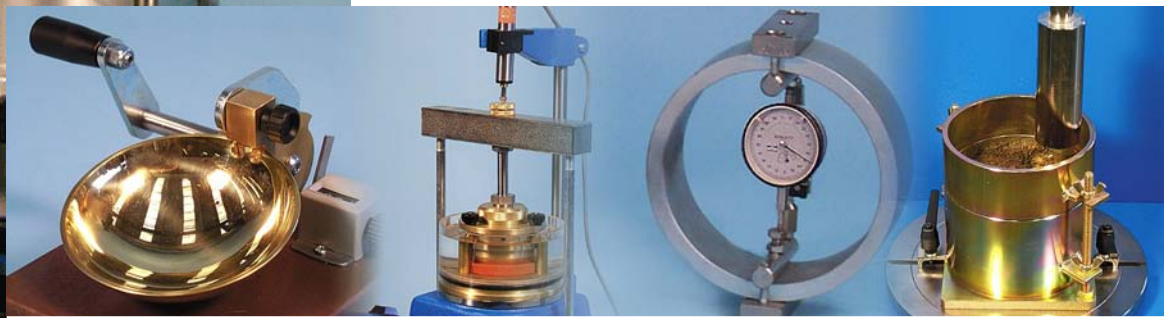


Section S^{SOIL}

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.



Index section

SOIL

	Mod.	Page		Mod.	Page
Absorption cone and tamper.....	S148	239	Lathe.....	S120	235
Acidity test kit of water.....	S135	237	Lightweight dynamic penetrometer.....	S050	228
Air compressor, triaxial.....	S351	273	Limits of soils.....	S165/S178	242/243
Air/water pressure system, triaxial.....	S350	273	Linear shrinkage mould.....	S176	242
Andreasen pipette.....	S144	238	Loads in piles.....	S228	267
Augers, hand and powerhead.....	S092/S098	233	Load proving rings.....	S370	284
Autographic unconfined apparatus.....	S130	236	Moisture density (Proctor test).....	S185/S194	244
Balloon density apparatus.....	S230/S233	258	Moisture density gauge, nuclear.....	S060	230
Bearing plate test equipment.....	S222/S226	256	Null indicator, triaxial.....	S353	274
Blue methylene test set.....	S157	239	Oedometer.....	S260	262
Calibration unit for dials			Organic matter test set.....	S138	237
and extensometers.....	S390	285	Particle size sedimentation.....	S144/S155	238
CBR - California bearing ratio.....	S200	248	Penetrometers, liquid limit.....	S165	242
CBR - in situ apparatus.....	S220	267	Penetrometers, pocket.....	S065/S071	231
CBR/Marshall testers.....	S213/S214	251/253	Penetrometer, Proctor.....	S088	232
CBR/Proctor compactor.....	S198	247	Penetrometer, proving ring.....	S086	232
CBR testing machines.....	S209/S211	250/254	Permeameters.....	S245/S254	260
Chloride test kit of water.....	S136	237	Plastic limit set.....	S178	243
Cohesionless relative density.....	S238	267	Plate bearing test equipment.....	S222/S226	256
Colour soil and standard charts.....	S132/S133	237	Proctor/CBR compactor.....	S198	247
Compaction moulds and rammers,			Proctor test: moisture/density.....	S185/S194	244
Proctor.....	S185/S194	244	Proving rings, load.....	S370	284
Compaction permeameters.....	S252	261	Pyknometers.....	S147	239
Compactor, CBR/Proctor.....	S198	247	Relative density cohesionless.....	S238	267
Cone and tamper, sand absorption.....	S148	239	Sampler, hollow punch.....	S118	235
Cone penetrometers: liquid limit.....	S165	242	Sampler, soil.....	S053	228
Consolidation apparatus: oedometer.....	S260	262	Sampler, core cutter.....	S084	233
Constant head permeameters.....	S245	260	Sand absorption cone + tamper.....	S148	239
Conversion frame, CBR.....	S221	267	Sand density cone, pouring apparatus.....	S234/S237	259
Core cutter; Soil samplers.....	S084/S085	233	Sand equivalent value.....	S158	240
Cybertronic digital unit.....	B044	252	Seismograph.....	S079	232
Data acquisition and processing.....	S349/S364	276/280	Shear apparatus, direct/residual.....	S280	264
De-airing tank.....	S355	274	Shear vane, pocket.....	S075	231
Density bottles, Gay Lussac.....	V105	239	Shrinkage limit set.....	S175	242
Density of soil in place.....	S230/S237	258	Shrinkage mould.....	S176	242
Dial indicators.....	S375/S383	285	Software CBR test.....	S218	254
Direct/Residual shear test apparatus.....	S280	264	Stabilized soil strength.....	S195	246
Earth resistivity meter.....	S077	232	Triaxial equipment.....	S301/S364	268/283
Extruders.....	S112/S114	234	Unconfined compression testers.....	S130	236
Falling head permeameter.....	S246	260	Universal multi-speed load frame.....	S212/S215	251/254
Geogauge, non nuclear density.....	S059	229	Vane field tester.....	S057	228
Hardness test kit of water.....	S137	237	Vane, laboratory.....	S080	230
Hollow punches and tampers.....	S122/S123	235	Vane shear, pocket.....	S075	231
In-situ CBR test set.....	S220	267	Vibrating compaction hammer.....	S197	246
Ion exchange device.....	S140	236	Water level indicator.....	S061	230





S050 Lightweight dynamic penetrometer

STANDARD: DIN 4094

Used to establish 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 out about 8 to 12 metres.

The penetrometer set consists of:

10 Kg. drop rammer, 500 mm. fall and anvil

11 sounding rod Ø 22 mm. x 1 m. length complete with threaded collar and guiding rod

Grooved rod to extract samples

2 drive point 90°, 5 cm² and 10 cm² surface

Lifting device for sounding rod, accessories

Carrying case

Dimensions: 1080x360x220 mm

Weight: 72 Kg



S050



S053

S053-04

S054

S053 Soil sampler

Used to obtain undisturbed soil samples of dia. 1 1/2" (38 mm)

The sampler is formed by:

T handle with extension rod, 900 mm long

Jarring link 3/4"

Stainless sample tube dia. 1 1/2" x 9" (38x230 mm)

Weight: 7 Kg

SPARE-PART AND ACCESSORY:

S053-04

Spare stainless sample tube dia. 1 1/2 x 9"

S054

Hand extruder used to extrude the soil specimens dia. 1 1/2" from the sample tube.

S057 Field inspection pocket vane tester

STANDARD: ASTM D 2573

Used to determine the shear strength of undrained (CU) cohesive soft soils, to firm non-fissured soils on site.

The instrument consists of a T-handle cylindrical body where a torsional spring is housed, and three interchangeable vanes of different sizes, used depending to the expected strength of the soil to be tested.

The vane is inserted into the soil for 60 mm approx., and the max. torque value is measured on a collar attached to the shaft.

Measuring range: 0 - 200 kPa

The unit, all stainless steel made, is supplied complete with three vanes dimensions (height x dia.) 16x32, 20x40, 25,4x50,8 mm, extension rod 500 mm long, tools, carrying case.

Dimensions: 500 x 300 x 100 mm

Weight : 4 kg approx.

ACCESSORY / SPARE:

S057-01 Extension rod, 500 mm long



S057

S059

GOEGAUGE**NON NUCLEAR DENSITY GAUGE FOR SITE SOIL COMPACTION CONTROL, STIFFNESS AND YOUNG MODULUS**

STANDARD: ASTM D6758

Technical features:

Stiffness	3 to 70 MN/m
Young's Modulus	26 to 610 Mpa
Measure Depth	from 230 to 310 mm.
Measure Duration	75 seconds
Power	Six D-Cell Batteries (500 to 1500 measurements)
Accessories	Carrying case, Batteries and Manual
Dimensions	Gauge only 280 mm x 270 mm With case 470x420x330 mm
Weight	15 kg.

Applications include subgrade, subbase, base monitoring the strength gain of lime, cement, fly-ash and polymer stabilised materials, monitoring the re-compacting of asphalt and cold in-place recycling to peak properties to prevent wasted effort and damaging over-compaction. The GeoGauge compliments and provides alternative to resilient modulus, Falling Weight Deflectometer, field California Bearing Ratio, plate load test, dynamic cone penetrometer and other measures of strength, stiffness, modulus and deflection.

The GeoGauge is the only hand portable gauge available to provide the required simplicity, quickness and precision to directly measure and monitor the in-place engineering properties and do so at construction speed. The GeoGauge applies a constant load vibrating force to the soil's surface and measures the resulting displacement. This dynamic technology simulates actual in-use conditions. One instrument to link design specifications with compaction in 75 seconds for enhanced QC/QA. The GeoGauge supports, links, and advances soil compaction process with Mechanistic Design and performance specifications. Soil and other materials are compacted to create a functional structure with the desired engineering properties for the application and life intended.

Effectively monitors the compaction of soil to the preferred engineering properties for no wasted effort and no damaging over-compaction. Readily reveals problem areas for quick remedy while equipment is still on site. Superior to density measurements in reducing construction variability by monitoring for uniform layer properties to enhance the stress distribution from surface to sub grade for longer life, longer lasting surface smoothness and reduce maintenance-all for improved life-cycle cost.



ACCESSORIES:

S059-01 Infrared Interface and Serial Port Adapter with Software Template (PC only)

S059-02 Verifier Mass (verifies Geo-Gauge operation).





S060

Nuclear moisture density gauge

STANDARDS: ASTM D2922, D2950, D3017 - BS 1337, 1924

It provides a rapid method of on-site determination of moisture density content of soils, aggregates and asphaltic concrete.

The microprocessor displays all functions directly.

Wet and dry density, moisture percent, moisture content, percent compaction for both soils and asphaltic concrete, void ratio and percent air voids.

Surce is 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: 400x220x140 mm

Weight: 14 Kg

S060



Water level indicator

Utilized to measure the water level in boreholes, wells and any open underground structures.

A light and audible signal are activated when the probe touches water:

Battery operated, the cable is marked at cm. intervals, drum mounted and the stainless steel tip has diameter of 10 mm

MODELS:

S061 Water level indicator; 50 m cable length

S061-01 Water level indicator; 100 m cable length

S061-02 Water level indicator; 200 m cable length

S061



S080

Laboratory vane apparatus

STANDARD: BS 1377

Used to determine the shear strength of a sample of soil confined within its sample tube. The equipment is supplied with hand operated clutch and the load is applied through the 12,7x12,7 mm. vane by means of any of the four calibrated springs supplied with the instrument.

Dimensions: 300x200x500 mm

Weight: 9 Kg

S080



ACCESSORIES:

S080-03 Vane 12,7 mm diameter x 19 mm long

S080-04 Vane 12,7 mm diameter x 25,4 mm long

S080-05 Attachment to take 38 and 100 mm dia. sample tubes

S080-06 Motorising attachment with feed rate of 10°/min.
220-240V 1ph 50 Hz

SPARE-PARTS:

S080-01 Spare set of four calibrated springs

S080-02 Spare vane 12,7 mm diameter x 12,7 mm long



23 I



POCKET PENETROMETERS AND SHEAR VANES

STANDARDS: ASTM D 1558 - D 2573

MODELS:

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 Kg/cm^2 on the dial graduated from 0 to 5 Kg/cm^2 . Peak hold feature; zero setting by push button.

Weight: 300 g

S066

DIAL POCKET PENETROMETER, identical to mod. S065 but with dial range 3-15 Kg/cm^2 , suitable for very compacted soils.

S068

GEOPOCKET DIAL PENETROMETER, designed 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.

Complete with 5 plungers \varnothing 6,4 - 10 - 15 - 20 - 25 mm.

Weight: 400 g

S070

POCKET PENETROMETER, designed for the rapid determination of soil consistency, shear strength and approximate Unconfined Compression Strength. Scale range 0-4,5 Kg/cm^2 with direct reading strength values. Plunger dia. 6,35 mm.

Weight: 300 g

S071

POCKET PENETROMETER, identical to mod. S070, but having a range of 0 - 16 Kg/cm^2 . Suitable for very compacted soils.

Weight: 800 g.

S075

POCKET SHEAR VANE DEVICE RANGE: 0-1 KG/CM^2

Designed for the rapid determination in the field or in the laboratory of shear strength of cohesive soils. The dial indicates directly the shearing strength in Kg/cm^2 .

Complete with interchangeable stainless steel vane.

Weight: 300 g.

S076

POCKET SHEAR VANE DEVICE RANGE: 0-2 KG/CM^2

Identical to mod. S075 but dial range 0-2 Kg/cm^2 .

SPARE-PART:

S076-01

Stainless steel vane for S075 and S076 devices.

MELTING POT, to melt wax and to cover soil samples keeping them to the original humidity.

See mod. A106
section "A" Aggregates



A106

S077

Earth resistivity meter

STANDARD: 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



ACCESSORY:

S078-01

Power energiser

Energy source for geoelectrical surveys (in alternative to dry batteries or generators).

Dimensions: 35x25x24 cm.

Weight: 6 Kg

S079

Enhancement seismograph, three channels

Used for depth determination of bedrock, foundation investigations, evaluation of gravel, sand, clay etc. deposits.

Instruments managed by a micro-processor.

Incorporated printer.

Complete with set of accessories.



S079

S086

Proving ring penetrometer

Used to determine the bearing strength, compaction degree of subgrades, and also for determining the penetration resistance of soil.

Supplied complete 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 against corrosion.

Weight: 5 Kg



MIXERS to prepare soil samples.

See section "E" Cement



S088

Proctor penetrometer

STANDARD: ASTM D 1558

Used to determine in field the moisture-penetration resistance relationship of fine grained soils.

Spring load with direct reading in Kg. on the sliding rod.

Complete with 9 interchangeable stainless steel needles dia. 4,52 - 5,23 - 6,40 - 9,07 - 12,83 - 16,54 - 20,22 - 24,79 - 28,55 mm., accessories, carrying case. Chromed finishing.

Weight: 8 Kg



S088

SURFACE SOIL SAMPLER / CORE CUTTER

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.

MODELS:

S084

SURFACE SOIL SAMPLER with sampling tube 73 mm inside diameter x 66 mm long and 5 Kg. drop hammer.

STANDARDS: ASTM D 2937 - CNR N° 22

Weight: 10 Kg

S085

SURFACE SOIL SAMPLER with sampling tube 100 mm diameter, capacity 1/30 cu.ft. and 10 Kg. drop hammer.

STANDARD: BS 1377:9

Weight: 16 Kg

SPARE PARTS:

S084-01 Sampling tube 73 mm diameter x 66 mm long

S085-01 Sampling tube 4" diameter and capacity 1/30 cu.ft.

HAND AUGERS

STANDARDS: ASTM D 420, D 1452 - CNR aVI n° 25
AASHTO T86, T202

Designed for soil investigations and explorations.
Plated against corrosion.

MODELS:

S092 Hand Auger, 80 mm dia. x 1 m long

S093 Hand Auger, 100 mm dia. x 1 m long

S094 Hand Auger, 150 mm dia. x 1 m long

S095 Extension rod for above 1 m long

Weight Kg

4

5

6

2



S096

Soil auger powerhead, fitted with two handwheels, to be utilized just by one operator. Lightweight and easy to use. Motor capacity 48 cc. two strokes, electronic starting. Supplied complete, except for the augers. Weight: 10 Kg

S098

Soil auger powerhead, fitted with two handwheels. It must be utilized by two operators. Motor capacity 106 cc. two strokes, electronic starting. Speed inverter to facilitate the extraction of the augers. Supplied complete except for the augers. Weight: 27 Kg

ACCESSORIES:

S097-01 Auger 60 mm dia. x 1 m long

S097-02 Auger 80 mm dia. x 1 m long

S097-03 Auger 100 mm dia. x 1 m long

S097-04 Auger 150 mm dia. x 1 m long

S097-05 Auger 200 mm dia. x 1 m long

S097-06 Extension rod



UNIVERSAL EXTRUDERS

STANDARDS: ASTM D698, D1587, D1883 - BS 598:107, 1377:4, 1924:2

S112

Screw extruder - hand operated

The unit extrudes samples from dia. 35 to 101,6 mm with max. stroke of 650 mm. Supplied complete with adaptors to extrude samples having dia. 38, 83, 100 mm, supporting bench, sample receiving table both adjustable in height and lowerable.

Dimensions: 1700x700x1200 mm

Weight: 90 Kg



S112



S114

S114

Universal extruder

Used to extrude samples having dia. 4", 6", 100 mm, 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: dia. 300x500 mm

Weight: 30 Kg



S111



S113

Screw extruder - motorized

Identical to mod. S112, but actuated by an electric motor that eliminates the hand working of the operator.

Power supply: 220-240V 1ph 50 Hz

Weight: 110 Kg



S113

ACCESSORY for mod. S111, S112 and S113:

S113-01

Adaptor (ring + tamper) to extrude soil sample from dia. 38 to 101,6 mm.

When ordering please specify required diameter.

S111

Motorised hydraulic extruder

Used for a smooth and rapid extrusion of soil samples from tubes also of thin walls with minimum disturbance. The unit extrudes samples from dia. 35 up to 101,6 mm with max. stroke of 900 mm.

The hydraulic piston is equipped of speed adjuster and can be stopped in any excursion's position.

Max. load: 70 kN (7000 kg)

The extruded sample is held in place by a receiving table adjustable in height and easily lowered along side the machine to save space.

Complete with adaptors (ring + tamper) to extrude samples having dia. 38, 83, 100 mm

Power supply: 220-240V 1ph 50Hz 1300W

Dimensions (working position): 2741 x 635 x 1200 mm

Weight: 160 kg



**S120****Soil lathe**

Designed to reduce by trimming the diameter of a soil sample until reaching the desired diameter size by using a wire saw.

The lathe is hand-operated, the height is adjustable up to 230 mm, and it accepts samples from dia. 38 to 110 mm.

Supplied complete with three sets of platens for samples dia. 38

50,47 - 60 mm, wire saw and 6 wires.

Dimensions: dia. 460x720 mm

Weight: 20 Kg

ACCESSORY:

S120-01 Upper and Lower trimming platen available from dia. 38 to 110 mm.

When ordering please specify required diameter:

S125 Trimming knife to prepare samples.

S124 Wire saw for trimming soil specimens. Complete with six wires.

**S118****Soil hollow punch / sampler**

To compress loose soils and to hollow punch samples to carry out shear, consolidation, triaxial and unconfined tests.

Dimensions: 500x300x900 mm

Weight: 30 Kg

**HOLLOW PUNCHES AND TAMPERS**

Used to prepare soil samples and to fit them into the relevant cells to carry out 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.

Models				Cell	Hollow Punch	Tamper
Ø	50,47	xh	20 mm	Consolidation	S122	S123
Ø	71,40	xh	20 mm	Consolidation	S122-01	S123-01
Ø	79,80	xh	20 mm	Consolidation	S122-02	S123-02
Ø	112,80	xh	25 mm	Consolidation	S122-03	S123-03
Ø	50,47	xh	20 mm	Consolidation Permeability	S122-04	S123
Ø	71,40	xh	20 mm	Consolidation Permeability	S122-05	S123-01
Ø	79,80	xh	20 mm	Consolidation Permeability	S122-06	S123-02
Ø	112,80	xh	25 mm	Consolidation Permeability	S122-07	S123-03
Ø	50	xh	25 mm	Shear	S122-08	S123-08
Ø	60	xh	25 mm	Shear	S122-09	S123-09
Ø	100	xh	25 mm	Shear	S122-10	S123-10
☒	60x60	xh	25 mm	Shear	S122-11	S123-11
☒	100x100	xh	25 mm	Shear	S122-12	S123-12
Ø	38	xh	76 mm	Triaxial and Unconfined	S122-13	S123-13
Ø	50	xh	100 mm	Triaxial	S122-14	S123-14
Ø	70	xh	140 mm	Triaxial	S122-15	S123-15
Ø	100	xh	200 mm	Triaxial	S122-16	S123-16

S122 ÷ S123-16





236

S130

Autographic unconfined compression apparatus

STANDARDS: ASTM D2166 - AASHTO T208 - BS 1377:7

Used for the rapid determination of unconfined compression and shear strength on site, drawing a stress/strain curve on the chart fitted to the front of the apparatus.

The unit is designed for testing specimens dia. 38 mm. x 80 mm. height, and is supplied with a pair of flat platens, a set of charts, four calibrated springs: 2 - 4 - 8 - 16N, transparent mask, portable case. Dimensions: 420x420x920 mm Weight: 15 Kg



S131

Unconfined compression tester

STANDARDS: ASTM D2166 - AASHTO T208 - BS 1377:7

This hand-operated tester, utilized both on site and in laboratory, applies the load by a handwheel and strength is read on a proving ring 200 Kg. capacity.

The apparatus can test samples up to dia. 80 mm. x 200 mm height and is supplied complete with proving ring, upper and lower plate, dial gauge

Dimensions: 380x460x1380 mm

Weight: 68 Kg



ACCESSORIES for mod. S130 - S131:

S053 Sampler dia. 38 mm

S054 Hand extruder

S122-13 Hollow punch dia. 38x76 mm

S123-13 Tamper dia. 38 mm

SPARE PART:

S130-01 Chart stress strain curve, pack of 100

S140

Ion exchange device

STANDARD: BS 1377:3

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: 190x110x600 mm

Weight: 5 Kg



ACCESSORIES:

V300-30

Ion exchange resin, 500 g

A019-03

Sulphate Test Strips, detection range 200 to 1600 mg/l. Pack of 100 strips.



A019-03

REMARKS:

The frame of the tester mod. S131 supports loads up to 50 kN and it is possible to get a CBR testing machine, by adding the following accessories:

S370-10 Proving ring 50 kN capacity

S212-01 CBR penetration piston

S213-03 Adjustable dial gauge holder

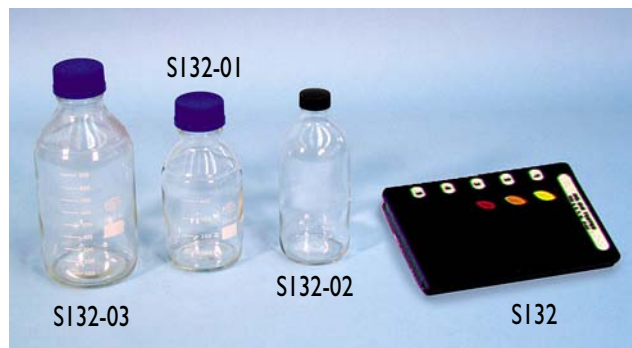
Furthermore the mechanical jack of the tester can be utilized for in-situ CBR tests, by adding the accessories listed under mod. S220

**S132****Colour standard chart**

STANDARDS: ASTM C40 - AASHTO T21 - UNI 8020-14

For the determination of the Organic impurities in soils and fine aggregates.

Original Hellige chart with 5 glass reference scales.



S132-01 Graduated impurities test bottle, stoppered, pyrex glass, 500 ml - ASTM C40

S132-02 Graduated impurities test bottle, stoppered, pyrex glass, 500 ml, marked at 130 and 200 ml - UNI 8020-14

S132-03 Graduated impurities test bottle, stoppered, pyrex glass, 1000 ml - ASTM C40

V300-24 Sodium Hydroxide, pack of 1000 g

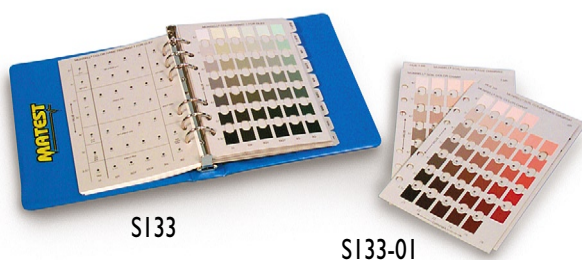
S133**Soil colour chart**

Colour matching charts for soil identification.

The set consists of 7 constant hue charts with 196 colours.

S133-01

TROPICAL SOIL COLOUR CHART. This consists of 2 charts and colour name diagrams. Charts fit into S133.

**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.

S138

ORGANIC MATTER TEST SET.

STANDARD: BS 1377

Formed by 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.

S138





Particle size sedimentation by the pipette method

STANDARD: BS 1377:2

- S144** ANDREASEN PIPETTE, for an accurate extraction of the soil suspension. Capacity 25 ml.
- S144-01** PIPETTE STAND, to accurately raise and lower the Andreasen Pipette with no transmission of vibrations. Weight: 10 Kg approx.
- S144-02** Sedimentation cylinder 500 ml. capacity
- S144-03** Rubber bung for cylinder
- S144-04** Evaporating dish, glass, dia. 90 by 50 mm. height
- V172-03** Soil Hydrometer long stem, graduated 0,995 to 1,030 g/ml
- S155-04** Glass tank dimensions: 600x300x380 mm
- S155-08** Heater, thermostat, cooling coil, circulation unit, thermometer.
220-240V 1ph 50 Hz 1000 W

S155

Particle size sedimentation by the hydrometer method

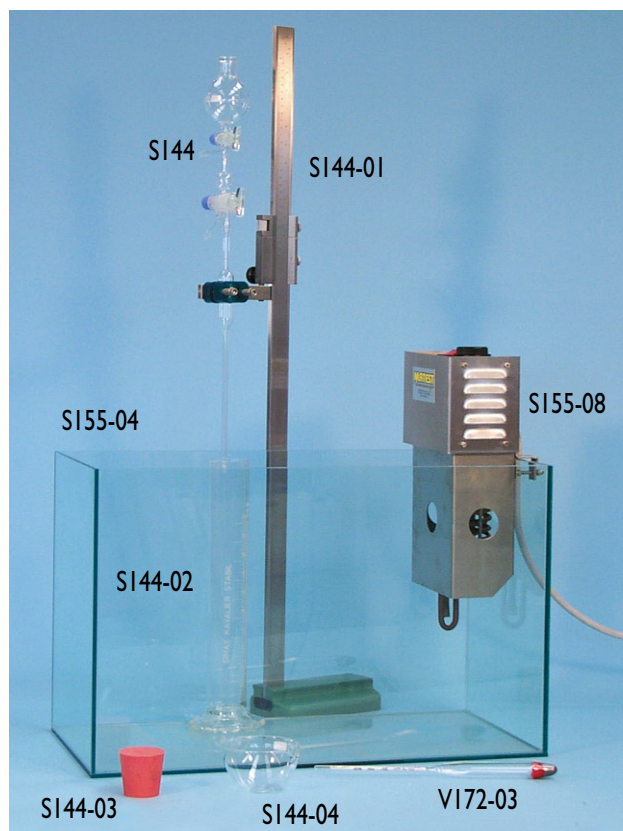
STANDARDS: ASTM D 422 - AASHTO T88 - BS 1377/2

To determine the quantitative granulometric distribution of particle-size in soils passing through the ASTM n° 200 sieve (0,074 mm)

The set consists of:

- S155-01** Sedimentation cylinder 1000 ml capacity (total n° 6 pieces)
- V172** Soil Hydrometer 151 H, scale: 0,995 ÷ 1,038 g/ml with div. 0,001
- S155-04** Glass tank, dimensions: 600x300x380 mm
- V104-03** Pyrex beaker, 250 ml capacity
- V300-23** Sodium hexametaphosphate, 1000 g
- S156-01** Mechanical analysis stirrer, 10000 rpm, complete with paddle, cup and anti-splash baffle. Used for dispersing soil samples in water: 220-240V 1ph 50 Hz
- S155-08** Heater; thermostat, cooling coil, circulation unit, thermometer: 220-240V 1ph 50 Hz 1000 W.

Weight of the set: 60 Kg



ACCESSORIES:

- V172-02** Soil hydrometer 152H, scale: -5 +60 g/litre
- S155-02** Rubber bung for the cylinder S155-01
- S156** Manual stirrer for cylinders 1000 ml capacity, NF P94-057
- S156-03** Manual stirrer for cylinders 2000 ml capacity, NF P94-057
- C306-03** Separate control panel, complete with switch and electric protections, to get S155-08 heater to CE Safety Directive

SPARE PARTS FOR S156-01 STIRRER:

- S156-11** Anti-splash baffle
- S156-12** Paddle
- S156-13** Cup (beaker)



**SI57****Blue methylene test set**

STANDARDS: EN 933/9 - NF P94-068 - XP P18-592 - UNE 83180
UNI 8520 - 15

Utilized to determine the clay content in the fine portions of the aggregates.

The set comprises:

SI57-01 Electric stirrer adjustable from 400 to 700 rpm, complete with 70 mm dia. propeller. 200-240 V 1 ph 50 Hz

SI57-06 Support base for stirrer

SI57-02 Burette 50 x 0,1 ml with stopcock

SI57-07 Support base for burette

SI57-08 Pan 200x150x80 mm

SI57-03 Filter paper 90 mm dia. (pack of 100)

SI57-04 Glass rod dia. 8x300 mm

SI57-05 3000 ml capacity plastic beaker

V300-28 Methylene blue, 100 g

V300-29 Kaolinite, 500 g

Total Weight: 10 Kg

**ACCESSORY:**

SI57-10 Automatic dispenser; 0-10 ml x 0,1 ml grad.
Capacity 1000 ml
(as an alternative to the Burette SI57-02)

SI47**Pycnometer**

STANDARDS: BS 812:2, BS 1377 - ASTM D854 - AASHTO T100

For particle density (specific gravity) of sands and fine aggregate, relative density and water absorption for aggregates max. 10 mm size. Glass jar made with aluminium cone and rubber seal.

Capacity: 1000 g.

PYCNOMETERS

STANDARDS: EN 1097/6 - BS 812 - ASTM C127, C128 - UNI 8520

Used to evaluate the bulk density and voids of aggregates.

Pyrex glass made, complete with capillary tube stopper.

MODELS:

Capacity	Mouth Ø 29 mm	Mouth Ø 50 mm
250 ml	V105-03	-
500 ml	V105	V105-04
1000 ml	V105-01	V105-05
2000 ml	V105-02	V105-06

PYCNOMETERS

STANDARD: EN 1097-6

Borosilicate glass, complete with capillary tube, stopper and funnel, they are used to determine the voids and bulk density of aggregates

MODELS: **V103** capacity 500 ml
V103-01 capacity 1000 ml

DENSITY BOTTLES GAY-LUSSAC TYPE

STANDARDS: BS 1377:2, ASTM D854, EN 1097/7, NF P18-558

For determining the particle density (specific gravity) of sand, fine aggregate and filler:

Pyrex glass made, complete with capillary tube stopper.

MODELS: **V108** capacity 25 ml
V108-01 capacity 50 ml
V108-02 capacity 100 ml

SI48**Sand absorption cone and tamper**

STANDARDS: BS 812 - ASTM C128 - AASHTO T84 - EN 1097/7

For the determination of the particle density (specific gravity) of fine aggregates, max. 20 mm size.



SAND EQUIVALENT TEST

Used to determine the relevant proportions of clay-like or plastic fines and dusts in granular soils and fine aggregates.

MODELS:

SI58

Sand equivalent (complete set)

STANDARDS: ASTM D2419 - AASHTO T176

The set comprises:

- SI58-01** Plexiglass graduated measuring cylinder (5 pieces)
 - SI58-02** Rubber stopper for cylinder (2 pieces)
 - VI76-02** Graduated rule 500 mm, stainless steel
 - VI36-01** Funnel, wide mouth
 - SI58-04** Measuring can 88 ml capacity
 - VI21** Plastic bottle, 5 litre capacity
 - SI58-06** Irrigator tube with stopcock and syphon assembly
 - SI58-07** Weighted foot assembly for sand level
 - A052-44** Sieve, dia. 200 mm, opening 4,76 mm
 - SI58-09** Concentrated stock solution, 1000 ml
 - VI70** Stop watch, digital
 - SI58-11** Clamp stand set to hold the syphon assembly with bottle
 - SI58-12** Portable carrying case, dimensions: 550x250x400 mm
- Total Weight: 18 Kg

SI58-20

Sand equivalent (complete set)

STANDARD: EN 933-8 - NF XP18-598 - UNI 8520/15 - CNR N.27
UNE 83131, 7324

The set is identical to mod. SI58 except:

- SI58-03** Plexiglass measuring cylinder graduated at 100 and 380 mm (5 pieces)
- SI58-05** Mesuring can 200 ml capacity
- SI58-10** Irrigator tube with stopcock and syphon assembly
- SI58-13** Weighted foot assembly for sand level
- A052-37** Sieve dia. 200 mm, opening 2 mm



SI59

Sand equivalent (simple set)

STANDARDS: ASTM D2419 - AASHTO T176

The set comprises:

- SI58-01** Plexiglass graduated measuring cylinder (4 pieces)
- SI58-02** Rubber stopper for cylinder (2 pieces)
- VI76-02** Graduated rule 500 mm, stainless steel
- VI36-01** Funnel, wide mouth
- SI58-04** Measuring can 88 ml capacity
- VI21** Plastic bottle 5 litre capacity
- SI58-06** Irrigator tube with stopcock and syphon assembly
- SI58-07** Weighted foot assembly for sand level
- SI58-09** Concentrated stock solution, 1000 ml

Total Weight: 5 Kg

SI59-01

Sand equivalent (simple set)

STANDARD: EN 933-8 - NF XP18-598 - UNI 8520/15 - CNR N.27
UNE 83131, 7324

The set comprises the same items of mod. SI59, but it conforms to the above Specifications.

ACCESSORY:

- SI58-08** Metallic funnel, conforming to EN, NF, UNI Specifications



S160**Motorized sand equivalent shaker**

STANDARDS: ASTM D2419 - AASHTO T176

The unit provides a constant uniform shaking with automatic cycle test.

Oscillating excursion is 203 mm at 175 strokes/min. rate.

Complete with timer that automatically stops the shaker at the end of the test.

Power supply: 220-240V 1ph 50 Hz 250 W

Dimensions: 700x360x350 mm

Weight: 30 Kg



S160

S160-01**Motorized sand equivalent shaker**, as described, but equipped with safety cover to 89/392/CEE Directive.

S160-01

S162**Motorized sand equivalent shaker**STANDARD: EN 933-8 - NF XP18-598 - UNI 8520/15 - CNR N.27
UNE 83131, 7324Identical to mod. S160, but having oscillating excursion of 200 ± 10 mm at 180 strokes/min. rate as requested by above Specifications.**S162-01****Motorized sand equivalent shaker**STANDARD: EN 933-8 - NF XP18-598 - UNI 8520/15 - CNR N.27
UNE 83131, 7324

Same to mod. S162, but equipped with safety cover to 89/392/CEE Directive, and conforming to above Specifications.

S161**Sand equivalent shaker hand operated**STANDARDS: ASTM D2419 - NF XP18-598 - AASHTO T176
EN 933/8 - UNI 8520/15 - UNE 83131, 7324

Hand operated working through handwheel. Complete with mechanical strokes counter.

Dimensions: 700x350x420 mm

Weight: 20 Kg



S161



LIQUID LIMIT DETERMINATION: CONE PENETROMETER METHOD

STANDARDS: BS 1337/2 - NF P94-052, I

The test is based on the relationship between the moisture content and the penetration of the cone into the soil sample. The apparatus is composed by: cast aluminium base, 150 mm dia. dial subd. 0,1 mm, calibrated cursor; automatic zeroing device, release button, "micrometric displacement device", penetration test cone, two sample brass cups.

section S



242

MODELS:

SI65

Cone penetrometer

Standard type, supplied complete.

Weight: 13 Kg.



SI66-01

SI66-03

SI65 + B057-02

SI66

Semi-automatic cone penetrometer

Equipped with built-in five seconds magnetic controller device with electronic digital programmable timer to perform greater uniformity test results. Supplied complete.

Power supply: 220-240 V 1 ph 50 Hz

Weight: 15 Kg

ACCESSORIES:

SI66-03

Test gauge, to check the condition of the cone point.

B057-02

Mirror, to facilitate the height adjustment of the cone

SPARE PARTS:

SI66-01 Penetration test cone 35 mm long, 30° angle

SI66-02 Weight: 20 g.

V122-05 Brass cup dia. 55x35 mm

V122-06 Brass cup dia. 70x45 mm

SI75

Shrinkage limit

STANDARDS: ASTM D 427 - AASHTO T 92 - UNI 10014

UNE 103-108, 7016 - NF P94 - 060 - BS 1377:2

Used to determine the maximum moisture content at which the soil does not shrink after drying the sample.

Complete with carrying case.

The set comprises:

V122-04 Shrinkage dish, dia. 45x12,7 mm (2 pieces)

V122-03 Crystallizing dish, dia. 57x32 mm

SI75-03 Shrinkage prong plate, made from plexiglass material with three metal prongs

SI75-04 Glass evaporating dish, dia. 120 mm flat bottom

V100-01 Graduated cylinder 25 ml. capacity

V192 Flexible spatula, 100 mm. blade

V175-01 Plastic carrying case

Weight: 2 Kg



SI75



SI76

SI76

Linear shrinkage

STANDARD: BS 1377:2

Mould to produce a specimen of 140 mm. long x 12,5 mm radius. This test covers the determination of linear shrinkage of soils and indicates the plastic properties of soils with a low clay content.

Weight: 500 g



SI72-01

SI70

LIQUID LIMIT: casagrande method

STANDARDS: ASTM D4318 - AASHTO T89 - BS 1377:2

UNI 10014 - NF P94-051 - UNE 7377, 7002

Used to evaluate the relationship between the moisture percentage of a soil sample and the number of blows required to close a groove made into the soil; and therefore to determine when a clay soil changes from a plastic to a liquid state.

The unit comprises a removable brass cup which through a cam device drops on a bakelite base (or hard rubber base). Supplied complete with drops counter, but without grooving tool which has to be ordered separately.

The instrument is available in two versions:

- hand operated through crank
- motor operated at 120 drops/min speed, ensuring better uniformity and accuracy

MODELS:

SI70**Liquid limit device**

Hand operated with hard rubber base.

STANDARDS: ASTM D4318 - BS 1377:2 - AASHTO T89

UNE 7377 - UNI 10014

Weight: 3 Kg

SI70-01**Liquid limit device**

Hand operated with bakelite base, chromed cup.

STANDARD: NF 94-051

Weight: 3 Kg

SI72**Liquid limit device**

Motor operated with hard rubber base.

STANDARDS: ASTM D4318 - BS 1377:2 - AASHTO T89

UNE 7377 - UNI 10014

Power supply : 220-240V 1ph 50Hz - Weight: 4,5 Kg

SI72-01**Liquid limit device**

Motor operated with bakelite base, chromed cup.

STANDARD: NF 94-051

Weight: 4,5 Kg

ACCESSORIES:

SI73-02 Rough brass cup, with central smooth band 10 mm wide, as requested by NF P94-051 Standard, used for soils having low plasticity

SI73-03 Grooving tool, to UNI 10014 - AASHTO T79 Spec.

SI73-04 Grooving tool, to ASTM D 4318 Specifications

SI73-05 Grooving tool, to NF P94-051 Specifications

SI73-06 Grooving tool, to BS 1377 Specifications

SPARE PARTS:

SI73-01

Brass cup.

SI73-07

Chromed cup (NF)

SI73-08

Coupling piece between cup and device



SI78

SI78-06

SI78**Plastic limit**

STANDARDS:

ASTM D4318 - AASHTO T90 - BS 1377 - UNI 10014 - NF P94-051

The plastic limit determines the lowest moisture content of a soil, by which a sample can be rolled into threads 3 mm. dia. without breaking the same neither longitudinally or transversely.

The set complete with carrying case comprises:

SI78-01 Glass plate 300x250x10 mm

SI78-02 Rod caliper 3 mm dia.

V114-03 Mixing porcelain dish 120 mm dia.

V192 Flexible spatula, 100 mm. blade

V122 Aluminium moisture tins dia. 55x35 mm. (Qty 6)

SI78-03 Plastic carrying case

Weight: 5 Kg

ACCESSORIES:

SI78-06 Glass Plate 105x50 mm graduated each 10 mm with brass spacer 5 mm to measure the diameter of the soil sample to 3 mm \pm 0,5 according to NF P94-051

SI79 Glass plate 500x500x10 mm

V300-17 Mercury, 1000 g

PROCTOR TEST: MOISTURE-DENSITY RELATIONSHIP

STANDARDS: EN 13286-2 - ASTM D558, D559, D560, D698, D1557 - AASHTO T99, T134, T135, T136, T180 - BS 1377:4, 1924:2
UNI/CNR N° 69 - NF P94-093, P94-078 - DIN 18127

Proctor mould

Used for determining the relationship between the moisture content and density of compacted soils. Steel made, complete with mould body, collar and base; plated against corrosion.

MODELS:

Code	Description	Standards	Int. dia. mm	Body height mm	Volume ml	Weight Kg
SI85	Standard Proctor Mould	ASTM - AASHTO - NF UNI/CNR	101,6	116,4	944	8
SI86	Modified Proctor Mould	ASTM - AASHTO - UNI/CNR	152,4	116,4	2124	10
SI89	Split Standard Proctor Mould	ASTM - AASHTO - NF UNI/CNR	101,6	116,4	944	8
SI90	Split Modified Proctor Mould	ASTM - AASHTO - UNI/CNR	152,4	116,4	2124	10
SI90-01	Modified Proctor Mould	NF	152	152,5	2765	10,
SI90-02	Split Modified Proctor Mould	NF	152	152,5	2765	10
SI91	Standard Proctor Mould	BS	105	115,5	1000	8
SI94	Standard Proctor Mould	EN also comparable to DIN	100	120	942	9
SI94-01	Modified Proctor Mould	EN also comparable to DIN	150	120	2120	13
SI94-03	Split Standard Proctor Mould	EN also comparable to DIN	100	120	942	9
SI94-04	Split Standard Proctor Mould	EN also comparable to DIN	150	120	2120	13
SI94-02	Proctor Mould Large Size	EN also comparable to DIN	250	200	9817	32





PROCTOR RAMMER

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. Plated against corrosion.

MODELLI:

Code	Description	Standards	Rammer dia. mm	Fall height mm	Rammer weight Kg	Total weight Kg
SI187	Standard Proctor rammer	ASTM - AASHTO UNI/CNR	50,8	304,8	2,495	6
SI187-01	Standard Proctor rammer	EN/NF	50	305	2,5	6
SI192	Standard Proctor rammer	BS	50	300	2,5	6
SI188	Modified Proctor rammer	ASTM - AASHTO UNI/CNR	50,8	457,2	4,536	8
SI188-01	Modified Proctor rammer	EN/NF	50	457	4,5	8
SI188-02	Proctor rammer Large Size	EN	125	600	15	23
SI193	Modified Proctor rammer	BS	50	450	4,5	8
SI194-05	Proctor rammer	DIN	50	300	2,5	8
SI194-06	Proctor rammer	DIN	50	450	4,5	11
SI194-07	Proctor rammer	DIN	75	450	4,5	11

COMPACTION DISK

STANDARD: DIN 18127

Complete with rod and spherical knob. Plated against corrosion

MODELLI:

SI194-09

Compaction disk dia. 99 mm
thickness 10 mm

SI194-10

Compaction disk dia. 149 mm
thickness 10 mm



Cutting collar

Coupled to the Proctor mould body, it gets easier the soil sampling

MODELS:

SI185-01 Dia. 4"

S200-09 Dia. 6"



SI187 ÷ SI194-07





S197

Vibrating compaction hammer

STANDARDS: BS 1377:4 - BS 1924:2

It provides an alternative method for the compaction of soil samples in the determination of dry density/moisture content relation (called Proctor), unconfined compressive strength of stabilized soils and CBR tests. This hammer is also used for the compaction of concrete specimens and asphalt in the percentage refusal density. Supplied without tampers and support frame which must be ordered separately.

Power supply: 220-240 V 1F 50/60 Hz 750 W

Weight: 8 Kg



ACCESSORIES:

- S197-01** Supporting frame for vibrating hammer: Steel made, plated against corrosion.
Weight: 45 Kg
- S197-02** Tamping foot 145 mm. dia. for CBR and Proctor tests.
Weight: 3 Kg
- S197-03** Tamping foot for unconfined compression tests.
Centering disk has a distance from the base of 50 mm.
Weight: 3,5 Kg
- S197-04** Tamping foot, ditto, but with centering disk having distance from base of 100 mm.
Weight: 3,5 Kg
- S197-05** Tamping foot, ditto, but with centering disk having distance from base of 150 mm.
Weight: 3,5 Kg

Determination of strength of stabilized soils

Preparation of materials bound with cementitious binders or aggregates mixes. Preparation by static compression of sand of fine grained soil specimens. STANDARD: NF P 98-230/2

MODELS:

- S195-01** Mould dia. 50 by 122 mm to obtain specimen dia. 50 by 50 mm of fine and medium grained soils
- S195-02** Mould dia. 50 by 172 mm. to obtain specimen dia. 50 by 100 mm of medium and coarse grained soils
- S195-03** Base and upper piston dia. 50 by 36 mm
- S195-04** Penetration and demoulding piston dia. 50 by 125 mm
- S195-05** Penetration and demoulding piston dia. 50 by 175 mm
- S195-06** Two displacing supports dia. 50 by 6 mm
- S195-07** Two displacing supports dia. 50 by 12,5 mm
- S195-08** Two displacing supports dia. 50 by 25 mm
- S195-09** Collecting cylinder dia. 56 by 60 mm
- S195-10** Collecting cylinder dia. 56 by 110 mm



S198-01

S198**Automatic universal CBR/Proctor compactor**

STANDARDS: ASTM D558, D560, D698, D1557, D1883
 AASHTO T99, T134, T135, T136, T180
 CNR/UNI 10009 - CNR N° 29, 69 - DIN 18127
 NF P94-093, P94-066 - BS 1377, 1924 - DUTCH
 UNE 7365, 7255

Designed to compact Proctor and CBR specimens, it ensures an extremely uniform degree of compaction with completely automatic test cycle through a program managed by microprocessor, according to the following Standards:

NF P94-093:	moulds dia. 4" = 25 blows and dia. 6" = 56 blows
NF P94-066:	mould dia. 6" = 100 blows
ASTM D1883:	moulds dia. 4" = 25 blows and dia. 6" = 56 blows
AASHTO T99, T180:	mould dia. 6" = 25 and 55 blows
BS1377, 1924:	moulds dia. 105 mm = 27 blows and dia. 152 mm = 30, 62 blows
DIN 18127:	moulds dia. 100 mm = 25 blows and dia. 150 mm = 22, 59 blows
UNE 103-501-94:	mould dia. 6" = 60 blows
UNE 7365, 7255:	moulds dia. 4" = 26, 60 blows and dia. 6" = 55 blows
CNR/UNI 10009:	mould dia. 6" = 12, 26, 56 blows
CNR N° 69:	moulds dia. 4" = 25 blows and dia. 6" = 56 blows
CBR N° 29:	mould dia. 6" = 85 blows
DUTCH RAW:	mould dia. 4" = 25 blows and dia. 6" = 56 blows
DUTCH EPP:	mould dia. 6" = 40 blows
DETCH EPP:	mould dia. 6" = 20 blows

The blows are distributed automatically as requested by relevant Standards, with turntable rotation and rammer displacement through photoelectric cell sensors and microprocessor. The digital control panel is separate from the machine and can be fixed to the wall or mounted on a bench.

The compactor accepts moulds dia. 4" and 6" (100 and 150 mm) both Matest made or of other producers, thanks to its universal mould's fixing system.

Rammer drop height can be selected at 12" or 18" (300 or 450 mm)
 Rammer drop speed: 1 blow each 2 seconds

The machine is supplied **"without rammers"** which must be ordered separately and selected according to the desired Standard (the rammers are interchangeable)

Power supply: 220-240 V 1F 50 HZ 500 W

Dimensions: 550x360x1700 mm

Weight: 240 Kg

S198-01**Automatic universal CBR/Proctor compactor**

Identical to mod. S198 but equipped with Safety Guards to 89/392/CEE Directive

S198-02**Automatic universal CBR/Proctor compactor**

Same to mod. S198, but equipped with cabinet, inside lined with sound-proofing material for noise reduction to CE Directive.
 Suitable also as Safety Guards to 89/392/CEE Directive.

**S198-02****ACCESSORIES:**

S198-11 ASTM, AASHTO Standard Rammer, Ø 2" weight 2490 g

S198-12 ASTM, AASHTO Modified Rammer, Ø 2" weight 4540 g

S198-13 BS, DIN, UNE Standard Rammer, Ø 50 mm weight 2500 g

S198-14 BS, DIN Modified Rammer, dia. 50 mm and weight 4500 g

S198-15 CNR/UNI Standard Rammer, Ø 51 mm and weight 2495 g

S198-16 CNR/UNI Modified Rammer, dia. 51 mm and weight 4539 g

S198-17 NF Standard Rammer, dia. 50,4 and weight 2490 g

S198-18 NF Modified Rammer, dia. 50,4 mm and weight 4535 g

S198-19 UNE Modified Rammer, dia. 50 mm and weight 4540 g

S198-20 DIN Modified Rammer, dia. 75 mm and weight 4500 g

SPARE PARTS:

S198-22 Calibrated rod holding the rammer

S198-23 Set of devices fixing the mould to the table



CALIFORNIA BEARING RATIO - CBR

STANDARDS: ASTM D1883, D3668 - AASHTO T193 - CNR/UNI 10009 - UNE 103:502 - 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 in force. The test is aimed to the evaluation of the bearing capacity of soil for flexible pavement design in road construction.

section S

S200-01... CBR SET TO ASTM, AASHTO, CNR/UNI, UNE STANDARDS



S201-05

S201... CBR SET TO NF STANDARDS



S202... CBR SET TO BS STANDARDS



The equipment is available in different versions according to the various Standards in use:

Description	Standards	Standards	Standards
CBR mould complete with collar and perforated base: Dia. 6" (152,4 mm) x 7" (177,8 mm) height.....	ASTM, AASHTO CNR/UNI, UNE S200-01	NF P94-078 NF P94-093	BS 1377:4 BS 1924:2
Dia. 152 mm x 152 mm height		S201	
Dia. 152 mm x 127 mm height			S202
Split CBR mould with collar and perforated base: Dia. 6" (152,4 mm) x 7" (177,8 mm) height.....	S200-13		
Dia. 152 mm x 152 mm height.....		S201-01	
Solid base plate for CBR mould.....	S200-12	S201-12	S202-03
Perforated base plate for CBR mould	S200-10	S201-10	S202-10
Filter screen, stainless steel dia. 149 mm mesh 0,150 mm (ASTM n° 100)	S200-02	S200-02	S200-02
Spacer disc with "T" handle: Dia. 5 15/16" (150,8 mm) x 2,416" (61,4 mm) height	S200-03		
Dia. 151 x 25,4 mm height.....		S201-02	
Dia. 151x36 mm height.....		S201-06	
Dia. 150x50 mm height.....			S202-07
Perforated (sweel) plate with adjustable stem	S200-04	S200-04	S200-04
Tripod (dial gauge support)	S200-05	S200-05	S200-05
Dial gauge 10 mm range, 0,01 mm subd.....	S376		
Dial gauge 25 mm range, 0,01 mm subd.....		S377	S377
Annular surcharge weight 2270 g.....	S200-07		
Annular surcharge weight 2300 g.....		S200-07	
Annular surcharge weight 2000 g.....			S202-08
Slotted surcharge weight 2270 g.....	S200-08		
Split surcharge weight 2300 g.....		S201-04	
Split surcharge weight 2000 g.....			S202-09
Cutting edge	S200-09	S200-09	S200-09
Compaction rammer: Ø 50,8, mm fall height 457,2 mm, weight 4,54 Kg.....	S188		
Ø 50, mm fall height 457,2 mm, weight 4,54 Kg.....		S188-01	
Ø 50, mm fall height 450 mm, weight 4,5 Kg.....			S193
Straight edge 300x30x3 mm	S200-11	S200-11	S200-11
Filter paper dia. 150 mm (pack of 100).....	S200-14	S200-14	S200-14
Soaking tank 600x400x400 mm.....	S201-05	S201-05	S201-05



The CBR equipment is cadmium plated against corrosion.

CBR TESTING MACHINES

STANDARDS: ASTM D1883, D3668 - BS 1377:4, 1924 - AASHTO T193 - CNR/UNI 10009 - NF P94-078

Used to load the penetration piston into the soil sample at a constant rate of 1,27 mm/min (1 mm/min to BS Spec.), and to measure the applied loads and piston's penetrations at determined intervals.

Matest proposes a wide range of machines: hand operated, motorized, dual speed, universal multispeed; load measurement by load ring, or by electric load cell and digital unit with X/Y graphic recorder of load/penetration through RS 232 port to PC.

section S



250

S209

CBR loading machine, hand operated, laboratory model

Load is applied through a mechanical jack and handwheel.

Upper beam can be adjusted in height.

Foreseen of fast approach device of the base plate.

The machine is supplied complete with:

- Load Ring 50 kN capacity, calibrated with relevant Calibration Certificate
- Penetration piston
- Dial gauge with dial gauge holder

Dimensions: 430x380x1180 mm

Weight: 80 Kg



S209

S210

CBR loading machine, hand operated, field model

Load is applied through a mechanical jack and handwheel.

This mechanical jack can be used also for in-situ CBR test (see mod. S220).

Upper beam can be adjusted in height.

The machine is supplied complete with:

- Load Ring 50 kN capacity, calibrated with relevant Calibration Certificate
- Penetration piston
- Dial gauge with dial gauge holder

Dimensions: 420x370x1180 mm

Weight: 65 Kg



S210

S211

CBR loading machine motorized, 50 kN ASTM version

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 and assured also under load.

Upper beam can be adjusted in height.

Foreseen of fast approach device of the base plate and electric end of stroke switches of the load plate to save the machine from wrong manipulations.

The machine is supplied complete with:

- Load Ring 50 kN capacity, calibrated with relevant Calibration Certificate
- Penetration piston
- Dial gauge with dial gauge holder

Power supply:

220-240V 1ph 50 Hz 750 W

Dimensions:

430x380x1180 mm

Weight: 98 Kg



S211

S211-01

CBR loading machine motorized, 50 kN BS version

Identical to mod. S211, but with penetration rate of 1 mm/min. to BS 1377:4 Specifications.

S374

BRAKE DEVICE, it holds the max. applied load on the dial gauge of the load ring, with manual zero setting

S374-01

STOP SAFETY DEVICE, electrical, fixed on the load ring for automatic stop to the machine when reaching the max. capacity load of the ring, so as to prevent any overload damage.

ACCESSORIES:

S210-02

CBR RATE INDICATOR

Used to apply the correct rate of 1,27 mm/min penetration.

Power supply:

220-240V 1ph 50 Hz



S210-02

S212**Universal multi-speeds load frame**

This motorized machine with electronic digital control by micro-processor is suitable to perform all the tests where the requested speed rate is within 0,5 to 63 mm/min. with max. load of 50 kN. It can therefore perform:

- Unconfined test with rate of 0,635 mm/min
- CBR test with rate of 1 mm/min (BS Standards)
- CBR test with rate of 1,27 mm/min (ASTM, CNR/UNI, NF, AASHTO)
- Marshall test with rate of 50,8 mm/min.
- Duriez test with rate of 60 mm/min (NF French Spec.)

The speed rate is infinitely variable, easily and promptly selected.

Upper beam can be adjusted in height.

Foreseen of electric end of stroke switches of the load plate to save the machine from wrong manipulations.

The machine is supplied “without” load ring and accessories which have to be ordered separately (see accessories pag. 254)

Power supply: 220-240 V 1ph 50 Hz 750 W

Dimensions: 650x500x1350 mm

Weight: 180 Kg

S212**S213****CBR/Marshall 2 speeds load frame, 50 kN
ASTM version**

Suitable to perform both CBR and MARSHALL tests.

The frame is provided of two fix speed ranges, easily selectable by a gear:

1,27 mm/min. for CBR tests

50,8 mm/min for Marshall tests.

Upper beam can be adjusted in height.

Foreseen of electric end of stroke switches of the load plate to save the machine from wrong manipulations.

The machine is supplied “without” load ring and accessories which have to be ordered separately (see accessories pag. 254)

Power supply: 220-240 V 1ph 50 Hz 750 W

Dimensions: 450x400x1200 mm

Weight: 130 Kg

S213-01**CBR/Marshall 2 speeds load frame, 50 kN
BS version**

Identical to mod. S213, but with penetration rate for CBR test of 1 mm/min. to BS 1377:4 Specifications

**S213**

H009-01

S218
Load/Deformation
diagramS218 Selection of the test
Standard with possibility to
personalize the calculation
algorithm

B044

C128

B044 Cybertronic, multichannel computerized digital display unit

for use with:

- CBR/Marshall two speeds load frame mod. S213
- Universal multi-speeds load frame mod. S212
- CBR loading machine mod. S211
- Triaxial load frame mod. S301
- Marshall mechanical load frame mod. B042

This unit displays at the same time:

- The Load measured by an estensometric cell
- The Deformation measured by 3 linear displacement transducers

The digital unit with relevant accessories can be used on any type of existing machine (also from other manufacturers).

The software displays simultaneously the following data:

- year/month/day/hour
- Instant load in kN with 3 decimal points (\pm values)
- Instant deformation in mm with 3 decimal points (\pm values)
- Hold peak values of load and deformation with memorization
- Test code, symbols of pushbuttons functions, informative messages (planning, alarms, load cell and strain transducer setting, etc.)
- Graphic display of large size
- Operator interface through 4 multi-function pushbuttons + selection encoder
- Memory recording of load and deformation peak values
- Possibility to modify the test code (before the test)
- Safety function for automatic machine stop at max. reached load
- Safety function for automatic machine stop at max. reached deformation of the strain transducer
- Automatic loading of the scale correction values
- Calibration program for each channel for the correction of any non-linear situation due to the load cell or to the load frame
- Memorization of 2 calibration tables for load cell and strain transducer
- Software in different languages

Power supply: 220-240 V 1 ph 50 Hz

Dimensions: 250x400x160 mm

Weight: 8 Kg

ACCESSORIES:

B044-01

LOAD CELL, 50kN capacity, with high precision strain transducers, complete with cable and connector

B044-02

LINEAR DISPLACEMENT TRANSDUCER, 50 mm stroke, independent linearity $\pm 0,1\%$, complete with cable and connector

S218



SOFTWARE UTM2 (Universal Testing Machine 2)

Developed for the management and the remote control through PC of Matest testing machines.

Licence for CBR Test

Standards: ASTM D1883, CNR/UNI 10009, BS 1377, NF P94-078

B043-01



SOFTWARE UTM2 (Universal Testing Machine 2)

Developed for the management and the remote control through PC of Matest testing machines.

Licence for MARSHALL test

Standards: ASTM D1559, CNR N. 30, BS 598:107, NF P98-251, prEN 12697-34

B043-02



SOFTWARE UTM2 (Universal Testing Machine 2)

Developed for the management and the remote control through PC of Matest testing machines.

Licence for TENSILE SPLITTING Test

Standards: ASTM D4123, CNR N. 134, prEN 12697-23

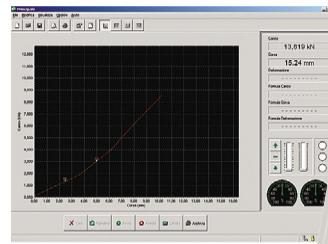
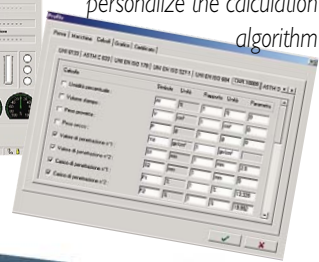
Description and technical details of Software UTM2: see pag. 14

H009-01

PERSONAL COMPUTER, complete with LCD monitor 17", keyboard, mouse, connection cables, installation and setting up of the purchased software.

C128

Bench printer, A4 format, for the graphic and test certificate printing

S218
Load/Deformation
diagramS218 Selection of the test
Standard with possibility to
personalize the calculation
algorithm

B044



C128





LOAD TEST FRAME:

- CBR
 - TWO SPEEDS
 - UNIVERSAL MULTI-SPEEDS
- COMBINED WITH "CYBERTRONIC", COMPUTERIZED DIGITAL DISPLAY UNIT

Technical Specifications:

The frame is the same as for the previous load frames (mod. S211 to S213), but the load is measured by an electric 50kN cell with high precision strain transducers. The deformation (flow) is measured by a displacement transducer 50 mm stroke and $\pm 0,1\%$ independent linearity.

The "CYBERTRONIC" computerized multichannel digital display unit (technical details: see mod. B044 at previous page), 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.

AVAILABLE MODELS:

S216

CBR digital computerized loading machine

ASTM version (speed rate of 1,27 mm/min.)

Technical details of the frame: see mod. S211

Supplied complete

S216-01

CBR digital computerized loading machine

BS version (speed rate of 1 mm/min.)

Technical details of the frame: see mod S211

Supplied complete



S216+H009-01+ACCESSORI



S214 + ACCESSORI

S214

CBR/Marshall 2 speed load frame digital, computerized

ASTM version (speed rate for CBR: 1,27 mm/min.)

Technical details of the frame: see mod. S213

Supplied complete with "Cybertronic" unit, load cell and displacement transducer; but "without" accessories for CBR and Marshall tests, to be ordered separately (see page 254)

S214-01

CBR/Marshall 2 speed load frame digital, computerized

BS version (speed rate for CBR: 1 mm/min.)

Technical details of the frame: see mod. S213

Supplied complete with "Cybertronic" unit, load cell and displacement transducer; but "without" accessories for CBR and Marshall tests, to be ordered separately (see page 254)



S215

Universal multi-speeds load frame digital, computerized

Technical details of the frame: see mod. S212
Supplied complete with "Cybertronic" unit, load cell and displacement transducer; but "without" accessories for CBR, Marshall, Unconfined tests, to be ordered separately (see accessories)

ACCESSORIES FOR THE 2 SPEEDS AND THE MULTI-SPEEDS LOAD FRAMES TO PERFORM:

CBR tests

- S212-01** Penetration piston
- * **S212-03** Dial gauge holder
- * **S376** Dial gauge 10mm travel x 0,01mm subd.
- * **S370-10BS** Load ring 50kN capacity complete with bracket device and stop safety device

MARSHALL tests

- S212-05** Load piston
- B046** Stability mould, cast aluminium alloy
- * **B047** Flow meter
- * **B047-01** Dial gauge for flow meter
- * **S370-08BS** Load ring 30kN capacity complete with bracket device and stop safety device

UNCONFINED test

- S212-08** Upper compression plate, 100 mm dia.
- S212-04** Distance piece complete with rod
- * **S212-03** Dial gauge holder
- * **S376** Dial gauge 10mm travel x 0,01mm subd.
- * **S370-02BS** Load ring 2kN capacity complete with bracket device and stop safety device

DURIEZ test

Equipment required for CBR tests, and in addition:
Duriez Equipment dia. 80 mm (see section "B" bitumen, mod. B096)

* Note: only for models S212 and S213. Not required for the machines mod. S214, S215 combined with Cybertronic unit.



S215 + H009-01

ACCESSORIES FOR THE FRAMES COMBINED WITH "CYBERTRONIC" UNIT:

S218



SOFTWARE UTM2 (Universal Testing Machine 2)
Developed for the management and the remote control through PC of Matest testing machines.
Licence for CBR Test

Standards: ASTM D1883, CNR/UNI 10009, BS 1377, NF P94-078

B043-01



SOFTWARE UTM2 (Universal Testing Machine 2)
Developed for the management and the remote control through PC of Matest testing machines.
Licence for MARSHALL test

Standards: ASTM D1559, CNR N. 30, BS 598:107, NF P98-251, prEN 12697-34

B043-02



SOFTWARE UTM2 (Universal Testing Machine 2)
Developed for the management and the remote control through PC of Matest testing machines.
Licence for TENSILE SPLITTING Test

Standards: ASTM D4123, CNR N. 134, prEN 12697-23

Description and technical details of Software UTM2: see pag. 14

H009-01

PERSONAL COMPUTER, complete with LCD monitor 17", keyboard, mouse, connection cables, installation and setting up of the purchased software.

C128

Bench printer, A4 format, for the graphic and test certificate printing



S212-01 + S374-01



PLATE BEARING TEST

STANDARDS: ASTM D1194, D1195, D1196 - BS 1377:9 - CNR N° 92, N° 146 - UNE 7391 - DIN 18134

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 enduser needs:

S222

Plate bearing test equipment 100 kN capacity - 1 dial gauge model

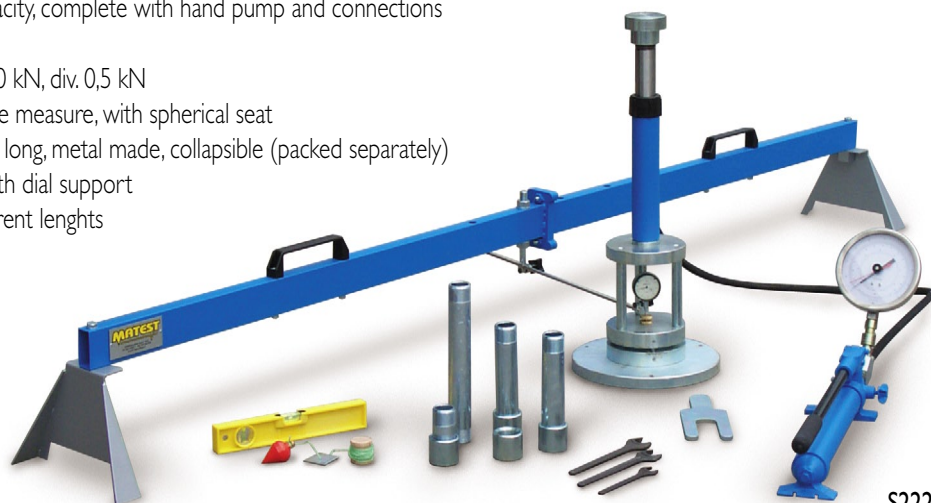
STANDARD: CNR N° 146, Method "A"

Consisting of:

- Hydraulic jack 100 kN capacity, complete with hand pump and connections
- Bearing plate 300 mm dia.
- Pressure gauge range 0-100 kN, div. 0,5 kN
- Device for centre dial gauge measure, with spherical seat
- Datum bar assembly 2,5 m long, metal made, collapsible (packed separately)
- Dial gauge 25x0,01 mm with dial support
- Set of extension rods, different lengths
- Plumb bob and spirit level

Carrying case

Weight: 60 Kg approx.



S222

S223

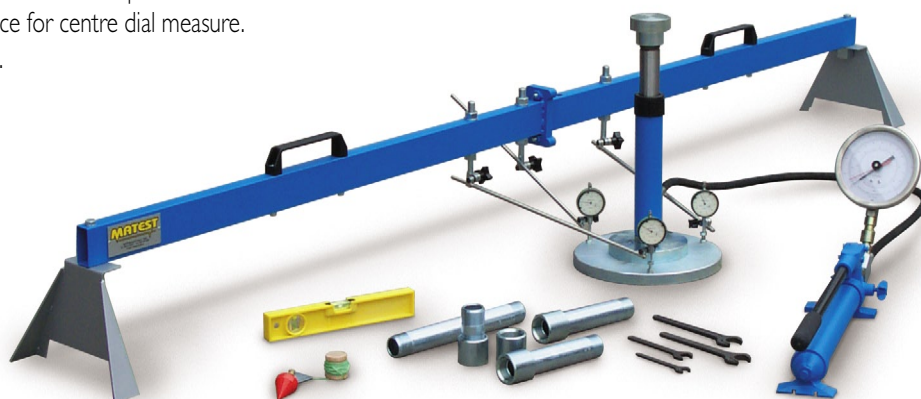
Plate bearing test equipment 100 kN capacity - 3 dial gauges model

STANDARD: CNR N° 146, Method "B" - BS 1377:9

Identical to mod. S222, but with 3 dial gauges 25x0,01 mm complete with dial holders, for three-points measurements of the plate, and upper spherical seat, and additional plate 160 mm dia.

Supplied without device for centre dial measure.

Weight: 60 Kg approx.



S223

ACCESSORY for mod. S222 and S223

S223-01

PRESSURE GAUGE range 0-50 kN, div. 0,25 kN with large dial dia. 200 mm, complete with fast connector; used for accurate readings at low loads, as for ex. pre-load of 0,5 Kg/cm²



S223-01

**S225****Plate bearing test equipment 200 kN capacity - 3 dial gauges model**

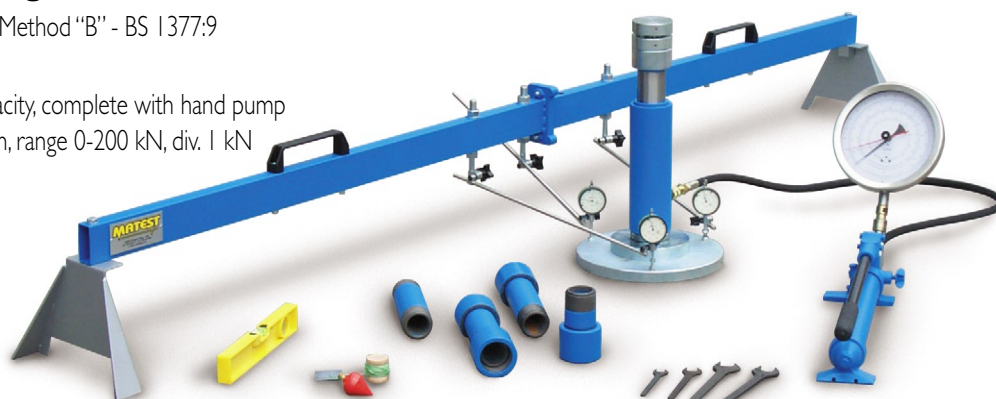
S225

STANDARD: CNR N° 146, Method "B" - BS 1377:9

Identical to mod. S223 but:

- Hydraulic Jack 200 kN capacity, complete with hand pump
- Pressure gauge dia. 200 mm, range 0-200 kN, div. 1 kN

Weight: 70 Kg approx.

**S226****Plate bearing test equipment 500 kN capacity - 3 dial gauges model**

STANDARD: CNR N° 146, Method "B" - BS 1377:9

Identical to mod. S223 but:

- Hydraulic Jack 500 kN capacity, complete with hand pump
- Pressure gauge dia. 200 mm, range 0-500 kN, div. 2 kN

Two carrying cases.

Weight: 110 Kg approx.



S226 + S226-01 + S226-02 + S226-03 + S226-10

ACCESSORIES for mod. S225 and S226, to meet:
CNR N° 92 - ASTM D1195, D1196 Standards

- S226-01** Loading plate dia. 450 mm
- S226-02** Loading plate dia. 600 mm
- S226-03** Loading plate dia. 760 mm
- S226-10** Set of extension rods to get the datum bar assembly 5,5 m long

ACCESSORIES for all the models of Plate Bearing test equipment:

- S226-04** Loading plate, square 305x305 mm
- S226-07** Loading plate dia. 254 mm
- S226-08** Loading plate dia. 309,1 mm

SPARE PARTS:

- S226-11** Datum bar assembly 2,5 m long, metal made, collapsible
- S226-12** Device for centre dial gauge measure
- S226-05** Loading plate dia. 300 mm
- S226-06** Loading plate dia. 160 mm
- S226-13** Upper spherical seat for 100 kN and 200 kN models
- S226-14** Upper spherical seat for 500 kN model

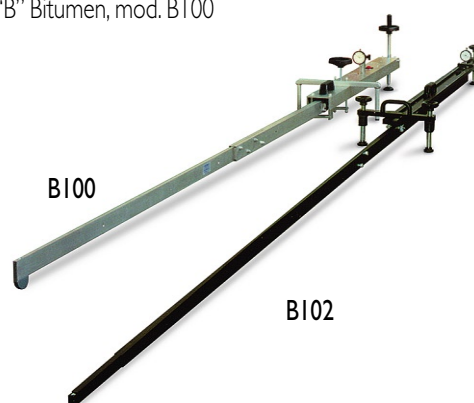
- S226-15** Articulated dial gauge support
- S377** Dial gauge 25x0,01 mm

Benkelman beam apparatus

STANDARDS: NF P94-117 - NF P98-200/2

Utilized in conjunction with the plate bearing test equipment, to determine the static deformation of road pavements EV1 - EV2 and Westergard.

See section "B" Bitumen, mod. B100



**S229****LIGHT DROP-WEIGHT TESTER**

Determination of the soil bearing capacity and compaction quality of soils and non-cohesive subbases.

STANDARDS: Conforming to German engineering test code for soil and rock in road construction TP BF StB part B 8.3.2003

USE:

The dynamic plate load test employing the Light Drop-Weight Tester is used in earthwork and road construction to determine the soil bearing capacity and the compaction quality of soils and non-cohesive subbases, as well as for soil improvement applications. The test method is suited for coarse-grain and mixed-grain soil having maximum grain size of 63 mm.

The test method may be used to determine the dynamic modulus of deformation on soil in the range $E_{vd} = 15 \dots 80 \text{ MN/m}^2$.

APPLICATIONS:

- Road and railway construction
- Testing of pavement bedding
- Compaction monitoring in pipe trenches and cable ducts
- Quality assurance in canal construction
- Foundation backfill

ADVANTAGES over the static plate load tester:

- Immediate evaluation of each measurement
- Low tester weight
- Easy to handle
- Time-saving
- Testing in locations not really accessible
- No vehicle required for loading

Being easy to handle and providing immediate measurements results, the Light Drop-Weight Tester is especially suited for monitoring intra-company operations. It facilitates quick decisions for continuing construction work at the site.

SPECIFICATIONS:

- Max. impact force: 7,07 kN
- Duration of the impact: 18 ms
- Load plate dia. 300 x 20 mm
- Settlement measuring range: 0,10 to 2,0 mm
- Power supply: 4 x R6 rechargeable batteries

The tester is supplied complete with loading unit, load plate with acceleration transducer; electronic settlement meter with displaying of date and time in carrying case.

Total weight: 30 kg

ACCESSORIES:**S229-10**

THERMALPRINTER WITH ADDITIONAL INTERFACE FOR PRINTER.

For evaluation of stored data at any time and any place, including charger and power pack, connecting cable. The printer can be operated independent of a power supply unit and is powered by rechargeable batteries. Complete with battery charger and cable.

S229-11

ADDITIONAL INTERFACE to PC with extra storage capability for 200 tests.

**S229-12**

SOFTWARE for printout on PC (or CD). Required: Windows, serial interface: COM

S229-13

TRANSPORT CART, collapsible, for long distances at the site.

**S229-14****S229-14**

BASE PLATE WITH MAGNET, for proper positioning of loading unit

**S229-13**



S230

Balloon density apparatus, 1600 ml capacity

STANDARDS: ASTM D2167 - AASHTOT205 - CNR 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 plexiglass cylinder 1600 ml capacity, fitted in a corrosion resistant frame, a rubber pump with stop valve, a density plate and 12 rubber balloons.

Dimensions: 340x340x700 mm

Weight: 8 Kg

SPARE PART:

S230-01

Rubber balloons, pack of 12



S232

Balloon density apparatus, 3000 ml capacity

STANDARD: NF P94-061-2

Used to determine the in-situ density of fine graded compacted or bonded soil, this unit has the same test system of mod. S230, but with a capacity of 3000 ml 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.

The unit is supplied complete with 6 reinforced rubber membranes, 4 locking clamps, base plate, accessories.

Dimensions: 360x360x700 mm

Weight: 10 Kg

SPARE PART:

S232-01

Reinforced rubber membrane, pack of 6



S233

Balloon density apparatus, 6000 ml capacity

Identical to mod. S232, but with capacity of 6 litres.

Weight: 18 Kg

SPARE PART:

S233-01

Reinforced rubber membrane, pack of 6

ACCESSORIES, used 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

VI95 Rubber mallet 50 mm dia.

VI93 Steel hammer 300 g

VI94 Steel hammer 2 Kg.

VI99 Density pick

VI98 Chisel 300 mm long x 25 mm wide

VI86 Density spoon, big sized

VI88 Trowel, 100x200 mm

VI83 Aluminium scoop 325 cc

VI25-02 Tinned can 5 litre cap.



**S234****Sand density cone apparatus
dia. 6 1/2" (165,1 mm)**

STANDARDS: ASTM D1556 - AASHTOT191 - CNR N° 22
UNE 7371, 83109

Used to determine the in-situ density of fine grained compacted soil. The test consists in digging a hole into the ground and then collect, dry and weight the sampled soil. The hole is than filled with dry sand from the cone container. The apparatus consists of a steel double metal cone with valve, two plastic 5 litre jars, metal base with centre hole.

Plated against corrosion.

Dimensions: 305x305x600 mm Weight: 6 Kg

ACCESSORY:

S234-01 Calibrating container

SPARE PARTS:

S234-05 Metal double cone assembly
with valve

S234-06 Metal base with centre hole

V121 Plastic jar, 5 litre

S231**Sand density cone apparatus
dia. 12" (305 mm)**

Identical to mod. S234 but with cone diameter of 12" (305 mm), recommended for coarse grained soil and gravel (over 38 mm diameter)

Weight: 20 Kg

ACCESSORY:

S231-01

Calibrating container

**S236****Sand replacement apparatus dia. 100 mm**

STANDARDS: BS 1377:9, 1924:2

Used to determine the in-situ density of fine grained compacted soil. The apparatus consists of: sand pouring cylinder dia. 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 dia. 200 mm**

Identical to mod. S236 but having cone dia. 200 mm, recommended for coarse grained soil and gravel.

Weight: 24 Kg

ACCESSORY FOR MOD. S231, S234, S236, S237:

S235 STANDARD SAND for density tests, passing 600 micron and retained on 300 micron. Bag of 50 Kg





Constant head permeameters

STANDARDS: 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, and 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: 75 mm and 114 mm diameter.



S245-01

Constant head permeability cell

75 mm dia., with three pressure take-off points.

Formed by an acrylic plexiglass body held between two aluminium anodized end plates.

Weight: 3 Kg

S245-02

Constant head permeability cell

114 mm dia., with six pressure take-off points and an additional six blanked-off pressure points. Formed by an acrylic plexiglass body held between two aluminium anodized end plates. When using this cell, two manometer tube stands mod. S245-03 are required. 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, made from acrylic plexiglass, wall mounting. The inlet, outlet and overflow pipes can be adjusted for height within the tank.

Weight: 3 Kg

S246

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 dia. 3, 4 and 6 mm for the different degrees of permeability
- Permeameter dia. 4" complete with perforated plates and stainless steel gauze (mod. S252)
- Soaking reservoir with cock
- Tubing and connectors

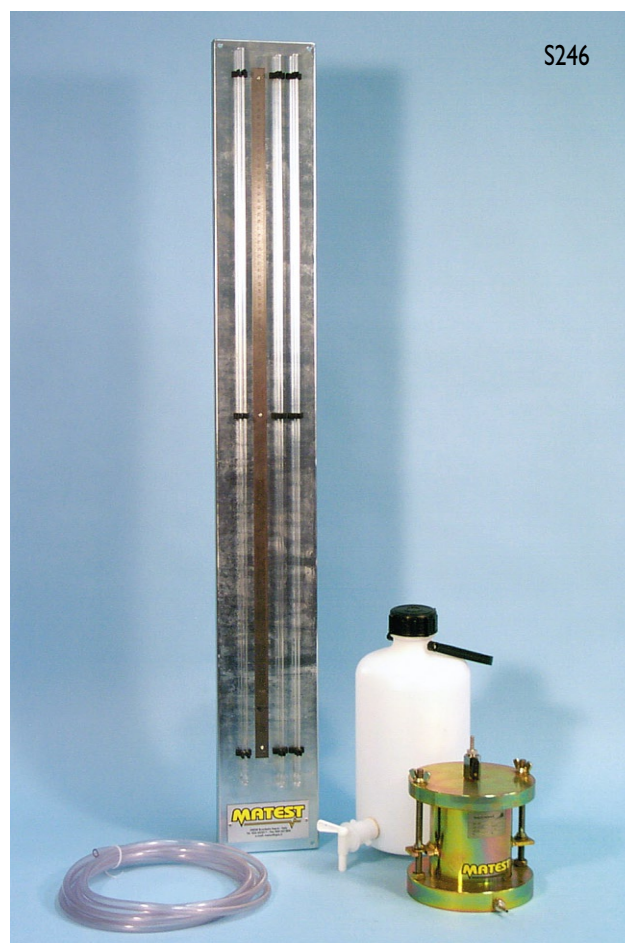
Weight: 18 Kg

ACCESSORIES:

S253 Permeameter dia. 6" complete with perforated plates and stainless steel gauze

S355 De-airing tank 20 litre capacity made from acrylic plexiglass (see pag. 235)

V203 Portable vacuum pump, 220-240V 1ph 50 Hz



S248**Permeameter stand for constant and falling head tests**

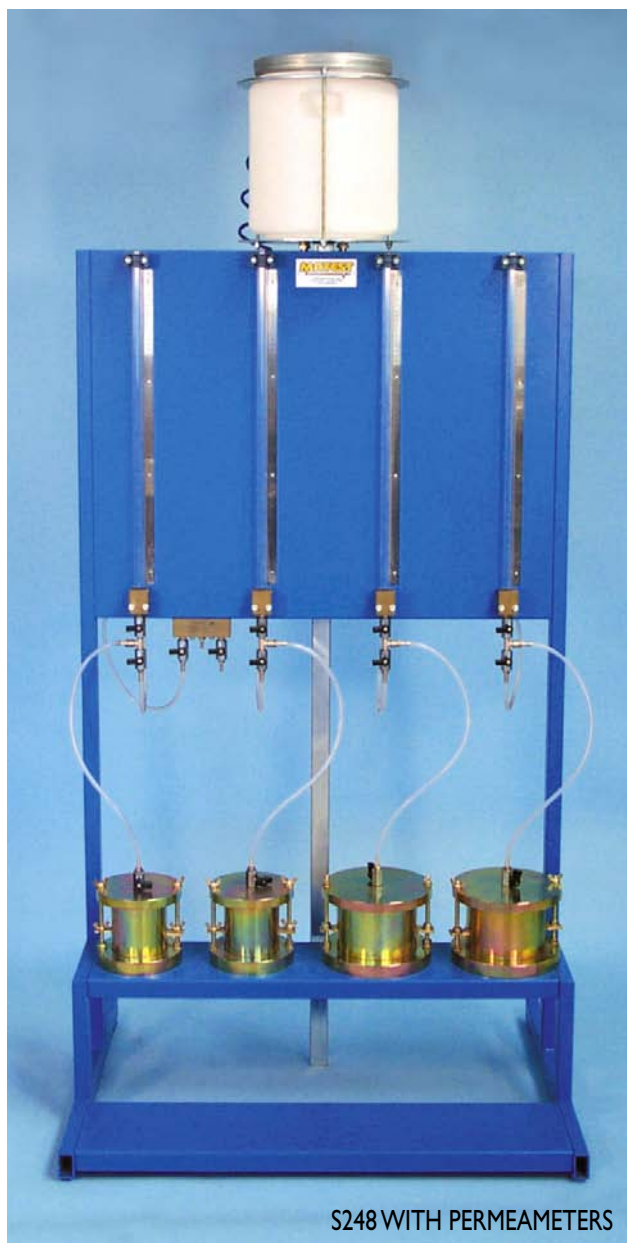
This 4 cells capacity stand is designed to perform both constant head and falling head permeability tests on compacted granular soil samples.

The stand consists of a metal frame with water tank adjustable in height between 1350 and 3450 mm. Supplied complete with tubes, graduated rules, piping, connectors and cocks; but without permeameters to be ordered separately.

The stand can hold up to 4 permeameters having dia. 4", 6" and 12" to perform different types of tests at the same time.

Dimensions: 1050x900x2000/3850 mm

Weight: 75 Kg

**COMPACTION PERMEAMETERS**

Used for determining permeability to water of soil gravel, clay, sand samples.

Supplied complete 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.

Stell made, plated against corrosion.



MODELS:

S252**Compaction permeameter 4" dia.**

(as a Proctor Standard mould). Weight: 8 Kg

S253**Compaction permeameter 6" dia.**

(as a CBR or Proctor Modified mould). Weight: 16 Kg

S254**Compaction permeameter 12" dia. (305 mm).**

Weight: 38 Kg

ACCESSORY:

CUTTING COLLAR, coupled to the Permeameter body, it gets easier the soil sampling

MODELS:

S185-01 Dia. 4"

S200-09 Dia. 6"





CONSOLIDATION TEST

The one-dimensional consolidation test of a soil sample enables to ascertain the settlement characteristic over a given period of time. The soil specimen under test is axially loaded and laterally contained.

Loads are applied with progressive increases and the settlement values are read on a dial gauge or on a digital display (through a displacement transducer)

S260

Front loading oedometer (consolidation apparatus)

STANDARDS: ASTM D2435, D3877, D4546 / BS 1377:5
AASHTO T216 / NF P94 090-1, P094 091
UNE 103-405, 103-601, 103-602

Rigidly manufactured from aluminium alloy casting to provide a high degree of accuracy with any frame distortion under load. The load bridge group is supported in high accuracy self-aligning seat balls.

The beam provides three loading ratio: 9:1 10:1 11:1 and the beam assembly is fitted with an adjustable counterbalance weight.

Maximum load: 150 kg of slotted weights.

The oedometer accepts cells up to 100 cm²

Supplied without: consolidation cell, weights, dial gauge (or transducer), holding bench which have to be ordered separately.

Weight: 25 kg approx.

ACCESSORIES:

Holding Bench, made from sturdy structural painted steel, complete with locking bolts and nuts.

S265 Bench holding one apparatus

S265-01 Bench holding three apparatuses

S376 Dial gauge 10 mm travel x 0,01 mm subd. for vertical displacements.

Alternative solution:

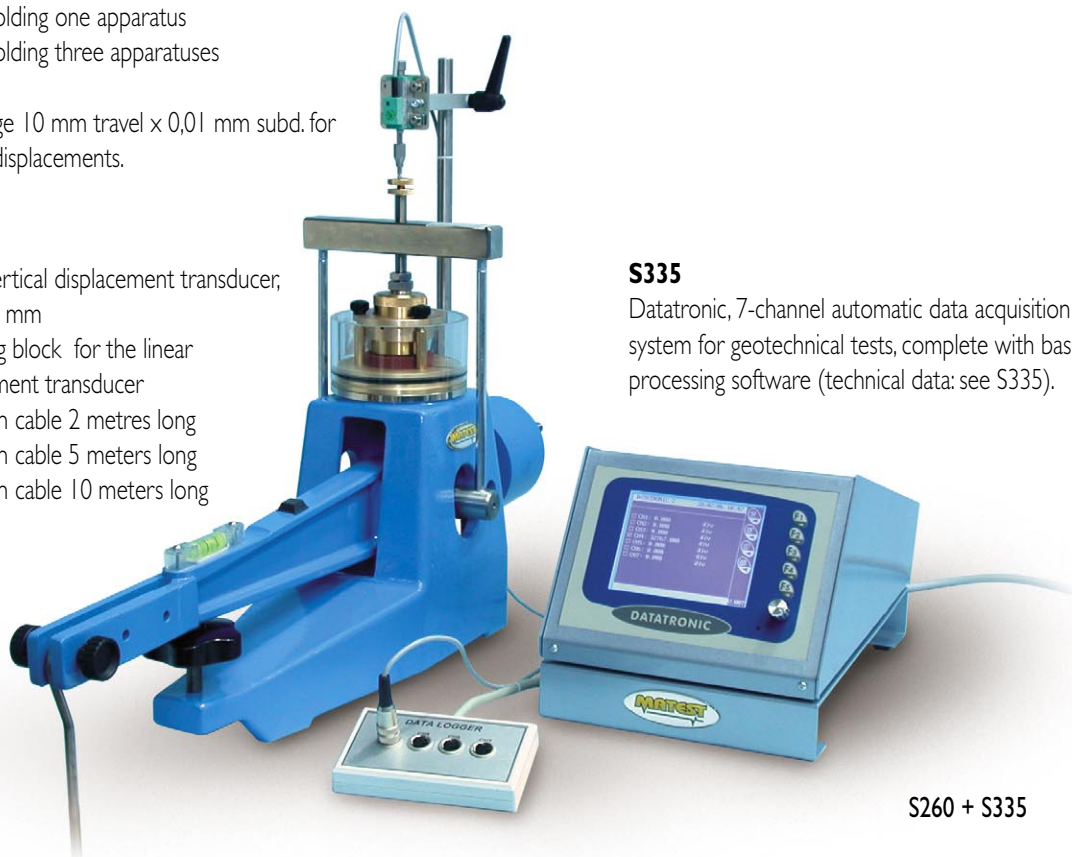
S336-11 Linear vertical displacement transducer, travel 10 mm

S260-11 Mounting block for the linear displacement transducer

S336-30 Extension cable 2 metres long

S336-31 Extension cable 5 meters long

S336-32 Extension cable 10 meters long



S260 + S335

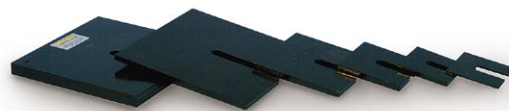


S260 + S336

or:

S336 Datatronic, 128-channel automatic data acquisition system for geotechnical tests, complete with basic processing software (technical data: see S336)

S260-05 Software for Data Processing and print report on consolidation tests, to be used with S335 or S336 Datatronic.



S273

S273

Set of 50 kg. of slotted weights for Oedometer, formed by:
4x10 Kg. - 1x5 Kg. - 2x2 Kg. - 1x1 Kg
Steel made, painted against corrosion.

SLOTTED WEIGHTS, available models:

S273-10	100	g	S273-07	4	Kg
S273-06	250	g	S273-02	5	Kg
S273-05	500	g	S273-08	8	Kg
S273-04	1	Kg	S273-01	10	Kg
S273-03	2	Kg			

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 plexiglass transparent water jacket.

Model	Specimen diameter mm	Specimen area cm ²	Specimen thickness mm	Spare cutting ring mm	Specimen tamper	Spare couple of porous stones
S268	50,47	20	20	S122	S123	S274
S268-01	71,40	40	20	S122-01	S123-01	S274-01
S268-04	75,00	44,16	20	S122-17	S123-04	S274-09
S268-02	79,80	50	20	S122-02	S123-02	S274-02
S268-03*	112,80	100	25	S122-03	S123-03	S274-03

*The consolidation cell dia. 112,8 mm is made from aluminium.



S268 DISASSEMBLED

S268

S268-03

S268-01

S272



Consolidation cells with permeability attachment

Similar in manufacture to the fixed ring cells, they are also provided of a pipe connector with cock and graduated glass burette 10 ml capacity allowing to perform permeability tests.

Model	Specimen dia. mm	Specimen area cm ²	Specimen thickness mm	Hollow punch	Tamper estrusore	Spare couple of porous stones
S272	50,47	20	20	S122-04	S123	S274-04
S272-01	71,40	40	20	S122-05	S123-01	S274-05
S272-04	75,00	44,16	20	S122-18	S123-04	S274-08
S272-02	79,80	50	20	S122-06	S123-02	S274-06
S272-03*	112,80	100	25	S122-07	S123-03	S274-07

*The consolidation cell dia. 112,8 mm is made from aluminium.



GAUGE BLOCKS. Grade I

Used to calibrate the linear displacement transducers.
Supplied complete with Certificate of Inspection.

Available models:

S336-41 Gauge block, nominal length 5 mm

S336-43 Gauge block, nominal length 10 mm



S262

EDOTRONIC "HIGH PERFORMANCE" AUTOMATIC CONSOLIDATED OEDOMETER FOR SOILS TESTS.

This automatic consolidation system, ideal for modern and efficient laboratories, has been created to eliminate or reduce to the absolute minimum any forms of manual intervention, which the oedometer test requires. This therefore results in greater efficiency and cost effectiveness. This appliance is extremely simple and easy to use. Edotronic connects with the PC using a simple Windows based software, in which the entire test cycle can be set and personalized and the machine will perform completely automatically.

When connected to a data collection device, the appliance can visualize information in graphic form, automatically transmit and record test data via a displacement transducer (optional).

The system is equipped with a high resolution and contrast (negative blue) wide display 320 x 240 LCD and is facilitated by a 5 key membrane keyboard with encoder for rapid setting.

A computerised functions control allows multiple tests to be carried out both simultaneously and independently.

Simple and rapid linearisation and calibration procedure.

There is no need of weights as the cylinder and pneumatic piston take it to the desired weight.

Weight application and removal are carried out automatically in the test sequences.

Edotronic, equipped with two coaxial cylinders, provides a precise and timely weight positioning with two ranges of measurement:

0 – 1499 (N) Newtons

1500 – 15000 (N) Newtons

Input of compressed air (filtered): minimum 10 Bar
maximum 14 Bar

Resolution: 1 Newton

Precision: 1%

Maximum load: 15 kN (with 8 Bar input)

The appliance comes completely equipped with the relevant software.

The following are not included: oedometric cell, transducer, compressor and filter.

Power supply: 220-240V 1ph 50Hz

Dimensions approx.: 240 x 370 x h 450 mm

Weight : 30 kg

ACCESSORIES:

V207 LABORATORY COMPRESSOR, tank capacity 50 litres, nominal pressure 10 Bar.

S262-11 AIR FILTER, auto-draining, it reduces up to one micron, complete with discharge.

S336-11

Linear displacement-deformation transducer, accurate and versatile.
Transducer 10 mm travel.

Independent linearity <0,1 – 0,3% (0,1x50mm, 0,3x10mm)

Max. displacement speed up to 10 m/s.

S336-30 Extension cable 2 metres long

S336-31 Extension cable 5 metres long

S336-32 Extension cable 10 metres long

It is recommended not using more than 10 metres of extension cable with the linear strain transducers.

S336-35 MOUNTING BLOCK for the linear strain transducer.



DIRECT/RESIDUAL SHEAR TEST APPARATUS

STANDARDS: ASTM D3080 / BS 1377:7 / AASHTO T236 / NF P094 071-1/2

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 dia. 50, 60, 100 mm, and square 60x60, 100x100 mm.

The apparatus is equipped with a control closed loop motor with epicycloid reducers.

At the beginning of each test, the machine performs an automatic and complete internal check, a position reset with the elimination of all possible positioning errors and all pauses.

The input of all the test patterns is achieved by the interaction of the keyboard and the alphanumeric display with self-memory, thus granting infinitesimal resolutions in short times.

All data are input and stored when the machine is in stand-by, without affecting the specimen under test with quick machine setting.

Possibility to fix maximum excursion of the shear box, so as to interrupt automatically the test.

It is possible to input a different return speed (residual shear) in relation to the one used for the shear test, thus allowing a quick playback to select the residual shear test, saving a lot of time.



S277-KIT
+ S284

Technical features:

- RS 232 output for connection to PC
- Display of both speed and displacement with 0,00001 mm resolution
- Shear speed between 0,00001 to 9,99999 mm/minute
- Max shear effort: 5000 N possible on the whole speed range
- Possibility of direct vertical load, or with a lever arm ratio 10:1
- Max vertical direct load: 500N; with lever arm: 5500N
- Display and pilot lamps to signal any bad functioning and alarms
- Box group mounted on ball track with high quality antifriction system
- Read value results are immediate and of extreme accuracy
- Extremely easy and practical use, not requiring qualified staff.

Shear box, hollow punch and tamper are not included in the standard supply and have to be ordered separately.

Power supply: 230V 1ph 50Hz 200W

Dimensions: (lever model) : 1040x420x1350 mm

Dimensions (pneumatic model) : 1010x360x660 mm

Weight : 120 Kg



The direct/residual shear test machine is available in "Three" basic versions:

DIGITAL BASIC VERSION

S277-KIT

DIGITAL SHEAR TESTING MACHINE, comprising:

- S277-10** Digital shear frame with microprocessor; complete with beam loading device, shear box case with adaptors, dial gauge supports.
- S370-03S** Load ring, 3000 N capacity with electric safety stop device.
- S377** Dial indicator for horizontal displacement 25 x 0,01 mm
- S376** Dial indicator for vertical displacement 10 x 0,01 mm
- S273** Set of 50 kg of slotted weights



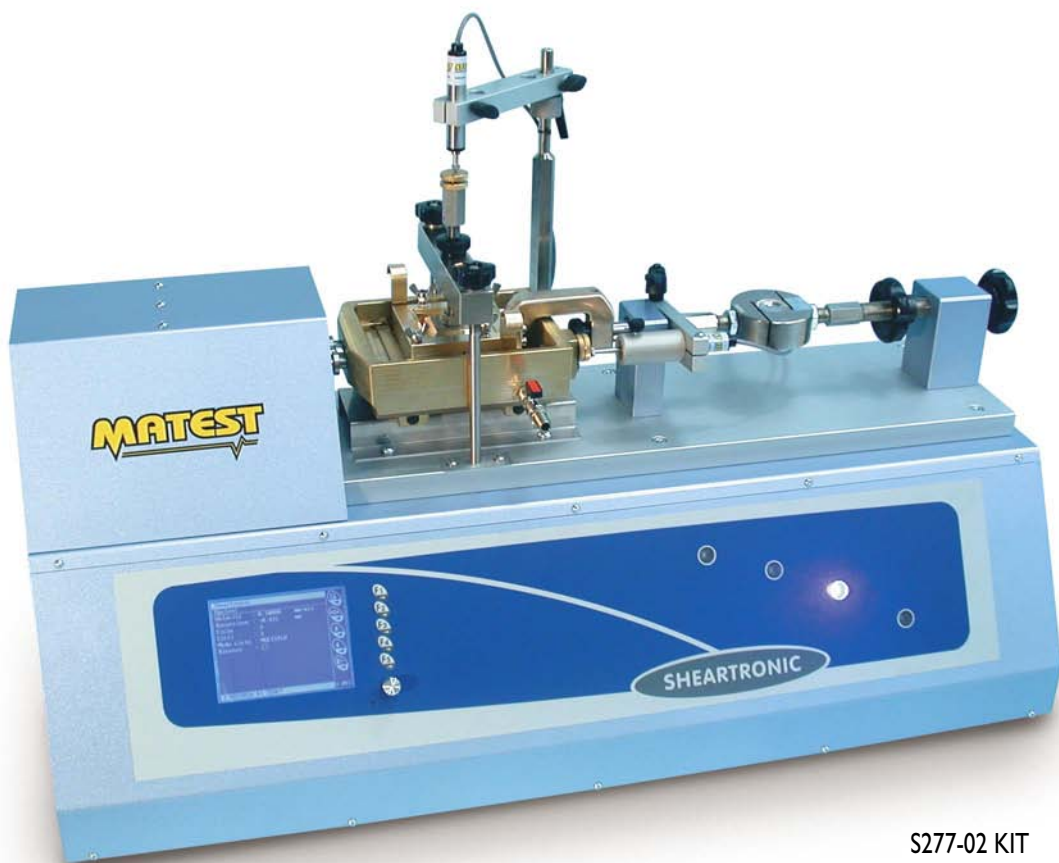
DATA ACQUISITION/PROCESSING VERSION

S277-01

DIGITAL SHEAR TESTING MACHINE, WITH INCORPORATED DATA ACQUISITION/PROCESSING SYSTEM AND SOFTWARE, comprising:

- S277-10** Digital shear frame with microprocessor; complete with beam loading device, shear box case with adaptors, transducers supports.
- S277-20** Load cell, 3000 N capacity, complete with cable
- S336-11** Linear potentiometric vertical transducer 10 mm travel
- S336-12** Linear potentiometric horizontal transducer 25 mm travel
- S277-31** Software for basic data acquisition/processing, complete with incorporated electronic card
- S273** Set of 50 kg of slotted weights





S277-02 KIT
+ S284

DATA ACQUISITION/PROCESSING, PNEUMATIC, FULLY AUTOMATIC VERSION

S277-02 KIT

DIGITAL SHEAR TESTING MACHINE, FULLY AUTOMATIC, WITH INCORPORATED DATA ACQUISITION/PROCESSING SYSTEM + SOFTWARE AND AUTOMATIC PNEUMATIC VERTICAL LOADING DEVICE, comprising:

- S277-11** Digital shear frame with microprocessor, complete with pneumatic vertical loading device automatically driven through the SVV, shear box case with adaptors, transducers supports.
- S277-20** Load cell, 3000 N capacity, complete with cable
- S336-12** Linear potentiometric vertical transducer 10 mm travel
- S336-12** Linear potentiometric horizontal transducer 25 mm travel
- S277-31** Software for basic data acquisition/processing, complete with incorporated electronic card.

Note.

The pneumatic shear machine, requires an air compressed source (see: V206 Air Compressor)

Accessories for S277-01 and S277-02 machines:

- S277-40** Software for Data Processing and print report on shear tests.



GAUGE BLOCKS, Grade I

Used to calibrate the linear displacement transducers.

Supplied complete with Certificate of Inspection.

Available models:

- S336-41** Gauge block, nominal length 5 mm
- S336-43** Gauge block, nominal length 10 mm
- S336-45** Gauge block, nominal length 25 mm
- S336-47** Gauge block, nominal length 50 mm

ACCESSORIES:

Shear box assemblies, made from brass, accurately machined, complete with carriage, walled round or square hole, base plate, two grids, two perforated grids, two porous stones, adapters to fit the box holder.

Models:	Shear box	Spare couple of porous stones
Round specimens dia. 50 mm	S282	S286-03
Round specimens dia. 60 mm	S283	S286
Round specimens dia. 100 mm	S281	S286-04
Square specimens 60x60 mm	S284	S286-01
Square specimens 100x100 mm	S285	S286-02

Hollow punch (sample cutter) and **Tamper** (extrusion tool)

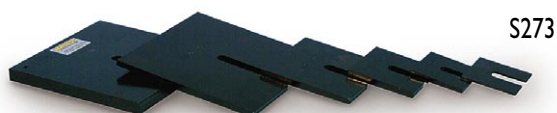
The hollow punch with cutting rim is used to prepare the soil sample, and the tamper ejects the specimen filling it directly into the shear box without disturbing it.

Models:	Hollow punch	Tamper
Dia. 50 x h 25 mm	S122-08	S123-08
Dia. 60 x h 25 mm	S122-09	S123-09
Dia. 100 x h 25 mm	S122-10	S123-10
Square 60x60 x h 25 mm	S122-11	S123-11
Square 100x100 x h 25 mm	S122-12	S123-12



SPARE PARTS:

S273 Set of 50 Kg. of slotted weights formed by: 4x10 Kg
1x5 Kg - 2x2 Kg - 1x1 Kg
Steel made, painted against corrosion



Slotted weights, available models:

S273-06	250	g
S273-05	500	g
S273-04	1	Kg
S273-03	2	Kg
S273-07	4	Kg
S273-02	5	Kg
S273-08	8	Kg
S273-01	10	Kg

On request the shear machine can be equipped with load rings or load cells having capacity from 500 N to 5000 N:

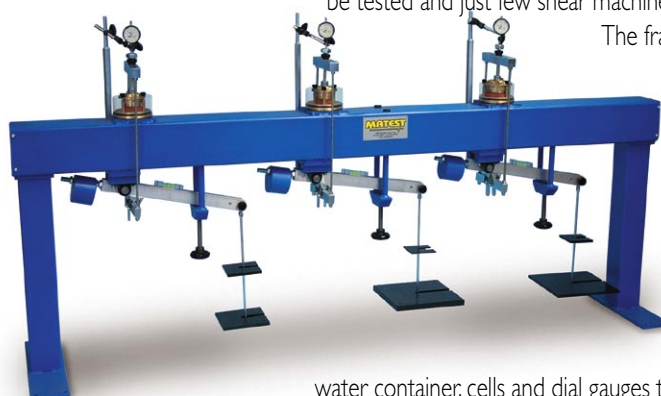
S290

Consolidation frame, it accepts up to 3 shear boxes or consolidation cells.

Used to apply a constant load on the specimen in the shear box, so as to shorten the test duration when a lot of specimens have to be tested and just few shear machines are available.

The frame can also be used to consolidate oedometric cells. Produced in a rugged steel structure, it is supplied complete with three lever arms ratio 10:1 having each max. load up to 550 Kg., centering devices and dial gauge holders. Supplied without weights,

water container; cells and dial gauges to be ordered separately.
Dimensions: 2300x450x900 mm
Weight: 150 Kg approx.



S290 WITH ACCESSORIES

ACCESSORIES:

S291 WATER CONTAINER, made from plexiglass and aluminium, it accommodates the shear box during the consolidation test, by keeping the specimen deep into the water.
Weight: 4 Kg

S273 Set of 50 Kg. of slotted weights

S376 Dial gauge 10x0,01 mm



**S220****In-situ CBR test set**

STANDARDS: BS 1377:7, 1924:2 - ASTM D1883, D4429
AASHTO T193 - CNR/UNI 10009 - LCPC

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 penetron piston, set of adaptors and holders

Set of extension rods: 2x100 mm, 1x300, 600, 1000 mm

Datum bar 1400 mm long with two tripods

Dial gauge 25x0,01 mm

Slotted surcharge weights 4,5 and 9 Kg. and annular 4,5 kg

Carrying case

Weight: 70 Kg approx.



S221-01

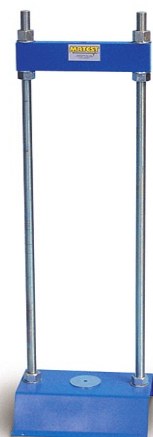
S220

S221

Conversion frame, for laboratory CBR tests, by using part of the components of the S220 in-situ set.

S221-01

Mechanical jack, 50 kN capacity, hand operated through handwheel.



S221

S238**Relative density of cohesionless soils**

STANDARDS: ASTM D4253 - D4254

The equipment consists of:

vibrating table 762x762 mm, actuated by a vibrator of 3600 rpm. with adjustable amplitude.

Relative density mould sets 0,1 and 0,5 cu.ft., cylindrical shape, complete with two guide sleeve with clamp assembly, two surcharge base with handle, two surcharge weights.

Dial gauge with measuring device.

Power supply: 220-240 V 1ph 50 Hz

Weight: 300 Kg approx.



S238

STATIC LOADS ON PILES

STANDARD: ASTM D1143

This equipment is utilized for static axial compressive loads on piles and special foundation structures tests to verify their bearing under known loads, and with accurate and sensitive value measurements.

The complete set consists of a loading ram 55 mm stroke, hydraulic pump with reservoir, precision manometer with max. loading pointer, flexible pipe connector, 2 mt. long, large spherical seat assuring a valid contact with the contrasting structure.

Weight: 100÷170 Kg

MODELS:

S228 HYDRAULIC LOADING EQUIPMENT, 2000 kN capacity, hand operated

S228-01 HYDRAULIC LOADING EQUIPMENT, 3000 kN capacity, hand operated

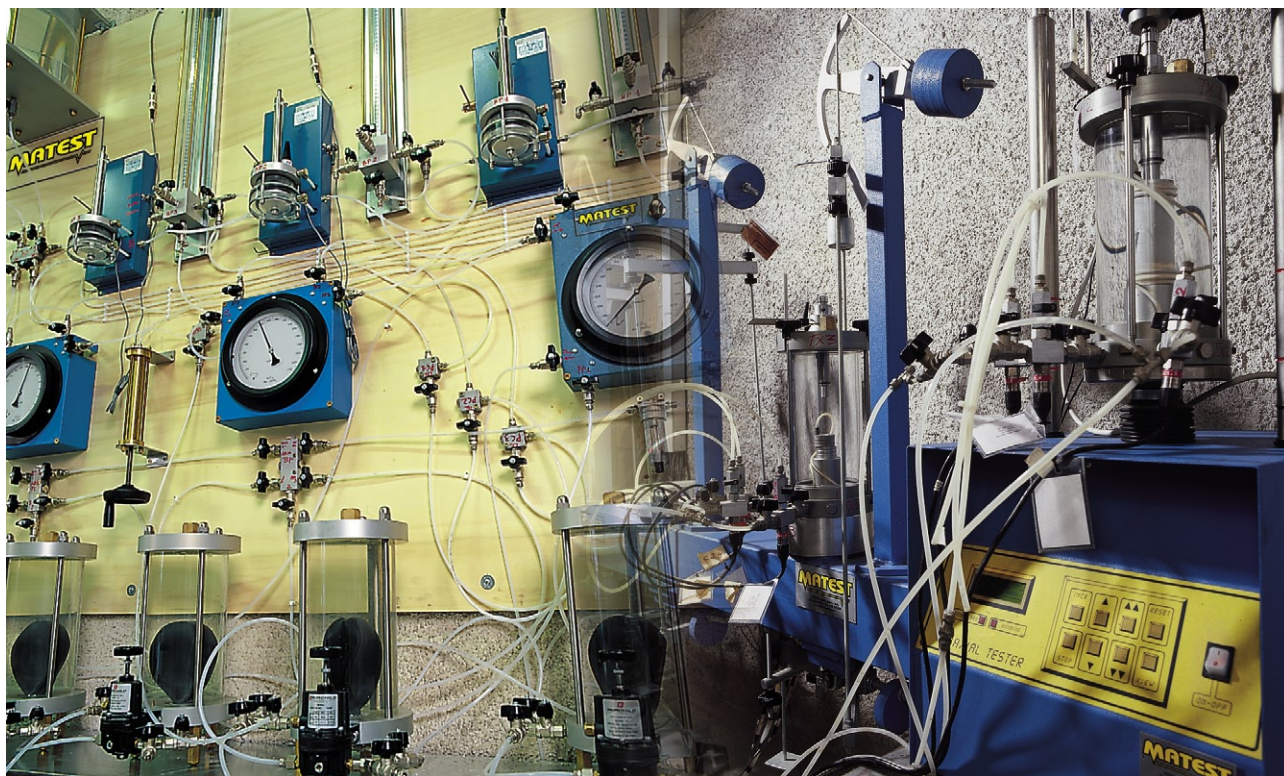
S228-02 HYDRAULIC LOADING EQUIPMENT, 2000 kN capacity, motorized.
Power supply: 220-240 V 1ph 50 Hz 750 W

S228-03 HYDRAULIC LOADING EQUIPMENT, 3000 kN capacity, motorized.
Power supply: 220-240 V 1ph 50 Hz 750 W



S228-03

TRIAXIAL TESTS



INTRODUCTION

The application of local loads or pressures on soils determine 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 null 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 is allowed. The same specimen is then stressed up to the failure.

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, isotropic 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, isotropic 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 geo-technical aspects and soil conditions and is particularly indicated to evaluate sandy or highly permeable soils.

S301**Digital triaxial load frame - 50 kN**

STANDARDS: ASTM D2850 - BS 1377:8

This sturdy construction machine has been developed to meet all the requirements of a soil laboratory.

Thanks to its large structure it can accommodate all standard Triaxial Cells for testing soil specimens up to 100 mm. dia. by 200 mm. length.

Machine is very simple; 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: $\pm 0,5\%$
- RS 232 port for connection to PC
- Vertical daylight: 0-790 mm. (0-530 mm. with ring)
- Distance between columns: 305 mm
- Platen diameter: 177 mm
- Power supply: 220-240V 1ph 50 Hz 750 W
- Dimensions: 420x580x1410 mm
- Weight: 105 Kg

Note: The machine is supplied complete with load piston and sphere, but without proving rings, triaxial cell, dial gauges which must be ordered separately.

Data acquisition and processing system

As an alternative to the load ring and dial gauges measurements, it is possible to equip the triaxial system with electric load cell and electronic axial strain transducers connected to the data acquisition unit, complete with suitable software.

See mod. S349 and S361, in next pages.

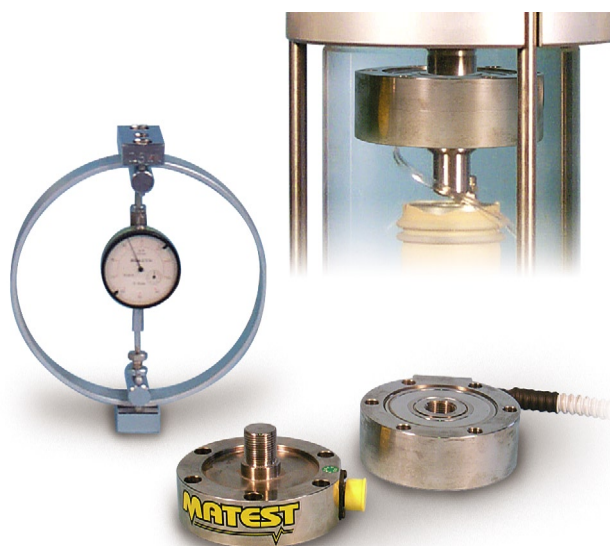


MEASUREMENT OF THE IMPOSED LOAD OF THE TRIAXIAL MACHINE THROUGH:

- Load rings: see next pages.
- Summersible electric load cells: see next pages.
- Electric load cells: see next pages.



S301 WITH ACCESSORIES





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 complete with an adjustable dial gauge or displacement transducer holder to measure the axial deformation of the specimen.

Note: The triaxial cell is supplied without accessories like: caps, plinths, membranes, membrane sealing rings, porous stones, dial gauges, etc. which must be ordered separately.



Models:	S305	S306
Max. specimen size mm	Ø 70x140	Ø 100x200
Max. cell pressure	1700 kPa	1700 kPa
Overall dimensions mm	Ø 280x480	Ø 310x540
Weight Kg	8	16

Note: cell mod. S305 can be also used for specimens dia. 50x100 and 38x76 mm. with accessories of suitable diameter. Cell mod. S306 can be also used for specimens dia. 70x140, 50x100 and 38x76 mm. with accessories of suitable diameter.

ACCESSORIES FOR TRIAXIAL CELLS:

	Ø 38x76 mm	Ø 50x100 mm	Ø 70x140 mm	Ø 100x200 mm
Rubber membrane (pack of 10)	S310	S310-01	S310-02	S310-03
Membrane sealing ring (pack of 10)	S311	S311-01	S311-02	S311-03
Membrane stretcher	S312	S312-01	S312-02	S312-03
Slipt former	S313	S313-01	S313-02	S313-03
Top cap with drain	S314	S314-01	S314-02	S314-03
Plinth for cell. mod. S305	S315	S315-01	S315-02	-
Plinth for cell. mod. S306	S315-04	S315-05	S315-06	S315-07
Porous disc (2 pcs)	S316	S316-01	S316-02	S316-03
Perspex plain disc (2 pcs)	S317	S317-01	S317-02	S317-03
"O" ring for plinth	S318	S318-01	S318-02	S318-03
Filter paper drain (50 pcs)	S319	S319-01	S319-02	S319-03
Filter paper for base (100 pcs)	S320	S320-01	S320-02	S320-03
Stainless core cutter	S122-13	S122-14	S122-15	S122-16
Extraction plate	S123-13	S123-14	S123-15	S123-16



S310 ÷ S331



271

ACCESSORIES FOR TRIAXIAL CELLS (follows):

- S321** Drain burette, 10 ml. cap.
- S322** Drain burette, 50 ml. cap.
- S325** Nylon tube dia. 6x4 (25 mt.)
- S326** Terminal for connection tube (10 pcs)
- S327** Flaring tool
- S328** Vaseline oil (1 Kg)
- S329** Water-repellent grease (1 Kg)
- S330** Grease pump
- S331** Null displacement valve (spare)
- S377** DIAL GAUGE, 25x0,01 mm sens. for specimens up to dia. 50x100 mm
- S379** DIAL GAUGE, 50x0,01 mm sens. for specimens from dia. 70x140 mm
- S212-03** Dial gauge holder on load piston

RUBBER MEMBRANE, to become the specimen waterproof.

MEMBRANE SEALING RING, to block the membrane on the top cap of the plinth.

MEMBRANE STRETCHER, to stretch the membrane and make the specimen lock easier; avoiding to disturb it.

SPLIT FORMER, to prepare non cohesive soil specimens like sand. Made of aluminium, it is composed by two halves.

TOP CAP WITH DRAINAGE, for load homogeneous application on the whole section of the specimen. Made of anodized aluminium, complete with connector.

PLINTH, in aluminium used to adapt the triaxial cell to the specimen diameter.

POROUS DISCS, in phosphor bronze, to filter and uniformly distribute water on the whole section of the specimen. Two pieces are required each cell.

FULL DISC, in perspex, with 10 mm. thickness, to place into the plinth and top cap replacing the porous disc, used for undrained tests. Two pieces are required each cell.

FILTER PAPER, for lateral drain on short permeability specimens like clays, etc.

FILTER PAPER, to avoid the soil clog in the porous stones during the test.

CORE CUTTER, to cut, in the predetermined diameter; soil cohesive samples having higher dimensions. Made from stainless steel and cutting edge.

PLATE, to extrude the specimen from the core cutter.

DRAINAGE BURETTE, to prepare non cohesive specimens applying negative pressure to the base of the specimen and to measure the drainage inside and outside the specimen during the test with

specimen open to the atmosphere. Two models are available: 10 ml. for specimens up to 70 mm. dia. and 50 mm. for specimens 100 mm. dia. Supplied complete with cell rod and couplings.

“O” RING, to facilitate the clamping of the membrane sealing ring to the membrane, avoiding to disturb the soil specimen.

TOOL, to cut and prepare the ends of the nylon connection tubing in order to be fixed to the suitable connector.

DIAL INDICATORS, to measure the deformation of the sample during the axial load tests.

Pressure measuring panel

Used to measure the cell pressure, the back pressure and other pressure measurements.

The panel is composed by a metallic support with, inside an accurating gauge dia. mm. 200, having scale 0-1700 kPa.

TWO MODELS ARE AVAILABLE:

S340

Pressure measuring panel at 4 inlet/outlet null displacement valves. Supplied complete.

Dimensions: 410x350x110 mm

Weight: 6 Kg



S340



S341



S341

Pressure measuring panel at 8 inlet/outlet null displacement valves which enable the best versatility for connecting the pressure of the system, of the pressure measuring points and of the different units, commonly used (screw pump, vacuum pump, de-airing water tank, mercury gauge, etc.) Supplied complete. Dimensions: 410x460x110 mm
Weight: 8 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



S345

S348

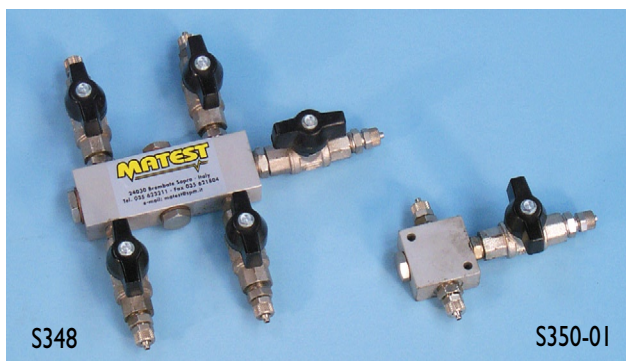
Distribution panel, delivers water or pressure to various systems. Provided with 5 inlet/outlet valves with null variation of volume. Assembled on an aluminium support. Dimensions: 200x200x55 mm
Weight: 3 Kg



S350-03

S350-01 Two-way distribution valve for air or water.

S350-03 Filter unit composed by filtering device and interchangeable cartridge.



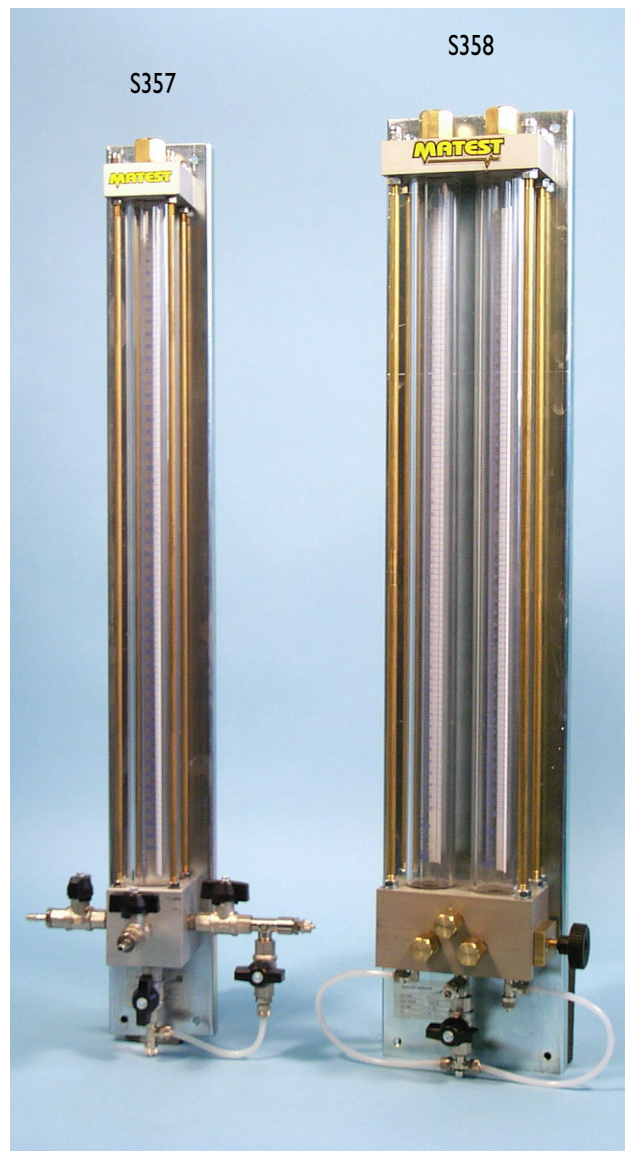
S348

S350-01

VOLUME CHANGE MEASUREMENT

Used to measure the continuous volume changes, during triaxial tests.

Composed by a measuring burette, cap. 100 ml. and 0,2 ml. sens., placed inside a perspex tube, reversing valve and by-pass valve which allows to exclude the volume change measurement.



MODELS:

S357

Single burette apparatus

Dimensions: 180x270x860 mm
Weight: 4 Kg

S358

Double burette apparatus

Dimensions: 230x270x860 mm
Weight: 5 Kg

**S356****Differential mercury manometer, scale: -100 kPa +100 kPa**

The measure of low, positive and negative pore pressures, effected with standard manometers dia. 200 mm., does not result sufficiently accurate. The use of a mercury manometer offers a simple and effective system in order to take, accurately, the low pressures. Composed by a "U" manometer full of mercury, calibrated for directed kPa readings. Mounted on metallic panel to fix on a wall. Complete with TRAP for mercury, collects the eventual mercury pushed out from the manometer. Supplied without mercury.

**S356**

ACCESSORY:

V300-I7

MERCURY, pack of 1 Kg

S350**Air/Water pressure system,**

to distribute pressure water up to 1700 kPa. Simple, practical and extremely accurate to select tests pressure, it can also offer the possibility to further system expansions. The cell membrane enables the use of deaerated water. A suitable compressor, which can grant a pressure source, is necessary for using the air/water membrane cell. 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.

Maximum pressure 1700 kPa

Dimensions: 270x300x425 mm

Weight: 9 Kg

**S350****S350-05**

SPARE PARTS:

S331

Null displacement valve.

S350-04

Membrane for air/water cell.

Pack of 2 pieces.

S350-05

Pressure regulator; high accuracy model.

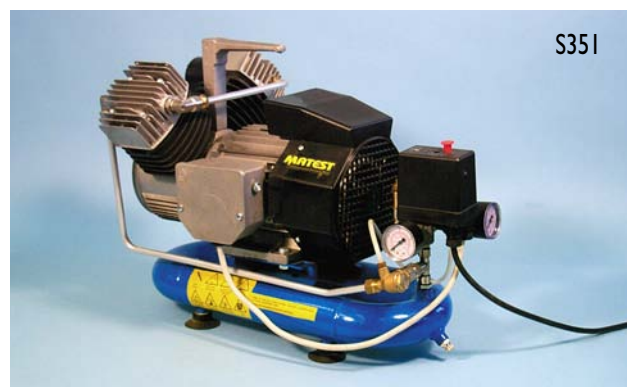
S351

Laboratory air compressor, max. pressure 17 bar, to be used with the air/water membrane cell. Supplied complete with tubings and couplings for cell connection.

Dimensions: 520x310x400 mm

Power supply: 220-240 V 1 ph 50 Hz

Weight: 35 Kg

**S351****A144****Oil/Water constant pressure system**

This unit 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. Supplied complete with test pressure precision gauge, range 0-3500 KPa.

Power supply: 220-240V 1 ph 50 Hz

Weight: 20 Kg

**A144**



S353

Null Indicator

Used as a balancing device to measure the pore pressure of the specimen.

The unit is made from acrylic material, and is realized in one piece only; assembled on the triaxial cell, avoiding eventual tubing expansions.



S355

De-airing tank, 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.

Tank capacity: 20 litres.

Dimensions: 320x320x520 mm

Weight: 15 Kg

ACCESSORIES:

V204

VACUUM PUMP, portable, one stage, it produces a final vacuum of 730 mm/Hg

Volume sucked: 5 Cu-m/h

Power supply: 220-240 V Iph 50 Hz

Dimensions: 260x220x190 mm

Weight: 12 Kg

S355-01

WATER TRAP collects condensed water.



S359

Three-place consolidation load frame

Used to apply a constant load to the piston of the triaxial cell.

Load can be applied through a hanger with a direct ratio: 1:1, or through lever with ratio 5:1.

Maximum load of 250 Kg. each place.

The frame, resistant metallic construction, accepts up to 3 triaxial cells and is provided with suitable centering plate cells.

Supplied without cells, weight and dial gauges, which must be ordered separately.

Dimensions: 2300x400x1800 mm

Weight: 150 Kg

ACCESSORIES:

S273 Set of slotted weights 50 Kg.

S377 Dial gauge 25 mm. stroke and 0,01 mm. div. for specimens up to dia. 50x100

S379 Dial gauge 50 mm. stroke and 0,01 mm. div. for specimens from dia. 70x140



S359 WITH ACCESSORIES

S335

DATATRONIC 7 "HIGH PERFORMANCE"

7-CHANNEL AUTOMATIC DATA ACQUISITION SYSTEM FOR GEOTECHNICAL TESTS.

This 7-channel stand alone automatic data acquisition system has been designed and produced to satisfy the requirements of small laboratories and to considerably improve laboratory productivity and cost effectiveness.

Data collection takes place automatically.

Our Windows based program with menu driven command selection, is straightforward and easy to follow and does not require the attention of a skilled operator.

section S

The system can be used for:

Oedometer (consolidation) tests

Direct and residual shear tests (cycle tests)

Triaxial tests

Free lateral expansion tests

CBR tests

Marshall tests



S335

This appliance can receive up to 7 different independent signals, all of which can be calibrated and zeroed independently.

The high resolution and contrast (negative blue) wide display 320 x 240 LCD simultaneously visualises all the 7 channels.

Continual live display of test diagrams.

Test data exportation with .TXT or .XLS files for consecutive processes.

Personalised printouts of certificates and test diagrams.

System configuration facilitated by a 5 key membrane keyboard with encoder for rapid setting.

Every configuration and calibration can be stored.

Data logging (from the PC using the Windows based program) is facilitated by user-friendly software included in the Datatronic package.

The system allows setting for each channel the sampling type in linear form, square root form, logarithmic form and personalizable form, with frequencies from very fast (one second) to infinite, without reading limits (storage limits are linked to PC memory), with the possibility of delaying the start time.

Password protected configuration and calibration. All data is saved on the RAM memory.

Battery backed data storage.

This appliance contains an analogue / digital (24 bit) conversion device.

Display type size can be chosen from engineering units for load, strain, volume variation, pressure and personalised units.

Datatronic provides a 5V DC output for the auxiliary transducer supply. The PGA regulation system allows a wide range of electric signals to be selected with an input of 20 mV to $\pm 2.5V$ (whether half or full bridge).

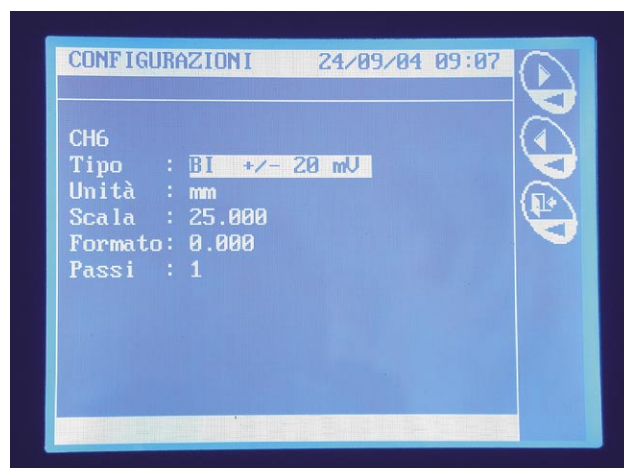
Input transducers from 0-20mV to $\pm 2.5V$. These can be set up by the PGA.

Transducer excitation output 5Vdc

Power supply: 220-240V 1ph 50Hz

Dimensions: 240 x 370 xh 220 mm

Weight : 5 kg



SCREEN EXAMPLE

LINEAR STRAIN TRANSDUCERS

Supplied calibrated with calibration certificate, complete with cable, connector and signal conditioner.

THREE DIFFERENT TYPES OF TRANSDUCERS ARE PROPOSED:

TYPE "A": Linear displacement-deformation transducer; accurate and versatile.

Available with 10, 25, 50, 100 mm travel

Independent linearity $<0,1 - 0,3\%$ (0,1x50mm, 0,3x100mm)

Max. displacement speed up to 10 m/s.

Models:

S336-11 Transducer 10 mm travel

S336-12 Transducer 25 mm travel

S336-14 Transducer 50 mm travel

S336-13 Transducer 100 mm travel

TYPE "B": Linear Strain Gage Transducer

Available with 10, 25 mm travel

Full bridge at 350 Ohm

Independent linearity $<0,3\%$

Models:

S336-15 Transducer 10 mm travel

S336-16 Transducer 25 mm travel

TYPE "C": Linear Strain Gage Transducer; extremely high accuracy

This sensor utilizes the most advanced components of the extensometric technology.

Available with 10, 25, 50 mm travel

Full bridge at 350 Ohm

Accurate thermal compensation with drift: $0,01\%/^{\circ}\text{C}$.

Independent linearity: $<0,1\%$

Models:

S336-20 Transducer 10 mm travel

S336-21 Transducer 25 mm travel

S336-22 Transducer 50 mm travel

ACCESSORIES FOR LINEAR TRANSDUCERS:

S336-30 Extension cable 2 metres long

S336-31 Extension cable 5 metres long

S336-32 Extension cable 10 metres long

It is recommended not using more than 10 metres of extension cable with the linear strain transducers.

S336-35 COUPLING BLOCK to the linear strain transducer TYPE "A" to get easier its mounting on any type of machine

S336-36 COUPLING BLOCK for the linear transducer TYPE "B" and "C" to get easier its mounting on any type of machine

S260-11 MOUNTING BLOCK for the linear transducer TYPE "A" to be fixed on the S260 consolidation apparatus (oedometer).

S260-12 MOUNTING BLOCK for the linear transducer TYPE "B" and "C" to be fixed on the S260 consolidation apparatus (oedometer).

S280-13 MOUNTING BLOCK for the linear transducer TYPE "B" and "C" to be fixed on the S280 shear apparatus (vertical displacement).

S280-11 MOUNTING BLOCK for the linear transducer TYPE "A" to be fixed on the S280 shear apparatus (vertical displacement).

S280-12 MOUNTING BLOCK for the linear transducer TYPE "A" to be fixed on the S280 shear apparatus (horizontal displacement).

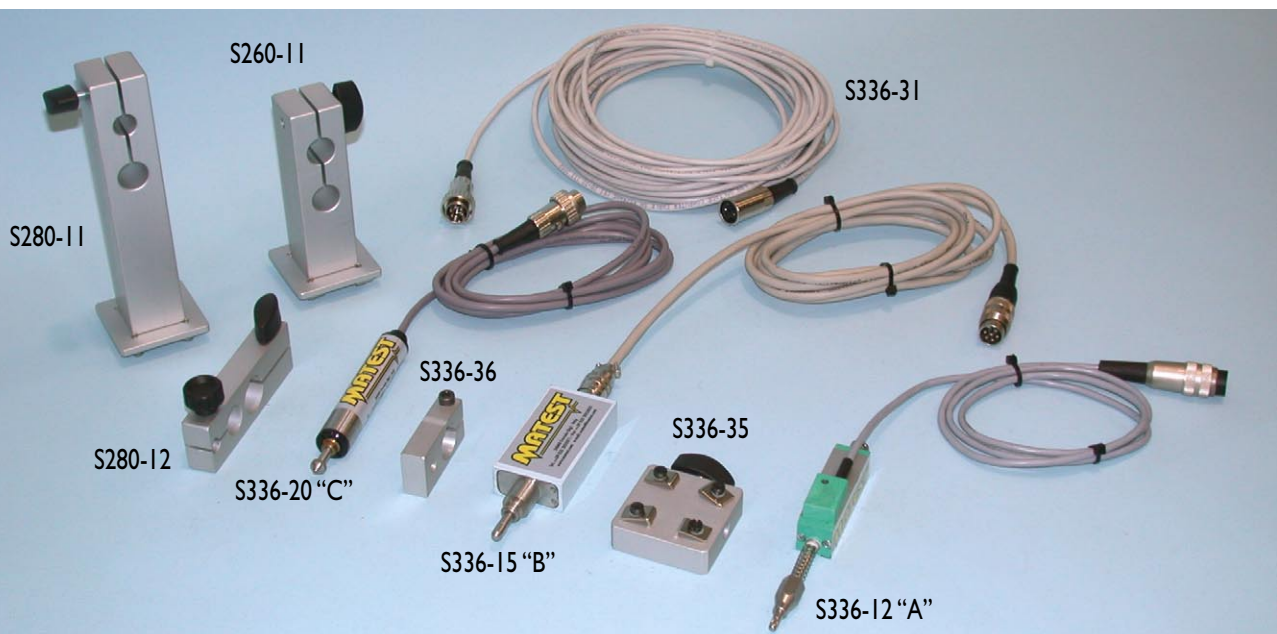
S280-14 MOUNTING BLOCK for the linear transducer TYPE "B" and "C" to be fixed on the S280 shear apparatus (horizontal displacement).

S373-11 MOUNTING BLOCK for the linear transducer TYPE "A" to be fixed on the load proving ring.

S373-12 MOUNTING BLOCK for the linear transducer TYPE "B" and "C" to be fixed on the load proving ring.

S305-11 MOUNTING BLOCK for the linear transducer TYPE "A" to be fixed on the triaxial cell.

S305-12 MOUNTING BLOCK for the linear transducer TYPE "B" and "C" to be fixed on the triaxial cell.



PORE PRESSURE TRANSDUCERS

Suitable for pore pressure measurement, but requires a de-airing block

- Requires an input voltage of 10 volts dc, giving an output of up to 100mV
- High accuracy and reliability
- Protected against corrosive pore water pressure
- Supplied with 2 metres cable and 5 pin plug
- Threaded 0,25 BSP
- Operating temperatures between 0 and 70°C.

MODELS:

S336-50 Pressure transducer 1000 kPa

S336-51 Pressure transducer 2000 kPa



ACCESSORIES:

S336-55 De-airing block for pressure transducer

S336-30 Extension cable 2 metres long

S336-31 Extension cable 5 metres long

S336-32 Extension cable 10 metres long

It is recommended not using more than 10 metres of extension cable with the pressure transducers

SUBMERSIBLE TRIAXIAL LOAD CELLS

Designed for measuring compressive loads, connected to the S335 or S336 Datatronic units, they can be fitted into new or existing triaxial cells.

Manufactured from high quality materials, fully sealed waterproof device, with excellent inherent resistance to side forces.

Being insensitive to cell pressure, the load cell can be used inside the triaxial cell; the load also being measured within the cell eliminates the effect of piston friction.

Used as an alternative to the load rings or electric load cells.

Rated output: 2mV/V nominal

Non-linearity: 0,05% FS

Hysteresis: 0,1%FS

MODELS:

S337-03

Submersible load cell 5 kN capacity

S337-04

Submersible load cell 10 kN capacity

S337-05

Submersible load cell 25 kN capacity

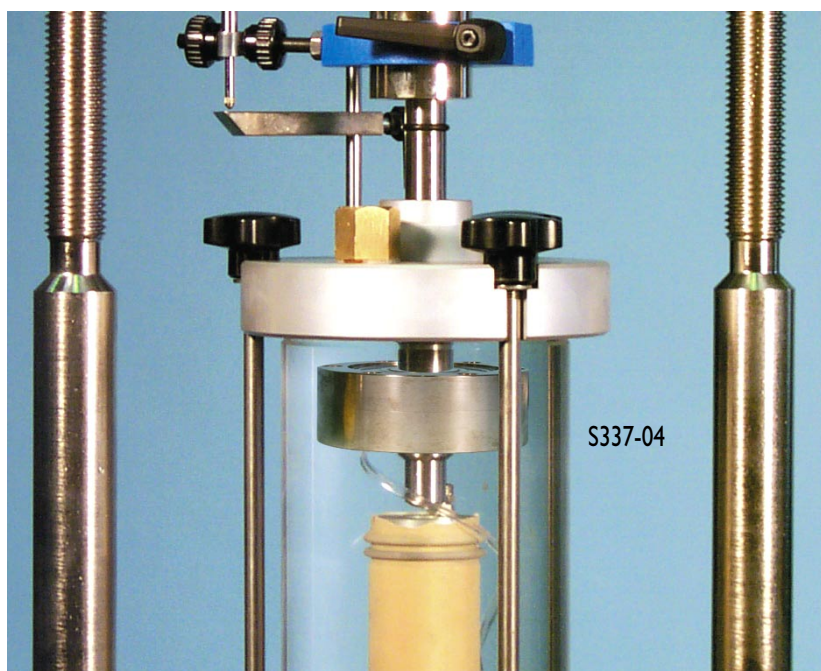
ACCESSORIES:

S337-21

Ram 15,5 mm for the submersible load cell

S337-22

Ram 25,0 mm for the submersible load cell



ELECTRIC LOAD CELLS

Designed for measuring compressive loads, they are connected to the S335 or S336 Datatronic units

As an alternative to the load rings or submersible load cells.

Supplied complete with cable and connector.

Rated output: 2 mV/V nominal

Hysteresis: 0,1% FS

MODELS:

S337-31 Load cell 2,5 kN capacity

S337-32 Load cell 10 kN capacity

S337-33 Load cell 25 kN capacity

B044-02 Load cell 50 kN capacity



S338

Volume change instrument

Designed to use with triaxial cells for measurements of volume change during the test.

The unit consists of a volume change cylinder with capacity of 100 ml.

It can be used with linear strain transducer; or dial gauge.

Accuracy is better than 0,1 ml.

Easy de-airing of bottom and top chamber.

Supplied without measuring device and mounting block.

Dimensions: 180 x 180 x 240 mm

Weight : 4,5 kg



S338-01

Automatic volume change instrument

Specifically designed to use with our range of triaxial cells for continuous measurements of volume change during the test.

The unit 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.

- It can be used with linear strain transducer
- The accuracy is better than 0,1 ml
- Easy de-airing of top and bottom chamber
- Supplied with push fittings (6 mm) for easy connections, but without measurement device and mounting block.

Dimensions: 360 x 270 x 210 mm

Weight : 7,5 kg



S338-01

ACCESSORIES for volume change instruments :

S336-12 Linear displacement transducer; accurate and versatile, 25 mm travel TYPE "A"

S336-16 Linear displacement transducer; accurate and versatile, 25 mm travel TYPE "B"

S336-21 Linear displacement transducer; extremely high accuracy, 25 mm travel TYPE "C"

S338-11 MOUNTING BLOCK for the linear transducer TYPE "A" to be fixed on the volume change instrument.

S338-12 MOUNTING BLOCK for the linear transducer TYPE "B" and "C" to be fixed on the volume change instrument.

LOAD PROVING RINGS

Used for load compression measurement applied by the testing machine.

Made from hardened alloy steel, they are chrome-coated and complete with upper and lower coupling blocks having M10 female gas thread.

The accuracy is $\pm 1\%$ of applied load and repeatability is within 0,2%

Each ring is supplied complete with calibration chart made by PC

Large range from 0,5 kN to 400 kN in the following versions:

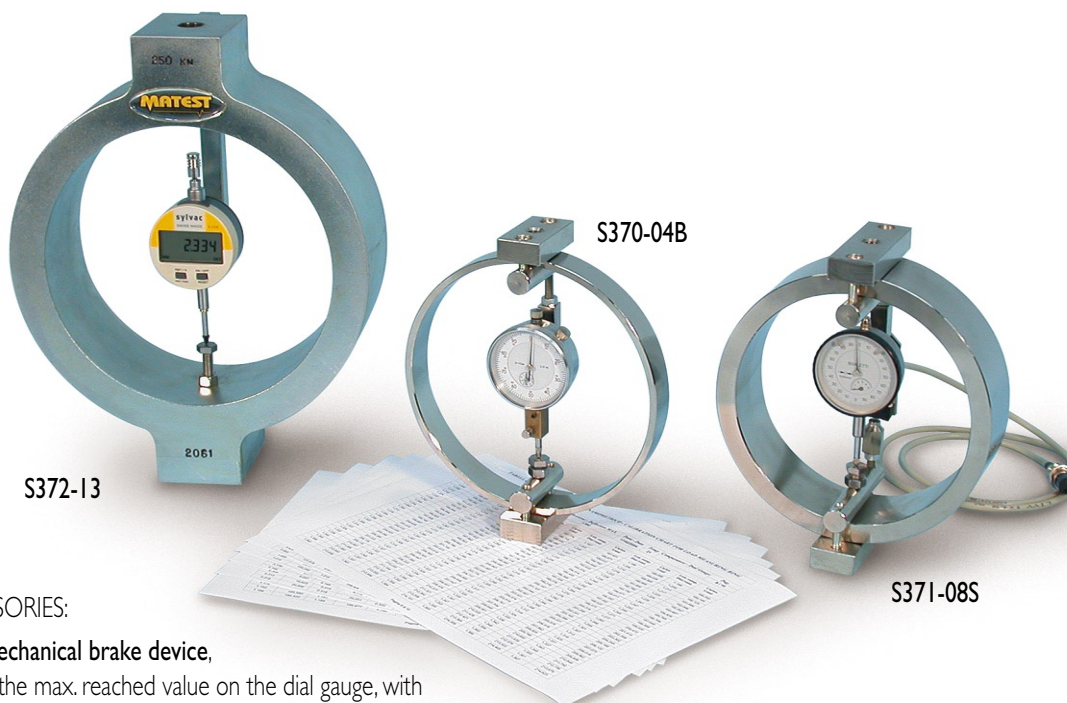
S370 Serie with dial gauge 0,01 mm graduation

S371 Serie with dial gauge 0,001 mm graduations

S372 Serie with digital gauge 0,001 mm graduation, including battery and RS232 port to PC connection.



Max. Capacity kN	Dial gauge 0,01 mm	Dial gauge 0,001 mm	Digital gauge 0,001 mm - RS232	Height mm	Weight Kg
0,5	S370	S371	S372	210	1,6
1	S370-01	S371-01	S372-01	210	1,7
2	S370-02	S371-02	S372-02	210	1,8
3	S370-03	S371-03	S372-03	210	1,9
5	S370-04	S371-04	S372-04	210	2
10	S370-05	S371-05	S372-05	210	2,2
15	S370-06	S371-06	S372-06	210	2,5
20	S370-07	S371-07	S372-07	210	3
30	S370-08	S371-08	S372-08	210	3,5
40	S370-09	S371-09	S372-09	210	3,9
50	S370-10	S371-10	S372-10	210	7,2
60	S370-11	S371-11	S372-11	210	7,7
100	S370-12	S371-12	S372-12	210	10,2
250	S370-13	S371-13	S372-13	318	16
400	S370-14	S371-14	S372-14	318	21



ACCESSORIES:

Stem mechanical brake device,

it holds the max. reached value on the dial gauge, with manual zero setting. For ordering you have to add the letter "B" at the end of the load ring code.

Ex.: **S370-09B**

Stop electrical safety device to stop the machine when reaching the max. capacity of the ring, to prevent any overload damage. For ordering you have to add the letter "S" at the end of the load ring code.

Ex.: **S370-09S**

NOTE: To order both the stem brake device and the electrical stop device, you have to add the letters "BS" at the end of the load ring code. Ex.: **S370-09BS**

S374-02

Ball seat, complete with connector, for an articulated coupling to the testing machine.

Dial indicators

Diameter of the dial: 60 mm, with clockwise rotation.

Model	Travel mm	Division mm
S375	5	0,001
S375-01	10	0,002
S376	10	0,01
S377	25	0,01
S378	30	0,01
S379	50	0,01

Digital dial indicators, including battery

Model	Travel mm	Division mm	RS 232 port
S381	12	0,01	Yes
S382	12,7	0,001	No
S382-01	12,7	0,001	Yes
S383	25	0,001	Yes

S383-01

Cable to connect S383 dial to PC

Note: RS 232 port is used for PC connection.

ACCESSORIES:

S380

Magnetic dial holder, comprising a fix rod and an adjustable rod.
Magnetic base force 25 Kg

S380-01

Rear mount of the dial indicator.

S390

Calibration unit for extensometers and dial gauges

This Appliance can be used to check the displacement calibration of extensometers, dial gauges, transducers etc.

Composed by:
Aluminium frame,
Delicate moving saddle,
Digital micrometric head 50 mm. travel, resolution 0,001 mm, error limit $\pm 0,003$ mm.

Sample holder to fit dial gauges with stem having 8 mm. diameter (different sample holders are available on demand).

Weight: 18 Kg



285

