notchings on specimens with square section 10x10 mm
H057-11 Broach for “U” notchings on specimens with square section 10x10 mm

H060 Pendulum impact Charpy tester for resilience tests
ASTM E23, EN 10045-1, UNI 4431, 4714 - ISO TC/7
The tester is equipped with a falling pendulum hammer, able to break, with a single blow, a sample carved in the middle and positioned on two supports. The test is carried out on a Charpy sample in order to check the energy absorbed during the impact, which is measured in joule.
The value stands for the impact strength of the material (resilience). Consists of cast iron frame, pendulum with hardened knife, brake device to stop the pendulum, impact energy 300J with 2J graduation, falling angle 140°, real weight kg 21.300, impact speed 5.187 m/s. Supplied complete with knife-edge to perform the test as per ASTM Standard. Dimensions 500x1400x1900 mm, weight 470 kg
H060-01 Protection cage

H065 Cold bend testing machine
For bending steel bars at 180º or at 90º and straighten of at least 20º. Rugged frame supporting a beam with cylinder with relevant load piston fixed on it. Activated by hydraulic cell with speed adjuster, direction control valve, max. pressure valve, control gauge. Max piston load 16 t, max. piston stroke 550 mm, 400 V, 3 ph, 1500 W. Dimension 154x80x130 cm, weight 350 kg.
The mandrels and mandrel-holders have to be ordered separately.
H075-01P Hardness tester Equotip 3
ASTM A956, DIN 50156
For the determination of the hardness of steel. The Equotip 3 is a hand-held metal hardness tester with a rugged shock-resistant housing and sealed membrane keypad. It converts directly to all common harness scales like HV, HB, HRC, HRB, HRA, HS, Rm, accuracy ± 4 HL (0.5¢ at 800 HL) with automatic correction for impact direction. Internal storage of up to 100'000 measured values in a flexible user-defined file/folder structure. Down/upload data from/to PC via USB, Ethernet or RS232. With D-probe (other probes are available), battery, in carrying case. Dimensions 170x200x45 mm, weight 3 kg.
This section proposes a wide range of laboratory equipment and accessories that cannot be located in a specific application, but they are utilized for general purposes and are suitable to perform properly different measuring procedures of liquids and solids, weighing, temperature, containers, still, pH, chemicals, reagents etc.
General equipment

Balances
Mechanical balances

V016 - V017 Mechanical balances "Ohaus"
V016  Triple beam balance 2610 gx0.1 g, stainless steel pan, set of weights, weight 4 kg.
V017  Heavy duty solution balance 20 kgx 1 g, with set of weights, sliding weight for tare up to 2270 g, holding plate 280 mm Ø, weight 20 kg.

V031 - V034 Semi-automatic zero-centering balance
This scale with central zero is particularly suitable for predetermined weights. It has two pans; the sample is placed on the main pan and the weights are placed on the other until the pointer indicates the dial. Without weights

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Sensitivity</th>
<th>Dial</th>
</tr>
</thead>
<tbody>
<tr>
<td>V031</td>
<td>10 kg</td>
<td>1 g</td>
<td>-100/+100 g</td>
</tr>
<tr>
<td>V034</td>
<td>30 kg</td>
<td>5 g</td>
<td>-250/+250 g</td>
</tr>
</tbody>
</table>

V036 Weights for balances
Set of brass weights, total 1000 g, formed by 1x500 g, 1x200 g, 2x100 g, 1x50 g, 1x20 g, 2x10 g, 1x5 g, 2x2 g, 1x1 g.

V057+V059 Rotary automatic scales
Five pointer turns allowing a larger amplitude of the subdivision. Double quadrant and under quadrant sticking for multiples, oil oscillation shock-absorber, with exterior adjustment. Displacement of the head in all positions without angulation limit. Pan, mass-produced, stainless steel.

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>V057</td>
<td>60 kg</td>
<td>20 g</td>
</tr>
<tr>
<td>V059</td>
<td>150 kg</td>
<td>50 g</td>
</tr>
</tbody>
</table>

V051 Batching scale
Painted metal, double oscillation, case in strong profiled, platform in reinforced steel. With set of weights.

<table>
<thead>
<tr>
<th>Models</th>
<th>Capacity</th>
<th>Sensitivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>V051</td>
<td>200 kg</td>
<td>100 g</td>
</tr>
</tbody>
</table>
V065-02 Electronic analytical balance
Capacity 200 g, readability 0.0001 g (0.1 mg), tolerance ±0.2 mg. Outer keyboard with direct reading on a wide LCD display. Data interface: RS 232, single pan dia. 85 mm, tare range by subtraction up to full capacity, dust proof plexiglas cover. Ideal for very accurate weightings and for heat of hydration cement tests, 230 V, 50 Hz, dimensions 31x40x45 cm, weight 11 kg.

V085 Specific gravity frame
EN 12390-7, 1097-6, BS 812, 1881 :14
Used for specific gravity determination of concrete, aggregates etc. with a suitable electronic balance fitted with an underhook facility. Robust steel frame, on its lower part a platform adjustable in height, holding a water container, allowing the specific gravity test. The balance is not included and must be ordered separately. Dimensions 510x510x1150 mm, weight 50 kg.

V085-01 Cradle for holding concrete cube and cylinder specimens
V041 Density basket, stainless steel, dia. 200 mm x h 200 mm, mesh 3.35 mm
V072-02 Electronic balance
capacity 5500 g, precision 0.01/0.1 g
**V070-01 - V075-22 Electronic precision top loading and platform balances**

For laboratory general purposes, most of them are fitted with under balance weighting facility for specific gravity test and RS232 for PC and printer connection. Sturdy and precise, they are fitted with strain gauge cells and large backlighted display. Immediate zeroing and tare, automatic stabilization, automatic changeover of scale sensitivity for dual range models, 230 V

<table>
<thead>
<tr>
<th>Model</th>
<th>Capacity</th>
<th>Readability</th>
<th>Pan Ø mm</th>
<th>Standard accessories</th>
</tr>
</thead>
<tbody>
<tr>
<td>V070-01</td>
<td>150 g</td>
<td>0.005 g</td>
<td>124x144</td>
<td>A + F + G</td>
</tr>
<tr>
<td>V070-02</td>
<td>160 g</td>
<td>0.001 g</td>
<td>Ø 110</td>
<td>G</td>
</tr>
<tr>
<td>V070-03</td>
<td>300 g</td>
<td>0.01 g</td>
<td>Ø 110</td>
<td>G</td>
</tr>
<tr>
<td>V070-04</td>
<td>300 g</td>
<td>0.1 g</td>
<td>132x160</td>
<td>C</td>
</tr>
<tr>
<td>V070-05</td>
<td>330 g</td>
<td>0.001 g</td>
<td>Ø 110</td>
<td>A + F + G</td>
</tr>
<tr>
<td>V070-06</td>
<td>500 g</td>
<td>0.001 g</td>
<td>Ø 110</td>
<td>A + F + G</td>
</tr>
<tr>
<td>V070-07</td>
<td>600 g</td>
<td>0.02 g</td>
<td>Ø 110</td>
<td>G</td>
</tr>
<tr>
<td>V070-08</td>
<td>600 g</td>
<td>0.2 g</td>
<td>132 x 160</td>
<td>C</td>
</tr>
<tr>
<td>V070-09</td>
<td>800 g</td>
<td>0.01 g</td>
<td>Ø 160</td>
<td>A + F</td>
</tr>
<tr>
<td>V071-01</td>
<td>1000 g</td>
<td>1 g</td>
<td>180x180</td>
<td></td>
</tr>
<tr>
<td>V071-02</td>
<td>1200 g</td>
<td>0.01 g</td>
<td>Ø 130</td>
<td>A + F + G</td>
</tr>
<tr>
<td>V071-03</td>
<td>1500 g</td>
<td>0.5 g</td>
<td>132x160</td>
<td></td>
</tr>
<tr>
<td>V071-04</td>
<td>1700 g</td>
<td>0.01 g</td>
<td>Ø 160</td>
<td>A + F</td>
</tr>
<tr>
<td>V071-05</td>
<td>3000 g</td>
<td>0.1 g</td>
<td>140x170</td>
<td>G</td>
</tr>
<tr>
<td>V071-06</td>
<td>3000 g</td>
<td>1 g</td>
<td>232x232</td>
<td></td>
</tr>
<tr>
<td>V071-07</td>
<td>3100 g</td>
<td>0.01 g</td>
<td>Ø 160</td>
<td>A + F + G</td>
</tr>
<tr>
<td>V071-08</td>
<td>4500 g</td>
<td>0.1 g</td>
<td>Ø 160</td>
<td>A + F</td>
</tr>
<tr>
<td>V071-09</td>
<td>5000 g</td>
<td>1 g</td>
<td>150x160</td>
<td>A</td>
</tr>
<tr>
<td>V071-10</td>
<td>2200 g</td>
<td>0.01 g</td>
<td>Ø 160</td>
<td>A + F + G</td>
</tr>
<tr>
<td>V071-11</td>
<td>4100 g</td>
<td>0.01 g</td>
<td>Ø 160</td>
<td>A + F + G</td>
</tr>
<tr>
<td>V072-01</td>
<td>5000 g</td>
<td>5 g</td>
<td>180x180</td>
<td></td>
</tr>
<tr>
<td>V072-02</td>
<td>800 g/5500 g</td>
<td>0.01/0.1 g</td>
<td>Ø 160</td>
<td>A + F + G</td>
</tr>
<tr>
<td>V072-04</td>
<td>1000 g/10 kg</td>
<td>0.1/1 g</td>
<td>190x210</td>
<td>A + F</td>
</tr>
<tr>
<td>V072-05</td>
<td>10 kg</td>
<td>0.1 g</td>
<td>175x200</td>
<td>E + F + G</td>
</tr>
<tr>
<td>V072-06</td>
<td>12 kg</td>
<td>0.1 g</td>
<td>320x360</td>
<td>A + F + G</td>
</tr>
<tr>
<td>V072-07</td>
<td>15 kg</td>
<td>0.5 g</td>
<td>210x210</td>
<td></td>
</tr>
<tr>
<td>V072-08</td>
<td>15 kg</td>
<td>5 g</td>
<td>232x232</td>
<td>G</td>
</tr>
<tr>
<td>V072-09</td>
<td>4500 g/16 kg</td>
<td>0.1/1 g</td>
<td>320x210</td>
<td>A + F + G</td>
</tr>
<tr>
<td>V073-01</td>
<td>16 kg</td>
<td>0.1 g</td>
<td>320x360</td>
<td>A + F + G</td>
</tr>
<tr>
<td>V073-02</td>
<td>20 kg</td>
<td>1 g</td>
<td>250x210</td>
<td>G</td>
</tr>
<tr>
<td>V073-03</td>
<td>4500/30 kg</td>
<td>0.5 g</td>
<td>450x500</td>
<td>A</td>
</tr>
<tr>
<td>V073-04</td>
<td>4500 g/30 kg</td>
<td>0.1/1 g</td>
<td>320x360</td>
<td>A + F + G</td>
</tr>
</tbody>
</table>
### General equipment

#### Glassware

**Measuring cylinders, beakers, pyrometers**

<table>
<thead>
<tr>
<th>V098 - V099-07 Measuring cylinders</th>
<th>Capacity in ml</th>
<th>Transparent plastic spouted</th>
<th>Glass with stopper</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 V098</td>
<td>10</td>
<td></td>
<td>V099</td>
</tr>
<tr>
<td>25 V098-01</td>
<td>25</td>
<td></td>
<td>V099-01</td>
</tr>
<tr>
<td>50 V098-02</td>
<td>50</td>
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<td>V099-02</td>
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<tr>
<td>100 V098-03</td>
<td>100</td>
<td></td>
<td>V099-03</td>
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<tr>
<td>250 V098-04</td>
<td>250</td>
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<td>V099-04</td>
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<tr>
<td>500 V098-05</td>
<td>500</td>
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<td>V099-05</td>
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<tr>
<td>1000 V098-06</td>
<td>1000</td>
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<td>V099-06</td>
</tr>
<tr>
<td>2000 V098-07</td>
<td>2000</td>
<td></td>
<td>V099-07</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>V100 - V101-07 Measuring cylinders</th>
<th>Capacity in ml</th>
<th>Opaque plastic spouted</th>
<th>Transparent glass spouted</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 V100</td>
<td>10</td>
<td></td>
<td>V101</td>
</tr>
<tr>
<td>25 V100-01</td>
<td>25</td>
<td></td>
<td>V101-01</td>
</tr>
<tr>
<td>50 V100-02</td>
<td>50</td>
<td></td>
<td>V101-02</td>
</tr>
<tr>
<td>100 V100-03</td>
<td>100</td>
<td></td>
<td>V101-03</td>
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<tr>
<td>250 V100-04</td>
<td>250</td>
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<td>V101-04</td>
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<tr>
<td>500 V100-05</td>
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<tr>
<td>1000 V100-06</td>
<td>1000</td>
<td></td>
<td>V101-06</td>
</tr>
<tr>
<td>2000 V100-07</td>
<td>2000</td>
<td></td>
<td>V101-07</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>V102 - V102-04 Decanters, polypropylene made</th>
<th>Capacity ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>V102-01</td>
<td>500</td>
</tr>
<tr>
<td>V102-02</td>
<td>1000</td>
</tr>
<tr>
<td>V102-03</td>
<td>2000</td>
</tr>
<tr>
<td>V102-03</td>
<td>2000</td>
</tr>
<tr>
<td>V102-04</td>
<td>3000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>V104 Beakers, pyrex glass with spout, squat form</th>
<th>Capacity ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>V104</td>
<td>25</td>
</tr>
<tr>
<td>V104-01</td>
<td>50</td>
</tr>
<tr>
<td>V104-02</td>
<td>100</td>
</tr>
<tr>
<td>V104-03</td>
<td>250</td>
</tr>
<tr>
<td>V104-04</td>
<td>600</td>
</tr>
<tr>
<td>V104-05</td>
<td>1000</td>
</tr>
<tr>
<td>V104-06</td>
<td>2000</td>
</tr>
<tr>
<td>V104-07</td>
<td>5000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>V105 - V105-08 Pyknometer, pyrex glass, with ground-in-perforated stopper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mouth Ø 29 mm</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>V105-03</td>
</tr>
<tr>
<td>V105</td>
</tr>
<tr>
<td>V105-01</td>
</tr>
<tr>
<td>V105-02</td>
</tr>
<tr>
<td>--</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>V103 Pyknometer, borosilicate glass</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>V103</td>
</tr>
<tr>
<td>V103-01</td>
</tr>
<tr>
<td>V103-02</td>
</tr>
</tbody>
</table>
General equipment
Flasks, reagent bottles, containers, tins

V106 - V106-04 Conical flasks, Erlenmeyer, pyrex glass wide mouth
V106  100 ml
V106-01  250 ml
V106-02  500 ml
V106-03  1000 ml
V106-04  2000 ml

V107 - V107-04 Filter flask, pyrex glass, for vacuum filtering
V107  250 ml
V107-01  500 ml
V107-02  1000 ml
V107-03  2000 ml

V108 - V108-02 Specific gravity Gay-Lussac bottles
V108  25 ml
V108-01  50 ml
V108-02  100 ml
V108-03  200 ml

V109 - V109-03 Volumetric flask, borosilicate glass, with plastic stopper,
ASTM D854, BS-ISO 1042
V109  100 ml
V109-01  250 ml
V109-02  1000 ml
V109-03  500 ml

V109-04 - V109-07 Volumetric flask, unstoppered, borosilicate glass
V109-04  100 ml
V109-05  250 ml
V109-06  500 ml
V109-07  1000 ml
V109-08  2000 ml

V108-10 – V108-12 Reagent bottles
V108-10  250 ml
V108-11  500 ml
V108-12  1000 ml

V125 Sample containers, tinned steel, airtight lid
V125  capacity 0.5l
V125-01  capacity 1l
V125-03  capacity 5l

V122 - V122-11 Tins, with or without cover
V122  Ø 55 x 35 mm, with cover
V122-01  Ø 55 x 65 mm, with cover
V122-02  Ø 75 x 50 mm, with cover
V122-03  Ø 57 x 32 mm, without cover
V122-04  Ø 45 x 13 mm, without cover
V122-05  Ø 55 x 35 mm, without cover
V122-06  Ø 70 x 45 mm, without cover
V122-07  Ø 90 x 20 mm, aluminium, with cover
V122-11  Ø 55 x 36 mm, without cover
General equipment

Small laboratory material
Boxes, pans, mortar and pestle, dishes, bowls, crucible

V127 - V127-02 Boxes, plastic, stacking
V127  38x28x20 cm, 20l
V127-01  56x33x25 cm, 50l
V127-02  65x38x32 cm, 80l

Ref. 578: V127 - V127-02

V182 - V182-08 Galvanized steel pans

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimension mm</th>
<th>Model</th>
<th>Dimension ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>V182</td>
<td>600x600x80</td>
<td>V182-06</td>
<td>306x306x38</td>
</tr>
<tr>
<td>V182-03</td>
<td>500x400x120</td>
<td>V182-07</td>
<td>460x460x50</td>
</tr>
<tr>
<td>V182-04</td>
<td>250x120x80</td>
<td>V182-08</td>
<td>910x910x76</td>
</tr>
</tbody>
</table>

Ref. 579: V182 - V182-08

V182 - V182-13 Aluminium pans
V182-01  370x260x50
V182-02  330x220x50
V182-05  270x180x50

Ref. 580: V182-01 - V182-13

V112 - V112-04 Mortar and pestle, porcelain

<table>
<thead>
<tr>
<th>Model</th>
<th>Ø</th>
<th>Height</th>
<th>Model</th>
<th>Ø</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>V112</td>
<td>100 mm</td>
<td>60 mm</td>
<td>V112-03</td>
<td>180 mm</td>
<td>92 mm</td>
</tr>
<tr>
<td>V112-01</td>
<td>125 mm</td>
<td>65 mm</td>
<td>V112-04</td>
<td>200 mm</td>
<td>100 mm</td>
</tr>
<tr>
<td>V112-02</td>
<td>150 mm</td>
<td>76 mm</td>
<td>V112-04</td>
<td>200 mm</td>
<td>100 mm</td>
</tr>
</tbody>
</table>

Ref. 581: V112 - V112-04

V113 Rubber heated pestle

V114 - V114-07 Evaporating dishes, porcelain, with sput
V114-01  Ø 80 mm  V114-04  Ø 160 mm
V114-02  Ø 100 mm V114-05  Ø 210 mm
V114-03  Ø 120 mm V114-06  Ø 254 mm

Ref. 582: V116

V116 - V116-03 Mixing bowls, stainless steel
V116-03 Ø 160 mm
V116      Ø 240 mm
V116-01   Ø 300 mm
V116-02   Ø 350 mm
V116-05   Mortar and Pestle, stainless steel, 135 mm long

V117 - V117-04 Porcelain Crucible

V117  Porcelain crucible, 30 ml, squat form
V117-01 Porcelain lid for V117
V117-02 Porcelain crucible, 50 ml, squat form
V117-03 Porcelain lid for V117-02
V117-04 Platinum crucible, 25 ml

V140  Buchner funnel, porcelain, diameter 115 mm, for use with 110 mm dia. filter paper.

Ref. 583: V117 Ref. 584: V140
### General equipment

**Small laboratory material**
- Bottles, funnels, bucket, watch glass, Petri dish

<table>
<thead>
<tr>
<th>Reference</th>
<th>Description</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>V118</td>
<td>Plastic bottles, wide mouth stoppered</td>
<td></td>
</tr>
<tr>
<td>V118-01</td>
<td></td>
<td>500 ml</td>
</tr>
<tr>
<td>V118-02</td>
<td></td>
<td>1000 ml</td>
</tr>
<tr>
<td>V118-03</td>
<td></td>
<td>2000 ml</td>
</tr>
<tr>
<td>V128</td>
<td>Bucket, plastic with handle</td>
<td>12 litres</td>
</tr>
<tr>
<td>V135</td>
<td>Funnels, plastic</td>
<td></td>
</tr>
<tr>
<td>V135-01</td>
<td></td>
<td>140 mm</td>
</tr>
<tr>
<td>V135-02</td>
<td></td>
<td>120 mm</td>
</tr>
<tr>
<td>V136</td>
<td>Funnels, wide mouth, plastic</td>
<td></td>
</tr>
<tr>
<td>V136-01</td>
<td></td>
<td>max. 80 mm, min. 15 mm</td>
</tr>
<tr>
<td>V136-02</td>
<td></td>
<td>max. 120 mm, min. 30 mm</td>
</tr>
<tr>
<td>V136-03</td>
<td></td>
<td>max. 150 mm, min. 35 mm</td>
</tr>
<tr>
<td>V138</td>
<td>Filter funnel</td>
<td></td>
</tr>
<tr>
<td>V140</td>
<td></td>
<td>Pyrex glass, Ø 90 mm for particle analysis test to BS 1377</td>
</tr>
<tr>
<td>V120</td>
<td>Wash bottles, plastic</td>
<td></td>
</tr>
<tr>
<td>V120-01</td>
<td></td>
<td>100 ml</td>
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<tr>
<td>V120-02</td>
<td></td>
<td>250 ml</td>
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<tr>
<td>V120-03</td>
<td></td>
<td>500 ml</td>
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<tr>
<td>V121</td>
<td></td>
<td>1000 ml</td>
</tr>
<tr>
<td>V110</td>
<td>Weighting bottles, glass, with cover</td>
<td></td>
</tr>
<tr>
<td>V110-01</td>
<td></td>
<td>Ø 50 x h 30 mm</td>
</tr>
<tr>
<td>V110-02</td>
<td></td>
<td>Ø 25 x h 40 mm</td>
</tr>
<tr>
<td>V111</td>
<td>Hubbard specific gravity bottle</td>
<td>ASTM D70</td>
</tr>
<tr>
<td>V111-01</td>
<td></td>
<td>24 ml</td>
</tr>
<tr>
<td>V111-02</td>
<td></td>
<td>25 ml</td>
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<tr>
<td>V115</td>
<td>Watch glass (beaker cover)</td>
<td></td>
</tr>
<tr>
<td>V115-01</td>
<td></td>
<td>100 mm</td>
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<tr>
<td>V115-02</td>
<td></td>
<td>130 mm</td>
</tr>
<tr>
<td>V119</td>
<td>Glass funnel</td>
<td></td>
</tr>
<tr>
<td>V119-01</td>
<td></td>
<td>25 mm</td>
</tr>
<tr>
<td>V119-02</td>
<td></td>
<td>50 mm</td>
</tr>
<tr>
<td>V119-03</td>
<td></td>
<td>100 mm</td>
</tr>
<tr>
<td>V120</td>
<td>Petri dish with cover, pyrex glass, Ø 100 mm</td>
<td></td>
</tr>
<tr>
<td>V123-01</td>
<td>Petri dish with cover, pyrex glass, Ø 60 mm</td>
<td></td>
</tr>
<tr>
<td>V124</td>
<td>Dropping bottle, 100 ml capacity</td>
<td></td>
</tr>
</tbody>
</table>

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**Beratest AG**
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CH-5036 Oberentfelden
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Fax +41 062 723 43 58
e-mail: info@beratest.com
www.beratest.com
### General equipment

**Small laboratory material**

- Pipettes, sample bags, brushes, gloves, stirring rods, pencils

#### V142 - V142-05 Graduated pipettes, type Mohr, soda glass
- V142: 1 ml/0.01 ml
- V142-01: 5 ml/0.1 ml
- V142-03: 10 ml/0.1 ml

#### V143 - V143-02 Graduated burettes, bended, soda glass, with stopcock
- V143: 25 ml, subdivision 0.1 ml
- V143-01: 50 ml, subdivision 0.1 ml
- V143-02: 100 ml, subdivision 0.2 ml

#### V145 - V145-11 Sample bags, heavy plastic
- V145-10: Sample bags, 25x35 cm
- V145-11: Sample bags, 40x60 cm

#### V178 - V179-04 Soft brush to clean sieves etc.
- V178: Soft brush, for cleaning sieves etc.
- V178-01: Fine wire brush
- V178-03: Bottle brush Ø 50 mm
- V179: Bristle, round, Ø 35 mm soft hair
- V179-01: Bristle, flat 62 mm, soft hair
- V179-02: Sieve brush, double-ended, brass/nylon
- V179-03: Sieve brush, double-ended, soft/hard nylon
- V179-04: Sieve brush, fine brass
- V179-05: Soft hair brush, dia. 3 mm, BS 812
- V179-06: Bristle, flat, 60 mm, nylon

#### V177 Heat resistant gloves
- V177-01: Neoprene gloves

#### V147 Stirring rod, glass
- Ø 8 mm x 250 mm. Set of 10 pieces

#### V147-01 Marking pencil
- Set of 12 pieces
General equipment
Scoops, spoon, ladle, trowel, shovel, pick mattock, spatulas

V183 - V184-02 Round aluminium scoops

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimension mm</th>
<th>ml</th>
<th>Model</th>
<th>Dimension mm</th>
<th>ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>V183</td>
<td>245x80</td>
<td>325</td>
<td>V184-02</td>
<td>380x145</td>
<td>1550</td>
</tr>
<tr>
<td>V184</td>
<td>260x90</td>
<td>500</td>
<td>V184-03</td>
<td>420x160</td>
<td>2600</td>
</tr>
<tr>
<td>V184-01</td>
<td>335x120</td>
<td>1000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

V184-04 - V184-07 Flat aluminium scoops

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimension mm</th>
<th>ml</th>
<th>Model</th>
<th>Dimension mm</th>
<th>ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>V184-04</td>
<td>210x70</td>
<td>165</td>
<td>V184-06</td>
<td>350x135</td>
<td>755</td>
</tr>
<tr>
<td>V184-05</td>
<td>310x110</td>
<td>450</td>
<td>V184-07</td>
<td>400x155</td>
<td>1550</td>
</tr>
</tbody>
</table>

V185 - V185-03 Round stainless steel scoops

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimension mm</th>
<th>Capacity ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>V185</td>
<td>100x185</td>
<td>500</td>
</tr>
<tr>
<td>V185-01</td>
<td>120x200</td>
<td>1000</td>
</tr>
<tr>
<td>V185-02</td>
<td>150x270</td>
<td>2000</td>
</tr>
<tr>
<td>V185-03</td>
<td>125x250,</td>
<td>5 kg of concrete</td>
</tr>
</tbody>
</table>

V186 Sampling spoon, large size
V186-01 Ladle, stainless steel

V187 Trowel 120x260 mm, stainless steel
V188 Trowel 100x200 mm, stainless steel
V189 Trowel 60x140 mm, stainless steel

V196 Shovel, with handle
V197 Pick mattock with handle

V192 - V192-03 Flexible spatulas, stainless steel

<table>
<thead>
<tr>
<th>Model</th>
<th>Blade length mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>V192</td>
<td>100 mm</td>
</tr>
<tr>
<td>V192-01</td>
<td>150 mm</td>
</tr>
<tr>
<td>V192-02</td>
<td>200 mm</td>
</tr>
<tr>
<td>V192-03</td>
<td>300 mm</td>
</tr>
<tr>
<td>V192-08</td>
<td>Spatula Chattaway 120 mm</td>
</tr>
</tbody>
</table>

V192-04 - V192-08 Rigid spatulas, stainless steel

<table>
<thead>
<tr>
<th>Model</th>
<th>Lame length</th>
</tr>
</thead>
<tbody>
<tr>
<td>V192-04</td>
<td>20 mm</td>
</tr>
<tr>
<td>V192-05</td>
<td>50 mm</td>
</tr>
<tr>
<td>V192-06</td>
<td>70 mm</td>
</tr>
<tr>
<td>V192-07</td>
<td>100 mm</td>
</tr>
</tbody>
</table>
**General equipment**

**Laboratory items**
Hammers, mallet, chisel, pick, vacuum pump, air compressors

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**V193 Steel hammer, 300 g**

**V194 Steel mallet, 1000 g**

**V195 Rubber mallet, head Ø 55 mm**

**V198 Density chisel, 300 mm long x 25 mm wide**

**V199 Density pick, small sized**

Ref. 605: V193 - V199

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**V204 Vacuum pump**

Portable, volume sucked 5 m3/h, ultimate vacuum 730 mm/Hg, 230 V, 50 Hz.
Dimensions 220x260x190mm, weight 12 kg.

Ref. 606: V204

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**V206 Air compressor**

Receiver capacity is 50 litres and it delivers 70 litres of air per minute at 6 ATM. Air delivery 240 litre/min. at room pressure, max. pressure is 8 kg/cm2 (800 kPa), 230 V, 50 Hz, 30 kg.

Ref. 607: V206

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**S351 Air compressor**

Max. pressure 17 bars, receiver capacity 5 litres, 230 V, 50 Hz, dimensions 520x310x400 mm, weight 35 kg.

Ref. 608: S351
**General equipment**

**Heating**

Hot plates, magnetic stirrer/heater, Bunsen burner

**V200 - V200-06 Hot plates**

With thermoregulator, 230 V, 50 Hz.

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimension</th>
<th>Watt</th>
</tr>
</thead>
<tbody>
<tr>
<td>V200</td>
<td>Round, Ø 185 mm</td>
<td>1500 W</td>
</tr>
<tr>
<td>V200-02</td>
<td>Round, Ø 220 mm</td>
<td>2000 W</td>
</tr>
<tr>
<td>V200-01</td>
<td>Rectangular 200x300 mm</td>
<td>1500 W</td>
</tr>
<tr>
<td>V200-03</td>
<td>Rectangular 300x400 mm</td>
<td>2400 W</td>
</tr>
<tr>
<td>V200-05</td>
<td>Rectangular 400x500 mm</td>
<td>3400 W, up to 400°C</td>
</tr>
<tr>
<td>V200-06</td>
<td>Rectangular 400x600 mm</td>
<td>4000 W</td>
</tr>
</tbody>
</table>

**B074 Hot plate with thermoregulator**

Dia. 160 mm, 230 V, 50 Hz, 1000 W

**B073-01 Magnetic stirrer/heater**

For titration and stirring of liquid and semi-solid materials, dia. 150 mm, variable speed and temperature by electronic regulators, complete with magnetic Teflon coated follower, 230 V, 50 Hz, 400 W

**V201-01 Butane three-burner**

Field heater, to be used with a common butane cylinder, dimensions 600x320x90 mm, weight 5 kg

**V173 KIT Bunsen burner**

With air control, tripod dia. 100x150 mm and iron wire gauze 150 mm square with ceramic centre

- V173-01 Bunsen burner with air control
- V173-02 Tripod dia. 100x150 mm
- V173-05 Tripod dia. 120x220 mm
- V173-06 Tripod dia. 150x230 mm
- V173-03 Iron wire gauze, 150 mm square with ceramic centre
- V173-04 Iron wire gauze, 200 mm square with ceramic centre
- V174 Crucible tongs
**General equipment**

**Thermometers**

**Digital thermometers and thermo-hygrometers**

**V150 - V152 Digital thermometers**

Complete with depth stainless steel probe, for temperature measurements of liquid, fluid, semisolid, granular materials, air. The probe is directly connected to the digital unit.

<table>
<thead>
<tr>
<th>Model</th>
<th>Range °C</th>
<th>Res. °C</th>
<th>Accuracy</th>
<th>Probe Ø x length</th>
</tr>
</thead>
<tbody>
<tr>
<td>V150</td>
<td>-50/+150</td>
<td>0.1</td>
<td>± 0.3</td>
<td>3x105 mm</td>
</tr>
<tr>
<td>V151</td>
<td>-50/+220</td>
<td>0.1</td>
<td>± 0.3</td>
<td>5x125 mm</td>
</tr>
<tr>
<td>V152</td>
<td>-40/+550</td>
<td>1.0</td>
<td>± 2.0</td>
<td>3x130 mm</td>
</tr>
</tbody>
</table>

**V153 Digital thermometer**

Including remote probe connected to the instrument with 1 m cable. Temperature range: -50/+150°C, resolution 0.1°C, accuracy ± 0.3°C, stainless steel probe Ø 3x160 mm

**V154 Digital microprocessor thermometer**

Rugged, easy to use portable instrument with K-type sensor for high temperature measurements, it is equipped with a membrane keyboard and microprocessor with memory functions of: hold, min/max temperatures measured in the cycle, °C/F readings. Dual temperature range -50/+200 °C/0.1 °C, +200/ +1350°C/1°C, accuracy ± 0.5% full scale, power supply 1x9 V battery. Supplied without probe to be selected and ordered separately.

**V154-01 - V154-04 Probes, stainless steel**

K-type sensor, with 1 metre cable and connector

| V154-01 Penetration probe | Ø 3x120 mm, max temp. 900°C |
| V154-02 Surface probe | Ø 16x260 mm, max. temperature 650° |
| V154-03 Air probe | Ø 3x245 mm, max temperature 300 °C |
| V154-04 General purpose probe | Ø 5x220 mm, max. temperature 900°C |

**V160 - V161-06 Digital thermometers**

For general-purpose use and temperature measurement of freshly mixed concrete, bituminous mixtures. Stainless steel.

<table>
<thead>
<tr>
<th>Model</th>
<th>Range °C</th>
<th>Sub-Div. °C</th>
<th>Dial Ø mm</th>
<th>Stem length mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>V160</td>
<td>-40/+40</td>
<td>1</td>
<td>50</td>
<td>250</td>
</tr>
<tr>
<td>V160-01</td>
<td>0/+60</td>
<td>1</td>
<td>50</td>
<td>250</td>
</tr>
<tr>
<td>V160-02</td>
<td>0/+100</td>
<td>2</td>
<td>50</td>
<td>250</td>
</tr>
<tr>
<td>V160-03</td>
<td>0/+250</td>
<td>5</td>
<td>50</td>
<td>250</td>
</tr>
<tr>
<td>V160-04</td>
<td>0/+400</td>
<td>10</td>
<td>75</td>
<td>600</td>
</tr>
<tr>
<td>V160-05</td>
<td>0/+60</td>
<td>1</td>
<td>75</td>
<td>600</td>
</tr>
<tr>
<td>V160-06</td>
<td>0/+250</td>
<td>5</td>
<td>75</td>
<td>600</td>
</tr>
</tbody>
</table>

**V164 - V164-03 Thermometers**

Glass stem and mercury system, for general laboratory use

V164  -5/+ 50°C /0.5°C
V164-01 -10/+ 100°C/1°C
V164-02 -10/+ 200°C/1°C
V164-03 -10/+ 300°C/1°C

**V165 Thermo-hygrometer digital portable**

with detachable probe, it measures and displays in a short time both relative humidity and temperature. Scale: R.H. 10 to 95%, resolution 0.1%, accuracy ± 2%. Temperature 0-60°C, resolution 0.1°C, accuracy ± 0.4°C, battery 1x9 V. Dimension 185x82x45 cm, weight 400 g.
**General equipment**

Small laboratory material
Clamps, metal stands, trolley, tool kit, rubber tubing, sand bath

**V220 - V220-05 Clamps**
- V220 Hoffman screw clamp, max. opening 25 mm
- V220-01 Mohr clamp
- V220-02 Double sleeve metal/metal, Ø 10+25 mm
- V220-03 Double sleeve metal/metal, Ø 10+20 mm
- V220-04 Simple clamp, Ø 10+20 mm
- V220-05 Simple clamp, Ø 20+30 mm

**V19 Metal stands with rod**
- 165x140 mm, rod Ø 10 mm, height 500 mm, weight 3 kg

**V19-01 Metal stand with rod**
- 200x260 mm, rod Ø 12 mm, height 800 mm, weight 5 kg

**V224 - V225 Laboratory trolley**
Used for laboratory displacement of heavy pieces like moulds, soil and concrete samples etc. Steel made, mounted on rubber wheels.
- V224 Trolley platform size  60x40 cm, weight 20 kg
- V224-01 Trolley platform size 100x60 cm, weight 50 kg
- V225 Trolley at double shelf size 80x45 cm, 20 kg

**V222 Tool kit**
For general purpose uses, weight 7 kg

**V230 - V230-02 Rubber tubing**

<table>
<thead>
<tr>
<th>Model</th>
<th>Ø Interior</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>V230</td>
<td>5.0 mm</td>
<td>5 m</td>
</tr>
<tr>
<td>V230-01</td>
<td>6.5 mm</td>
<td>5 m</td>
</tr>
<tr>
<td>V230-02</td>
<td>8 mm</td>
<td>5 m</td>
</tr>
</tbody>
</table>

**V241 Sand bath**
For the homogeneous heating or evaporation of the content of beakers flasks etc. Inside dimensions 30x24x9 cm, volume 7 litres, 230 V, 50 Hz, weight 17 kg.
General equipment

**Laboratory instruments**
Water stills, aspirator pump, stop watches, vernier caliper, steel rules

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**V212 Water stills, capacity 5 l/h**
Used to produce distilled water, it is equipped of an automatic device to keep the water at a constant level. All stainless steel made, it can be easily dismantled for cleaning and maintenance., 230 V, 50 Hz, 4000 W, dimensions 55x30x65 cm, weight 16 kg.

**V213 Water still, capacity 10 l/h**
Basically similar to V212, 8000 W, dimensions 60x36x75 cm, weight 20 kg.

**V202 Aspirator pump**
Used with current water having approx. pressure of 0.7 kg/cm² to create a moderate vacuum.

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**V171 Timing device, 0-60 minutes, with alarm**

**V170 Stop watch**
Digital, non magnetic, having also watch functions. Precision 0.1 second.

**V170-01** Stop watch, mechanical dial type, non magnetic. Precision 0.1 second.

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**V175 - V175-02 Vernier caliper**

**V175** Vernier caliper, 0-160 mm x 0.02 mm
**V175-01** Vernier caliper, 0-205 mm x 0.02 mm
**V175-02** Digital vernier caliper, 0-200 mm x 0.01 mm, readings in mm and inch
**V175-03** Vernier caliper digital, 0-153 mm x 0.01 mm

**V176** Steel folding rule, 2 metres long
**V176-01** Steel rule, 300 mm long, 0.5 mm grad.
**V176-02** Steel rule, 500 mm long, 0.5 mm grad
General equipment

Laboratory instruments
pH-meter, conductivity meter, filter paper, thermohygrograph

V214 Digital pH-meter and thermometer
BS 1377:3, ASTM D1067
Accurate, compact model, in plastic carrying case, designed for fast but precise operations also on field conditions. Measuring range 0-14 pH with resolution of 0.01 pH. Temperature range -50 to +150 °C, division 0.1°C. Temperature compensation 0-100°C. Feeding common 9 V battery. With combination electrode, temperature probe, buffer solution powders pH 4 and 7, plastic beakers, weight 3 kg.

Ref. 634: V214

V166-01 Conductivity meter – thermometer
Digital, portable, used for site and laboratory measurements of the conductivity in soils, measuring scale 0 to 3999 µS/cm, resolution 1 µS/cm, accuracy 1%. Temperature in °C and °F, range 0-60°C, resolution 0.1%, automatic temperature calibration and compensation. Use conditions 0-50°C, R.H. 100%, battery 1x9 Volt, weight 100 g

Ref. 635: V166-01

V218-01 - V218-11 Filter paper, set of 100 pieces
Whatman no.

<table>
<thead>
<tr>
<th>Model</th>
<th>Ø</th>
<th>Model</th>
<th>Ø</th>
</tr>
</thead>
<tbody>
<tr>
<td>V218-01</td>
<td>1 x 110 mm</td>
<td>V218-09</td>
<td>54 x 150 mm</td>
</tr>
<tr>
<td>V218-02</td>
<td>1 x 150 mm</td>
<td>V218-10</td>
<td>540 x 150 mm</td>
</tr>
<tr>
<td>V218-05</td>
<td>40 x 150 mm</td>
<td>V218-11</td>
<td>541 x 110 mm</td>
</tr>
<tr>
<td>V218-06</td>
<td>44 x 150 mm</td>
<td>V218-12</td>
<td>54 x 400 mm</td>
</tr>
<tr>
<td>V218-07</td>
<td>40 x 110 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V218-08</td>
<td>50 x 110 mm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Ref. 636: V218-01 - V218-11

V168 Thermo hygrograph
For external use. Simultaneous recording of temperature and humidity on the same chart. Temperature range -35/+45°C. Humidity range 0-100 %, time scale 24 hours or 7 days. Spring operated, weight 6 kg.

V168-01 Thermohygrograph
Internal use. Same as V168 but with temperature range 0 to +40°C, battery operated

Spare parts:
V168-04 Writing pen. Pack of 4 pieces

Ref. 637: V168 - V168-01

Beratest AG
Ausserefeldstrasse 9
CH-5036 Oberentfelden
Suisse/Switzerland
General equipment

Meteorological instruments
Hand anemometer cup, rain gauge

V148-01 Hand anemometer cup
For wind speed in four scales. Measuring ranges: 0-120 km/h, 0 to 70 knots, 0-35 m/s, 0-12 beaufourt, weight 500 g.

Ref. 638: V148-01

V167-01 Rain gauge
For measuring rain fall; professional model, brass made. Capacity 250 cc corresponding to 25 ml of rain with 0.1 mm resolution.

Ref. 639: V167-01