

Section S^{SOIL}

section S



375

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.



MATEST

SAMPLING AND EVALUATION**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 of about 8 to 12 metres.

The penetrometer set, housed in carrying case, consists of:

- 10 kg. drop rammer; 500 mm. fall and anvil
- 11 sounding rod \varnothing 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
- Dimensions: 1080x360x220 mm. Weight: 72 kg



S050

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 - 240 kPa

The unit, all stainless steel made, is supplied "calibrated with calibration certificate and conversion table" and complete with three vanes dimensions (dia. x height) 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



376

S051**Dynamic cone penetrometer (DCP)
Matest Made**

TRL = TRANSPORT RESEARCH LABORATORY, UK.

STANDARD: ASTM D 6951-03

This portable hand operated equipment is designed to obtain a direct and rapid in-situ evaluation of the structural strength of road pavement layers constructed with unbound materials.

The DPC Penetrometer results can be compared with CBR (California Bearing Ratio) as per sperimental Kleyn 1982 studies. The test is performed with continuous penetrations at approx. 800 mm depth with max. depth of 2 m by using extension rods. The equipment housed in carrying case, consists of:

- Drop sliding hammer 8 kg weight, falling height of 575 mm
- Impact anvil with driving rod
- Penetration rod with conical 60° point and 20 mm dia.
- Bar wrench, spanners, accessories.

Dimensions: 1210 x 340x190 mm. Weight: 29 kg

ACCESSORIES:

S051-10 Drop Sliding Hammer 4,6 kg weight.

SPARE PARTS:

S051-11 Penetration cone**S051-12** Extension rod, 400 mm long

S051

SAMPLING AND EVALUATION



S051-01

section
S

S052KIT Soil prospecting and sampling kit Matest Made

This equipment, manufactured by Matest, comprises different augers, sampler and tools for soil investigations; the whole housed in a wooden carrying case.

The kit consists of:

- S092-01** Auger head 80 mm dia.
- S093-01** Auger head 100 mm dia.
- S094-01** Auger head 150 mm dia.
- S052-01** Dutch soil auger head, Edelman type, 150 mm dia.
- S052-02** Gravel auger head 50 mm dia.
- S092ASTA** Extension rod 1 m long with "T" handle
- S095** n° 5 extension rods, 1 m long
- S053** Soil sampler 38 mm dia. complete with stainless steel sample tube dia. 38x230mm, jarring link, "T" handle.
- S053-04** n° 5 Stainless steel sample tubes dia. 38x230mm
- S052-03** Plastic cap ends for sample tubes dia. 38x230mm (12 pieces)
- S054** Hand extruder for sample tube dia. 38x230mm
- S052-04** Stillson wrenches (2 pieces)
- S052-05** Wooden carrying case.

Dimensions: 1080x360x2200mm. Total weight: 50 kg approx.

S051-01 Mackintosh prospecting kit Matest Made

This equipment, manufactured by Matest, is particularly useful for initial site investigation work in remote areas. The kit is capable boring to a depth 10 - 12 mtrs depending on ground conditions. The use of specially designed extension rod couplers reduces borehole friction to a minimum, permitting easy operation to considerable depth.

Equipment consists of:

- 12 boring rods 1 mtr long with 12 couplers
- 2 pipe wrench and 1 tap wrench
- Core tube adaptor and clay core tube
- Driving head and clearing rod
- Long and short driving point
- Auger tool and standard core tube
- Lifting/driving tool and hammer
- Die nut and hand tap

All equipment supplied in a strong wooden box
Weight: 45 kg approx.



377



S052 KIT

MATEST

SOIL SAMPLING

Hand Augers

STANDARDS: ASTM D 420, D 1452 / CNR a VI n° 25
AASHTO T86, T202

Designed for soil investigations and explorations.
Complete with "T" handle.
Made of special galvanized steel.



section S



378

MODELS:

	Weight kg
S092 KIT Hand Auger; 80 mm dia. x 1 m long	4
S093 KIT Hand Auger; 100 mm dia. x 1 m long	5
S094 KIT Hand Auger; 150 mm dia. x 1 m long	6
S095 Extension rod for above 1 m long complete with coupling device	2

Auger power head to obtain disturbed soil samples.

Supplied "without" augers, to be ordered separately (see accessories).

MODELS:

S096

Auger power head

Motor capacity 2 HP, two strokes, without speed inverter.
Fitted with two handwheels, to be used just by one operator.
Drilling holes up to dia. 200 mm and max. depth of 1000 mm
It does not accept extension rods.
Weight: 10 kg



S097

Auger power head

Motor capacity 6 HP, two strokes, equipped "with speed inverter" to facilitate the extraction of the augers.
Fitted with two handwheels, to be used by two operators.
Weight: 30 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

DENSITY AND EVALUATION

Surface soil samplers

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. Steel made, galvanized against corrosion.

MODELS:

S084 KIT

Surface soil sampler 73 mm ID

STANDARDS: ASTM D2937 / CNR no. 22

Sampling tube is 73 mm inside diameter by 66 mm high.

Drop hammer is 5 kg

Total weight: 10 kg

SPARE PART:

S084-01 Sampling tube 73 mm diameter by 66 mm high.

S083 KIT

Surface soil sampler 100 mm ID

STANDARD: BS 1377:9

The sampling tube (core cutter) is driven into the soil by using the rammer dropping on the driving dolly.

The sampled specimen is trimmed weighed and dried; the density and the moisture content % is calculated. Manufactured of plated steel.

The set S083KIT includes:

S083-01 Driving rammer for 100mm dia. core cutter.
Weight 13.5 kg

S083-02 Driving dolly for 100mm dia. core cutter.
Weight 1 kg

S083-03 Core cutter (sampling tube) 100mm dia.
by 130mm length. Weight: 1 kg

Total weight: 15.5 kg

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



S053

Soil sampler 38 mm dia

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

ACCESSORY AND SPARE-PART:

S054 Hand extruder used to extrude the soil specimens dia. 1 1/2" from the sample tube.

S053-04 Spare stainless sample tube dia. 1 1/2 x 9"

Laboratory sample mixers

Suitable to mix granular materials like soils and bituminous mixtures, by using a whisk beater, as prescribed by EN, BS Spec.

MODELS:

E095 + B028-03

MIXER, 5 LITRE CAPACITY, complete with whisk beater

B027 + B027-03

MIXER, 20 LITRE CAPACITY, complete with whisk beater

Technical details:
see pag. 81, 82



E095 + B028-03



SOIL EVALUATION



380

POCKET PENETROMETERS AND SHEAR VANES

STANDARD: ASTM D 2573-94

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 kgf/cm^2 on the dial graduated from 0 to 6 kgf/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 1-14 kg f/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 kgf/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 kgf/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, 10x20 mm (dia. x height)

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 10x20 mm (dia. x height) 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" pag. 29



A106

COMPACTION AND MOISTURE

S086

Proving ring penetrometer

Used to determine the bearing strength, compaction degree of subgrades, and also for determining the static 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



S086

S088

Proctor penetrometer

STANDARD: ASTM D 1558

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

Spring load scale 0-40 kg, subdiv. 1 kg, with direct max. value 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

S088-10

Moisture condition value (MCV) and chalk crushing value (CCV)

STANDARDS: EN 13286-46 / BS 1377:4 (TRL approved)

This apparatus is used to measure the minimum comparative effort required to produce near full compaction of a soil, and the rate at which a sample of chalk lumps are crushed.

The unit can be used to classify chalk as a fill material with saturated moisture content.

The apparatus comprises a robust frame where a rammer falls, mould, scale, counter, accessories.

Weight: 60 kg approx.



S088-10

section 5



381

MATTEST

S058**Nuclear Moisture Density Gauge**

STANDARDS: ASTM D6938, D2950 / AASHTO T310

This product is used to measure moisture density of the construction material from surface to 300 mm of depth. This device can measure and display wet density and dry density, percent moisture, moisture content and other necessary engineering parameters related to density and moisture content of materials.

Software features include self-test, special calibration, asphalt thinlayer mode and built in diagnostics tests to help users identify problems and solve them in the field.

Specifications:

- Density measurement range: 1120 to 2720 kg/m³
- Moisture measurement range: 0 to 640 kg/m³
- Precision at 2000 kg/m³, 150 mm - Depth: ±3,5 kg/m³
- Moisture precision at 240 kg/m³: ±4.42 kg/m³

Gauge dimensions: 580x310x220 mm

Weight: 14 kg



S058

ACCESSORY:

S058-II**Nuclear gauge verification and calibration device**

STANDARDS: ASTM D6938, D2950, D7759/AASHTO T310

This lightweight block may be used in the field to check the calibration accuracy of the gauge and re-calibrate all model gauges, if necessary. The software for determination of calibration constant is user friendly and communicates directly with the gauge for download of constants. The block is constructed for the rugged construction industry with 1/8" Aluminum exterior with powder coat paint and it is internally lined with shielding and composite compound in secured enclosure.

For calibration, the user requires a PC with Windows® operating system.

Dimensions: 480x460x300 mm

Weight: 38 kg



S058-II



S059**Non nuclear 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)
Dimensions with case	470x420x330 mm
Weight	15 kg.



S059

This 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 device 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.

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 device 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.

ACCESSORIES:

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

S059-02 Verifier Mass (verifies the non nuclear gauge operation).

S077**Earth resistivity meter**

STANDARDS: ASTM G57 / BS 1377:3

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 with Software
 Dimensions: 210x170x90 mm
 Weight: 2 kg
 2 potential copper 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



S077

ACCESSORY:

S078-01**Rechargeable accumulator, two pieces**

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

Dimensions: 35x25x24 cm. Weight: 6 kg

S079**Seismograph, three channels**

Applications:

- Depth determination of bedrock.
- Determination of elastic-dynamic properties of surface deposits.
- Foundation studies.
- Preliminary investigations for the realization of important works.
- Cost estimation for excavation.
- Evaluation of elastic-dynamic modules of materials.
- Downhole survey with tridimensional borehole geophone.
- Microseismics.

The seismograph is supplied complete with set of accessories to perform seismic refraction tests.

This seismograph can perform also "Downhole" and "Crosshole" measurements by adding suitable kit of devices (optional accessories on request).

Dimensions: 210x170x90mm

Weight: 2 kg



S079



UNIVERSAL EXTRUDERS

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

section S



384

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 150 mm (external dia. 160 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. 38,1 (1½"), 83, 100 mm.

Power supply: 230V 1ph 50Hz 1300W

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

Weight: 160 kg



S111

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.

Supplied complete with adaptors

Dimensions: dia. 300x500 mm

Weight: 30 kg



S114

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. 38,1 (1½"), 83, 100 mm, supporting bench, sample receiving table both adjustable in height and lowerable.

Dimensions: 1700x700x1200 mm

Weight: 90 kg



S112

ADAPTORS (ring and tamper) for S111 and S112 Extruders:

S113-10 Dia. 38,1 mm (1½") (spare)

S113-11 Dia. 50,8 mm (2")

S113-12 Dia. 76,2 mm (3")

S113-13 Dia. 101,6 mm (4")

S113-14 Dia. 83 mm (spare)

S113-15 Dia. 100 mm (spare)

S113-16 Dia. 35 mm

S113-17 Dia. 150 mm (only for mod. S111)

S118**Die cutting soil sampler**

Used to compress loose soils to prepare samples, and to hollow punch (cut) and extrude soil specimens for consolidation, shear, triaxial, unconfined tests.

The sampler is used with the hollow punches S122 to S122-20 and tampers S123 to S123-16

Upper plate dia. is 120 mm and max. vertical daylight is 470 mm

Dimensions: 500x300x900 mm

Weight: 30 kg

HOLLOW PUNCHES AND TAMPERS

Used to prepare soil samples and to fit them into the relevant cells to perform triaxial, consolidation, shear, unconfined tests.

The punch has thin walls with cutting rim, and the tamper expels the specimen from the hollow punch by inserting it directly into the cell without disturbing the same.

Cell	Dimensions			Hollow Punch	Tamper
Consolidation	Ø	50,47	xh 20 mm	S122	S123
Consolidation	Ø	63,50	xh 20 mm	S122-19	S123-05
Consolidation	Ø	71,40	xh 20 mm	S122-01	S123-01
Consolidation	Ø	75,00	xh 20 mm	S122-17	S123-04
Consolidation	Ø	79,80	xh 20 mm	S122-02	S123-02
Consolidation	Ø	112,80	xh 25 mm	S122-03	S123-03
Consolid. Permeab.	Ø	50,47	xh 20 mm	S122-04	S123
Consolid. Permeab.	Ø	63,50	xh 20 mm	S122-20	S123-05
Consolid. Permeab.	Ø	71,40	xh 20 mm	S122-05	S123-01
Consolid. Permeab.	Ø	75,00	xh 20 mm	S122-18	S123-04
Consolid. Permeab.	Ø	79,80	xh 20 mm	S122-06	S123-02
Consolid. Permeab.	Ø	112,80	xh 25 mm	S122-07	S123-03
Shear	Ø	50	xh 25 mm	S122-08	S123-08
Shear	Ø	60	xh 25 mm	S122-09	S123-09
Shear	Ø	100	xh 25 mm	S122-10	S123-10
Shear	☐	60x60	xh 25 mm	S122-11	S123-11
Shear	☐	100x100	xh 25 mm	S122-12	S123-12
Triaxial + Unconf.	Ø	38	xh 76 mm	S122-13	S123-13
Triaxial	Ø	50	xh 100 mm	S122-14	S123-14
Triaxial	Ø	70	xh 140 mm	S122-15	S123-15
Triaxial	Ø	100	xh 200 mm	S122-16	S123-16



VI12-01 STANDARDS: ASTM D421 / BS 1377:2, 1924:1
PORCELAIN MORTAR dia. 125 by 65 mm complete with porcelain pestle.

VI13 PESTLE, rubber headed.

S124 WIRE SAW for trimming soil specimens. Complete with six blades.

S125 TRIMMING KNIFE to prepare samples.



ACCESSORY:

S120-01 Upper trimming platen available from dia. 38 to 110 mm.
When ordering please specify required diameter.



S118

with punches and tampers

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 blades.

Dimensions: dia. 460x720 mm

Weight: 20 kg



SOIL AND WATER ANALYSIS

S132N

Colour standard chart

ORGANIC IMPURITIES IN SOILS

STANDARDS: ASTM C40-11 method / AASHTO T21 / UNI 8020-14

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

The chart has 5 glass reference scales.

section S



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

S133N

Soil colour chart

Colour matching charts for soil identification.

The set consists of 7 constant hue charts with 196 colours, plus two tropical soil colour charts.



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.

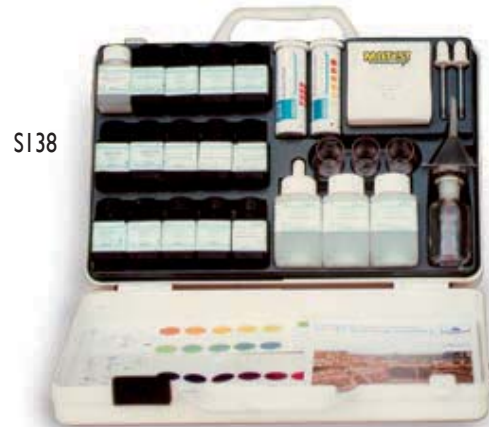
The set comprises different reagents and graduated containers, syringe, pipette, instructions.

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



386



S135

S136

S137

CHEMICAL ANALYSIS OF SOILS**S140****Ion exchange device**

SULPHATE CONTENT DETERMINATION

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

ACCESSORY:

V300-30

Ion exchange resin, 500 g

**Chloride and sulphate content, Rapid Method**

STANDARDS: BS 812:117 / BS 1377:3

Used to estimate the chloride content of aqueous solutions in sand and fine aggregates.

A019-01 Quantab Chloride Titrator Strips, type 1175, range 0,005% to 0,1% (30 to 600 ppm) Na Cl. Pack fo 40 strips.

A019-02 Quantab Chloride Titrator Strips, type 1176, range 0,05% to 1% (300 to 6000 ppm) Na Cl. Pack of 40 strips.

Sulphate Content, Rapid Method:

STANDARD: BS 1377:3

Used to determine the sulphate ions in aqueous solutions of sand and fine aggregates.

A019-03**Sulphate Test Strips**, detection range 200 to 1600 mg/l.

Pack of 100 strips.

**B073-01****Magnetic stirrer/heater**

for titration and stirring of liquid and semi-solid materials.

Plate dia. 150 mm.

Variable speed and temperature by electronic regulators.

Supplied complete with magnetic teflon coated follower.

Power supply:

230V 1 ph 50/60 Hz 700 W



B073-01

pH METERS, DIGITAL

STANDARDS: ASTM D1067 / BS 1377:3

V215**pH meter, pocket**, battery operated,

with replaceable electrode

Range: 0,00 to 14,00 pH - Resolution 0,01 pH

Manual 2 points calibration.

Power supply: standard battery, 3000 hours use.

Supplied complete with: electrode, batteries, 5+5 kit of pH 4 and 7 calibration solutions

Weight. 70 g



V215

V215-01N**pH / mV / °C meter, portable, waterproof**

Range pH: 0.00 to 14.00 - Resolut. 0.01 pH

mV: ± 1999 - Resolut. 0,1mV - 1mV

Temperature: 0 to 100°C

Manual 2 points calibration.

Automatic temperature compensation.

Power supply: 9V battery, 100 hours use.

Supplied complete with: electrode, temperature probe, battery, calibration solutions, case.

Weight. 180 g



V215-01N

NOTE: Complete range of pH meters at pag. 489



MOISTURE AND PARTICLE DENSITY OF SOILS

A028

Universal carbide meter

STANDARD: BS 6576 / AASHTO T217 / ASTM D4944
UNE 7804

For the rapid and accurate determination of moisture content in soil sand, gravel, aggregates etc, based on the calcium carbide method. It is possible to vary the sample weight from 3 to 100 g achieving a moisture range 50% (3g) - 7,5% (20g) - 1,5% (100g). The bottle is calibrated and equipped with a surface thermometer. The glass ampoule containing the calcium carbide is broken when the bottle is closed and shaken, granting better accuracy to the test. The instrument comprises the testing bottle with manometer, small balance, 25 ampoules of reagent, accessories, case. Dimensions: 520x340x140 mm. Weight: 6 kg approx.



A117 + A116-11 + A116-12

C279-02

A117

End-Over-End shaker

PARTICLE DENSITY OF SOILS

STANDARD: BS 1377:2

Used to determine the particle density of soils containing up to 10% of particles retained on a 37,5 mm sieve. It rotates two gas jars at approx. 50 rpm to satisfy BS Standard. The shaker is equipped with an original friction device conforming the unit to CE Safety Directive. Supplied "without" gas jars to be ordered separately. Power supply: 230V 50 Hz 1ph 150W. Dimensions: 550x430x500 mm. Weight: 20 kg

ACCESSORIES:

A116-11

GAS JAR to determine the specific gravity of soils. Complete with glass cover. Diameter 75 mm by 300 mm height. Weight: 1,3 kg

A116-12

RUBBER BUNG for the gas jar A116-11

C279-02

SEPARATE CONTROL PANEL, complete with ON/OFF switch, timer, fuse, electric protections.



section S



388

A028



NOTE: Other carbide meter models: see pag. 30

SPARE-PART:

A028-11 Carbide Ampoules (pack of 100)



V023-01

Moisture determination balance

160 g. capacity x 0,001/0,01 g. sensitivity with tare up to 10 g. Samples are dried by a infrared lamp with adjustable heat control. A built-in-timer 0-61 min. switches off the heater at the end of the drying cycle which is signaled by a bell. Moisture loss percentage and residual mass are read directly from the lighted scale. Power supply: 230V 1ph 50/60 Hz



V023-01

SPECIFIC GRAVITY OF SOILS

E136

Water bath, digital

STANDARD: BS 1377:2

For the determination of particle density, pycnometer method, according to BS 1377:2 Specifications, and for general laboratory purposes

All stainless steel made, with wool insulation and water circulation electric stirrer; the bath ensures an uniform and constant temperature.

Complete with digital thermostat and dual safety thermostat with higher thermic threshold ensuring safe working conditions.

A cooling device to be connected to the water net is used when room temperature exceeds the requested one.

Capacity: 40 litres.

Temperature range: ambient to 90°C., accuracy +/- 0,5°C.

Internal dimensions: 510x350x230 mm

Overall dimensions: 680x420x420 mm

Power supply: 230V 1ph 50Hz 2000W

Weight: 28 kg approx.



E136

Specific gravity bottle, Gay Lussac type

STANDARDS: BS 1377:2 / ASTM D854 / AASHTO T100

NF P18-054, NF P94-054

Pyrex glass made, complete with capillary tube stopper; these bottles are used to determine the specific gravity and density of fine soils and filler in fine aggregates.

MODELS:

V108 Capacity 25 ml

V108-01 Capacity 50 ml

V108-02 Capacity 100 ml

V108-03 Capacity 250 ml



Desiccators borosilicate glass

Complete with perforated porcelain plate.

without vacuum

A035 Dia. 200 mm

A036 Dia. 250 mm

A036-01 Dia. 300 mm

with vacuum

A039 Dia. 200 mm

A040 Dia. 250 mm

A040-01 Dia. 300 mm

ACCESSORY:

V300-15 Desiccators salts Silica gel box 1000 g



A039

A035

S147

Cone pycnometer

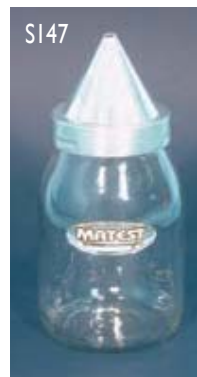
STANDARDS: EN 1097-6

BS 1377:2

Used for the determination of specific gravity and water absorption of sands and fine aggregates.

Glass jar with aluminium cone and rubber seal.

Capacity: 1 kg



S147



S148

S148

Sand absorption cone and tamper

STANDARDS: EN 1097-6 / BS 812

Used to determine the specific gravity and water absorption of fine aggregates.

Weight: 500 g approx.

V202

Aspirator pump

To be connected to the water net with a minimum pressure of 0,7 kg/cmq, it produces a moderate vacuum pressure.

Weight: 100 g



V202

section S



389

MATEST

S155 KIT complete set
Particle size analysis of soils

Hydrometer method

STANDARDS: ASTM D422 / AASHTO T88 / UNE 103.102

This equipment is used to determine the quantitative size distribution of very fine particle in soils such as clay and silt.

S155 KIT The complete set comprises:

S155-01 HYDROMETER JAR, 1000 ml capacity (6 pieces)

V172 SOIL HYDROMETER, 151H, range 0,995 to 1,038 g/ml with div. 0,001

S155-04 GLASS TANK, dimensions: 600x300x380 mm

S155-09 HEATER, "professional type", complete with thermostat, cooling coil, circulation unit. 230V 1ph 50Hz 1000W

S155-10 GLASS THERMOMETER, range 0 – 50°C., subdiv. 0,5°C.

V104-03 BEAKER, pyrex, 250 ml capacity

V300-23 SODIUM Hexametaphosphate, 1000 g

S156-01 KIT HIGH SPEED STIRRER, 10.000 rpm, complete with cup, paddle, anti-splash baffle, for dispersing soil particles in water. 230V 1ph 50/60Hz

Total weight: 60 kg approx.

NOTE: each item can be ordered separately.

ACCESSORIES:

V172-02 SOIL HYDROMETER 152H, range -5 to 60 g/l (alternative to mod.V172)

S155-02 BUNG, rubber, for the cylinder S155-01

S156 STIRRER, manual, for cylinders 1000 ml capacity mod. S155-01

C306-03 SEPARATE CONTROL PANEL, complete with on/off switch and electric protections, to get S155-09 heater to CE Safety Directive.

ACCESSORIES to NF P94-057 Standard:

S155-03 HYDROMETER JAR, 2500 ml capacity, 85 ± 5 mm Ø, graduated at 500, 1500, 2000 ml.

S156-03 STIRRER MANUAL, 600 mm long for cylinders 2500 ml capacity, mod. S155-03.

V172-03 SOIL HYDROMETER 0,995 to 1030 g/ml.

SPARE PARTS for S156-01 KIT Stirrer:

S156-11 Anti-splash baffle

S156-12 Paddle

S156-13 Cup (beaker)

section S



390



C306-03



S155 KIT



S156-01 KIT



S156-03

S156-11



S156-13

S156-12

S156-11

SI43-KIT complete set**Particle size distribution** Pipette method

STANDARD: BS 1377.2

This equipment is used to determine the quantitative size distribution of very fine particle in soils, like clay and silt.

The complete set comprises:

- SI44** ANDREASEN PIPETTE, 25 ml capacity, for an accurate extraction of the quantities of soil in suspension for analysis.
 - SI44-01** PIPETTE STAND, to accurately raise and lower the pipette with no transmission of vibration to not disturb the sample suspension. Weight: 10 kg
 - SI44-02** SEDIMENTATION CYLINDER, 500 ml capacity
 - SI44-03** RUBBER BUNG for cylinder
 - SI44-04** EVAPORATING DISH, glass, dia. 90 by 50 mm height.
 - VI72-03** SOIL HYDROMETER, long stem, 0,995 to 1030 g/ml. (BS, NF)
 - SI55-04** GLASS TANK, dimensions: 600x300x380 mm.
 - SI55-09** HEATER, "professional type", complete with thermostat, cooling coil, circulation unit. 230V 1ph 50Hz 1000W
 - SI55-10** THERMOMETER, range 0 - 50°C., subd. 0,5°C.
- Total weight: 40 kg approx.

NOTE: each item can be ordered separately.

ACCESSORIES:

- SI44-10** ANDREASEN PIPETTE, capacity: 10 ml
- C306-03** Separate control panel, complete with on/off switch and electric protections, to get SI55-09 heater to CE Safety Directive.
- A117** END-OVER-END SHAKER. Technical details: see pag. 56

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

CLAY CONTENT IN FINE AGGREGATES

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

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. 230V 1ph 50/60 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** 2000 ml capacity plastic beaker
 - V300-28** Methylene blue, 100 g
 - V300-29** Kaolinite, 500 g
- Total Weight: 10 kg

NOTE: each item can be ordered separately.

ACCESSORY:

- SI57-10** AUTOMATIC DISPENSER, 0-10 ml x 0,1 ml grad. Capacity 1000 ml (as an alternative to the Burette SI57-02+SI57-07)

**SI57-20****Automatic Methylene Blue tester**

This instrument determines automatically the quantity of clay in sand. It grants accurate and repeatable test results, saving a lot of time (approx. 30 minutes each test). The apparatus is composed by: precision pump, colorimeter, control unit, filters, liquids, powder; accessories.

To perform the test SI57-01 and SI57-06 devices are also needed. Power supply: 230V 1ph 50Hz Dimensions: 300x400x350mm approx. Weight: 10 kg



S158-20 KIT**Sand equivalent test set (complete)**

ASSESSMENT OF FINE AGGREGATES

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

The set comprises:

S158-03 Plexiglass measuring cylinder engraved at 100 and 380 mm (5 pieces)**S158-02** Rubber stopper for cylinder (2 pieces)**V176-02** Graduated rule 500 mm, stainless steel**V136-01** Funnel, wide mouth**S158-05** Measuring can 200 ml capacity**V121** Plastic bottle, 5 litre capacity**S158-10** Irrigator tube with stopcock and syphon assembly EN/ASTM**S158-13** Weighted foot assembly for sand level**A052-37** Sieve, dia. 200 mm, opening 2 mm**S158-09** Concentrated stock solution, 1000 ml**V170** Stop watch, digital**S158-11** Clamp stand set to hold the syphon assembly with bottle**S158-12** Portable carrying case, dimensions: 550x250x400 mm

Total Weight: 18 kg

S158-20 KIT

**S158 KIT****Sand equivalent test set (complete)**

STANDARDS: ASTM D2419 / AASHTO T176

The set is identical to mod. S158-20 KIT except:

S158-01 Plexiglass measuring cylinder, engraved at 100 and 380 mm, with transparent adhesive label, graduated in mm and inch (5 pieces)**S158-04** Measuring can 88 ml capacity**S158-07** Weighted foot assembly for sand level**A052-44** Sieve dia. 200 mm, opening 4,75 mm**S159-01 KIT****Sand equivalent test set (simple)**STANDARDS: EN 933-8 / NF XP18-598 / UNI 8520-15
CNR N.27 / UNE 83131

The set comprises:

S158-03 Plexiglass measuring cylinder engraved at 100 and 380 mm (4 pieces)**S158-02** Rubber stopper for cylinder (2 pieces)**V176-02** Graduated rule 500 mm, stainless steel**V136-01** Funnel, wide mouth**S158-05** Measuring can 200 ml capacity**V121** Plastic bottle 5 litre capacity**S158-10** Irrigator tube with stopcock and syphon assembly EN/ASTM**S158-13** Weighted foot assembly for sand level**S158-09** Concentrated stock solution, 1000 ml
Total Weight: 5 kg

S159-01 KIT

**S159 KIT****Sand equivalent test set (simple)**

STANDARDS: ASTM D2419 / AASHTO T176

The set comprises the items of mod. S159-01 KIT, except:

S158-01 Plexiglass measuring cylinder engraved at 100 and 380 mm, with transparent adhesive label, graduated in mm and inch (4 pieces).**S158-04** Measuring can 88 ml capacity**S158-07** Weighted foot assembly for sand level

NOTE: Each item can be ordered separately.

ACCESSORIES:

S159-11**Carrying case, plastic**, housing the sand equivalent set mod. S159 KIT, or S159-01 KIT except the bottle V121**S158-08** Metallic funnel, conforming to EN 933-8 / NF XP18-598 UNI 8520/15 Specifications.

S158-08



Measuring Cylinders

Available Models :

S158-01

PLEXIGLASS MEASURING CYLINDER, engraved at 100 and 380 mm, with transparent adhesive label graduated in mm and inches.

STANDARDS: ASTM D2419
AASHTOT176

IN ALTERNATIVE:

S158-01G

PLEXIGLASS MEASURING CYLINDER, engraved at 100 and 380 mm with additional "engraved scale from 0 to 380 mm"

STANDARDS: ASTM D2419 / AASHTOT176

S158-03

PLEXIGLASS MEASURING CYLINDER, engraved at 100 and 380 mm

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



S160 N

Motorized sand equivalent shaker

STANDARDS: EN 933-8 / ASTM D2419 / AASHTOT176
NF XP18-598 / UNE 83131 / CNR N.27
UNI 8520-15

The unit provides a constant uniform shaking with automatic cycle test. Oscillating excursion is 203 mm at 175÷180 adjustable strokes/min. rate. Complete with digital timer that automatically stops the shaker at the end of the test. It cannot be sold in CE markets without security cabinet (see model S160-01 N)

Power supply: 230V 1 ph 50 Hz 250 W

Dimensions: 700x360x350 mm.

Weight: 30 kg



S160 N + S158-03 + S158-02



S160-01 N + S158-03 + S158-02

S160-01 N

Motorized sand equivalent shaker

As described, but equipped with steel Security Cabinet, conforming to CE Safety Directive. When opening cabinet's door during shaker working, a microswitch automatically stops the machine.

S161

Sand equivalent shaker hand operated

STANDARDS: EN 933-8 / ASTM D2419 / NF XP18-598
AASHTOT176 / UNI 8520-15 / UNE 83131

Hand operated working through handwheel.

Complete with mechanical strokes counter.

Dimensions: 700x350x420 mm approx.

Weight: 20 kg approx.



S161





394



LIQUID LIMIT: casagrande method

STANDARDS: ASTM D4318 / CEN ISO / TS 17892-12
AASHTO T89 / UNI 10014 / NF P94-051,
comparable to: BS 1377:2 / UNE 103 103-94

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 (left or right side)
- motor operated at 120 drops/min speed, ensuring better uniformity and accuracy

MODELS:

S170

Liquid limit device

Hand operated with "left side crank" and hard rubber base.

STANDARDS: ASTM D4318 / UNI CEN ISO / TS 17892-12
AASHTO T89 / UNI 10014,
comparable to: BS 1377:2 / UNE 103 103-94

Weight: 3 kg

S170-05

Liquid limit device

Hand operated.

Same to mod. S170, but with "right side crank".

S170-01 Liquid limit device

Hand operated with bakelite base, chromed cup.

STANDARD: NF P94-051. Weight: 3 kg

S172

Liquid limit device

Motor operated with hard rubber base.

STANDARDS: ASTM D4318 / UNI CEN ISO / TS 17892-12
AASHTO T89 / UNI 10014,
comparable to: BS 1377:2 / UNE 103 103-94

Power supply : 230V 1ph 50Hz. Weight: 4,5 kg

S172-01 Liquid limit device STANDARD: NFP94-051

Motor operated with bakelite base, chromed cup.

Power supply: 230V 1ph 50 Hz. Weight: 4,5 kg



ACCESSORIES:

S173-02 Rough brass cup, with central smooth band 10 mm wide, as requested by NF P94-051 Standard, used for soils having low plasticity

S173-03 Grooving tool, to UNI 10014 - AASHTO T79 Spec.

S173-04 Grooving tool, to ASTM D 4318 Specifications

S173-04P Grooving tool, hard plastic made. Pack of 10 pcs.
Standard: ASTM D 4318

S173-05 Grooving tool, to NF P94-051 Specifications

S173-06 Grooving tool, to BS 1377:2 Specification

S173-06P Grooving tool, hard plastic made. Pack of 10 pcs.
Standard: BS 1377:2



SPARE PARTS:

S173-01 Brass cup. (ASTM, BS, UNI, UNE, AASHTO).

S173-07 Chromed cup (NF P94-051).

S173-08 Coupling piece between cup and device, hand operated models

S173-09 Coupling piece between cup and device, motor operated models

S175**Shrinkage limit**

STANDARDS: ASTM D 427 / AASHTO T 92 / UNI 10014
UNE 103-108 / NF XP94-060-1 / 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

S175-03 Shrinkage prong plate, made from plexiglass material with three metal prongs

S175-04 Glass evaporating dish, dia. 120 mm flat bottom

V100-01 Graduated cylinder 25 ml. capacity

V192 Flexible spatula, 100 mm. blade

Weight: 2 kg

NOTE: Each item can be ordered separately.



S175



S176

S176**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 approx.



S178

S178**Plastic limit**

STANDARDS: ASTM D4318 / AASHTO T90 / BS 1377:2
UNI 10014 / UNE 103-104 / NF P94-051
CEN ISO-TS 17892-12

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:

S178-01 Glass plate 300x250x10 mm

S178-02 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)

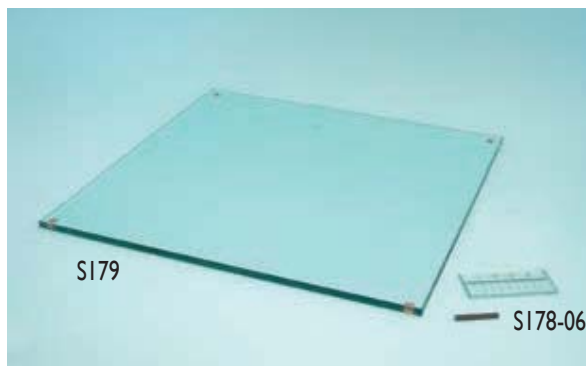
Weight: 5 kg

NOTE: Each item can be ordered separately.

ACCESSORIES:

S178-06 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

S179 Glass plate 500x500x10 mm



S179

S178-06



Cone penetrometer method for:

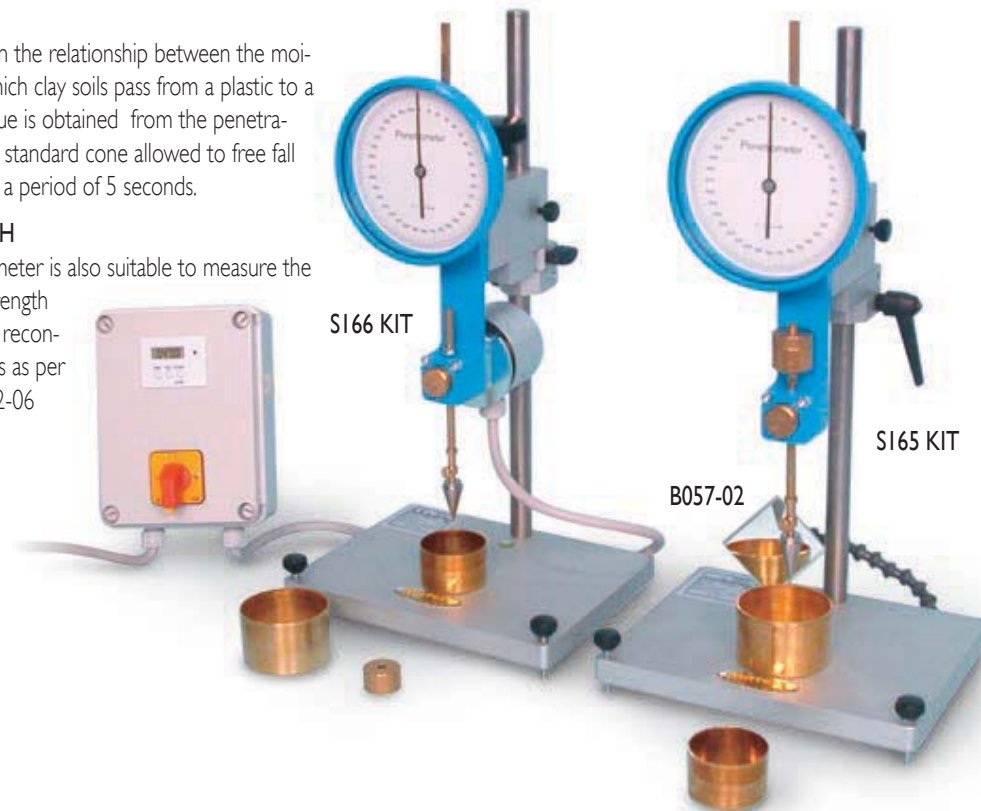
- **Liquid Limit determination.** STANDARDS: CEN ISO/TS 17892-12 / BS 1377:2 / NF P94-052-1
- **Shear Strength determination.** STANDARD: CEN ISO/TS 17892-06

LIQUID LIMIT

The test is based on the relationship between the moisture content at which clay soils pass from a plastic to a liquid state. This value is obtained from the penetration capacity of the standard cone allowed to free fall into the sample for a period of 5 seconds.

SHEAR STRENGTH

The cone penetrometer is also suitable to measure the shear undrained strength of undisturbed and reconstituted soil samples as per CEN ISO/TS 17892-06 Standard.

**MODELS:****SI65 KIT****Cone dial penetrometer**

The cone penetrometer consists of:

- Aluminium base with levelling screws and spirit level.
- Chromed vertical rod with "micrometric vertical displacement device"
- Dial gauge 150 mm diameter; graduated in 360°, division 0,1 mm
- Slider, brass made, with free fall, stop and release push button, automatic zero set.
- Stainless steel penetration test cone 35 mm long, 30° angle
- Weight 20 g.
- Two brass cups dia. 55x35 mm and 70x45 mm

Dimensions: 220x170x410 mm

Weight: 13 kg approx.

SI66 KIT**Semiautomatic cone dial penetrometer**

Basically structured as mod. SI65KIT, but equipped with a magnetic controller device with electronic digital programmable timer that automatically releases the plunger head and ensures free falling of the cone during the 5-seconds test.


Supplied complete.

Power supply: 230V 1ph 50Hz 200W

Dimensions: 220x280x410 mm

Weight: 15 kg approx.

ACCESSORIES:

- SI66-03** TEST GAUGE, to check the condition of the cone point 30° angle.
- B057-02** MIRROR, to facilitate the height adjustment of the cone.
- SI66-04** TEST CONE 60° angle and 60g weight (liquid limit and shear strength tests).
- SI66-05** TEST GAUGE, to check the condition of the cone point 60° angle.
- SI66-06** WEIGHT, 320g to be added to the cone 30° angle, to get a total weight of 400g (shear strength test)
- V122-08**  SAMPLE CUP, aluminum, 55 mm dia. x 40 mm deep, to meet BS 1377:2 Specification

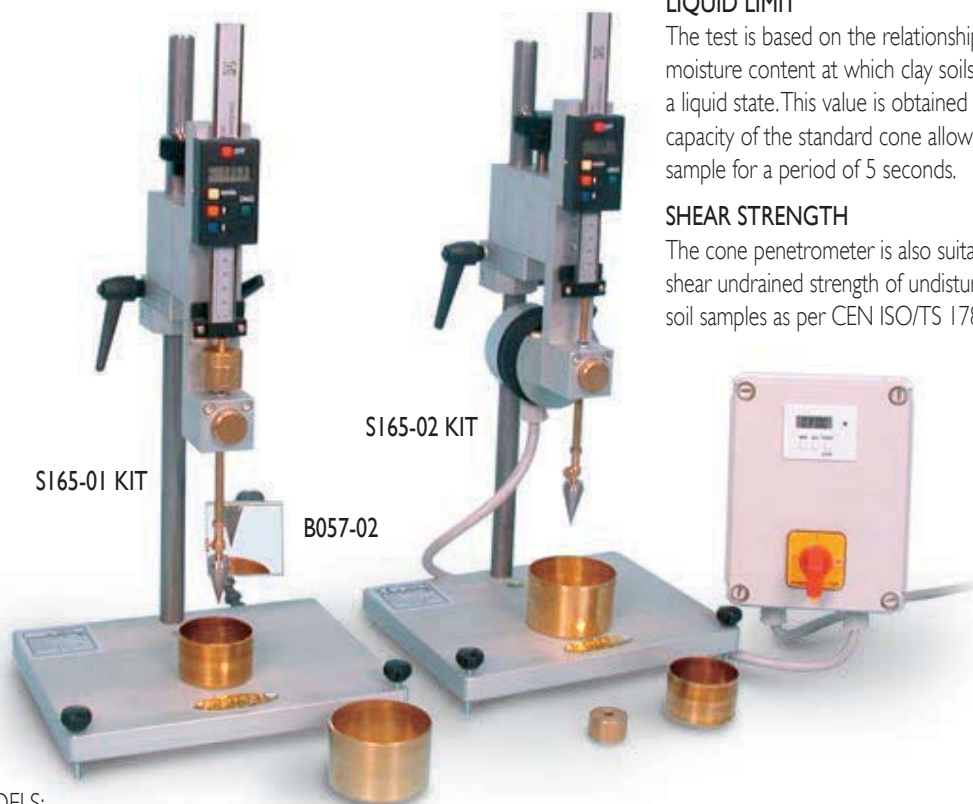
SPARE PARTS:

- SI66-01** Test cone 35 mm long and 30° angle.
- SI66-02** Weight 20g to be added to the cone 30° angle, to get a total weight of 100g
- V122-05** Brass cup dia. 55x35 mm
- V122-06** Brass cup dia. 70x45 mm



Cone penetrometer method for:

- **Liquid Limit determination.** STANDARDS: CEN ISO/TS 17892-12 / BS 1377:2 / NF P94-052-1
- **Shear Strength determination.** STANDARD: CEN ISO/TS 17892-06



MODELS:

S165-01 KIT**Cone digital penetrometer**

The cone penetrometer consists of:

- Aluminium base with levelling screws and spirit level.
- Chromed vertical rod with "micrometric vertical displacement device"
- Digital readout of the penetration values.
- Readings in mm and inch, with 0,1 mm resolution. LCD 5 digits display, with zero set in any position.
- Power: 1,5V battery.
- Slider, brass made, with free fall, stop and release push button, automatic zero set.
- Stainless steel penetration test cone 35 mm long, 30° angle
- Weight 20 g.
- Two brass cups dia. 55x35 mm and 70x45 mm

Dimensions: 220x170x410 mm

Weight: 13 kg approx.

S165-02 KIT**Semiautomatic cone digital penetrometer**

Basically structured as mod. S165-01 KIT, but equipped with a magnetic controller device with electronic digital programmable timer that automatically releases the plunger head and ensures free falling of the cone during the 5-seconds test.

Supplied complete.

Power supply: 230V 1ph 50Hz 200W

Dimensions: 220x280x410 mm

Weight: 15 kg approx.

LIQUID LIMIT

The test is based on the relationship between the moisture content at which clay soils pass from a plastic to a liquid state. This value is obtained from the penetration capacity of the standard cone allowed to free fall into the sample for a period of 5 seconds.

SHEAR STRENGTH

The cone penetrometer is also suitable to measure the shear undrained strength of undisturbed and reconstituted soil samples as per CEN ISO/TS 17892-06 Standard.

ACCESSORIES:

- S166-03** TEST GAUGE, to check the condition of the cone point 30° angle.
- B057-02** MIRROR, to facilitate the height adjustment of the cone.
- S166-04** TEST CONE 60° angle and 60g weight (liquid limit and shear strength tests).
- S166-05** TEST GAUGE, to check the condition of the cone point 60° angle.
- S166-06** WEIGHT, 320g to be added to the cone 30° angle, to get a total weight of 400g (shear strength test)
- V122-08** **NEW** SAMPLE CUP, aluminum, 55 mm dia. x 40 mm deep, to meet BS 1377:2 Specification

SPARE PARTS:

- S166-01** Test cone 35 mm long and 30° angle.
- S166-02** Weight 20g to be added to the cone 30° angle, to get a total weight of 100g
- V122-05** Brass cup dia. 55x35 mm
- V122-06** Brass cup dia. 70x45 mm



PROCTOR TEST: MOISTURE-DENSITY RELATIONSHIP

STANDARDS: EN 13286-2 / ASTM D558, D698, D1557 / AASHTO T99, T134, T180 / BS 1377:4, 1924:2
CNR N° 69 / NF P94-093, P98-231-1 / DIN 18127 / NLT-108-91 / UNE 103-500, 103-501

Proctor moulds

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. Different proctor mould models are available according to the various international Standards in use.

MODELS:



Code	Description Proctor Mould	Standards	Int. dia. mm	Body height mm	Volume ml	Weight kg
S185	Standard	ASTM / AASHTO / NF / CNR	101,6	116,4	944	4,5
S186	Modified	ASTM / AASHTO / CNR	152,4	116,4	2124	10
S189	Split Standard	ASTM / AASHTO / NF / CNR	101,6	116,4	944	5
S190	Split Modified	ASTM / AASHTO / CNR	152,4	116,4	2124	10
S190-01 KIT	Modified	NF	152	152	2758	10
S190-02 KIT	Split Modified	NF	152	152	2758	11
S191	Standard	BS	105	115,5	1000	5
S191-01	Standard	UNE 103-500	102	122,4	1000	5
S191-02 KIT	Modified	UNE 103-501, NLT-108-91	152	127	2320	10
S194*	Standard	EN 13286:2 comparable to DIN	100 ± 1	120 ± 1	942	9
S194-01 KIT*	Modified	EN 13286:2 comparable to DIN	150 ± 1	120 ± 1	2120	13
S194-03*	Split Standard	EN 13286:2 comparable to DIN	100 ± 1	120 ± 1	942	7,5
S194-04 KIT*	Split Standard	EN 13286:2 comparable to DIN	150 ± 1	120 ± 1	2120	12,5
S194-02	Large Size	EN 13286:2 comparable to DIN	250 ± 1	200 ± 1	9817	32

* NOTE:

Annex "A" of EN 13286-2:2010 (E) Standard, allows alternative moulds such as: S185, S186, S189, S190, S190-01KIT, S190-02KIT, S191, S191-01, that have cheaper prices. It is intended that these alternatives will be deleted at the next EN revision.



PROCTOR RAMMERS

Used to compact the soil sample into the mould. The spherical hand knob is from bakelite with metal screw and protection ring nut; guide sleeve with vent holes. The rammers are steel made, plated against corrosion, available in different models according to the various International Standards in use. In alternative to the rammers the automatic compactor mod. S199 (see pag. 400) can be used.

MODELS:

Code	Description	Standards	Rammer dia. mm	Fall height mm	Rammer weight kg	Total weight kg
S187	Standard Proctor rammer	ASTM / AASHTO CNR / UNE / NF	50,8	304,8	2,495	5
S187-01	Standard Proctor rammer	EN 13286:2 comparable to BS	50 ± 0,5	305 ± 3	2,5 ± 0,02	5
S188	Modified Proctor rammer	ASTM / AASHTO CNR / UNE / NLT / NF	50,8	457,2	4,536	8
S188-01	Modified Proctor rammer	EN 13286:2 comparable to BS	50 ± 0,5	457 ± 3	4,5 ± 0,04	8
S188-02	Proctor rammer Large Size	EN 13286:2	125 ± 0,5	600 ± 3	15 ± 0,04	23

Steel plate (compaction disk)

STANDARDS: EN 13286:2 / DIN 18127

Used to compact the EN moulds, it is supplied complete with T handle, plated against corrosion.

MODELS:

S194-09

PLATE, dia. 99,5 mm
thickness 10 mm

S194-10

PLATE, dia. 149,5 mm
thickness 10 mm

S194-11

PLATE, dia. 249,5 mm
thickness 20 mm



Cutting collar

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

MODELS:

S185-01 Dia. 4"

S200-09 Dia. 6"



S200-09



S114



S114

UNIVERSAL EXTRUDER for moulds dia. 100, 150 mm; 4", 6"
Technical details at pag. 384



S199

Automatic, programmable PROCTOR / CBR Compactor with microprocessor, "high technology"

STANDARDS: EN 13286-47 / ASTM D698, D1557, D1883 / AASHTO T99, T180, T193 / BS 1377:4, 1990, 1994 / NF P94-093, P94-066 / DIN 18127 / UNE 7365, 7255, 103-501-94 / CNR UNI 10009 / CNR N. 29, 69 / DUTCH RAW / AS 1289 and most International Standards.

Designed to compact Proctor and CBR specimens, it ensures an extremely uniform compaction degree, granting reliable and repeatable test results.

The microprocessor software allows to select and to perform different compaction cycles in a fully automatic system, by strictly meeting the mentioned International Standards.

The blows are automatically distributed as requested by the selected Standard, with turntable rotation and rammer displacement through photoelectric cell sensors and microprocessor. Top quality components and high accuracy mechanical workings grant very long life also under intensive utilisations.

The digital control panel is separate from the machine and it can be fixed to the wall or mounted on a bench.

The high resolution graphic display (blue negative) 320x240 pixels visualizes selected Standard, total number of blows, effected and remaining ones to end the test, and execution of each layer.

The compactor is easy to use, friendly menu driven, of simple and practical maintenance.

The user can "select and memorize up to 10 personalized test cycles", that can be later on modified or replaced by other ones. This is a very important function, because it allows to update the Compactor to new Standards, or any Standard not included in the microprocessor, or for research purposes.

The original lift system of the rammer can be selected at 12" or 18", or at 300 or 450 mm, granting a correct and constant fall height.

Rammer drop speed: 1 blow each 2 seconds.



Data introduction screen



S199 with mould and rammer

The compactor accepts moulds having dia. 4" and 6", 100 and 150 mm, both Matest made or from other producers, thanks to its universal mould fixing system.

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

Not sellable in CE markets

(see accessory: safety guards mod S199-11)

Power supply: 230V 1ph 50Hz 500W

Dimensions: 610x470x1710 mm

Weight: 165 kg



NEEDED ACCESSORIES:

S199-06 STANDARD RAMMER 50 +/- 0,2 mm dia.
and 2500 +/- 10 g weight

S199-07 MODIFIED RAMMER 50 +/- 0,2 mm dia.
and 4535 +/- 5 g weight

Conforming to: EN 13286-47 / BS 1377:4 / DIN 18127
UNE 7255, 7365, 103-501-94 Standards.

OR:

S199-08 STANDARD RAMMER 50,8 +/- 0,13 mm dia.
and 2491,25 +/- 1,25 g weight

S199-09 MODIFIED RAMMER 50,8 +/- 0,13 mm dia.
and 4537 +/- 3 g weight

Conforming to: ASTM D558, D559, D698, D1557, D1883
NF P94-066/93 / CNR UNI 10009
CNR N. 69 / ASHTO T99, T180, T193

OR:

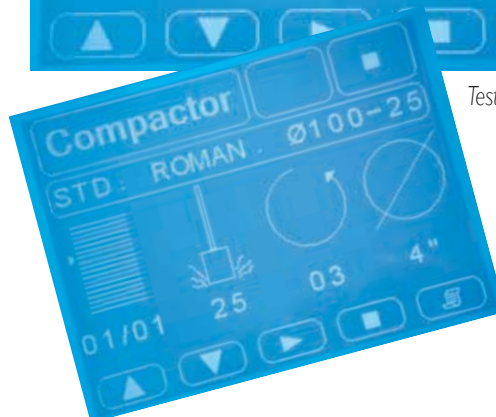
S199-13 STANDARD RAMMER, 50 ± 0,4 mm dia.
and 2700 ± 10 g weight

S199-14 STANDARD RAMMER, 50 ± 0,4 mm dia.
and 4900 ± 10 g weight

Conforming to: AS 1289 (Australian) Standard.



Test screens



section S



401



S199 + S199-12 with accessories

ACCESSORIES:

S199-11

SAFETY GUARDS to CE Directive.
If the door is opened when the Compactor is working, it stops automatically.

S199-12

SOUNDPROOF SECURITY CABINET, steel made with microswitch, complying to CE Safety Directive, lined with sound-proofing material for noise reduction. If the door is opened while the Compactor is working, it automatically stops.

Dimensions: 740x730x1900 mm

Weight: 80 kg approx.

SPARE PARTS:

S198-22 Calibrated rod holding the rammer.

S198-23 Kit of two devices fixing the mould to the table.



CALIFORNIA BEARING RATIO - CBR

STANDARDS: EN 13286-47 / EN 13286-4 / ASTM D1883 / AASHTO T193 / CNR UNI 10009 / UNE 103-502
 NF P94-078, P94-093, P98-231-1 / 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. The compaction test can be performed both with the manual rammers and the automatic compactor mod. S199.



S201-05

section S



402



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



S201 KIT... CBR SET TO NF STANDARD



S202 KIT... CBR SET TO BS, EN 13286-4 STANDARDS



S203 KIT... CBR SET TO EN 13286-47 STANDARD

The CBR equipment, steel made and plated against corrosion is available in different versions according to the various Standards in force.



S114

MATEST

Description	Standards			
	ASTM D1883	EN	NF P94-078	EN 13286-4
	CNR UNI 1009	13286-47	NF P94-093	BS 1377:4
	UNE 103-502		NFP98-231-1	BS 1924:2
	AASHTO T193			
CBR mould complete with collar and perforated base:				
Dia. 6" (152,4 mm) x 7" (177,8 mm) height.....	S200-01			
Dia. 150 mm x 120 mm height.....		S203 KIT		
Dia. 152 mm x 152 mm height.....			S201 KIT	
Dia. 152 mm x 127 mm height.....				S202 KIT
Split CBR mould with collar and perforated base:				
Dia. 6" (152,4 mm) x 7" (177,8 mm) height.....	S200-13			
Dia. 150 mm x 120 mm height.....		S203-01 KIT		
Dia. 152 mm x 152 mm height.....			S201-01 KIT	
Solid base plate for CBR mould.....	S200-12	S194-15	S201-12	S202-03
Perforated base plate for CBR mould.....	S200-10	S194-14	S201-10	S202-10
Filter screen, stainless steel dia. 149 mm mesh 0,150 mm (ASTM n° 100).....	S200-02	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. 149,5 x 36 mm height.....		S194-21		
Dia. 151 x 25,4 mm height.....			S201-02	
Dia. 151x36 mm height.....			S201-06	
Dia. 150x50 mm height.....				S202-07
Perforated (swell) plate with adjustable stem.....	S200-04	S194-23	S200-04	S200-04
Plein swell plate.....		S194-24		
Tripod (dial gauge support).....	S200-05	S194-26	S200-05	S200-05
Dial gauge 10 mm range, 0,01 mm subd.....	S376	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		S202-08
Slotted surcharge weight 2270 g.....	S200-08			
Split surcharge weight 2300 g.....			S201-04	
Split surcharge weight 2000 g.....		S202-09		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	S188-01	S188-01
Straight edge 300x30x3 mm.....	S200-11	S200-11	S200-11	S200-11
Straight edge, cutting rim, 300x30x3 mm.....	S200-06	S200-06	S200-06	S200-06
Filter paper dia. 150 mm (pack of 100).....	S200-14	S200-14	S200-14	S200-14
Soaking tank 600x400x400 mm.....	S201-05	S201-05	S201-05	S201-05
Universal extruder (see pag. 384).....	S114	S114	S114	S114



S197N
Vibrating compaction hammer

STANDARDS: EN 13286-4 / 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 asphalt in the percentage refusal density (see pag. 78).

Supplied without tampers and support frame which must be ordered separately.

Power supply: 230V 1 ph 50/60 Hz 750 W

Dimensions: 105x430x270 mm

Weight: 7 kg

ACCESSORIES:

S197-01N

Supporting frame for vibrating hammer.

The sliding mass has a total weight (including hammer and tamping foot) of 37 kg as requested by EN Spec. Steel made, plated against corrosion.

Weight: 70 kg

B097-12

CBR and Proctor Tamping foot, 146 mm dia., complete with shank.



COMPRESSIVE STRENGTH OF SOIL-CEMENT MIXTURES
 STANDARD: EN 13286-41, 12390-4



A compression machine with suitable measuring range (0-250/500 kN) is used for compression tests on soil-cement cylindrical mixture specimens.

The cement (see pag. 342) or concrete (see pag. 168 ÷ 219) machines are suitable to perform this test.

Determination of strength of stabilized soil

STANDARDS: EN 13286-53 / NF P98-230-2 / BS 1924 :2

Used to prepare specimens bound with cementitious binders or aggregate mixes for determination of the Unconfined compressive strength of fine and medium grained soils. Made of plated steel.

MODELS:

S195-01 Mould dia. 50 by 122 mm to obtain specimen dia. 50x50 mm high of fine and medium grained soil (NF)

S195-02 Mould dia. 50 by 172 mm to obtain specimen dia. 50x100 mm high of fine and medium (EN, BS) and of coarse grained soil (NF)

S195-15 Mould dia. 100 by 242 mm to obtain specimen dia. 100x100 mm high of coarse grained soil (EN, BS)

S195-20 Mould dia. 100 by 342 mm to obtain specimen dia. 100x200 mm high of coarse grained soil (EN, BS)

S195-03 Base and upper piston dia. 50 by 36 mm

S195-16 Base and upper piston dia. 100 by 71 mm

S195-04 Penetration and demoulding piston dia. 50 by 125 mm

S195-05 Penetration and demoulding piston dia. 50 by 175 mm

S195-17 Penetration and demoulding piston dia. 100 by 245 mm

S195-21 Penetration and demoulding piston dia. 100 by 345 mm

S195-09 Collecting cylinder dia. 56 by 60 mm

S195-10 Collecting cylinder dia. 56 by 110 mm

S195-18 Collecting cylinder dia. 106 by 110 mm

S195-22 Collecting cylinder dia. 106 by 210 mm

S195-11 Set of 2 displacing collars dia. 50 by 5 mm

S195-06 Set of 2 displacing collars dia. 50 by 6 mm

S195-12 Set of 2 displacing collars dia. 50 by 8,33 mm

S195-23 Set of 2 displacing collars dia. 50 by 10 mm

S195-07 Set of 2 displacing collars dia. 50 by 12,5 mm

S195-24 Set of 2 displacing collars dia. 50 by 16,66 mm

S195-08 Set of 2 displacing collars dia. 50 by 25 mm

S195-13 Set of 2 displacing collars dia. 100 by 10 mm

S195-14 Set of 2 displacing collars dia. 100 by 16,66 mm

S195-25 Set of 2 displacing collars dia. 100 by 20 mm

S195-19 Set of 2 displacing collars dia. 100 by 25 mm

S195-27 Set of 12 displacing collars dia. 100 by 33,33 mm

S195-28 Set of 2 displacing collars dia. 100 by 50 mm



RELATIVE DENSITY OF COHESIONLESS SOIL

VIBRATING TABLE METHOD

This test covers the determination of the maximum dry density and the water content (humidity/density ratio) of cohesionless mixtures to be used in road construction, and where the max density by the impact method is lower than the vibratory method.

The relative density set is proposed in two versions according to EN or ASTM Specifications:

S238 KIT

Relative density of cohesionless soils

STANDARD: EN 13286-5

The set is composed by:

S238-10

Vibrating electromagnetic table, dimensions 762x762 mm, vibration frequency 3600 rpm, amplitude range: 0,05 to 0,64 mm, max. load capacity 250 kg, complete with separate control panel.

S238-11 Relative density mould 0,5 cu. ft. capacity with accessories.

S238-12 Surcharge weight and base with handle to EN for the 0,5 cu. ft. mould.

S238-16 Relative density gauge measuring set.

Power supply: 230V 1ph 50/60Hz

Total weight: 290 kg approx.

S238-01 KIT

Relative density of cohesionless soils

STANDARDS: ASTM D4253, D4254

The set is composed by:

S238-10 Vibrating electromagnetic table, as above described.

S238-11 Relative density mould 0,5 cu. ft. capacity + accessories.

S238-13 Relative density mould 0,1 cu. ft. capacity + accessories.

S238-14 Surcharge weight and base with handle to ASTM for the 0,5 cu. ft. mould.

S238-15 Surcharge weight and base with handle to ASTM for the 0,1 cu. ft. mould.

S238-16 Relative density gauge measuring set.

Power supply:

230V 1ph 50/60Hz

Total weight:

310 kg approx.



S238-01 KIT

S229N

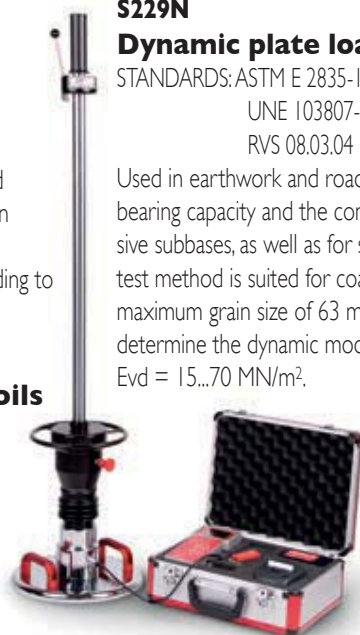
Dynamic plate load test Light Weight Deflectometer

STANDARDS: ASTM E 2835-11 / TP BF-StB part B 8.3

UNE 103807-2:2008 / TB 10102-2004, J338-2004

RVS 08.03.04 march 2008

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 of soil in the range $E_{vd} = 15...70 \text{ MN/m}^2$.



S229N

ADVANTAGES over the static plate load tester:

- Immediate evaluation of each measurement
- Only 2 minutes per measurement point
- Time and cost-saving
- Easy to handle by one person
- Testing in location not really accessible

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

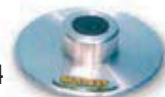
SPECIFICATIONS:

- Measuring instrument - small, portable and precise
- Intuitive menu navigation - choose, confirm, ready!
- Individual adjustment possibilities
- USB interface, GPS and thermal printer
- Max. impact force: $7,07 \text{ MN/m}^2$
- Duration of the impact 17 ms
- Load plate dia. 300x20 mm
- Temperature range 0 bis 40°C
- Storage capacity 1000 series of measured data
- Language for menu navigation selectable
- Made in Germany, certified production

The tester is supplied complete with loading unit, load plate, measuring instrument and application video on USB stick (in carrying case). Printer, GPS and PC-Software are optional.

Total Weight: 30 kg

S229-14



ACCESSORIES:

S229-05 DROP weight of 15 kg with max. impact force of 10605N, complete of calibration certificate.

S229-10 PROTOCOL SOFTWARE. Add information about the measuring point and use the comfortable user interface for issuing and easy-view archiving of representative A4-protocols.

S229-11 THERMAL PRINTER. Small, quick printer with light resistant thermal paper.

S229-12 EXTERNAL GPS-Receiver. To proof the exact coordinates of the measuring point.

S229-13 TRANSPORT CART. Collapsible, for long distances at the site.

S229-14 MAGNETIC BASE PLATE. For proper positioning of loading unit.

S229-15 TRANSPORT BOX. Wood, for the safe transport and storage.



**S131 KIT****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.

The S131KIT tester comprises:

S221 Conversion frame

S221-01 Mechanical jack 50 kN capacity

S370-02 Load ring 2 kN capacity

S131-11 Upper+lower compression platens with accessories

S376 Dial gauge 10 x 0,01 mm

S212-03 Dial gauge holder

Dimensions: 380x460x1380 mm

Weight: 68 kg

S131 KIT

**S210 KIT****CBR loading machine, hand operated, field model**

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

The load is applied through a mechanical jack with handwheel.

The upper beam can be adjusted in height.

The S210KIT machine comprises:

S221

Conversion frame

S221-01

Mechanical jack 50 kN capacity

S370-10

Load ring 50 kN capacity

S212-01

CBR penetration piston

S376

Dial gauge 10 x 0,01 mm

S212-03

Dial gauge holder

Dimensions: 420x370x1180 mm

Weight: 65 kg approx.

S210 KIT



NOTE:

The machines described in this page include some common component (like for ex. the mechanical jack mod. S221-01).

It is therefore possible to combine these components for different machines, with some economical advantage.

S220 KIT**Field CBR test set**

STANDARDS: BS 1377:7, 1924:2 / ASTM D4429
CNR UNI 10009

Used to determine quickly and efficiently the bearing capacity of soils on road constructions, foundations, road subgrades etc.

The S220KIT tester comprises:

S221-01 Mechanical jack 50 kN capacity

S370-09 Load ring 40 kN capacity

S212-01 CBR penetration piston

S377 Dial gauge 25 x 0,01 mm

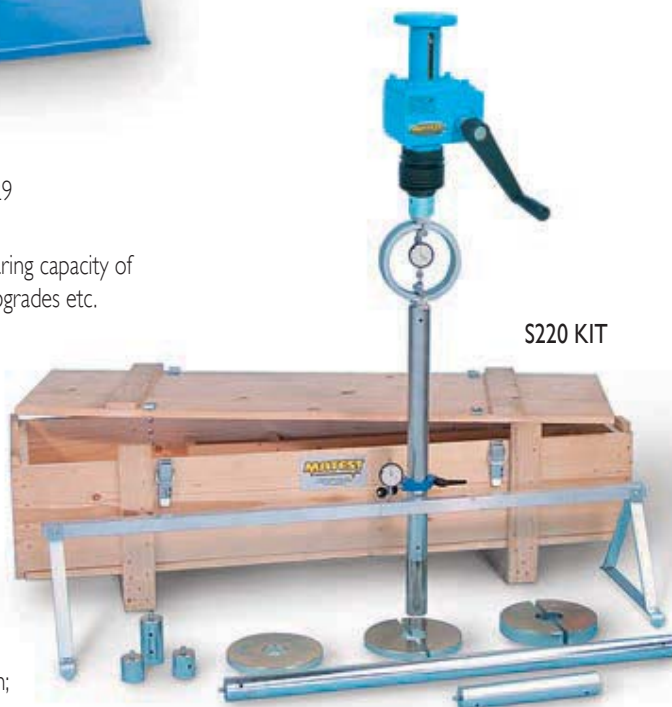
S212-03 Dial gauge holder

S220-01

Datum bar 1400 mm long; slotted surcharge weights 4,5 and 9 kg and annular 4,5 kg; set of extension rods: 2x100 mm, 1x300, 600, 1000 mm; accessories; wooden carrying case.

Weight: 70 kg approx.

S220 KIT



CBR TESTING MACHINES

STANDARDS: EN 13286-47 / ASTM D1883 / BS 1377-4:1990 / 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, 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.

S209 KIT

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 S209KIT CBR machine comprises:

S209-01 CBR laboratory frame

S212-01 CBR penetration piston

S370-10 Load ring 50 kN capacity

S376 Dial gauge 10 x 0,01 mm

S212-03 Dial gauge holder

Dimensions:

430x380x1180 mm

Weight: 80 kg

S209 KIT



ACCESSORIES:

S210-02

CBR RATE INDICATOR

Used to apply the correct rate of 1,27 mm/min penetration to hand operated CBR machine S209 KIT. Power supply: 230V 1ph 50 Hz



S210-02

S374 BRAKE DEVICE, it holds the max. applied load on the dial gauge of the load ring, with manual zero setting. Suitable for S209 KIT and S211 KIT machines.

S211 KIT

CBR loading machine motorized, 50 kN Speed rate: 1,27 mm/min

Load is applied through a screw jack driven by an electric motor at a constant penetration rate of 1,27 mm/min (ASTM, BS, EN Spec.) 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 S211KIT CBR machine comprises:

S211-10 CBR motorized frame

S212-01 CBR penetration piston

S370-10 Load ring 50 kN capacity

S376 Dial gauge 10 x 0,01 mm

S212-03 Dial gauge holder

Power supply: 230V 1ph 50 Hz 750W

Dimensions:

430x380x1180 mm

Weight: 98 kg

S211 KIT



S374-01

ELECTRIC DEVICE FOR AUTOMATIC STOP of the CBR machine when reaching the max. capacity load.

To prevent any overload damage this device is mounted on the proving ring of the S211 KIT machine.

...follows...

material testing equipment



**S212N****Universal multispeed load frame 50 kN, digital, "Touch-Screen"**

This motorized machine with electronic digital "touch-screen" controlled by microprocessor, is suitable to perform all the tests where the requested speed rate is within:

"0,05 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 1,27 and 1 mm/min.
- Marshall test with rate of 50,8 mm/min.
- Splitting tensile test on Marshall specimens.
- Quick Triaxial (only with load cell 2,5 kN capacity mod. S337-31 and S215A frame. See page 410)

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

Graphic display ¼ VGA color Touch-Screen.

Time/date and language selection (English, French, German, Spanish, Italian, Polish).

Symbols of pushbuttons functions.

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

Upper beam can be adjusted in height.

Supplied "without" load ring and accessories which have to be ordered separately.

Power supply: 230V 1ph 50/60Hz 750W

Dimensions: 480x450xh1280 mm

Weight: 140 kg

ACCESSORIES for S212N and S213N frames

CBR test:

- S212-01** Penetration piston
- S370-10S** Load ring 50kN with electric stop safety device
- S374** Brake device to hold max. load
- S376** Dial gauge 10 x 0,01 mm
- S212-03** Dial gauge holder

MARSHALL test:

- S212-05** Load piston
- B046N** Stability mould
- B047** Flow meter
- B047-01** Dial gauge for flow meter
- S370-08S** Load ring 30kN with electric stop safety device
- S374** Brake device to hold max. load

UNCONFINED test:

- S212-08N** Upper + lower compression plates, dia. 100 mm + distance piece with rod
- S212-03** Dial gauge holder
- S376** Dial gauge 10 x 0,01 mm
- S370-02S** Load ring 2kN with electric stop safety device
- S374** Brake device to hold max. load

S213N**CBR/Marshall 2 speeds frame 50 kN**

The frame is provided of two fix speed ranges, easily selectable by a frequency changer (inverter) activated by an electric switch:

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 switch of the load plate to save the machine from wrong manipulations.

Supplied "without" load ring and accessories which have to be ordered separately.

Power supply: 230V 1ph 50/60 Hz 750 W

Dimensions: 450x400x1200 mm

Weight: 130 kg

S213-01N**CBR/Marshall 2 speeds frame 50 kN**

Identical to mod. S213N but with speed ranges:

1 mm/min. for CBR tests

50,8 mm/min for Marshall tests.



S212N
with accessories for CBR test



S213N
with accessories for Marshall test

LOAD TEST FRAMES:

- CBR
- TWO SPEEDS
- UNIVERSAL MULTISPEED

COMBINED WITH "CYBER-PLUS 8 EVOLUTION", COMPUTERIZED TOUCH-SCREEN DIGITAL DISPLAY SYSTEM

Technical Specifications:

The frame is the same as for the previous load frames (mod. S211 KIT to S213N), 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 +/- 0,1% independent linearity.

The "CYBER-PLUS 8 EVOLUTION" computerized multichannel digital display system (technical details: see mod. B044N-SET at pag. 412, Hardware technical details at pag. 24), 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 print certificates and graphics directly on a laser printer via USB or to transfer them to PC via Ethernet.

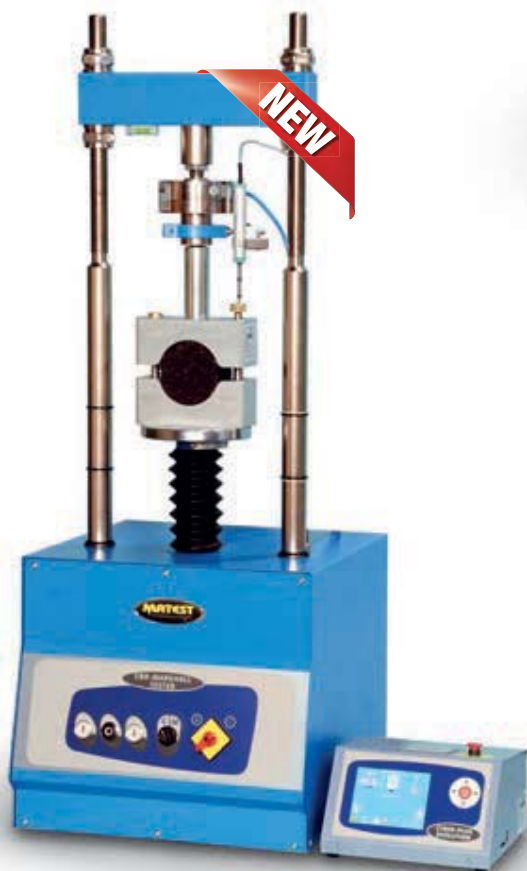
AVAILABLE MODELS:

S216 KIT**CBR digital computerized machine**

SPEED RATE: 1,27 mm/min

Technical details of the frame: see mod. S211 KIT, pag. 407

SUPPLIED COMPLETE except the software (see next page mod. S218N).



S214N KIT + MARSHALL accessories



S216 KIT + CBR accessories

S214N KIT**CBR/Marshall 2 speeds load frame digital, computerized**

The frame is provided of two fix speed ranges, easily selectable by an electric switch:

1,27 mm/min. for CBR tests

50,8 mm/min for Marshall tests.

Technical details of the frame: see mod. S213N, pag. 408

Supplied complete with "Cyber-Plus 8 Evolution" system, load cell and displacement transducer; but "without" accessories and Software for CBR and Marshall tests, to be ordered separately (see accessories at next page).

S214-01N KIT**CBR/Marshall 2 speeds load frame digital, computerized**

Identical to mod. S214N KIT but with speed ranges:

1 mm/min. for CBR tests

50,8 mm/min for Marshall tests.

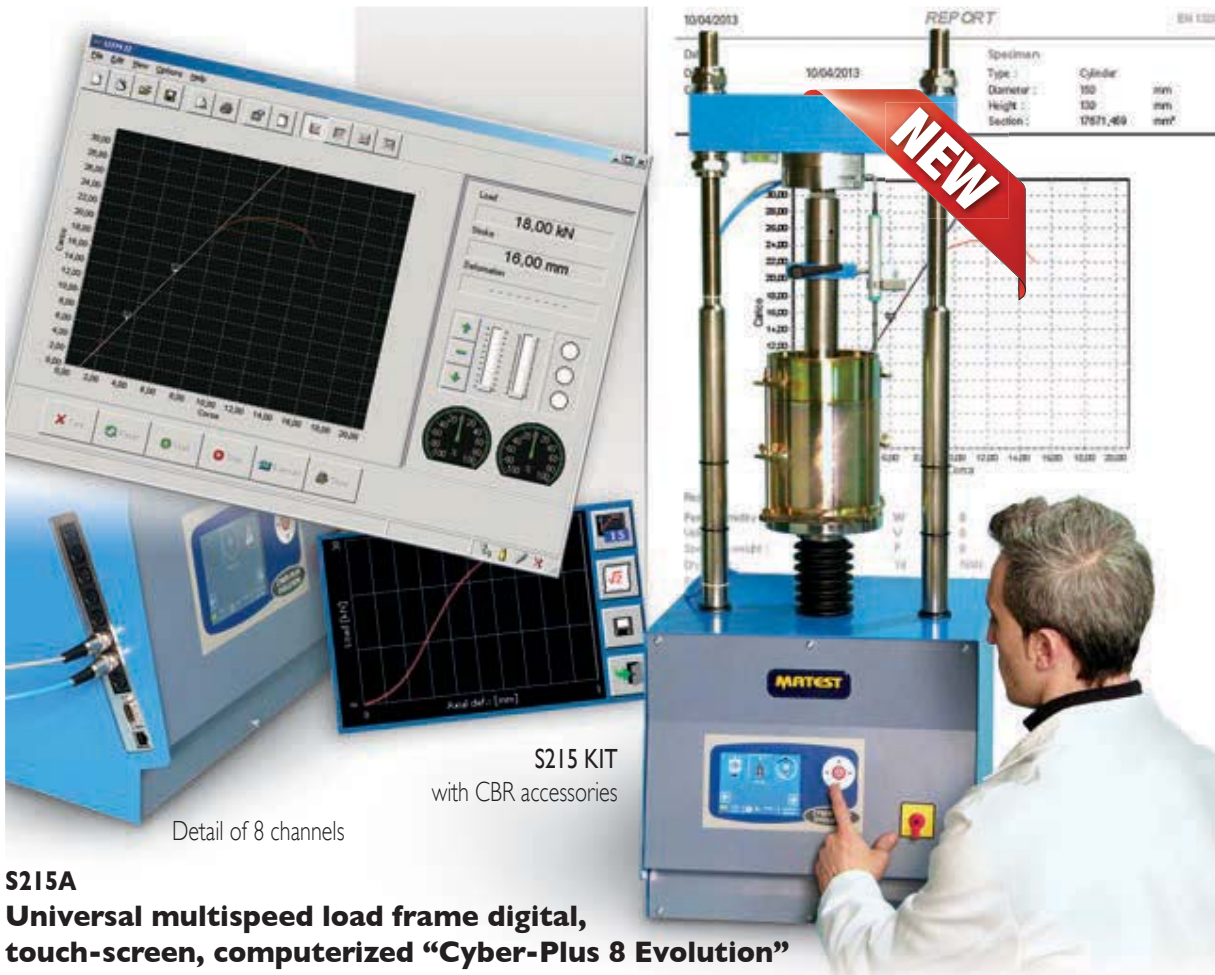
... follows...

material testing equipment





410



S215 KIT
with CBR accessories

Detail of 8 channels

S215A

Universal multispeed load frame digital, touch-screen, computerized "Cyber-Plus 8 Evolution"

Comprising:

S212N Universal multispeed load frame 50 kN, touch-screen.
Technical spec.: see page 408

S212A Acquisition and data processing system up to 8 analogical/digital channels for load cells and transducers. Graphic and numbers visualization, processing and printing of the test results.
Technical spec.: see B044N Cyber-plus 8 Evolution Touch-Screen, next page.

S337-34 Load Cell 50kN capacity, complete with cable and connector.

S336-14 Linear Displacement Transducer 50mm stroke, complete with cable and connector.

S305-05 Mounting device of the coupling pliers.

S335-15 Coupling pliers to hold the transducer.

Supplied "without" accessories for CBR, Marshall, Unconfined tests and Software, to be ordered separately (see accessories).

ACCESSORIES FOR THE 2 SPEEDS AND THE MULTISPEED LOAD FRAMES, MOD. S214N KIT, AND S215A TO PERFORM:

CBR tests

S212-01 Penetration piston

MARSHALL tests

S212-05 Load piston

B046N Stability mould, cast aluminium alloy

UNCONFINED test

S212-08N Upper + lower compression plates, 100 mm dia. + distance piece with rod

SOFTWARES FOR THE FRAMES COMBINED WITH "CYBER-PLUS 8 EVOLUTION" SYSTEM:

S218N SOFTWARE UTM2 (Universal Testing Machine 2)
Licence for **CBR** Test

Standards: **EN 13286-47** / CNR UNI 10009 / ASTM D1883
BS 1377 / NF P94-078

S218-01N SOFTWARE UTM2 (Universal Testing Machine 2)
Licence for **UNCONFINED** test

Standard: ASTM D2166

B043-01N SOFTWARE UTM2 (Universal Testing Machine 2)
Licence for **MARSHALL** test

Standards: **EN 12697-34** / CNR N. 30 / ASTM D1559
BS 598 :107 / NF P98-251

B043-02N SOFTWARE UTM2 (Universal Testing Machine 2)
Licence for **TENSILE SPLITTING** test

Standards: **EN 12697-23** / CNR N. 134 / ASTM D4123

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

C127N Graphic printer on thermo paper on board.
(only for S214N KIT model)

H009-01 PERSONAL COMPUTER, complete with LCD monitor 22", keyboard, mouse, connection cables, installation and setting up of the purchased software.

C128 Laser printer, for the graphics and test certificate printing with direct connection to Cyber-Plus 8.



section S



411

MATTEST



B044N SET

B044N-SET**Cyber-Plus 8 Evolution "Touch-Screen"**

Acquisition and data processing system. 8 channels.

Developed for the implementation and upgrading of any type of existing machines (even not manufactured by Matest) applicable to:

- CBR loading machine motorized mod. S211 KIT.
- CBR/Marshall 2 speeds load frame mod. S213N.
- Marshall mechanical load frame mod. B042 KIT.

Cyber-Plus 8 Evolution allows:

- Acquisition up to 8 analogical/digital channels: load cell and linear displacement potentiometric vertical and/or horizontal transducers.

To perform the following tests:

- CBR TEST: **EN 13286-47** / CNR / UNI 10009
ASTM D1883 / BS 1377 / NF P94-078.
- UNCONFINED TEST: ASTM D2166
- MARSHALL: **EN 12697-34** / ASTM D1559 / CNR N. 30
NF P98-251-2 / BS 598 :107
- INDIRECT TENSILE TEST: **EN 12697-23** / ASTM D4123
- DETERMINATION OF THE WATER SENSIBILITY OF BITUMINOUS SPECIMENS: **EN 12697-12**
- Remote control of the digital unit through PC and UTMII software

Hardware specifications:

- 8 independent channels available for the load cells or potentiometric transducers or strain gages for load, deformation or displacement measurements..
- Stabilized power supply of the analogical channels: 5Vcc and 3Vcc
- Analogue input: +/- 20 mV and +/-5V
- Nominal resolution: 24 bit.
- Acquisition up to 200 readings for each channel.
- Safety discrete On/off output
- Graphic display 1/4 VGA colour Touch-Screen.
- Time and calendar system

Firmware specifications:

- Instant visualization of the load measured by an extensometric cell.
- Instant visualization of the deformation measured by 4 linear displacement transducers.
- Visualization of the graphic of the test.
- Visualization of date and time.
- Semi-automatic configuration and calibration of all transducers connected.
- 20 steps lining that can be set by the enduser.
- Automatic correction of the axis origin for CBR/Marshall tests.
- Automatic calculation and visualization of all the results according to the Standard.
- Setting of all the parameters for test: alarms, zero threshold, end-test percentage, calculation parameters.
- Time/date and language selection (Italian, English, French, German, Spanish, Polish).
- Unlimited file for each type of test
- Symbols of pushbuttons functions
- Informative messages (planning alarms, load cell and strain transducer setting, etc.)
- Safety function for automatic machine stop at max. reached load and deformation of the strain transducer.
- Printing of the results on the incorporated thermal graphic printer (accessory C127N). Transfer and management via Ethernet of the filed data or real-time.

Hardware technical details: see pag. 24

B044N-SET is composed by:

B044N

CYBER-PLUS 8 EVOLUTION, Unit for data acquisition, as described
Power supply: 230V 1F 50/60Hz

S337-34

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

S336-14

LINEAR DISPLACEMENT TRANSDUCER, 50mm stroke, independent linearity +/- 0,1% complete with cable and connector

Accessories for fixing the load cell and transducer to the test machine.

The system is supplied fully calibrated with calibration certificate, and ready for use.

Every item can be ordered separately.

ACCESSORIES:

S218N

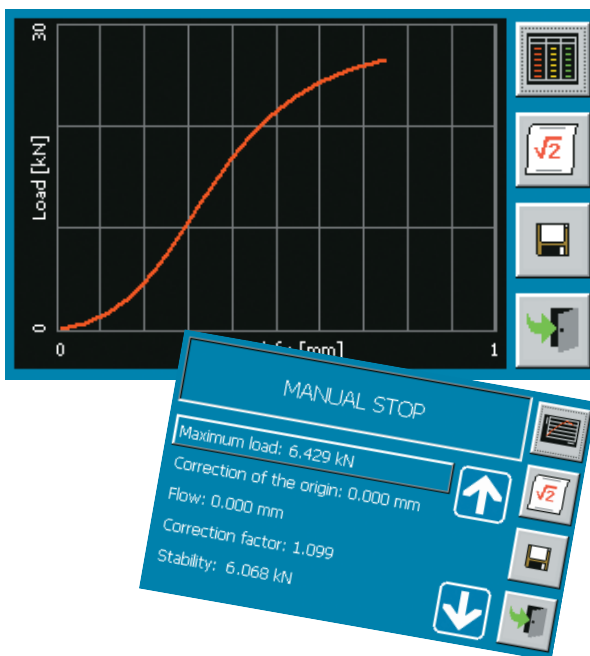
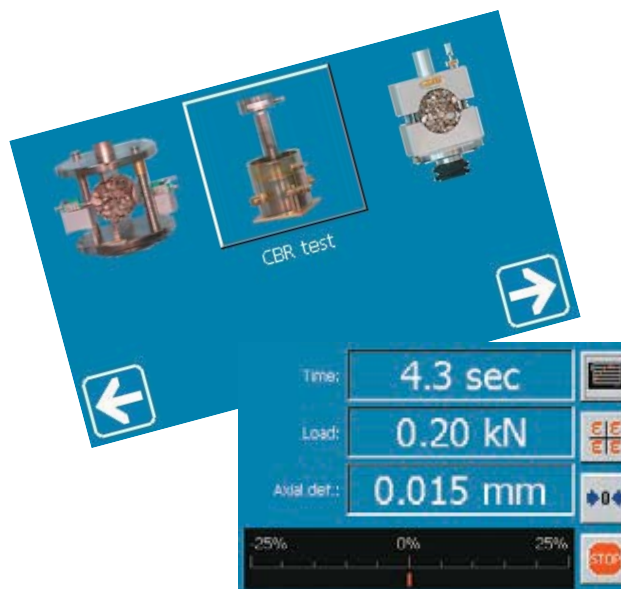
SOFTWARE UTM2 (Universal Testing Machine 2)
Licence for **CBR Test**
Standards: **EN 13286-47** / CNR/UNI 10009 / ASTM D1883
BS 1377 / NF P94-078

S218-01N

SOFTWARE UTM2 (Universal Testing Machine 2)
Licence for **UNCONFINED Test**
Standards: ASTM D1883

B043-01N

SOFTWARE UTM2 (Universal Testing Machine 2)
Licence for **MARSHALL test**
Data processing program for "X-Y STABILITY/FLOW"
Standards: **EN 12697-34** / CNR N. 30 / ASTM D1559
BS 598 :107 / NF P98-251-2



B043-02N

SOFTWARE UTM2 (Universal Testing Machine 2)
Licence for **INDIRECT TENSILE STRENGTH**
Standards: **EN 12697-23** / CNR N. 134 / ASTM D4123

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

C127N Graphic printer on thermo paper on board.

H009-01

PERSONAL COMPUTER, complete with LCD monitor 22", keyboard, mouse, connection cables, installation and setting up of the purchased software.

C128 Laser printer for test certificate and graphics printing with direct connection to CYBER-PLUS 8.



S205**UNITRONIC 50 kN, UNIVERSAL MULTIPURPOSE COMPRESSION/FLEXURAL AND TENSILE FRAME FOR:**

- COMPRESSION / FLEXURAL TESTS, 50 kN MAX. CAPACITY LOAD
- TENSILE TESTS, 25 kN MAX. CAPACITY LOAD (option mod. S205-05)

WITH AUTOMATIC LOAD OR DISPLACEMENT/DEFORMATION CONTROL, for testing:

Soil:

- CBR (California Bearing Ratio),
- UNCONFINED COMPRESSION,
- QUICK TRIAXIAL

Asphalt:

- MARSHALL
- SPLITTING TENSILE
- DIRECT SHEAR (Leutner) on the connection between bituminous strata

Concrete:

- FLEXURE ON BEAMS
- FLEXURE ON TILES

Cement:

- FLEXURE on 40x40x160mm specimens,
- COMPRESSION on cubes 40, 50, 70mm
- TENSILE on mortar briquettes (option mod. S205-05)

Metal, plastic, wires, ropes, textiles, papers etc.

- TENSILE TESTS, 25kN max capacity load (option mod. S205-05)

Clay blocks:

- PUNCHING

Rock and stones:

- UNIAXIAL SPLITTING TENSILE

Various materials:

By using suitable devices, Unitronic tester, within the limits of its max. 50 kN capacity for compression/flexural and 25 kN for tensile (see model S205-05), performs compression, flexural, splitting tensile and direct tensile tests, with automatic load or displacement/deformation control.

The load is applied by a mechanical jack that is driven by a motor "brushless with closed loop through optic encoder" and controlled by a microprocessor. Stroke electric end switches are applied to the load piston to save the machine from accidental handlings. The control panel is placed frontally and it is provided with a membrane having 6 multifunctional interactive pushbuttons driven by menu, a large graphic display and RS232 port for connection to PC.

Hardware and software specifications:

- Negative blue graphic display "320 x 240 pixel"
- 4 analogue A/D outputs for transducers or load cells.
- Permanent memory and clock calendar
- Fully automatic test processing with real time acquisition and visualization of the load/displacement or deformation, curve load/time/deformation.
- Memory of more than 100 tests, with possibility to display/delete tests from the file storage
- Multi-languages function: Italian, English, French, Spanish

Technical data:

- Maximum compression capacity: 50kN
- Maximum tensile capacity: 25kN (model S205-05)
- Adjustable testing speed from 0,01 to 51mm/minute
- Adjustable pace rate from 1 to 15000N/sec.
- Max. ram travel: 100mm
- Daylight between columns: 380mm
- Max. vertical daylight: 850mm
- Power supply: 230V 1F 50/60Hz 1500W
- Dimensions: 500x450x1450mm
- Weight: 130 kg approx



S205 / S205-05 with load cell

S205-05**UNITRONIC Compression / Tensile**

The Unitronic frame S205 is modified and improved to perform also tensile tests with max. capacity of 25 kN.
(Note: this modification is possible only in MATEST factory)

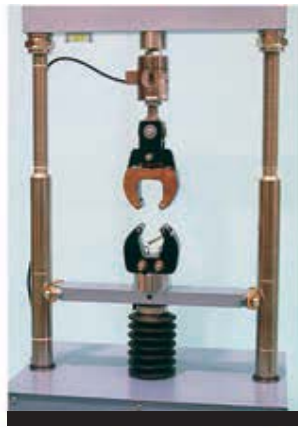




CBR Test



Quick Triaxial



Tensile test on mortar briquettes



Clay Blocks Punching



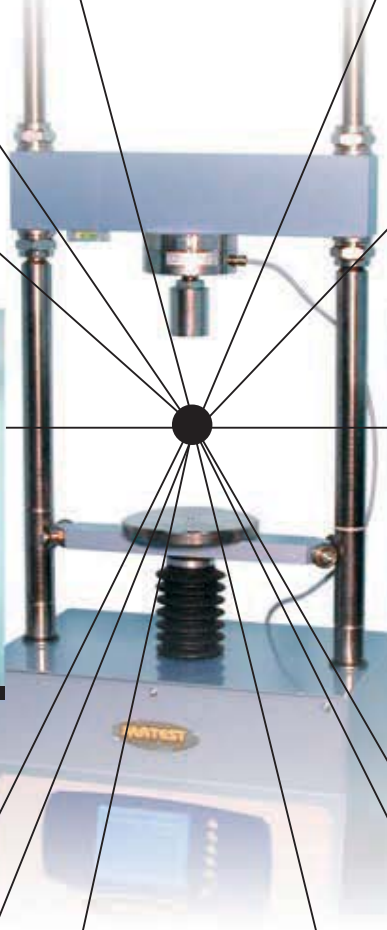
Marshall Test

Tensile tests on metals, plastics, wires, textiles etc.



Splitting Tensile

Unconfined Compression



Concrete Flexure

Tile Flexure



Cement Compression

Direct shear (Leutner)



Cement Flexure



Uniaxial Rock Splitting Tensile



S205: ACCESSORIES

UNITRONIC: SCREEN EXAMPLES

section S



CBR Test



Main screen



416

S205 / S205-05

UNITRONIC, specific applications:

CBR: California Bearing Ratio test

Standards: EN 13286-47:2006 / ASTM D1883 / BS 1377:4
 AASHTO T193 / NF P94-078 / UNE 103-502
 CNR UNI 10009

Test development with displacement control.

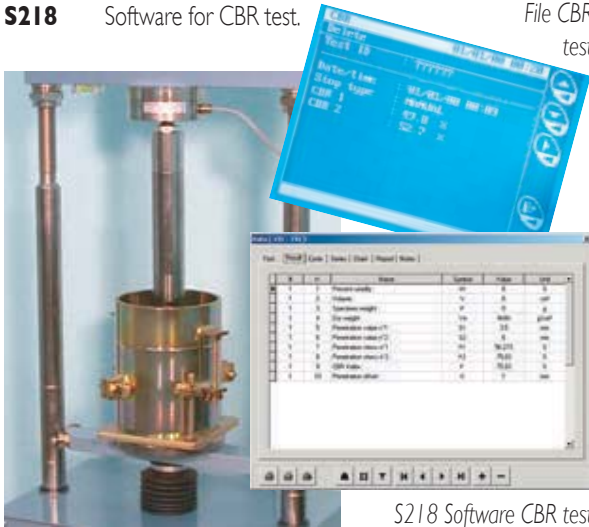
S205 Unitronic 50 kN

S337-34 Strain gauge load cell, 50 kN capacity.

S212-01 Penetration piston.

S218 Software for CBR test.

File CBR test



S218 Software CBR test

Transverse / Deformation test on adhesives for tiles

STANDARD: EN 12002

Test development with displacement control.

S205 Unitronic 50 kN

S205-13 Flexure device with lower bearers and upper loading piston

S205-14 Strain gauge load cell 500 N capacity



Four point bending test method on glass-fibre reinforced cement

STANDARD: EN 1170-4

Test development with load control.

S205 Unitronic 50 kN

S337-34 Strain gauge load cell 50kN capacity

S205-16 Four-point bending device to test glass-fibre reinforced cement.

Rollers dimensions: dia. 40 by 310 mm long
 Lower rollers adjustable from 110 to 310 mm
 Upper rollers adjustable from 45 to 120 mm
 Weight: 20 kg approx.

C109-11 Software for flexure tests on concrete beams.



S205-16

MATEST

Flexural test with centre point on concrete beams and clay tiles

Standards: EN 12390-5, 491, 538 / ASTM C78, C293
BS 1881:118 / NF P18-407 / UNE 83305 / UNI 6133
Test development with load control.

S205 Unitronic 50 kN

S337-34 Strain gauge load cell, 50 kN capacity

S205-18

Flexure device for centre point loading to test clay tiles and concrete beams dimensions 100x100x400(500) mm
Consisting of lower beam with two bearers (one articulated) adjustable from 110 to 310mm, and upper central articulated bearer fixed to the load cell.

Bearer dimensions: 40 mm dia. by 310mm long

Weight : 20 kg approx.

C109-11 Software for flexure tests on concrete beams

Punching test on clay blocks

Standard: UNI 9730-3

Test development with load control.

S205 Unitronic 50 kN

S337-32 Strain gauge load cell
10 kN capacity.

C093-11 Flexural punching device.

S205-15 Holding beam for the punching device

C109-16 Software for punching test on clay blocks.



Flexural test on mortar prisms 40x40x160mm

Standards: EN 196-1 / ASTM C348 / NF P15-451 / DIN 1164
EN ISO 679

Test development with load control.

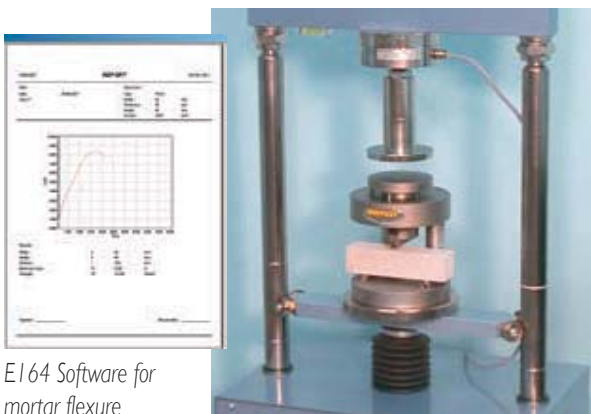
S205 Unitronic 50 kN

S337-32 Strain gauge load cell 10 kN capacity.

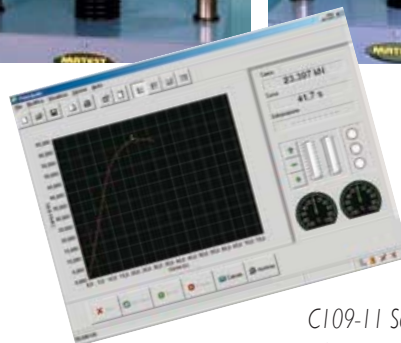
S212-05 Loading piston.

E172-01 Flexure EN device for 40x40x160 mm specimens.
(available also to ASTM, see pag. 352)

E164 Software for flexural tests.



E164 Software for mortar flexure



C109-11 Software for flexural test on concrete beam

Compression test on mortar specimens (50kN max. load)

Standards: EN 196-1 / EN ISO 679 / ASTM C109, C349
NF P18-411 / UNE 80101 / BS 3892 / DIN 1164

Test development with load control.

S205 Unitronic 50 kN

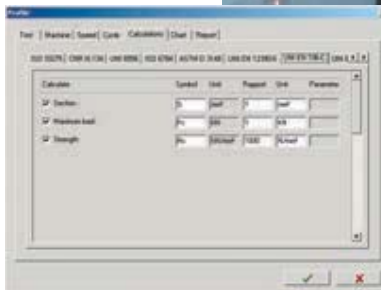
S337-34 Strain gauge load cell 50 kN capacity.

S212-05 Loading piston.

E170 Compression device on portion of 40x40x160mm specimens.

(devices for different specimens described at pag. 352)

E163 Software for compression tests.



E163 Software for mortar compression

... follows ...



S205: ACCESSORIES

Marshall stability test

Standards: EN 12697-34 / ASTM D1559 / AASHTOT245
BS 598 :107 / NF P98-251-2 / CNR N° 30

Test development with displacement control.

- S205** Unitronic 50 kN
- S337-34** Strain gauge load cell, 50 kN capacity.
- S212-05** Loading piston.
- B046N** Stability mould.
- B043-01** Software for Marshall test.

Splitting tensile test

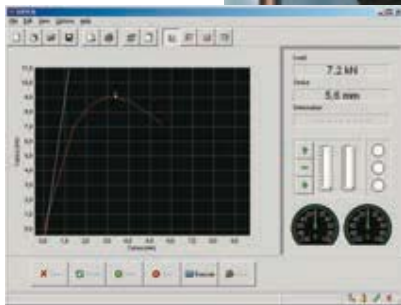
Standards: EN 12697-23 / ASTM D4123 / CNR N° 134
Test development with displacement control.

- S205** Unitronic 50 kN
- S337-34** Strain gauge load cell, 50 kN capacity.
- S212-05** Loading piston.
- B047-02** Splitting tensile device for samples dia. 4" and 6"
- B047-04** Set of TWO displacement transducers with accessories.
- B043-02** Software for Splitting Tensile test.

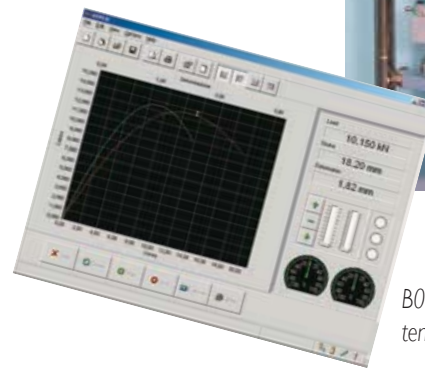
section S



File Marshall test



B043-01 Software Marshall test



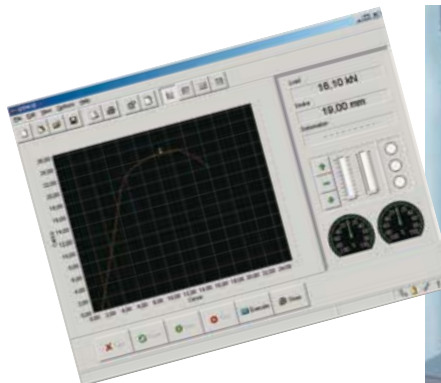
B043-02 Software splitting tensile test



Unconfined compression test

Standards: ASTM D2166 / BS 1377:7 / AASHTOT208
Test development with displacement control.

- S205** Unitronic 50 kN
- S337-31** Strain gauge load cell 2.5 kN capacity.
- S212-08N** Upper and lower compression platens dia. 100mm with accessories.
- S218-01** Software for Unconfined Compression test.



S218-01 Software unconfined test



Quick triaxial test

Standards: ASTM D2850 / BS 1377
Test development with displacement control.

- S205** Unitronic 50 kN
- S337-31** Strain gauge load cell 2.5 kN capacity.
- S205-11** Loading piston with ball.
- S305** Triaxial cell with accessories (see pag. 450)



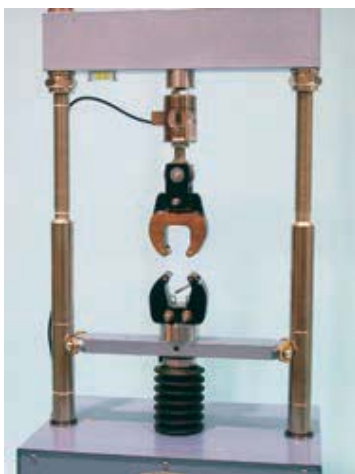
Tensile test on mortar briquettes "8" shaped

Standards: ASTM C190, C307 / AASHTO T132

Test development with load control

Needed accessories:

- S205-05** Unitronic Compression 50 kN / Tensile 25 kN
- S337-32** Tensile/Compression strain load cell 10kN capacity
- S205-07** Tensile jaws "8" shaped for mortar briquette
- S205-08** Software for tensile test
- E111** Briquette mould (see pag. 332)

**Tensile tests on metals, plastics, wires, textiles etc.**

Test development with load control

- S205-05** Unitronic Compression 50 kN / Tensile 25 kN
- S337-36** Tensile strain load cell 25kN capacity
- H005-11** Tensile heads (upper and lower)
- S205-09** Coupling for tensile heads installation
- H005-21** Flat seizing grips for flat specimens 1 - 10 mm thickness by 25 mm max. width and round specimens dia. 3 - 5mm
- H005-31** "V" shape seizing grips for round specimens dia. 5 - 12mm

Optional accessories:

H014-06 to H014-10

Extensometer, electronic, for tensile deformation strength tests. (See page 365)

- H009** Software for visualisation in real time of load/deformation, graphic, test certificate etc.

At pag. 364 of the catalogue there are listed devices to test plastics, wires, ropes, flexural and bending tests and various models of extensometers.

On request it is also possible to equip the Unitronic frame S205-05 with devices for tensile tests of different materials, within the 25kN max. capacity load.

**Uniaxial splitting tensile test of rock core specimens**

Standard: ASTM D3967

Test development with load control.

- S205** Unitronic 50 kN
- S337-34** Strain gauge load cell 50 kN capacity.
- S212-05** Loading piston.
- E171** Compression device.



section S



419

Direct shear (Leutner) between bituminous strata

Standard: ALP A StB.T.4

Direct shear test (LEUTNER) on the connection between bituminous strata, carried out on asphalt cylinder specimens dia. 150mm or 100mm obtained from road cores or on laboratory made specimens.

Test development with displacement control.

- S205** Unitronic 50 kN
- S337-34** Strain gauge load cell, 50 kN capacity.
- S212-05** Loading piston.
- B047-10** LEUTNER testing head for specimens 150mm dia.
- B047-11** Spacers for 100 mm dia. specimens with Leutner head.
- B043-03** Software for Marshall and Leutner tests.



NOTE:

Needed accessories listed above, are common for different tests. We recommend to check them when ordering, to avoid duplications.

MATTEST

S206N**UNITRONIC 200kN “Matest made”**

UNIVERSAL ELECTROMECHANICAL FRAME, 200kN CAPACITY,
“TOUCH-SCREEN” FOR:

- COMPRESSION
- FLEXURE
- TENSILE

TESTS OF CONSTRUCTION MATERIALS WITH SERVO-CONTROLLED
SYSTEM OF LOAD OR DISPLACEMENT/STRAIN.

section S

Unitronic 200kN is the universal and versatile machine fully satisfying the needs of control, research and university laboratories to carry out tests on:

Roads (Marshall, Duriez, CBR etc.), Steel, Concrete, Cement, Wood, Plastic, etc.

The machine is composed by a sturdy base containing the transmission components and the hardware control instruments.

The base holds two columns, made of high resistance steel with ground hard chrome surfacing.

The upper crosshead can be adjusted in height, to hold the accessories to perform the specific tests.

The lower mobile crosshead is operated by a recirculating ball screw and rotating lead, that through a servo-controlled motor, assures the correct application of load and constant speed.

The load is applied by a mechanical jack activated by a **“brushless closed-loop motor with optical encoder”** controlled by a micro-processor.

The two crossheads foresee couplings to fix the different test devices (see accessories).

The stress is measured by an electric load cell; the measurement and the displacement control of the crosshead is achieved by the electronic device incorporated into the machine.

Stroke electric end excursion switches of the upper mobile crosshead are foreseen to save the machine from accidental handlings.

Firmware:

- Electronic control unit “Cyber-plus Evolution” with Touch-Screen colour display, that runs like a standard PC based on Windows operating system for the management and analysis of the data, test results, graphs.
- The Touch-Screen icon interface allows an easy set up of the parameters and immediate execution of the test.
- The machine can be connected to a PC for remote test execution through suitable Software; the machine can in any case perform the tests without any external PC, because of the “Cyber-Plus” grants performances like a PC.
- Direct connection to Intranet (connection to a LAN network) and Internet to establish a remote communication and receive an immediate diagnostic analysis from Matest technicians, or for updates of the software.
- Unlimited memory storage with: 2 USB ports, 1 SD card slot, RS232/485 serial port.
- Possibility to select different languages.
- Hardware technical details: see pag. 24



S206N

Specifications of the Frame:

- Max. load: 200 kN (both Compression and Tensile)
- Max. vertical daylight: 900 mm (without accessories)
- Max. vertical daylight with compression platens: 800 mm
- Compression platens diameter: 216 mm (upper platen on seat ball)
- Distance between columns: 650 mm
- Crosshead travel: +/- 200 mm (400 mm total)
- Testing speed range: from 0,01 to 100 mm/min
- Load rate: from 1 N/s to 5 kN/s
- Displacement resolution: 0,01 mm with accuracy better than 0,2%
- Machine Class: I

The Unitronic 200kN is **supplied complete with:**

Electric load cell 200kN capacity, crosshead displacement device, upper with seat ball and lower compression platens.

“Are not included”: accessories and software for specific tests that must be ordered separately (see accessories).

Note: The machine can be equipped with intermediate load cells to the max. capacity of the machine, to satisfy specific test requirements.

Power supply: 230V 1ph 50/60Hz 850W

Dimensions: 950 x 560 x 2400 mm. Weight: 820 kg



420

S206N

UNITRONIC 200 kN, specific applications:

Duriez test on 80 and 120 mm dia. samples

STANDARD: NF P98-251-I/4

S206N Unitronic 200 kN

B096-01 Duriez set dia. 80 mm (see page 146)

B095-01 Duriez set dia. 120 mm (see page 146)

S206-21N Software for Duriez test



S206-21N
Software for Duriez test

B095-01



Splitting tensile test

STANDARDS: EN 12697-23 / ASTM D4123 / CNR N° 134

S206N Unitronic 200 kN

S337-34 Strain gauge load cell 50 kN capacity

S206-31 Flange/connector of the load cell S337-34

S212-05 Loading piston

B047-02 Splitting tensile device for samples dia. 4" and 6" (page 114)

B047-04

Set of TWO displacement transducers with accessories (page 114)

B043-02N

Software for Splitting Tensile test (page 14)



B047-02 + B047-04

Direct shear (Leutner) between bituminous strata

STANDARD: ALP A StB t.4

Direct shear test (LEUTNER) on the connection between bituminous strata, carried out on asphalt cylinder specimens dia. 150mm or 100mm obtained from road cores or on laboratory made specimens.

S206N Unitronic 200 kN

S337-34 Strain gauge load cell 50 kN capacity

S206-31 Flange/connector of the load cell S337-34

S212-05 Loading piston

B047-10 LEUTNER testing head for specimens 150mm dia.

B047-11 Spacers for 100mm dia. specimens with Leutner head

B043-03N Software for Leutner and Marshall tests.



S337-34

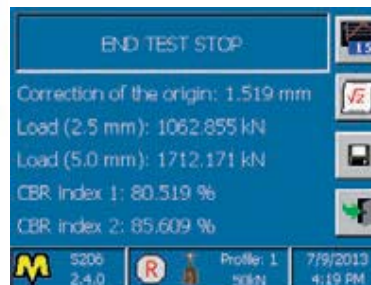
S212-05

B047-10 + B047-11



CBR Mould

CBR test results



Marshall stability test

STANDARDS: EN 12697-34 / ASTM D1559 / AASHTO T245
BS 598:107 / NF P98-251-2 / CNR N° 30

S206N Unitronic 200 kN

S337-34 Strain gauge load cell 50 kN capacity

S206-31 Flange/connector of the load cell S337-34

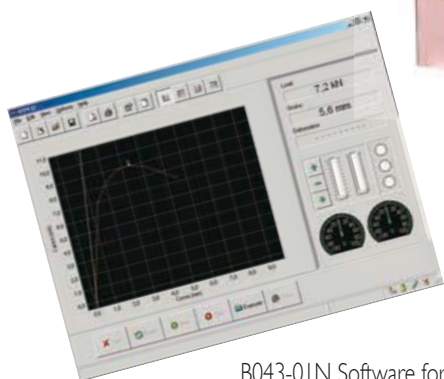
S212-05 Loading piston

B046N Stability mould

B043-01N Software for Marshall test



B046N



B043-01N Software for Marshall test

CBR: California Bearing Ratio test

STANDARDS: EN 13286-47 / ASTM D1883 / AASHTO T 193
NF P94-078 / BS 1377:4 / CNR UNI 10009
UNE 103-502

S206N Unitronic 200 kN

S337-34 Strain gauge load cell 50 kN capacity

S206-31 Flange/connector of the load cell S337-34

S212-01 Loading piston

S218N Software for CBR test (page 14)

... follows ...



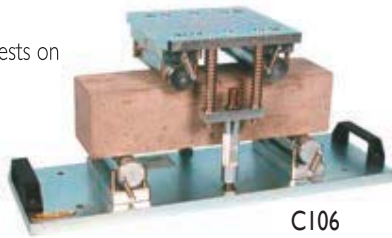


Flexural test on concrete beams

STANDARDS: EN 12390-5 / ASTM C78, C293 / AASHTO T97
NF P18-407 / BS 1881:118 / UNE 83305

- S206N** Unitronic 200 kN
- C106** Flexure device (page 242)
- C109-11N**

Software for flexural tests on concrete beams. (page 14)



C106

ALTERNATIVE SOLUTION:

Flexural test with centre point on concrete beams and clay tiles

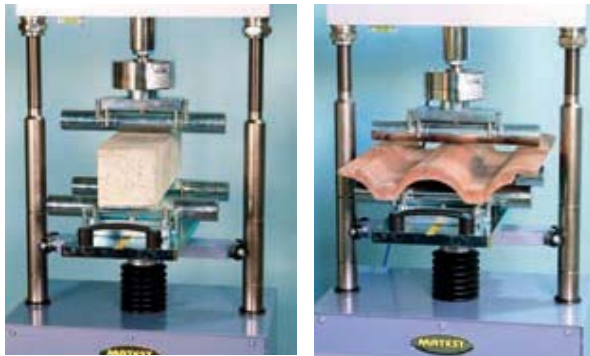
STANDARDS: EN 12390-5, 491, 538 / ASTM C78, C293
NF P18-407 / BS 1881:118 / UNE 83305

- S206N** Unitronic 200 kN
- S205-18** Flexure device with centre point loading to test clay tiles and concrete beams dimensions 100x100x400(500) mm
Consisting of lower beam with two bearers (one articulated) adjustable from 100 to 315mm, and upper central articulated bearer fixed to the load cell.
Weight: 20kg approx.

C109-11N Software for flexural tests on concrete beams (page 14)

Suggested accessories:

- S337-34** Strain gauge load cell 50 kN capacity (to replace the 200kN load cell)
- S206-31** Flange/connector of the load cell S337-34



S205-18

Splitting tensile test on concrete cylinders

STANDARDS: EN 12390-6 / ASTM C496 / NF P18-408 / BS 1881:117

- S206N** Unitronic 200 kN
- C101-01** Splitting tensile test device (technical details and other devices: page 241)
- C100-01** Packing strips for the device C101-01
- C109-12N**

Software for splitting tensile test. (page 14)



C101-01

C100-01

Splitting tensile test on concrete cubes and block pavers

STANDARDS: EN 1338 / EN 12390-6

- S206N** Unitronic 200 kN
- C103** Splitting tensile test device (page 241)
- C100-02** Packing strips for the device C103
- C109-12N** Software for Splitting tensile test (page 14)



C103

C100-02



S205-11

Clay blocks for flooring punching test

STANDARD: UNI 9730-3

- S206N** Unitronic 200 kN
- C093-11** Punching device for clay block for flooring tests
- S205-15** Holding beam for the device
- S337-32** Strain gauge load cell 10 kN capacity

S206-32 Flange/Connector for the load cell S337-32

C109-16N Software for the punching test

Four point bending test method on glass-fibre reinforced cement

STANDARD: EN 1170-4

Test development with load control.

- S206N** Unitronic 200 kN
- S337-34** Strain gauge load cell 50kN capacity
- S205-16** Four-point bending device to test glass-fibre reinforced cement.
Rollers dimensions: dia. 40 by 310 mm long
Lower rollers adjustable from 110 to 310 mm
Upper rollers adjustable from 45 to 120 mm
Weight: 20 kg approx.

C109-11N Software for flexure tests on concrete beams (page 14)

S206-31 Flange/Connector of the load cell S337-34



S205-16

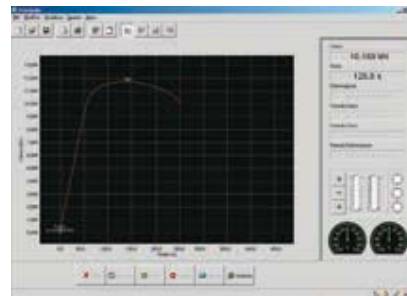
Compression test on mortar specimens

STANDARDS: EN 196-1 / ASTM C109, C349 / NF P15-451 / EN ISO 679 / DIN 1164 / BS 4550

- S206N** Unitronic 200 kN
- E170** Compression device on portions of 40x40x160mm specimens (devices for different specimens described at page 352)
- E163N** Software for the compression test (page 14)



E170



CI 64N Graph of the flexural test execution

Flexural test on mortar prisms 40x40x160 mm

STANDARDS: EN 196-1 / ASTM C348 / NF P15-451 / DIN 1164 / EN ISO 679

- S206N** Unitronic 200 kN
- E172-01** Flexure device for 40x40x160mm specimens (available also ASTM, see page 352)
- S337-32** Strain gauge load cell 10 kN capacity
- S206-32** Flange/connector of the load cell S337-32
- S164N** Software for the flexural test (page 14)



E172-01

Tensile test on mortar briquettes "8" shaped

STANDARDS: ASTM C190, C307 / AASHTO T132

- S206N** Unitronic 200 kN
- S205-07** Tensile jaws "8" shaped for mortar briquette
- E111** Briquette mould (page 332)
- S337-32** Strain gauge load cell Tensile/Compression 10kN capacity
- S206-32** Flange/connector of the load cell S337-32
- S205-08N** Software for tensile tests

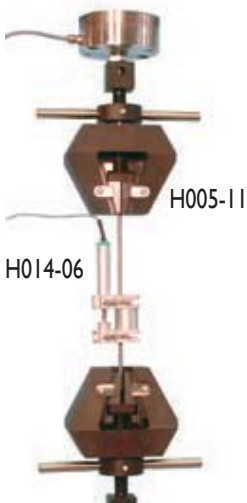


S205-08N Test calculations



S337-32

S205-07

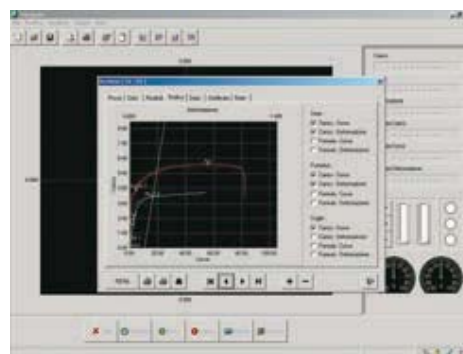


H005-11

H014-06

Tensile tests on metals, plastics, wires, etc.

- S206N** Unitronic 200 kN
- H005-11** Tensile heads, upper and lower (page 334). Daylight between heads: min. 50mm / max. 420mm
- S206-33** Flange/connector of the tensile heads H005-11
- H005-21** Flat seizing grip for flat specimens 1 - 25 mm thickness by 25 mm max. width, and round specimens dia 3 - 5mm
- H005-31** "V" shape seizing grips for round specimens dia. 5 - 12mm



H009N Practical example of a saving test graph where the user can select which traces have to be shown, modify the scales or personalize the colors and give a new name to the axis upgrading.

Optional accessories:

- H014** Extensometer, electronic, for tensile deformation strength tests (page 365)
- H014-06** Extensometer for tensile deformation strength tests until breakage for round specimens dia. 4 - 11 mm
- H014-10** Extensometer for tensile deformation strength tests until breakage for flat specimens
- H009N** Software for load/deformation, graphs, test certificate

Technical specifications: see page 366 where there are also listed devices to test plastics, wires, ropes, flexural and bending tests and various models of extensometers.

On customer's demand it is possible to equip Unitronic 200 kN with tensile heads and grips to test round specimens up to 18 mm dia. and flat specimens up to 22 mm thickness (page 364)

NOTE:

Listed accessories for specific tests listed above, are common for different tests. We recommend to check them when ordering, to avoid duplications.



PLATE BEARING TEST

STANDARDS: ASTM D1194, D1195, D1196 / BS 1377:9 / CNR N° 92 and 146 / UNE 7391

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.

The hand pumps 100 kN and 200 kN capacity are "Enerpac Made" and all models have double speed, ensuring fast approach.

NEW**S222 KIT****Plate bearing test equipment 100 kN capacity - 1 dial gauge model**

STANDARD: CNR N° 146, method "A"

Consisting of:

S222-01 Hydraulic jack 100 kN capacity, complete with hand pump, rubber pipe with fast connector; set of extension rods of different lengths, carrying case.

S222-02 Pressure gauge 0-100 kN, div. 0,5 kN.

S226-05 Load plate 300 mm dia.

S226-12 Device for centre dial gauge measure, with spherical seat.

S222-03 Datum bar assembly, 2,5 m long, telescopic, aluminium made, adjustable in height, complete with base supports, plumb and spirit level. Packed separately.

S377 Dial gauge 25 x 0,01 mm

S226-16 Articulated dial gauge support with adjustment device.

Weight: 60 kg approx.



424



S222 KIT

S223 KIT**Plate bearing test equipment 100 kN capacity - 3 dial gauges model**

STANDARDS: CNR N° 146, method "B" / BS 1377:9

Consisting of:

S222-01 Hydraulic jack 100 kN capacity, complete with hand pump, rubber pipe with fast connector; set of extension rods of different lengths, carrying case.

S222-02 Pressure gauge 0-100 kN, div. 0,5 kN.

S226-13 Upper spherical seat.

S226-05 Load plate 300 mm dia.

S226-06 Intermediate plate 160 mm dia.

S222-03 Datum bar assembly, 2,5 m long, telescopic, aluminium made, adjustable in height, complete with base supports, plumb and spirit level. Packed separately.

(Alternative solutions: S223-03 "Y" measuring system, Swiss method. See pag. 427).

S377 n° 3 dial gauges 25 x 0,01 mm

S226-16 n° 3 articulated dial gauge supports with adjustment device.

Weight: 60 kg approx.

ACCESSORY for S222 KIT and S223 KIT:

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/cmq.

S223-01 / S223-02



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

STANDARDS: CNR N° 146, method "B" / BS 1377:9, and using loading plates (accessory) dia. 450, 600, 760 mm, it meets also:
ASTM D1195, D1196 / CNR N. 92

Consisting of:

S225-01 Hydraulic jack 200 kN capacity, complete with hand pump, rubber pipe with fast connector, set of extension rods of different lengths, carrying case.

S225-02 Pressure gauge 0-200 kN, div. 1 kN.

S226-13 Upper spherical seat.

S226-05 Load plate 300 mm dia.

S226-06 Intermediate plate 160 mm dia.

S222-03 Datum bar assembly, 2,5 m long, telescopic, aluminium made, adjustable in height, complete with base supports, plumb and spirit level. Packed separately. (Alternative solutions: S223-03 "Y" measuring system, Swiss method. See pag. 427).

S377 n° 3 dial gauges 25 x 0,01 mm

S226-16 n° 3 articulated dial gauge supports with adjustment device.

Weight: 70 kg approx.

ACCESSORY for S225 KIT:

S223-02

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/cmq.



B103-10

B103-10**Bearing plate 600 mm Ø cast aluminium**

STANDARD: NF P94-117-1

Used to determine the static deformation of flexible road pavement and with the plate bearing equipment.

Technical details: see pag. 149



S225 KIT
(similar to S223 KIT and S226 KIT)

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

STANDARDS: CNR N° 146, method "B" / BS 1377:9, and using loading plates (accessory) dia. 450, 600, 760 mm, it meets also:
ASTM D1195, D1196 / CNR N. 92

Consisting of:

S227-02 Hydraulic jack 500 kN capacity, complete with hand pump, spherical seat, rubber pipe with fast connector, set of extension rods of different lengths, carrying case.

S227-03 Pressure gauge 0-500 kN, div. 2 kN.

S226-05 Load plate 300 mm dia.

S226-06 Intermediate plate 160 mm dia.

S222-03 Datum bar assembly, 2,5 m long, telescopic, aluminium made, adjustable in height, complete with base supports, plumb and spirit level. Packed separately. (Alternative solutions: S223-03 "Y" measuring system, Swiss method. See pag. 427).

S377 n° 3 dial gauges 25 x 0,01 mm

S226-16 n° 3 articulated dial gauge supports with adjustment device.

Weight: 110 kg approx.



S224 KIT**Digital plate bearing test equipment 100 kN capacity
3 linear displacement transducers and Cyber-Plus 8 Evolution acquisition system**

STANDARDS: CNR N° 146, method "B" / BS 1377:9

Consisting of:

S222-01 Hydraulic jack 100 kN capacity, complete with hand pump, rubber pipe with fast connector, set of extension rods of different lengths, carrying case.**S226-13** Upper spherical seat.**C116-09S** Pressure transducer, connected to the pump.**C405-15N** Cyber-Plus 8 Evolution "Touch Screen" for data acquisition, visualization, processing and storing, directly connected to PC or printer. Technical details: see pag. 428**S224-21N** Software for test data processing.**S226-05** Load plate 300 mm dia.**S226-06** Intermediate plate 160 mm dia.**S222-03** Datum bar assembly, 2,5 m long, telescopic, aluminium made, adjustable in height, complete with base supports, plumb and spirit level. Packed separately. (Alternative solutions: S223-03 "Y" measuring system, Swiss method. See pag. 427).**S336-14** n° 3 linear displacement transducers, 50 mm travel.**S336-31** n° 3 Extension cables for transducer, 5 m long.**S226-16** n° 3 articulated transducer supports with adjustment device.**S335-15** n° 3 universal coupling pliers for transducers.

Weight: 60 kg approx.

S224-01 KIT**Digital plate bearing test equipment 200 kN capacity
3 linear displacement transducers and Cyber-Plus 8 Evolution acquisition system**

STANDARDS: CNR N° 146, method "B" / BS 1377:9, and using loading plates (accessory) dia. 450, 600, 760 mm, it meets also:

ASTM D1195, D1196 / CNR N. 92

Consisting of:

S225-01 Hydraulic jack 200 kN capacity, complete with hand pump, rubber pipe with fast connector, set of extension rods of different lengths, carrying case.**S226-13** Upper spherical seat.**C116-09S** Pressure transducer, connected to the pump.**C405-15N** Cyber-Plus 8 Evolution "Touch Screen" for data acquisition, visualization, processing and storing, directly connected to PC or printer. Technical details: see pag. 428**S224-21N** Software for test data processing.**S226-05** Load plate 300 mm dia.**S226-06** Intermediate plate 160 mm dia.**S222-03** Datum bar assembly, 2,5 m long, telescopic, aluminium made, adjustable in height, complete with base supports, plumb and spirit level. Packed separately. (Alternative solutions: S223-03 "Y" measuring system, Swiss method. See pag. 427).**S336-14** n° 3 linear displacement transducers, 50 mm travel.**S336-31** n° 3 Extension cables for transducer, 5 m long.**S226-16** n° 3 articulated transducer supports with adjustment device.**S335-15** n° 3 universal coupling pliers for transducers.

Weight: 70 kg approx.

**S224-01 KIT**

(similar to S224 KIT and S224-02 KIT)



S224-02 KIT**Digital plate bearing test equipment 500 kN capacity****3 linear displacement transducers and Cyber-Plus 8 Evolution acquisition system**

STANDARDS: CNR N° 146, method "B" / BS 1377:9, and using loading plates (accessory) dia. 450, 600, 760 mm, it meets also:
ASTM D1195, D1196 / CNR N. 92

Consisting of:

S227-02 Hydraulic jack 500 kN capacity, complete with hand pump, spherical seat, rubber pipe with fast connector; set of extension rods of different lengths, carrying case.

C116-09S Pressure transducer, connected to the pump.

405-15N Cyber-Plus 8 Evolution "Touch Screen" for data acquisition, visualization, processing and storing, directly connected to PC or printer. Technical details: see pag. 428

S224-21N Software for test data processing

S226-05 Load plate 300 mm dia.

S226-06 Intermediate plate 160 mm dia.

S222-03 Datum bar assembly, 2,5 m long, telescopic, aluminium made, adjustable in height, complete with base supports, plumb and spirit level. Packed separately. (Alternative solution: S223-03 "Y" measuring system, Swiss method).

S336-14 n° 3 linear displacement transducers, 50 mm travel.

S336-31 n° 3 Extension cables for transducer, 5 m long.

S226-16 n° 3 articulated transducer supports with adjustment device.

S335-15 n° 3 universal coupling pliers for transducers.

Weight: 110 kg approx.

ACCESSORIES:

S226-01 Loading plate dia. 450 mm

S226-02 Loading plate dia. 600 mm

S226-03 Loading plate dia. 760 mm

S226-09 Set of telescopic extension rods, aluminium made, to be connected to the datum bar mod. S222-03 (2,5 m long) to obtain a max. adjustable length of 5,5 m as requested by ASTM, CNR Specifications

S223-03**"Y" measuring system - Swiss Method**

STANDARD: SNV 70312

Aluminium alloy made, lightweight and very easy to use, it may be used as alternative solution to the datum bar assembly mod. S222-03.

This system is applicable to the plate bearing equipment models:

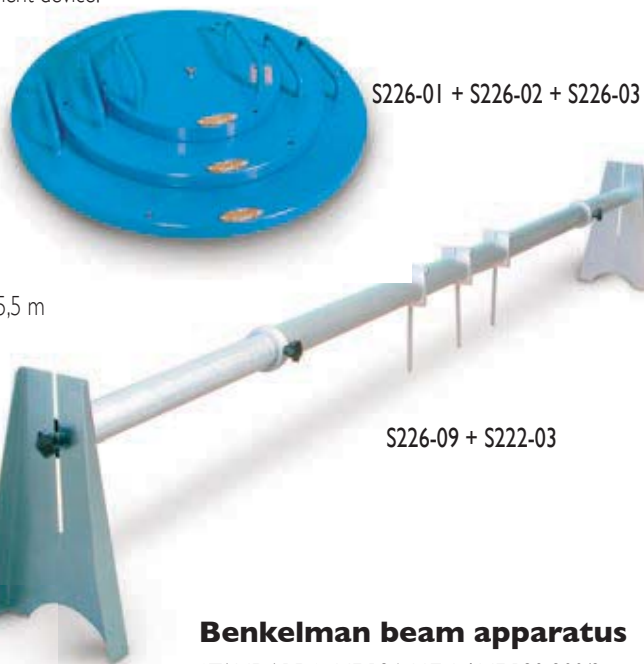
S223KIT, S225KIT, S226KIT, S224KIT, S224-01KIT,

S224-02KIT.

Weight: kg 7



S223-03 + S226-16



S226-01 + S226-02 + S226-03

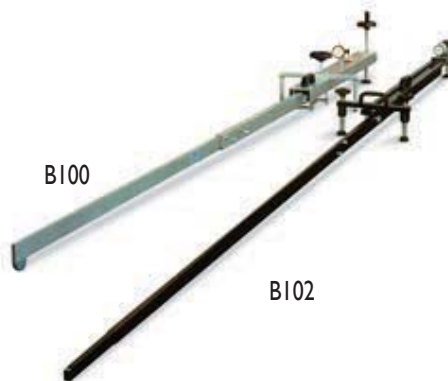
S226-09 + S222-03

Benkelman beam apparatus

STANDARDS: NF P94-117-1 / NF P98-200/2

AASHTO:T256

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 pag. 148



B100

B102

S226-50**Official ACCREDIA Calibration Certificate**

(equivalent UKAS, ENAC, DAKKS, SAS, COFRAC etc.) of the applied load for the Bearing Test Equipment from mod. S222KIT to mod. S226KIT (page 424 to 427) and for Field CBR/Unconfined test equipment mod. S131KIT, S210KIT, S220KIT (see page 406).

The calibration is carried out only at Matest factory.





**C405-15N
CYBER-PLUS 8 EVOLUTION
"TOUCH SCREEN"**

8 Channels acquisition and processing data system, 24 bit resolution. Electronic advanced technology, "colour touch screen" 11/4VGA, high graphic performances, the unit automatically performs test and data processing. A certificate can be printed through a printer (optional) directly connected to the unit through the USB port. The Cyber-Plus is equipped with slots for external pendrive or SD card infinite memory supports, it can be directly connected to a PC. Contained in a practical and sturdy watertight carrying case, can be powered from an electrical network 90-270 V or use the internal battery and charger granting one full day on-site use. Hardware technical details: see pag 24



C405-15N

S337-51

Calibration process between one displacement transducer and the data acquisition system C405-15N

AS AN ALTERNATIVE:



GAUGE BLOCKS, Grade 1

Used to calibrate the linear displacement transducers.

Available models:

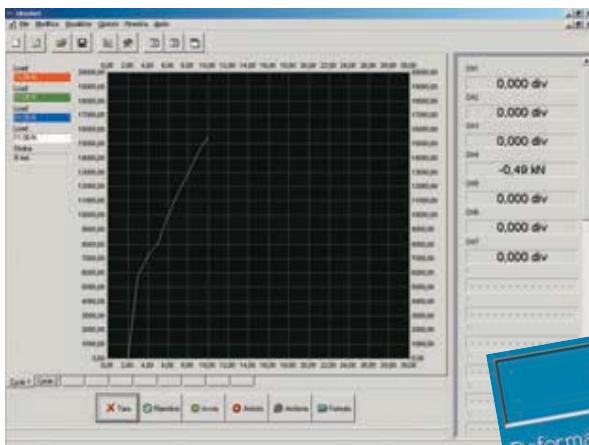
S336-43 Gauge block, nominal length 10 mm

S336-45 Gauge block, nominal length 25 mm

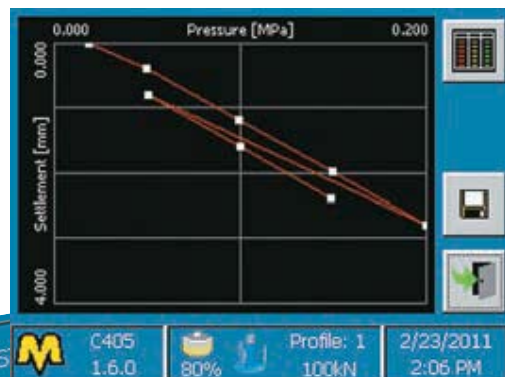
S336-47 Gauge block, nominal length 50 mm



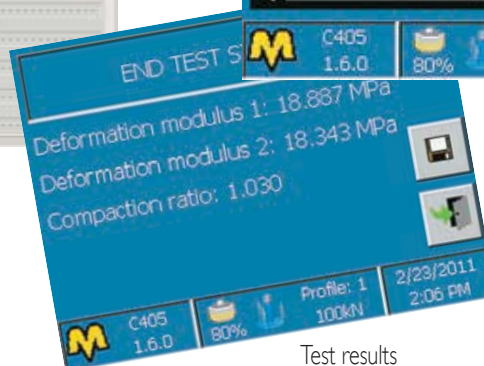
Test execution



Graph of end test



Test results:
graph



Test results



section S



429

MATTEST

BALLOON DENSITY METHOD

S230 KIT

Balloon density apparatus, 1600 ml capacity

STANDARDS: ASTM D2167 / AASHTO T205 / 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 ballon is measured from the graduation of the scale.

The instrument consists of a graduated plexiglass cylinder 1600 ml. capacity housed within an aluminium alloy casting, a rubber pump with stop valve, a density plate and 12 rubber balloons.

Dimensions: 340x340x700 mm
Weight: 8 kg

SPARE PART for S230 KIT:

S230-01

Rubber balloons, pack of 12



S230 KIT

S232 KIT

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 KIT, 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 for S232 KIT:

S232-01

Reinforced rubber membrane, pack of 6



S233 KIT

Balloon density apparatus, 6000 ml capacity

Identical to mod. S232 KIT, but with capacity of 6 litres.
Weight: 18 kg

SPARE PART for S233 KIT:

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
- V195** Rubber mallet 50 mm dia.
- V193** Steel hammer 300 g
- V194** Steel hammer 2 kg.
- V199** Density pick
- V198** Chisel 300 mm long x 25 mm wide
- V186** Density spoon, big sized
- V188** Trowel, 100x200 mm
- V183** Aluminium scoop 325 cc
- V125-03** Tinned can 5 litre cap.



S240-01...V199



SAND REPLACEMENT METHOD

S234 KIT

**Sand density cone apparatus
Ø 6,5" (165,1 mm)**

STANDARDS: ASTM D1556 / AASHTO T191 / CNR N° 22
UNE 7371, 83109 / NF P94-061-3

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:

- S234-05** Metal double cone assembly with valve Ø 6,5"
- S234-06** Metal base with fixed centre hole for cone housing
- V121** N° 2 Plastic jar, 5 litre
Galvanized against corrosion.
Dimensions: 305x305x600 mm
Weight: 6 kg

ACCESSORY for S234 KIT:

- S234-01**
Calibrating container



S234 KIT

ACCESSORIES:

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

- S235-01** STANDARD SAND 0,4 mm to 2 mm. CNR N° 22
Bag of 50 kg

Sand replacement apparatus

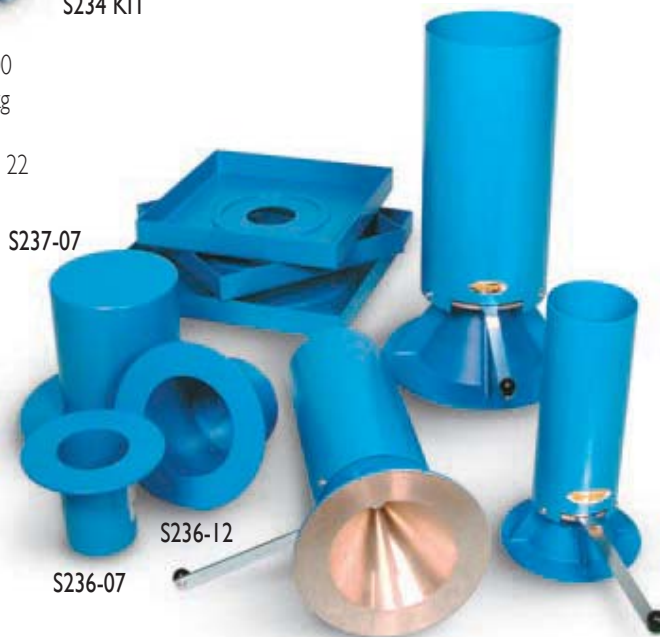
STANDARDS: BS 1377:9, 1924:2

Used to determine the in-situ density of fine grained compacted soil.

The apparatus consists of: sand pouring cylinder with shutter made of cast aluminium and accurately machined, upper cylinder, metal tray with fixed centre hole for cone housing.

The cylinder is available with 100, 150 and 200 mm diameter (200 mm Ø is recommended for coarse grained soil and gravel).

Weight: 10÷24 kg



S236-07

S236-12

S236 KIT + S237 KIT

S231 KIT

**Sand density cone apparatus
Ø 12" (304,8 mm)**

Similar to mod. S234 KIT but recommended for coarse grained soil and gravel (over 38 mm diameter).

The apparatus consists of:

- S231-05** Metal double cone assembly with valve, Ø 12"
- S231-06** Metal base with fixed centre hole for cone housing.
- S231-11** Plastic jar, 10 litre complete of cone fixing device..
Weight: 20 kg

ACCESSORY for S231 KIT:

- S231-01**
Calibrating container



S231-01

S231 KIT



Model:	Ø mm	Consisting of:	Pouring cylinder, shutter and upper cylinder	Metal tray with centre hole	Optional accessory: Calibrating container
S236 KIT	100		S236-05	S236-06	S236-07
S236-01 KIT	150		S236-10	S236-11	S236-12
S237 KIT	200		S237-05	S237-06	S237-07



432

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

Falling head permeameter

STANDARD: CEN ISO/TS 17892-11

Used to determine the permeability of fine-grained soils such as 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:

S246-01 Permeameter stand with three manometer tubes each dia. 3, 4 and 6 mm for the different degrees of permeability, soaking reservoir with cock, tubing and connectors.

Dimensions: 1700x220x50 mm. Weight: 10 kg

S252 COMPACTION PERMEAMETER 4" dia. complete (technical details: see next page)

ACCESSORIES:

S252-01 PLEIN BASE and COLLAR for compaction tests

S252-02 MOULD BODY with two lateral water inlet/outlet

ALTERNATIVE:

S253 COMPACTION PERMEAMETER 6" dia. complete

ACCESSORIES:

S253-01 PLEIN BASE and COLLAR for compaction tests

S253-02 MOULD BODY with two lateral water inlet/outlet

ACCESSORIES:

S355 De-airing tank 20 litre capacity made from acrylic plexiglass (see pag. 454)

S355-01 Water trap to collect the water condensation

V203 Portable vacuum pump, 230V 1ph 50 Hz

V230-03 Rubber tubing for vacuum, 3 m long

S325 Nylon tubing, 20 m.



S248**Permeameter stand 4 cell capacity for constant and falling head tests**

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

The stand consists of a metal frame with water tank adjustable in height between 1350 and 3450 mm for constant head tests. 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" and 6" to perform different types of tests at the same time.

Dimensions: 1050x900x2000/3850 mm

Weight: 75 kg



S248 with permeameters

S244**Pinhole test equipment**

DISPERSIBILITY DETERMINATION

STANDARDS: BS 1377:5 / ASTM D4647

Utilized to evaluate the erosion on soil samples having high degree of sodium content, the Pinhole apparatus reproduces the water flowing in a cavity obtained from a soil specimen.

The apparatus consists of a cylindrical container equipped at its ends of water inlet/outlet connectors, tube with graduated scale, base support with rod. Weight: 4 kg approx.

ACCESSORIES:

S245-04

CONSTANT LEVEL TANK. Details and picture: see previous page.

V230-02 TUBING, inside dia. 8 mm, 5 m long

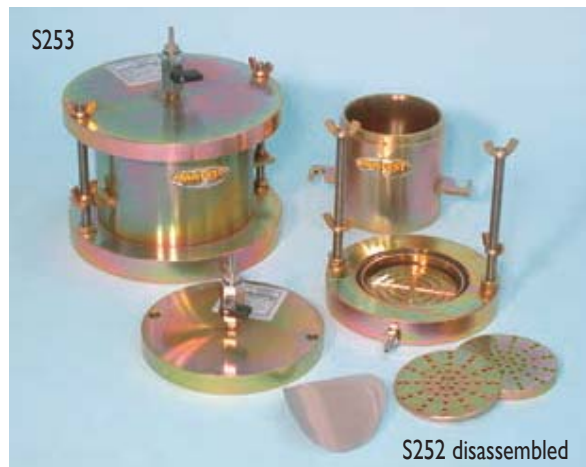


S244

COMPACTION PERMEAMETERS

STANDARD: CEN ISO/TS 17892-11

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. Still made, galvanized against corrosion.



S253

S252 disassembled

MODELS:

S252

COMPACTION PERMEAMETER 4" dia. complete. Weight: 8 kg

ACCESSORIES:

S252-01 PLEIN BASE and COLLAR for compaction test before the permeability test

S252-02 MOULD BODY with two lateral water inlet/outlet for test with piezometric measurement

S253

COMPACTION PERMEAMETER 6" dia. complete. Weight: 16 kg

ACCESSORIES:

S253-01 PLEIN BASE and COLLAR for compaction test before the permeability test

S253-02 MOULD BODY with two lateral water inlet/outlet for test with piezometric measurement



S253-02

S253-01

S252-02

S252-01

ACCESSORIES:

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

MODELS:

S185-01 Dia. 4"

S200-09 Dia. 6"

S200-09



CONSOLIDATION TEST

STANDARDS: ASTM D2435-80, D3877, D4546 / BS 1377:5
 AASHTO T216 / XP P94 090-1, P94-091
 UNE 103-601, 103-602 / CEN-ISO-TS 17892-5

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).

Two different oedometer models are proposed:

S260 Front loading oedometer with dial gauge or digital data acquisition system.

S262N Edotronic, pneumatic, fully automatic "touch-screen" consolidation apparatus (see next pages).

S260**Front loading oedometer (consolidation apparatus)**

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: 170 kg of slotted weights, corresponding to 1870 kg using the beam ratio 11:1

The oedometer accepts cells up to 100 cm²

Supplied complete with rod holding the weights and coupling block holding the dial gauge or transducer.

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

Weight: 25 kg approx.

ACCESSORIES:

DIAL GAUGE for vertical displacements.

S376

DIAL GAUGE 10 mm travel x 0,01 mm subdiv.
 or:

S375-01

DIAL GAUGE 12 mm travel x 0,002 mm subdiv.

Alternative solution:

S336-11 LINEAR VERTICAL DISPLACEMENT TRANSDUCER, 10 mm travel

S336-30 EXTENSION CABLE 2 metres long

S336-31 EXTENSION CABLE 5 metres long

S336-32 EXTENSION CABLE 10 metres long

S337-51

CALIBRATION process of the displacement transducer to the data acquisition unit of the oedometer.

S260 with cell and dial gauge



S265



S336-11

S260

with cell and S334 Cyber-Plus 8 Evolution

S334

S334**Cyber-Plus 8 Evolution**

8 channels acquisition and processing data system (expandable to 16 channels) colour "Touch Screen" display, it automatically performs test and data processing. Directly connected to PC via USB, it prints the test certificate. Equipped with slots for external Pendrive or SD Card infinite memory supports.

Technical details: see pag. 462, Hardware details at pag. 24

S260-05N**Software OedoLab Reports - Matest made**

Technical Data: see page 437



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 KIT
S268-05 <small>NEW</small>	63,5	31,67	20	S122-19 <small>NEW</small>	S123-05 <small>NEW</small>	S274-10 KIT <small>NEW</small>
S268-01	71,40	40	20	S122-01	S123-01	S274-01 KIT
S268-04	75,00	44,16	20	S122-17	S123-04	S274-09 KIT
S268-02	79,80	50	20	S122-02	S123-02	S274-02 KIT
S268-03*	112,80	100	25	S122-03	S123-03	S274-03 KIT

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



section S



435

Consolidation cells with permeability attachment

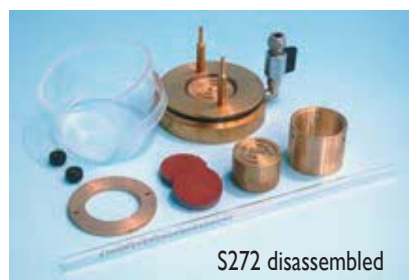
Made from "brass", similar in manufacture to the fixed ring cells, they are also provided of a pipe connector with cock and graduated glass burette 10 ml capacity allowing to perform permeability tests.

Model	Specimen dia. mm	Specimen area cm ²	Specimen thickness mm	Hollow punch	Specimen tamper	Spare couple of porous stones
S272	50,47	20	20	S122-04	S123	S274-04 KIT
S272-05 <small>NEW</small>	63,5	31,67	20	S122-20 <small>NEW</small>	S123-05 <small>NEW</small>	S274-11 KIT <small>NEW</small>
S272-01	71,40	40	20	S122-05	S123-01	S274-05 KIT
S272-04	75,00	44,16	20	S122-18	S123-04	S274-08 KIT
S272-02	79,80	50	20	S122-06	S123-02	S274-06 KIT
S272-03*	112,80	100	25	S122-07	S123-03	S274-07 KIT

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

S275 Permeability attachment

complete with stand, clamps and hose it is connected to the cells mod. S272 to S272-05. Recommended for soil samples having great value of permeability. Burette has 50 ml capacity and subdiv. 0,1 ml. Weight: 5 kg



MATEST

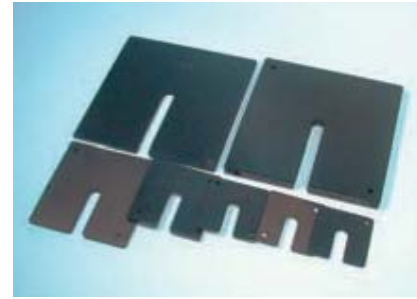
OEDOMETER: ACCESSORIES

Available slotted weights:

Slotted weights

Steel made, painted against corrosion (mod. E066-02 brass made).

Model	Weight	Model	Weight
E066-02	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		



KIT OF SLOTTED WEIGHTS

section S

S273 KIT:	S273-01 KIT:	S273-02 KIT:
S273-01 = 4 x 10 kg	S273-08 = 7 x 8 kg	S273-01 = 6 x 10 kg
S273-02 = 1 x 5 kg	S273-07 = 1 x 4 kg	S273-02 = 3 x 5 kg
S273-03 = 2 x 2 kg	S273-03 = 1 x 2 kg	S273-03 = 1 x 2 kg
S273-04 = 1 x 1 kg	S273-04 = 1 x 1 kg	S273-04 = 1 x 1 kg
	S273-05 = 1 x 500 g	S273-05 = 3 x 500 g
	S273-06 = 2 x 250 g	S273-06 = 2 x 250 g
TOTAL: 50 kg	TOTAL: 64 kg	TOTAL: 80 kg



436

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

Gauge blocks

GRADE 1

Used to calibrate the linear displacement transducers.

Available models:

S336-41

GAUGE BLOCK, nominal length 5 mm

S336-43

GAUGE BLOCK, nominal length 10 mm



S336-43

S336-41



S265



S260-05N Data import from the CyberPlus

SPARES:

S335-15

Universal coupling pliers for dial gauge/transducer. It accepts all Matest displacement transducers and dial gauges (dia. from 8 to 20 mm)

S260-13

Mounting device between the universal coupling pliers S335-15 and the consolidation apparatus to fix the transducer/dial gauge for the vertical displacement.



S336-11

MATEST

S260-05N**Software OedoLab Reports - Matest made**

STANDARDS: ASTM D2435-80 / XP P94-090-1 / CEN-ISO-TS 17892-5 / BS 1377:5

OedoLab Reports is the new informatic tool which allows geotechnical laboratories to process data and to view the results obtained from oedometric tests.

NEW

Used in conjunction with Cyber-Plus S334, the new features of this software allow the users to:

- Create a test file from data entered manually or imported
- Create a project to perform calculations according to the selected standard
- Integrate test files (from OedoLab Connect or manually entered) to a project
- Elaborate, customize and print their test reports which can be read without the need of a specific software.

The program can be used in a very simple and intuitive way. A dedicated window allows the user to import data from a specific location (for instance, from the Cyberplus through USB or SD card).

OedoLab Reports provides the user with a simple and flexible graphical interface giving the possibility to view, edit and print all the parameters involved in the oedometric tests.

- The input information for each stress level is the following:
 - Settlements in mm.
 - Time in min.
- The Software allows also to enter information related to the soil sample, among which:
 - Extraction method.
 - Blue value.
 - Atterberg's limits.
 - Soil classification according to AASHTO/USCS/GTR.
 - Particle size analysis.
- Laboratory coefficients of:
 - Consolidation – root method.
 - Void ratio.
 - Water content.
 - Densities.
 - Compressibility.
- CHARTS:
 - Settlements (mm) / Time (min).
 - Void ratio (%) / Applied pressure (kPa).
 - Passing (%) / Opening (mm).

PC specification:

- Operating system: Windows XP or more recent



S260-05N Data feeding/acquisition



S260-05N Test data visualization



S260-05N Results preview

section 5



437

MATEST

... follows ...

Buyer's guide for one standard Consolidation system and one automatic Consolidation data acquisition/processing system.

section S



438



Description	Model
Configuration for one standard Oedometer apparatus	
Front loading oedometer	S260
Oedometer bench (for one or three oedometers)	S265 / S265-01
Dial gauge	S376 / S375-01
Consolidation cell, fixed ring	S268 / S268-05
Spare cutting ring (to combine to the consolidation cell)	S122 / S122-19
Specimen tamper (to combine to the consolidation cell)	S123 / S123-05
Spare porous stones (to combine to the consolidation cell)	S274 / S274-10
Set of slotted weights	S273 / S273-10
Permeability measurement:	
Permeability consolidation cell	S272 / S272-05
Permeability attachment (50 ml burette)	S275
Hollow punch (to combine to the consolidation cell)	S122-04 / S122-20
Spare porous stones (to combine to the consolidation cell)	S274-04 / S274-11

Description	Model
Configuration for one Oedometer apparatus with electronic measurement and data acquisition/processing:	
Oedometer with accessories as listed in the standard configuration (without the dial gauge S376), and also:	
Cyber-Plus 8 Evolution, 8 channels (expandable to 16 channels) automatic data acquisition/processing	S334
Displacement transducer (in quantities as the oedometers)	S336-11
Extension cable (in quantities as the transducers)	S336-30 / S336-32
Software OedoLab Reports - Matest made	S260-05N
Gauge blocks to calibrate the transducers	S336-41 / S336-43
or:	
Transducer / Oedometer calibration process	S337-51



section S



439

MATEST

... follows ...

S262N**EDOTRONIC “TOUCH SCREEN HIGH PERFORMANCE”
AUTOMATIC CONSOLIDATION APPARATUS (OEDOMETER).**

STANDARD: ASTM D2435-80 / CEN - ISO - TS 17892-5 / BS 1377:5 / XP P094-090-1

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.

Specifications of the frame:

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

0 – 1499 (N) Newton

1500 – 15000 (N) Newton

Input of compressed air (filtered): Max. 10 Bar

Resolution: 1 Newton

Precision: 1%

Maximum load: 15 kN (with 8 Bar input)

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

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

The load value is measured by a pressure transducer which is built in the regulation valve.

An additional high precision load cell will detect the effective load value and perform precise control through a closed loop system, granting repeatability and accuracy.

Firmware:

- Electronic control unit Cyber-plus Evolution with “Touch-Screen” color graphic display ¼ VGA, that runs like a standard PC based on Windows operating system, for the management of the data.
- The Touch-Screen icon interface allows an easy set-up of all the parameters and prompt execution of the test. Read value results are immediate and of extreme accuracy.
- The machine can perform the tests without any external PC, because of the “Cyber-Plus” grants performances like a PC.
- Direct connection to Intranet (connection to a LAN network) and Internet to establish a remote communication and receive an immediate diagnosis from Matest technicians, or for upgrades of the Firmware.
- Unlimited memory storage with: 2 USB ports, 1 SD card.
- Simple, rapid linearisation and calibration procedure.
- The appliance comes completely equipped with the relevant software.
- Possibility to select different languages.
- Hardware technical details: see page 24

The following “are not included”: software oedolab connect, consolidation cell, transducer, compressor, filter, that have to be ordered separately (see accessories).

Power supply: 230V 1ph 50/60Hz

Dimensions: 290 x 450 x h 610 mm. Weight : 30 kg

ACCESSORIES:

S262-12N SOFTWARE OEDOLAB CONNECT – MATEST MADE
Technical Data: see next page

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.

section S



440

MATEST

material testing equipment



S262N with accessories

S336-11

LINEAR DISPLACEMENT-DEFORMATION TRANSDUCER, accurate and versatile.

Transducer 10 mm travel.

Independent linearity < 0,3%

S337-51 Calibration process of the linear displacement transducer combined with the Edotronic.

S268 / S272-05

CONSOLIDATION CELLS, different models: see pag. 435

GAUGE BLOCKS, Grade 1

Used to calibrate the linear displacement transducers.

Available models:

S336-41 Gauge block, nominal length 5 mm

S336-43 Gauge block, nominal length 10 mm

S262-12N**Software OedoLab Connect – Matest made**

STANDARD: ASTM D2435-80 / CEN - ISO - TS 17892-5 / XP P094-090-1 / BS 1377:5

To be used with the Edotronic mod. S262

OedoLab Connect is an extension of the OedoLab Reports S262-05N software, specifically designed to guide the user through the entire consolidation test.

This software allows automatic data acquisition and to save the results in a specific file.

Thus, the file obtained can be then added to a project created with OedoLab Reports, providing the users not only with the same features given by the S262-05N but also with new ones.

OedoLab Connect can be connected to one or more pneumatic oedometers, allowing automatic data acquisition and control during the test. Each oedometer is controlled by the PC via network connection.

OedoLab Connect provides the user with a simple and flexible graphical interface. A dedicated window allows to select the oedometer the user wants to work with.

Once a consolidation step is completed, the software automatically shifts to the next level; hence re-performing all the control and acquisition operations needed to complete the test. Furthermore, by setting test parameters which are included in the Software and dedicated to the loading sequences control (minimum speed of settlement and swelling threshold), the user is also able to program the test and save a lot of time then.

PC specification:

- Operating system: Windows XP or more recent.

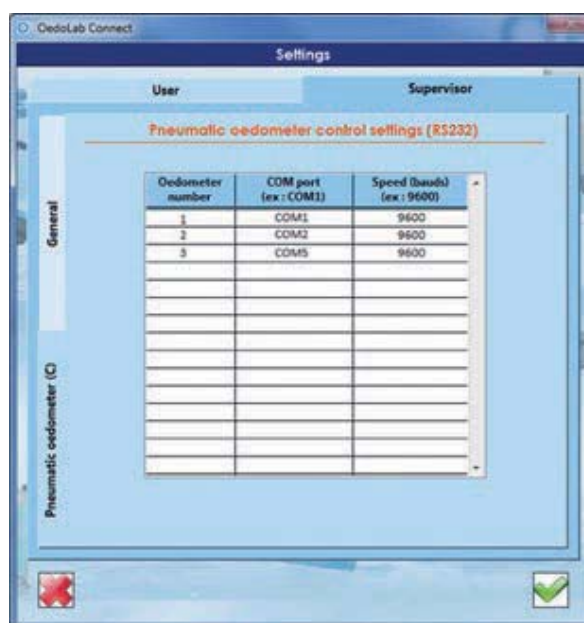
Supplied complete with connection cable.

NEWsection **S**

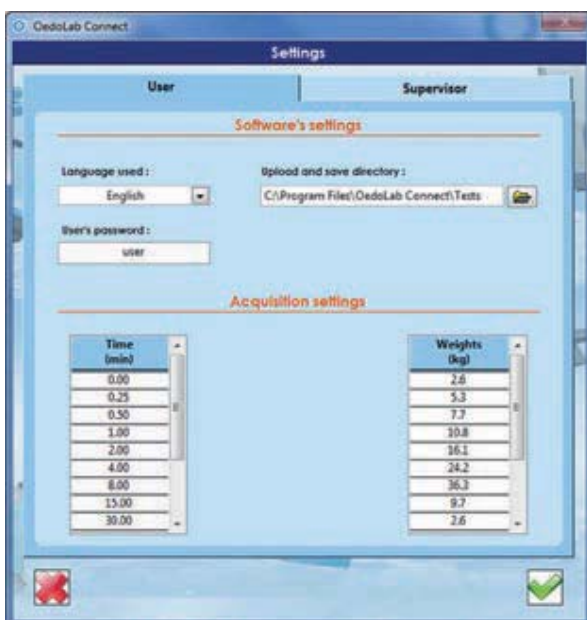
441



S262-12N Test view



S262-12N Control settings



S262-12N Acquisition settings



S262-12N Information about the test

MATEST

Direct / Residual Shear Test Apparatus, digital “Touch-Screen”

STANDARDS: ASTM D3080-72 / BS 1377:7 / NF P94-071-1, NF P094-071-2 / AASHTO T235 / CEN-ISO-TS 17892-10

NEW

Used to determine the resistance to shearing of all types of soil specimens, both consolidated and drained, undisturbed or remoulded.

The machine can accommodate specimens dia. 50, 60, 100mm, 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 “touch-screen” microprocessor; 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.

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

section S**442****Specifications of the frame:**

- Maximum shear load: 5000 N possible on the whole speed range.
- Shear speed: 0,00001 to 15,0000 mm/min.
- Display of both speed and displacement with 0,00001 mm resolution.
- Possibility of direct vertical load, or with a lever arm ratio 10:1
- Max vertical direct load: 500N; lever arm: 5500N
- Box group mounted on ball track with high quality antifriction system.
- Extremely easy and practical use, not requiring qualified staff.

Firmware:

- Electronic control unit Cyber-plus Evolution with “Touch-Screen” color graphic display ¼ VGA, that runs like a standard PC based on Windows operating system, for the management of the data. (Analysis of the data, test results, graphs with S277-40N Software; optional accessory).
- The Touch-Screen icon interface allows an easy set-up of all the parameters and prompt execution of the test. Read value results are immediate and of extreme accuracy.
- The machine can perform the tests without any external PC, because of the “Cyber-Plus” grants performances like a PC.
- Direct connection to Intranet (connection to a LAN network) and Internet to establish a remote communication and receive an immediate diagnosis from Matest technicians, or for upgrades of the Firmware.
- Unlimited memory storage with: 2 USB ports, 1 SD card.
- Possibility to select different languages.
- Hardware technical details: see page 24
- The machine is equipped with 8 connectors for the acquisition and data processing system (3 analogical/digital channels are activated with the S277-31 optional firmware for load cell and transducers; and 5 channels can be activated with the S277-32 optional firmware).

**S277N KIT + S284**

Detail of the 8 connectors

Power supply: 230V 1ph 50/60Hz 200W

Dimensions: 1040 x 420 x 1350 mm

Weight: 120 kg

MATEST

The direct/residual shear testing machine is available in “THREE” versions:

S277N KIT DIGITAL BASIC VERSION

SHEARLAB

Digital Shear Testing Machine, comprising:

S277-10N Shear Frame, with digital “Touch-Screen” microprocessor; complete with beam loading device, shear box case with adaptors, dial gauge supports.

S370-03S Load Ring, 3000N capacity with electric safety stop device (load rings of different capacities up to 5000N available on request).

S377 Dial indicator 25mm x 0,01 mm for horizontal displacement.

S376 Dial indicator 10mm x 0,01 mm for vertical displacement.

S273 KIT Set of 50 kg of slotted weights.

NOTE: Shear box, hollow punch, tamper “are not included” and have to be ordered separately (see accessories)

S277-01N DATA ACQUISITION VERSION

AUTO SHEARLAB

Digital Shear Testing Machine, with incorporated Data Acquisition System and Basic Firmware, comprising:

S277-10N Shear Frame with digital “Touch-Screen” microprocessor; complete with beam loading device, shear box case with adaptors, transducers supports.

S277-20 Load Cell, electric, 3000N capacity, complete with cable.

S336-11 Linear vertical transducer; 10 mm travel.

S336-12 Linear horizontal transducer; 25 mm travel.

S277-31 Firmware activating 3 connectors for basic data acquisition.

S273 KIT Set of 50 kg of slotted weights.

NOTE: Shear box, hollow punch, tamper and Software (see next pages) “are not included” and have to be ordered separately.

ACCESSORIES:

S277-40N

SOFTWARE SHEAR-LAB REPORTS – MATEST MADE
Technical data: see page 445

S277-32

FIRMWARE activating 5 connectors foreseen on the shear frame S277-10N. They can be used as data acquisition and processing system for geotechnical tests.

Technical data: see S334 page 462

NOTE: these 5 channels can be used alternatively (not simultaneously) to the 3 channels of the shear frame.

GAUGE BLOCKS, Grade 1

Used to calibrate the linear displacement transducers (see page 446)

SPARES:

S335-15 Universal coupling pliers for dial gauge/transducer.

It accepts all Matest displacement transducers and dial gauges (dia. from 8 to 20 mm)

S280-15 Mounting device between the universal coupling pliers S335-15 and the shear machine to fix the vertical displacement transducer or dial gauge.

S280-16 Mounting device between the universal coupling pliers S335-15 and the shear machine to fix the horizontal displacement transducer or dial gauge.



S277-01N + S284



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.

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

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:

Slotted weights. Steel made, painted against corrosion 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

ACCESSORIES for S290:

S291

WATER CONTAINER, made from plexiglass and aluminium, it accommodates the shear box up to max size Ø 60 mm or 60 mm during the consolidation test, by keeping the specimen deep into the water.

S291-01 **NEW** **WATER CONTAINER**, it accommodates all the shear boxes up to Ø 100 mm or 100 mm size.

S273 KIT Set of 50 kg. of slotted weights

S376 Dial gauge 10x0,01 mm

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



S290 with accessories

dial gauges to be ordered separately. Dimensions: 2300x450x900 mm Weight: 150 kg approx.



S277-40N**Software ShearLab Reports - Matest made**

STANDARDS: ASTM D3080-72 / NF P94-071-1 / NF P94-071-2 / BS 1377:7

To be used with the shear testing machine, data acquisition processing version, mod. S277-01N

ShearLab Reports is the new informatic tool which allows geotechnical laboratories to process data and to view the results obtained from direct and residual shear tests.

The new features of this software allow the users to:

- Create a test file from data entered manually or imported
- Create a project to perform calculations according to the selected standard
- Integrate test files to a project
- Elaborate, customize and print their test reports which can be read without the need of a specific software

The program can be used in a very simple and intuitive way. A dedicated window allows the user to import data in the test file.

ShearLab Reports provides the user with a simple and flexible graphical interface giving the possibility to view, edit and print all the parameters involved in shear tests.

- The input information is the following:
 - Settlement in mm.
 - Time in min.
 - Horizontal displacement in mm.
 - Force in kN.
- In the project management window, the Software automatically calculates the shear parameters:
 - Peak strength in kPa.
 - Residual strength in kPa.
 - Peak displacement in mm.
 - Residual displacement in mm.
- Laboratory coefficients of:
 - Water content.
 - Densities.
 - Void ratio.

ShearLab Reports automatically draws the curves of shear and compaction, hence performing all the calculations required by the standard. Comments on the current project can also be added if necessary.

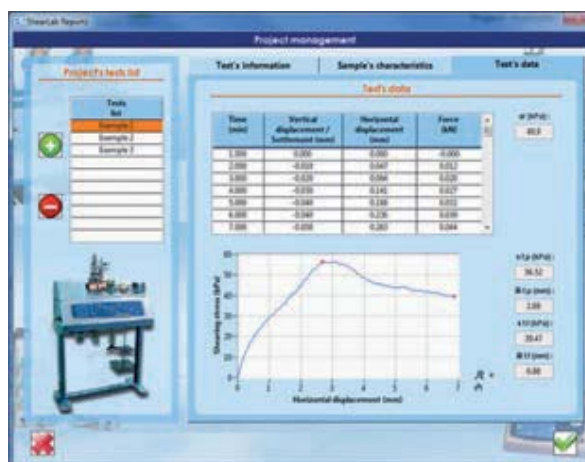
- CHARTS:
 - Shear stress (kPa) / Horizontal displacement (mm).
 - Settlement (mm) / Horizontal displacement (mm).
 - Shear strength (kPa) / Normal stress (kPa).

PC specification:

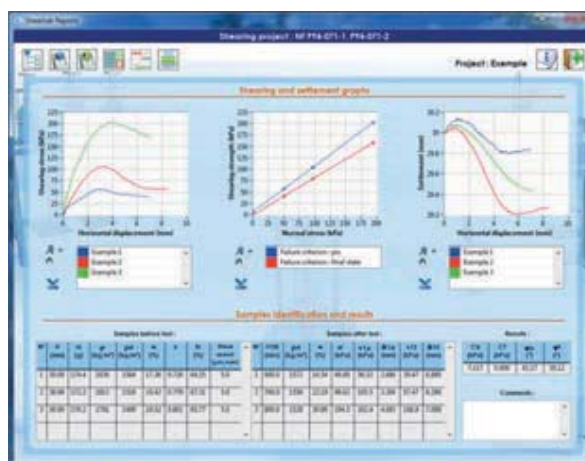
- Operating system: Windows XP or more recent.
- Supplied complete with connection cable.

NEW

S277-40N Data import



S277-40N Test data calculation



S277-40N Results preview

section S



445

MATEST

...follows...

material testing equipment

S277-02N DATA ACQUISITION/PROCESSING, PNEUMATIC, FULLY AUTOMATIC VERSION

SHEARTRONIC "HIGH PERFORMANCE"

Digital Shear Testing Machine, with incorporated Data Acquisition System + Software and Pneumatic Vertical Loading Device, Fully Automatic, comprising:

S277-11N Shear Frame with digital "Touch-Screen" microprocessor; complete with pneumatic vertical loading device automatically driven through SW, shear box case with adaptors, transducers supports.

S277-20 Load Cell, electric, 3000N capacity, complete with cable.

S336-11 Linear vertical transducer; 10 mm travel.

S336-12 Linear horizontal transducer; 25 mm travel.

S277-31 Firmware activating 3 connectors for basic data acquisition.

NOTE: Shear box, hollow punch, tamper (see accessories) and Software S277-41N "are not included" and have to be ordered separately

NOTE: The pneumatic shear machine mod. S277-02N requires an air compressed source.

NEW

section S



446



S277-02N + S284

ACCESSORIES for mod. S277-02N:

V207 LABORATORY AIR COMPRESSOR, 50 litres capacity, 10 bar nominal pressure

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

S277-41N

SOFTWARE SHEAR LAB CONNECT - MATEST MADE

For fully automatic data control, acquisition, processing and visualization in direct/residual shear tests, with graphics on all the test phases.

SPARES:

S335-15 Universal coupling pliers for dial gauge/transducer. It accepts all Matest displacement transducers and dial gauges (dia. from 8 to 20 mm)

S280-15 Mounting device between the universal coupling pliers S335-15 and the shear machine to fix the vertical displacement transducer or dial gauge.

S280-16 Mounting device between the universal coupling pliers S335-15 and the shear machine to fix the horizontal displacement transducer or dial gauge.

GAUGE BLOCKS, Grade 1

Used to calibrate the linear displacement transducers.

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



MATEST

S277-41N**Software ShearLab Connect - Matest made**

STANDARDS: ASTM D3080-72 / NF P94-071-1, P94-071-2 / BS 1377:7

NEW

ShearLab Connect is an extension of the ShearLab Reports S277-40N software, specifically designed for automatic data control, acquisition, processing and visualization of direct/residual shear tests.

The file obtained can be then added to a project created with ShearLab Reports S277-40N, which features are detailed on pag. 445.

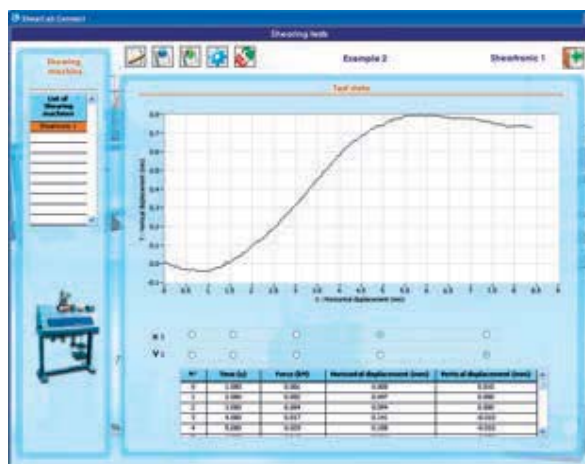
The program can be used in a very simple and intuitive way; a dedicated window allows to select the machine the user wants to work with while a test-specific setup guides the acquisition process, including data collection parameters that best fit the specific test. All test-specific initial, intermediate and final parameters are calculated based on input of specimen information, such as sample type (cylindric or square), sample diameter or width (mm), initial height of sample (mm), initial and final wet masses (g), dried mass after oven (g), applied load (kg), grain density (kg/m^3), consolidation time (min).

ShearLab Connect can be connected to one or more shearing machines, thus allowing automatic data control and acquisition during the test.

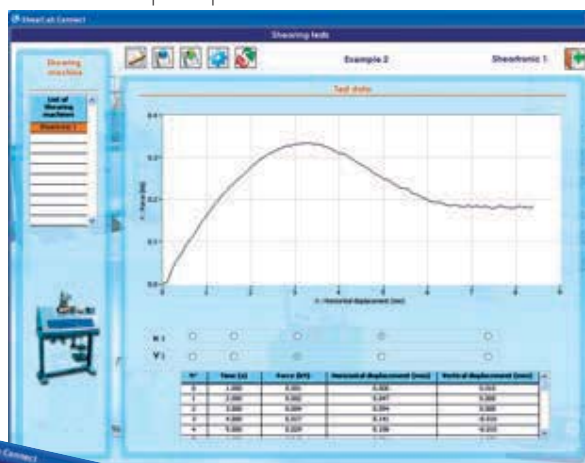
Each Sheartronic is connected via LAN or serial cable to the PC



S277-41N Test-specific parameters



S277-41N Test-specific parameters

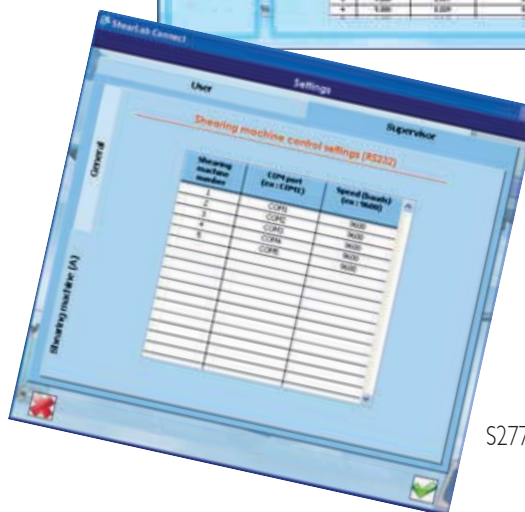


Displayed CHARTS (by selecting 2 of the following parameters):

- Time (s)
- Applied force (kN)
- Horizontal displacement (mm)
- Vertical displacement (mm)

PC specification:

- Operating system: Windows XP or more recent
- Supplied complete with LAN cable.



S277-41N Control settings



TRIAXIAL TESTS

STANDARDS: BS 1377 part 8 / ASTM D2850-032, D4767-95, D7181-11 / NF P94-070, P94-074 / CEN-ISO / TS 17892-8,9

Introduction

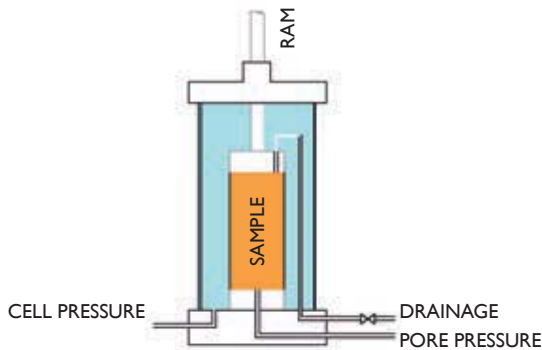
A knowledge of stress-strain behaviour and the shear strength parameters of soils is required when soil is interacting with structures or when soil is used as a construction material in many engineering purposes such as:

1. Excavations
2. Shallow foundations
3. Piles and deep foundations
4. Earth retaining structures, diaphragm walls, anchors
5. Slope stability
6. Ground improvement
7. Design of embankments, earth dams

The most widely used testing apparatus for investigating the stress-strain behaviour and the strength parameters of soils is the triaxial apparatus.

Triaxial tests are typically performed with two stages: an isotropic loading followed by shear loading which is carried out up to failure. A cylindrical saturated soil sample, undisturbed or reconstituted, is placed in a rubber membrane in order to isolate it from direct contact with the surrounding water with which the testing cell is filled, and which is pressurized. The sample sits in the cell between a rigid base and a rigid top cap and is loaded by means of a ram, at a constant speed. The water drainage in or out the sample can be allowed by means of opening or closing a valve.

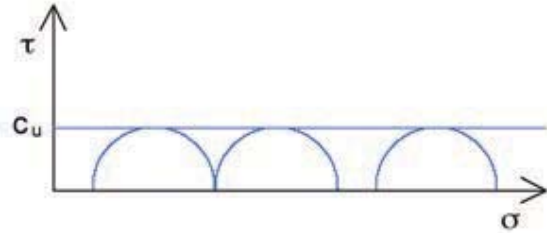
The two phases are carried out under different combinations of drainage conditions and give rise to 3 different standard triaxial tests. Each test is usually performed on three saturated specimens at three different confining pressures.



“UU” unconsolidated undrained test

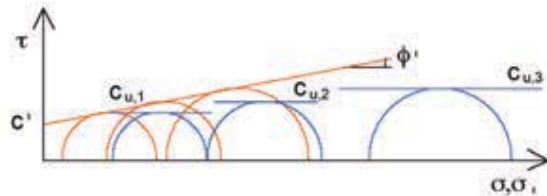
This test is used in order to estimate the undrained shear strength parameters (undrained shear strength c_u and undrained friction angle $\phi_u = 0$). It is usually performed on fine grained soils. In this test, both phases are carried out with the drainage valve closed. No volume change is allowed during the test and distortions during the shear phase occur up to the failure. This test gives a unique value of undrained shear strength, as the envelope of the Mohr circles plotted in total stresses is horizontal. The angle ϕ_u has to be zero or it is an error in the test, e.g. poor saturation.

The stress-strain behaviour and the strength parameters are then used to model engineering problems when undrained conditions are present, typically in short term design.



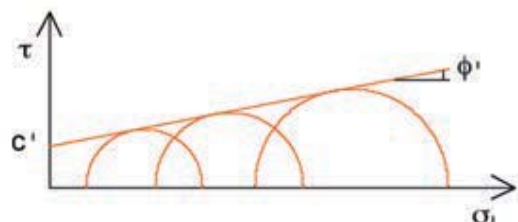
“CU” consolidated undrained test

This test is used in order to estimate the drained and undrained shear strength parameters (effective cohesion c' , effective friction angle ϕ' , and undrained shear strength c_u). It is usually performed on fine grained soils. In this test, the first phase is carried out with an open drainage valve in order to allow the consolidation and volume change to occur. During the second phase, the drainage valve is closed and the change of pore water pressure is measured; there is no volume change and distortions occur up to failure. It gives three values of undrained shear strength, which are the radii of the Mohr's circles, and the values of the effective cohesion and of the effective friction angle, which are derived from the envelope of the effective stress Mohr's circles. The stress-strain behaviour and the strength parameters are then used to model engineering problems when undrained conditions are present, after consolidation processes or in long term applications.



“CD” consolidated drained test

This test is used in order to estimate the effective shear strength parameters (effective cohesion c' , effective friction angle ϕ'). It is usually performed on coarse grained soils. In this test, both phases are carried out with the drainage valve open. Volume change occurs in both phases and during the second phase, distortions occur up to failure. The CD test gives the values of the effective cohesion and of the effective friction angle, which are derived from the envelope of effective stress Mohr's circles. The stress-strain behaviour and the strength parameters are then used to model engineering problems when drained conditions are present, typically in long term design.



S301N**Triaxial load frame 50kN, digital “Touch-Screen”**

This versatile, compact, heavy duty load frame has been designed for routine tests, for central laboratories, but also for research purposes.

The frame is of rigid chromed steel twin column construction.

The electronic color digital “touch-screen” display with microprocessor control system allows to perform tests within a speed range of 0,00001 to 12 mm/min.

The maximum load capacity is 50 kN, and it is suitable either for cells S305 (max. specimen size 70x140mm) and S306 (max. specimen size 100x200mm), Matest or other manufacturers made. The system guarantees high resolutions in real time. The load plate is foreseen of electric end of stroke, to save the machine from wrong manipulations.

Specifications of the frame:

- Maximum load capacity: 50kN
- Infinitesimal testing speed: from 0,00001 to 12 mm/min.
- Minimum vertical clearance: 400mm (140mm with ring)
- Maximum vertical clearance: 1100mm (840mm with ring)
- Horizontal clearance: 380 mm
- Platen diameter: 177 mm

Firmware:

- Electronic control unit “Cyber-plus Evolution” with Touch-Screen color graphic display ¼ VGA, that runs like a standard PC based on Windows operating system for the management of the data. (Analysis of the data, test results, graphs with S335-10N software; optional accessory).
- The Touch-Screen icon interface allows an easy set-up of the parameters and immediate execution of the test.
- The machine can perform the tests without any external PC, because of the “Cyber-Plus” grants performances like a PC.
- Direct connection to Intranet (connection to a LAN network) and Internet to establish a remote communication and receive an immediate diagnosis from Matest technicians, or for upgrades of the Firmware.
- Unlimited memory storage with: 2 USB ports, 1 SD card.
- Possibility to select different languages.
- Hardware technical details: see pag. 24



S301N with load ring

- The machine is equipped with 8 connectors for the acquisition and data processing system up to 8 analogical/digital channels (that is activated with the S301-05 optional firmware) for load cells and transducers. Extra slot available to expand the on-board channels to 16 (with S301-06)
- The frame is supplied with loading ram and sphere, but **“without”** load rings, dial gauges, electric load cells or displacement transducers that **“have to be ordered separately”** (see next pages).
- Power supply: 230V 1ph 50/60Hz 600W
 Dimensions: 490 x 510 x 1800 mm
 Weight: 115 kg

UPGRADING ACCESSORIES:**S301-05****FIRMWARE FOR ACQUISITION AND DATA PROCESSING**

system up to 8 analogical/digital channels for load cells and transducers. Graphic and numbers visualization, processing, printing and storing of the test results. This software activates the 8 connectors foreseen on the load frame.

S301-06

8-CHANNEL INTERNAL MODULE, for system expansion to 16 channels of the triaxial load frame. This upgrade is possible only in Matest factory.

S335-10N

SOFTWARE TRIAXLAB CONNECT & REPORTS See page 457



S301N with data acquisition



Detail of 8 channels



TRIAXIAL CELLS

Triaxial cells are provided in two different dimensions, mod. S305 and S306. Top and low cell caps are made in aluminium corodal alloy and the transparent cell cylinder is in high resistant acrylic material. The cell can be easily assembled and disassembled by means of quick clamping rods. In order to reduce as much as possible friction, a particular care is deserved during loading ram realisation. The low cell cap is supplied with "four inlet valves": back pressure, low drainage, pore pressure, cell pressure.

In order to measure the specimen axial deformation, an adjustable dial gauge or a displacement transducer is also provided.

Note: No top caps, base adapters, rubber membranes and sealing rings, porous stones, dial gauges, etc. are included and "should be ordered separately". In the table all accessories for triaxial cells are listed.



S305 with accessories

S306

* Note: Cell S305 can be also used also for specimens dia. 50x100 and 38x76 mm with accessories of suitable diameter; but it is not suitable for 100x200 mm samples.

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



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

MAXIMUM REACHABLE VERTICAL TOTAL STRESS:

Sample	Ø 38x76 mm	Ø 50x100 mm	Ø 70x140 mm	Ø 100x200 mm
Cell S305	~ 44 MPa	~ 25 MPa	~ 13 MPa	–
Cell S306	~ 44 MPa	~ 25 MPa	~ 13 MPa	~ 6 MPa

Note: Be aware that not all proving rings or load cells are suitable for all reachable axial force.

See "measure of the axial force applied" section, pag. 452

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
"O" ring (pack of 10)	S311	S311-01	S311-02	S311-03
Membrane stretcher	S312	S312-01	S312-02	S312-03
Split former	S313	S313-01	S313-02	S313-03
Top cap with drainage	S314	S314-01	S314-02	S314-03
Base adapter for cell. mod. S305	S315	S315-01	S315-02	–
Base adapter 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 base adapter	S318	S318-01	S318-02	S318-03
Filter paper for lateral drainage (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
Dolly for extraction	S123-13	S123-14	S123-15	S123-16
Drainage burette, 10 ml. cap.	S321	S321	S321	–
Drainage burette, 50 ml. cap.	–	–	–	S322
Nylon tube dia. 6x4 (20 mt.)	S325	S325	S325	S325
Terminal for connection tube (10 pcs)	S326	S326	S326	S326
Flaring tool	S327	S327	S327	S327
Vaseline oil (1000 ml)	S328	S328	S328	S328
Silicon grease (1 kg)	S329	S329	S329	S329
Grease pump	S330	S330	S330	S330
Null displacement valve (spare)	S331	S331	S331	S331

ACCESSORIES DESCRIPTION:

RUBBER MEMBRANE, to isolate the specimen from cell water.

"O" RING, to seal the membrane around the top cap and the base adapter.

MEMBRANE STRETCHER, to stretch the membrane during its positioning, avoiding to disturb the specimen.

SPLIT FORMER, to prepare coarse grain soil specimens. It is made of two aluminium halves.

TOP CAP WITH DRAINAGE, to load the whole cross section area of specimen when drainage is required. It is made of anodized aluminium. Connector is provided.

BASE ADAPTER, used to adapt the triaxial cell to the specimen diameter. It is made of aluminium.

POROUS DISCS, to allow the drainage in or out of the specimen in the whole cross sectional area, toward the top cap and the lower base. Two pieces are required. They are made of phosphor bronze.

PERSPEX PLAIN DISCS, to replace porous discs in undrained tests. Two pieces are required. They are made of 10 mm. thick Perspex.

FILTER PAPER FOR LATERAL DRAINAGE, for lateral drainage on low permeability specimens.

FILTER PAPER FOR BASE, to avoid passages of soil particles into the porous stones.

CORE CUTTER, to cut soil cohesive specimens in correct diameters from bigger samples. It is made of stainless steel with a cutting edge.

DOLLY FOR EXTRACTION, to extrude the specimen from the core cutter.

DRAIN BURETTE, to prepare coarse grain specimens by applying a negative pressure to the base of the specimen and to measure the water volume change in or out the specimen during testing with specimen open to the atmosphere. Two models are available: 10 ml. capacity for specimens up to 70 mm. dia. and 50 ml. for specimens up to 100 mm. dia. It is supplied with cell rod and cell couplings.

"O" RING FOR BASE ADAPTER, to seal the membrane on the base adapter and the top cap.

FLARING TOOL, to cut and prepare the ends of nylon tubes which have to be fixed to the suitable connectors.



MEASURE OF THE AXIAL FORCE APPLIED TO THE SPECIMEN

Three different equipments are available to measure the axial force applied to the specimen:

- load proving rings (manual readings)
- load cells (automatic readings)
- submersible load cells (automatic readings and no friction effects)

section S

Load proving rings

Mechanical equipment for manual reading. In order to avoid any overload damage, an electrical safety device is supplied to stop the loading process when the maximum capacity of the ring is reached. Technical details, other models and accessories see pag. 464

Models:



Submersible load cells

Submersible electrical equipment for automatic reading. The submersible load cell must be placed inside the cell and connected to the automatic data acquisition system mod. S334 (see pag. 462). It is made of high quality materials. It is a sealed waterproof device with an excellent resistance to lateral forces. It guarantees no friction effect of the ram. It is strongly recommended when high accuracy in testing is required. It must be equipped with the loading ram mod. S337-21.

Rated output: 2 mV/V nominal

Accuracy: 0,1%

Non-linearity: 0,05%

Models:

S337-02 Submersible cell 3 kN capacity

S337-03 Submersible cell 5 kN capacity

S337-04 Submersible cell 10 kN capacity

S337-05 Submersible cell 25 kN capacity

ACCESSORIES:

S337-21 LOADING RAM: Loading ram for submersible cells

S337-51

CALIBRATION PROCESS of one device that is combined with the acquisition/processing system mod. S334. To be chosen among:

- displacement transducer mod. S336-11 to S336-22,
- pressure transducer mod. S336-50, S336-51,
- electric load cell mod. S337-02 to S337-34.

Calibration certificate is supplied.



452

Max Capacity load kN	Dial Gauge 0,01 mm	Dial Gauge 0,001 mm	Height mm	Weight kg
1	S370-01S	S371-01S	210	1,7
3	S370-03S	S371-03S	210	1,9
5	S370-04S	S371-04S	210	2
10	S370-05S	S371-05S	210	2,2
20	S370-07S	S371-07S	210	3
50	S370-10S	S371-10S	210	7,2

ACCESSORY:

S374

STEM MECHANICAL BRAKE DEVICE

It keeps the max. reached value on the dial gauge and allows the manual zero setting.

Electric strain gauge load cells

Electrical equipment for automatic reading. The load cell must be connected to the automatic data acquisition system mod. S334 (see pag. 462). Cable, connector and device to fix the load cell to the triaxial frame are supplied.

Rated output: 2 mV/V nominal

Accuracy: 0,1%

Models:

S337-31 Load cell 2,5 kN capacity

S337-35 Load cell 5 kN capacity

S337-32 Load cell 10 kN capacity

S337-33 Load cell 25 kN capacity

S337-34 Load cell 50 kN capacity



MEASURE OF THE AXIAL STRAIN

Two different equipments are available to measure the specimen axial displacement:

- Dial gauges (manual readings)
- or:
- Displacement transducers (automatic readings)

NOTE: The displacement transducers must be connected to the automatic data acquisition system mod. S334 (see pag. 462) or mod. S301-05 (see pag. 449).



Dial gauges (manual readings)

S377 Dial gauge, 25x0,01 mm. suitable for specimens of max. dimensions 50x100 mm.

S379 Dial gauge, 50x0,01 mm. suitable for specimens of max. dimensions 70x140 mm.

Note: For other requirements, dial and digital gauges with different maximum travel and sensibility are also available: see technical details at pag. 465.



Displacement transducers (automatic readings)

Electrical devices for automatic readings. Calibration certificate is supplied. Cable, connector and signal conditioner are provided.

TYPES OF TRANSDUCERS AVAILABLE:

TYPE "A": Accurate and versatile linear potentiometric displacement transducer.

Independent linearity < 0,3% (0,3x10mm)

Max. displacement speed: up to 10 m/s.

- Models:
- S336-10** Transducer 5 mm travel
 - 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 Gauge Transducer: It guarantees good repeatability and noise reduction.

Full bridge at 350 Ohm

Independent linearity < 0,1%

Standard sensitivity: 2 mV/V

- Models:
- S336-18** Transducer 5 mm travel
 - S336-15** Transducer 10 mm travel
 - S336-16** Transducer 25 mm travel
 - S336-17** Transducer 50 mm travel

ACCESSORIES FOR DISPLACEMENT TRANSDUCERS:

S336-30 Extension cable 2 metres long

S336-31 Extension cable 5 metres long

S336-32 Extension cable 10 metres long

Note: It is recommended to use not more than 10m of extension cable to avoid noise problems that might occur.

S335-15 Universal coupling pliers to hold the transducer/dial gauge. It fits all Matest displacement transducers and dial gauges (from dia. 8mm to 20mm).

S305-05 Mounting device of the universal coupling pliers mod. S335-15 to fix the displacement transducer/dial gauge to the Triaxial Cell mod. S305 or mod. S306



GUAGE BLOCKS. Grade 1

Used to calibrate the linear displacement transducers.

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

... follows ...



PRESSURE SYSTEMS

Two different solutions are available:

- Oil/Water motorized constant pressure system
- Air/Water interface system with air pressure regulator (to be connected to a pneumatic compressor)

A144**Oil/Water constant pressure system**

This unit provides a constant pressure from 0 to 3500 kPa by using a motorized hydraulic pump, an oil/water interchange tank, ram/spring, valves and connectors, high viscosity oil.

Test pressure precision gauge, range 0-3500 kPa is supplied. To be noted that the maximum tolerable pressure in the cell is 1700 kPa.

Power supply: 230V 1ph 50 Hz

Dimensions: 320x320x410 mm

Weight: 20 kg



A144

S350**Air/Water interface pressure system**

It provides a water pressure up to 1700 kPa. Simple, practical and extremely accurate system used to select test pressures, it can also offer the possibility to further system expansions.

The use of deaerated water is recommended. It must be connected to a pneumatic compressor as mod. S351 or mod. V207.

The cell set is equipped with an inlet "high pressure air valve, a high accurate regulator which controls the work pressure and 4 outlet valves for pressurized water, water and air".

Dimensions: 270x300x425 mm

Weight: 9 kg



S350

SPARE PARTS for S350:

S350-04

Membrane for air/water cell. Pack of 2 pieces.

S350-05

Pressure regulator; high accuracy model.



S350-01

S350-05

S350-04

S355-01

FILTER UNIT (water trap) composed by filtering device and interchangeable cartridge, used to collect moisture.

S351N**Laboratory air compressor**

It reaches a maximum pressure of 15 bar and it must be used with the air/water interface cell.

Sucked air: 84 litre/minute.

Reservoir capacity: 3 litres.

Power supply:

230V 1ph 50Hz 0,75HP

Dimensions:

460x300x470 mm

Weight: 22 kg



S351N

As an alternative:

V207**Laboratory air compressor**

It can be used when lower cell pressures are required, as an alternative to mod. S351N.

Max. pressure: 10 bar

Reservoir capacity: 50 litres

Recommended for continuous

working pressure up to 800 kPa

Power supply:

230V 1ph 50Hz

Weight: about 40 kg



V207

S355**De-airing tank 20 litres capacity**

It produces de-aired water when connected to the vacuum pump.

It is a perspex tank with an inlet water valve and an outlet air valve.

Tank capacity: 20 litres.

Dimensions:

320x320x520 mm

Weight: 15 kg



S355

ACCESSORIES:

V205

VACUUM PUMP

To produce vacuum up to of 0,1 mbar (see pag. 487)

V205-10 - V205-12

VACUUM REGULATOR

It is supplied with vacuum gauge, control valve, suction filter and moisture trap.

V205-10

V230-03

Rubber tube. Suitable for vacuum, 3 m

Note:

other models of vacuum pumps described at pag. 487



V205



MEASURE OF PRESSURE

Dial gauge units to measure pressure (0-1700 kPa)

They are used to measure water pressure as cell pressure or pore pressures. The dial gauge is set in a metallic support.
Pressure range: 0-1700 kPa.

MODELS:

S340

Dial gauge unit 4 valves

4 inlet/outlet null displacement valves are supplied with the dial gauge.

Dimensions: 410x350x110 mm

Weight: 6 kg



S340

S341

Dial gauge unit 8 valves

8 inlet/outlet null displacement valves are supplied with the dial gauge. It is recommended when more versatility is required.

Dimensions: 410x460x110 mm

Weight: 8 kg



S341

S345

Screw pump

It has to be connected to the pressure dial gauge unit and it is used to control water pressures by means of small screw rotations. It can decrease or increase pressures as required.

Weight: 3 kg



S345

S348

S350-01

S348

Distribution unit

It is provided with 5 inlet/outlet valves with null variation of volume. All valves are connected to an aluminium support. It is used to deliver pressurized water to different lines.

Dimensions: 200x200x55 mm. Weight: 3 kg

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

PORE PRESSURE TRANSDUCER

It is a good reliability electronic device used to measure pore pressure. It requires a de-airing block. Every transducer must be connected to the automatic data acquisition system mod. S334 (see pag. 462) or mod. S301-05 (see page 4489).

- Input voltage: 10 volts dc, Sensitivity range: 2 - 4 mV/V
- Accuracy: 0,15 fs
- Pressure connection: 0,25 BSP
- Protected against corrosive pore water pressure
- 2 metres cable and 5 pin plug included

MODELS: **S336-50** Pressure transducer up to 1000 kPa

S336-51 Pressure transducer up to 2000 kPa

ACCESSORIES:

S336-55 De-airing block for pressure transducer



S336-50

S336-51

S336-55

EXTENSION CABLE FOR TRANSDUCERS.

Models: **S336-30** Extension cable 2 metres long

S336-31 Extension cable 5 metres long

S336-32 Extension cable 10 metres long

Note: It is recommended to use not more than 10m of extension cable to avoid noise problems that might occur.

S353

Null Indicator

It is used as a balancing device to improve pore pressure readings, avoiding any water flow inwards or outwards the sample.

It is made of one piece only of acrylic material.

It is placed directly on the triaxial cell, without

connection tubes since eventual tubing expansions might occur. It is usually connected to pressure unit S340 or S341 and differential mercury manometer S356.



S353

S356

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

It allows negative pore pressure measurements and it is used to measure pore pressure for accurate readings in lower range (from -100kPa up to +100kPa).

It is composed by a "U" mercury-filled manometer; calibrated for readings in kPa. It is mounted on a metallic panel to be fixed to the wall.

A trap on the top collects the overflowing mercury.

No mercury is supplied. Weight: about 3 kg.



S356

ACCESSORY:

MERCURY, pack of 1 kg

(Matest cannot supply for shipping safety problems)

V300-17



MEASURE OF VOLUME CHANGE

In order to measure volume changes during test, two solutions are proposed:

- Double burette apparatus
- Standard or automatic volume gauge with displacement transducer or dial gauge.

S358**Double burette volume change apparatus**

It is composed by two measuring burettes which are placed inside a perspex tube and connected directly to a reverse valve system.

A by-pass valve is also included.

Capacity: 200ml

Accuracy: 0,2ml

Dimensions: 230x270x860 mm

Weight: 5 kg

S338N**Volume gauge**

The unit consists of a metallic air/water interface. It measures the water volume changes inside the sample. It has to be used with linear strain transducer, or dial gauge.

Capacity: 100ml

Accuracy: better than 0,1 ml.

Dimensions: 180 x 180 x 240 mm

Weight : 4,7 kg

Easy de-airing of bottom and top chambers. No measuring device and mounting block are included (see accessories).



S358



S338N

S338-01 KIT**Automatic volume gauge**

The unit consists of a 100ml metallic air/water interface. A change valve box provides unlimited capacity.

Capacity : unlimited

Accuracy: better than 0,1 ml

Dimensions: 360 x 270 x 210 mm

Weight : 7,6 kg

Easy de-airing of top and bottom chambers. No measuring device and mounting block are included (see accessories).

NOTE:

The volume gauge has to be used with linear strain transducer which must be connected to the automatic data acquisition system mod. S334 (see pag. 462) or mod. S301-05 (see page 4489).



S338-01 KIT

ACCESSORIES for volume gauges:

S336-12 Displacement transducer 25 mm travel TYPE "A"**S336-16** Displacement transducer 25 mm travel TYPE "B"

Note: Technical data for all transducers: see pag. 453

S335-15 Universal coupling pliers to hold the transducer/dial gauge. It fits all Matest displacement transducers and dial gauges (from dia. 8mm to 20mm).**S338-05** Mounting device of the universal coupling pliers mod. S335-15 to fix the displacement transducer/dial gauge to the volume gauge.**CONSOLIDATION FOR TRIAXIAL SPECIMENS****S359****Three-cells consolidation frame**

It is used to apply a constant axial load to three specimens, at the same time. It performs an anisotropic consolidation stage reducing the consolidation testing times.

It is made of a resistant metallic structure which accepts up to 3 triaxial cells for specimens dia. 38 mm up to 100 mm, and it is provided with centering plate cells.

Load can be applied through an hanger with two different ratios:

- Ratio 1:1 (directly), maximum load for each cell: 50 kg
- Ratio 5:1 (by means of a lever), maximum load for each cell: 250 kg

Dimensions: 2300x400x1800 mm

Weight: 150 kg

Note: No cells, weights and dial gauges or displacement transducer are included and should be ordered separately.

ACCESSORIES:

S273 KIT Set of slotted weights 50 kg

Note: Different kits and loose slotted weights listed at pag. 436

S377 Dial gauge, 25x0,01 mm. suitable for specimens of max. dimensions 50x100 mm**S379** Dial gauge, 50x0,01 mm. suitable for specimens of max. dimensions 70x140 mm

As an alternative:

S336-12 Displacement transducer 25 mm travel**S336-14** Displacement transducer 50 mm travel**S336-31** Extension cable 5 m

S359 with accessories



NEW

S335-10N**Software TriaxLab Connect & Reports - Matest made**

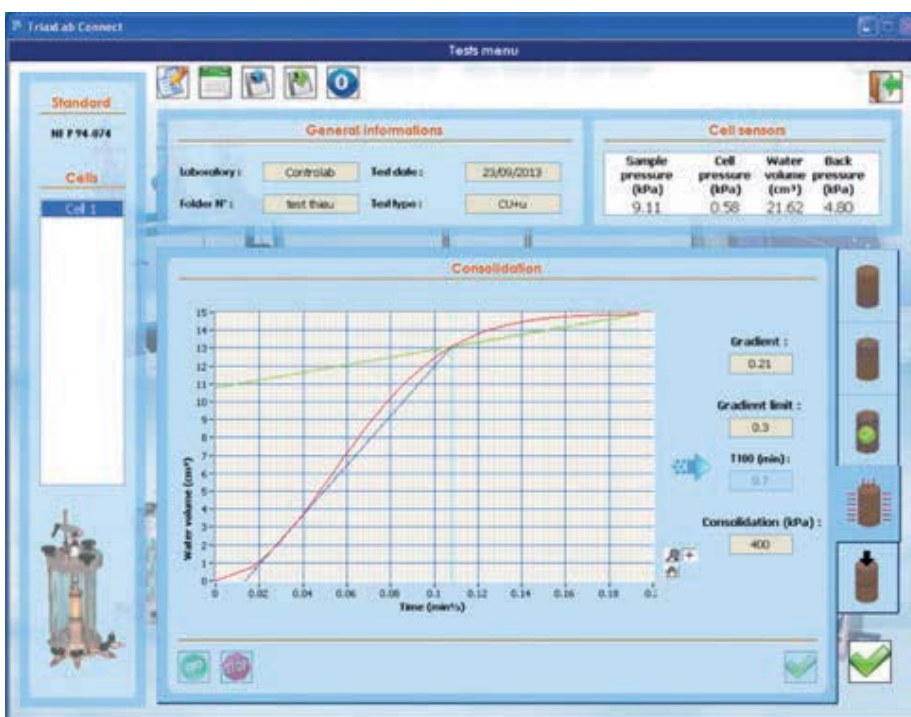
STANDARDS: NF P94-070, P94-074 / ASTM D2850-03a, D4767-95, D7181-11 / BS 1377:8

TriaxLab Connect is the new acquisition software for Matest triaxial systems. This software allows the user to:

- Configure the acquisition parameters necessary to conduct the test
- Perform all of the 3 steps of a triaxial test (saturation, consolidation and shearing)
- Calculate the t_{100} value used for the shearing speed
- Record data for each calculation step
- Save test data and test parameters

Hence, the files created by this software can be used in TriaxLab Reports to generate a report by selecting the dedicated Standards.

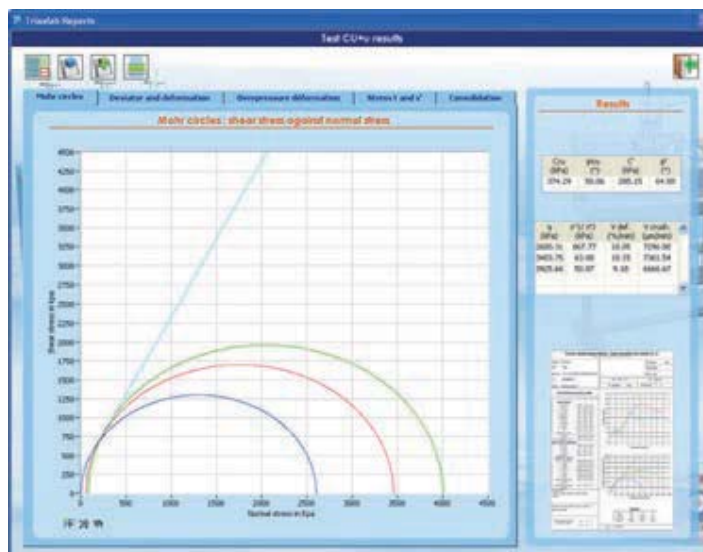
Both Connect and Reports programs can be used in a very simple and intuitive way. Thanks to a suitable window, TriaxLab Reports gives the opportunity to perform calculations for all triaxial tests (UU, CU+u or CD).



S335-10N Consolidation step in TriaxLab Connect

The software provides the user with a simple and flexible graphical interface, giving the possibility to view, edit and print all the parameters involved in triaxial tests.

- Laboratory coefficients of:
 - Saturation
 - Consolidation
 - Shearing
- CHARTS:
 - Water Volume (cm³) / Square-root Time (min)
 - Press Load (kN) / Press Displacement (mm)
 - Deviator Stress (kPa) / Axial Strain (%)
 - Pore Pressure (kPa) / Axial Strain (%)
 - Shear Stress (kPa) / Normal Stress (kPa)
 - Volume Deformation (%) / Axial Strain (%)
 - Stress t' (kPa) / Stress s' (kPa)
 - Effective Principal Stress Ratio / Axial Strain (%)
- PC specification:
 - Operating system: Windows XP or more recent



S335-10N Test CU+u results in TriaxLab Reports

... follows ...



Recommended typical configuration of the triaxial system with one cell in the: manual, automatic and automatic with submersible load cell versions

section S



458

APPARATUS SECTION	ITEM CODE	ITEM DESCRIPTION	ALTERNATIVE ITEM	MANUAL CELL SET	AUTOMATIC CELL SET	AUTOMATIC CELL SET with Submersible Load Cell
Hardware Software	S301N	digital triaxial load frame 50 kN	S306			
	S301-05	acquisition and data processing		-		
	S305	triaxial cell dia max. 70 x 140 mm				
	S335-10N	software triaxlab reports - Matest Made		-	(opt)	(opt)
Measure of Axial force	S370-05S	load proving ring 10 kN	S370/1-xxS		-	-
	S374	stem mechanical brake device		(opt)	-	-
	S337-32	electric load cell 10 kN capacity	S377-31..34	-		-
	S337-04	submersible load cell 10 kN	S337-02..05	-	-	
	S337-21	loading ram for submersible cell		-	-	
	S337-51	calibration process for load cell		-	(opt)	(opt)
Measure of Axial strain	S377	dial gauge 25 mm	S379		-	-
	S336-12	displacement transducer 25 mm	S336-16	-		
	S336-31	extension cable 5 m	S336-30..32	-		
	S335-15	universal coupling pliers				
	S305-05	mounting device for pliers				
	S337-51	calibration process for displacement transducer		-	(opt)	(opt)
	S336-45	gauge block 25 mm	S336-41..47	-	(opt)	(opt)
De-aired water system	S355	de-airing tank				
	V205	vacuum pump				
	V205-10	vacuum regulator				
	V205-12	moisture filter				
	V230-03	rubber tube 3 m				
Pore pressure system and measure	S350	air/water interface pressure system	A144	2	2	2
	S351	laboratory air compressor 17 bar (only if S350 system is chosen)	V207			
	S350-04	membrane for air/water cell (spare) (only if S350 system is chosen)		(opt)	(opt)	(opt)
	S350-05	pressure regulator (spare) (only if S350 system is chosen)		(opt)	(opt)	(opt)
	S355-01	filter unit				
	S340	dial gauge unit 4 valves (only if S350 system is chosen)	S341	2	2	2
	S345	screw pump		2	2	2
	S348	distribution unit		-	-	-
	S350-01	2-way distribution valve		5	5	5
	S336-51	pore pressure transducer 2000 kPa (cell pressure + pore/back pressure)	S336-50	-	2	2
	S336-55	de-airing block		-	2	2
	S336-31	extension cable 5 m	S336-30..32	-	2	2
	S356	differential mercury manometer		(opt)	-	-
		mercury 1000 g (cannot be supplied)		(opt)	-	-
S353	null indicator		(opt)	-	-	

Measure of Volume change	S358	double burette system	S338N		-	-
	S377	dial gauge 25 mm (only if S338 system is chosen)			-	-
	S335-15	universal coupling pliers (only if S338 system is chosen)			-	-
	S338-05	mounting device for pliers (only if S338 system is chosen)			-	-
	S338-01 KIT	automatic volume gauge	S338N	-		
	S336-12	displacement transducer 25 mm	S336-16	-		
	S336-31	extension cable 5 m	S336-30..32	-		
	S335-15	universal coupling pliers		-		
	S338-05	mounting device for pliers		-		
S337-51	calibration process for displacement transducer		-	(opt)	(opt)	
Specimen preparation and Accessories	S310	rubber membrane (10 pcs) (accordingly to specimen dimensions)	S310-01..03	1+	1+	1+
	S311	"O" ring (10 pcs) (accordingly to specimen dimensions)	S311-01..03	1+	1+	1+
	S312	membrane stretcher (accordingly to specimen dimensions)	S312-01..03			
	S313	split former (accordingly to specimen dimensions)	S313-01..03			
	S314	top cap with drainage (accordingly to specimen dimensions)	S314-01..03			
	S315	base adapter for cell (accordingly to cell model and specimen dimensions)	S315-01..07			
	S316	porous disc (2 pcs) for CD/CU/UU tests (accordingly to specimen dimensions)	S316-01..03			
	S317	plain disc (2 pcs) for UU test only (accordingly to specimen dimensions)	S317-01..03			
	S318	"O" ring for base adapter (accordingly to specimen dimensions)	S318-01..03	1+	1+	1+
	S319	filter paper for lateral drainage (50 pcs) (accordingly to specimen dimensions)	S319-01..03	1+	1+	1+
	S320	filter paper for base (100 pcs) (accordingly to specimen dimensions)	S320-01..03	1+	1+	1+
	S122-13	stainless core cutter (accordingly to specimen dimensions)	S122-14..16			
	S123-13	dolly for extraction (accordingly to specimen dimensions)	S123-14..16			
	S321	drainage burette 10 ml	S322			
	S325	nylon tube dia. 6x4 (20 m)		3	3	3
	S326	terminal for connection tube (10 pcs)		1+	1+	1+
	S327	flaring tool				
	S328	vaseline oil (1 kg)		1+	1+	1+
	S329	silicon grease (1 kg)		1+	1+	1+
	S330	grease pump				
S331	null displacement valve (spare)		(opt)	(opt)	(opt)	
S332-02	wearable material and recommended spares (accordingly to cell set)	S332-02..05				

(opt) = optional



Recommended typical configuration of the triaxial system with three cells in the: manual, automatic and automatic with submersible load cell versions

section S



460

APPARATUS SECTION	ITEM CODE	ITEM DESCRIPTION	ALTERNATIVE ITEM	3 MANUAL CELL SET	3 AUTOMATIC CELL SET	3 AUTOMATIC CELL SET with Submersible Load Cell
Hardware Software	S301N	digital triaxial load frame 50 kN	S306	1	1	1
	S301-05	acquisition and data processing		-	1	1
	S301-06	8 channel expansion module		-	1 (opt)	1 (opt)
	S305	triaxial cell dia max. 70 x 140 mm		3	3	3
	S359	3 cell consolidation frame		1	1	1
	S273 KIT	set of slotted weights 50 kg		3	3	3
	S335-10N	software triaxlab reports - Matest Made		-	1 (opt)	1 (opt)
Measure of Axial force	S370-05S	load proving ring 10 kN	S370/1-xxS	1	-	-
	S374	stem mechanical brake device		1 (opt)	-	-
	S337-32	electric load cell 10 kN capacity	S377-31..34	-	1	-
	S337-04	submersible load cell 10 kN	S337-02..05	-	-	1
	S337-21	loading ram for submersible cell		-	-	1
	S337-51	calibration process for load cell		-	1 (opt)	1 (opt)
Measure of Axial strain	S377	dial gauge 25 mm	S379	4	-	-
	S336-12	displacement transducer 25 mm	S336-16	-	4	4
	S336-31	extension cable 5 m	S336-30..32	-	4	4
	S335-15	universal coupling pliers		4	4	4
	S305-05	mounting device for pliers		4	4	4
	S337-51	calibration process for displacement transducer		-	4 (opt)	4 (opt)
	S336-45	gauge block 25 mm	S336-41..47	-	1 (opt)	1 (opt)
De-aired water system	S355	de-airing tank		1	1	1
	V205	vacuum pump		1	1	1
	V205-10	vacuum regulator		1	1	1
	V205-12	moisture filter		1	1	1
	V230-03	rubber tube 3 m		1	1	1
Pore pressure system and measure	S350	air/water interface pressure system	A144	6	6	6
	S351	laboratory air compressor 17 bar (only if S350 system is chosen)	V207	1	1	1
	S350-04	membrane for air/water cell (spare) (only if S350 system is chosen)		1 (opt)	1 (opt)	1 (opt)
	S350-05	pressure regulator (spare) (only if S350 system is chosen)		1 (opt)	1 (opt)	1 (opt)
	S355-01	filter unit		1	1	1
	S340	dial gauge unit 4 valves (only if S350 system is chosen)	S341	3	3	3
	S345	screw pump		3	3	3
	S348	distribution unit		3	3	3
	S350-01	2-way distribution valve		6	6	6
	S336-51	pore pressure transducer 2000 kPa (cell pressure + pore/back pressure)	S336-50	-	6	6
	S336-55	de-airing block		-	6	6
	S336-31	extension cable 5 m	S336-30..32	-	6	6

	S356	differential mercury manometer		3 (opt)	-	-
		mercury 1000 g (cannot be supplied)		3 (opt)	-	-
	S353	null indicator		3 (opt)	-	-
Measure of Volume change	S358	double burette system	S338N	3	-	-
	S377	dial gauge 25 mm (only if S338 system is chosen)		3	-	-
	S335-15	universal coupling pliers (only if S338 system is chosen)		3	-	-
	S338-05	mounting device for pliers (only if S338 system is chosen)		3	-	-
	S338-01 KIT	automatic volume gauge	S338N	-	3	3
	S336-12	displacement transducer 25 mm	S336-16	-	3	3
	S336-31	extension cable 5 m	S336-30..32	-	3	3
	S335-15	universal coupling pliers		-	3	3
	S338-05	mounting device for pliers		-	3	3
	S337-51	calibration process for displacement transducer		-	3 (opt)	3 (opt)
Specimen preparation and Accessories	S310	rubber membrane (10 pcs) (accordingly to specimen dimensions)	S310-01..03	1+	1+	1+
	S311	"O" ring (10 pcs) (accordingly to specimen dimensions)	S311-01..03	1+	1+	1+
	S312	membrane stretcher (accordingly to specimen dimensions)	S312-01..03	1	1	1
	S313	split former (accordingly to specimen dimensions)	S313-01..03	1	1	1
	S314	top cap with drainage (accordingly to specimen dimensions)	S314-01..03	3	3	3
	S315	base adapter for cell (accordingly to cell model and specimen dimensions)	S315-01..07	3	3	3
	S316	porous disc (2 pcs) for CD/CU/UU tests (accordingly to specimen dimensions)	S316-01..03	3	3	3
	S317	plain disc (2 pcs) for UU test only (accordingly to specimen dimensions)	S317-01..03	1	1	1
	S318	"O" ring for base adapter (accordingly to specimen dimensions)	S318-01..03	1+	1+	1+
	S319	filter paper for lateral drainage (50 pcs) (accordingly to specimen dimensions)	S319-01..03	1+	1+	1+
	S320	filter paper for base (100 pcs) (accordingly to specimen dimensions)	S320-01..03	1+	1+	1+
	S122-13	stainless core cutter (accordingly to specimen dimensions)	S122-14..16	1	1	1
	S123-13	dolly for extraction (accordingly to specimen dimensions)	S123-14..16	1	1	1
	S321	drainage burette 10 ml	S322	1	1	1
	S325	nylon tube dia. 6x4 (20 m)		9	9	9
	S326	terminal for connection tube (10 pcs)		2+	2+	2+
	S327	flaring tool		1	1	1
	S328	vaseline oil (1 kg)		1+	1+	1+
	S329	silicon grease (1 kg)		1+	1+	1+
	S330	grease pump		1	1	1
S331	null displacement valve (spare)		1 (opt)	1 (opt)	1 (opt)	
	S332-02	wearable material and recommended spares (accordingly to cell set)	S332-02..05	1	1	1

(opt) = optional



AUTOMATIC DATA ACQUISITION AND PROCESSING SYSTEM FOR GEOTECHNICAL TESTS

S334 Datatronic 8 channels Cyber-Plus Evolution Touch Screen "Expandable to 16 channels"

NEW

MATEST Equipment
or of other manufacturers

section **S**



462



S334



S301N
Triaxial
UU - CU - CD tests



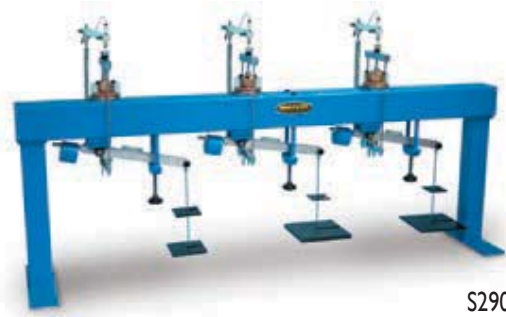
S260
Consolidation test



S277
Direct/Residual shear tests



S359
Consolidation frame
for triaxial specimens



S290
Consolidation frame
for shear boxes and consolidation cells

MATEST

S334**Datatronic 8 channels Cyber-Plus Evolution Touch Screen
“Expandable to 16 channels”**

This unit is designed and produced to satisfy the requirements of all laboratories, from the small, up to the most complex. 8 channels acquisition and processing data system (expandable to 16 channels, see accessory mod. S334-01), colour “Touch Screen” display, it automatically performs test and data processing. Directly connected to PC via USB, it prints the test certificate. Equipped with slots for external Pendrive or SD Card infinite memory supports. Hardware technical details at pag. 24.

One or more cyber-plus (8 or 16 ch) can be connected to create a network multichannel system. A flexible, customizable and infinitely expandable solution.

Data collection is completely automatic, improving considerably the productivity and cost effectiveness.

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

The system can be used for:

- Oedometer (consolidation) tests
- Direct and residual shear tests (cycle test)
- Triaxial UU, CU, CD tests
- Automatic data acquisition and processing systems permit the utilization of different channels that can be independently calibrated, zeroed and set up in order to visualize the units being measured;
- The appliances contain a modern high speed - high performing 24 bit conversion device;
- The appliances permit to acquire the signals coming from different types of transducers:
- Strain Gauge Bridge and Potentiometric Wide input range available for the electrical signal:

$$\pm 40 \text{ mV} \div \pm 5 \text{ V}$$

Different auxiliary transducer supply available: 3V, 5V

- User interface: Full-color display 320×340 pixel – Touchscreen
- Data storage: The data test can be stored directly into the appliance on a flash memory and be transferred to the PC at the end of the test by USB pendrive or SD card
- Every channel can be set with different sampling modes (linear form, quadratic form, logarithmic form, etc.). The sampling process can be executed with different frequencies: from 50 ms to infinite
- The calibration data are protected by password and they can be transferred to external supports archives.

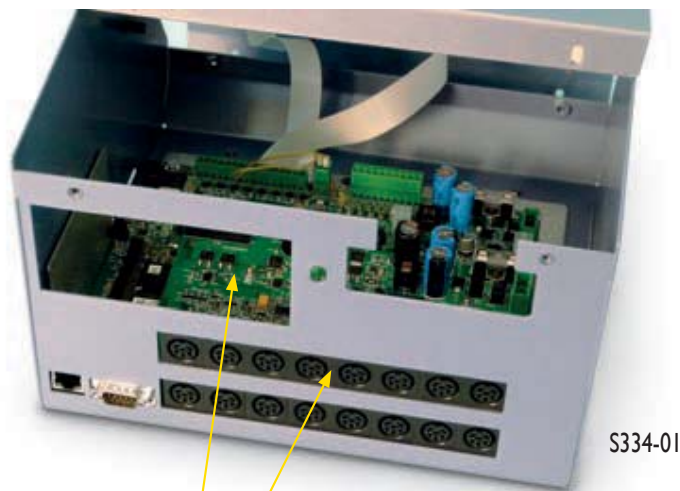
ACCESSORY:

S334-01

8-CHANNEL INTERNAL MODULE, for system expansion to 16 channels.

S334-11 Network connection RJ45 cable.

S334-12 Switch to connect from 2 up to 7 Cyber-Plus (mod. S334) to the Ethernet network.



System expansion to 16 channels.



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 100 kN in the following versions:

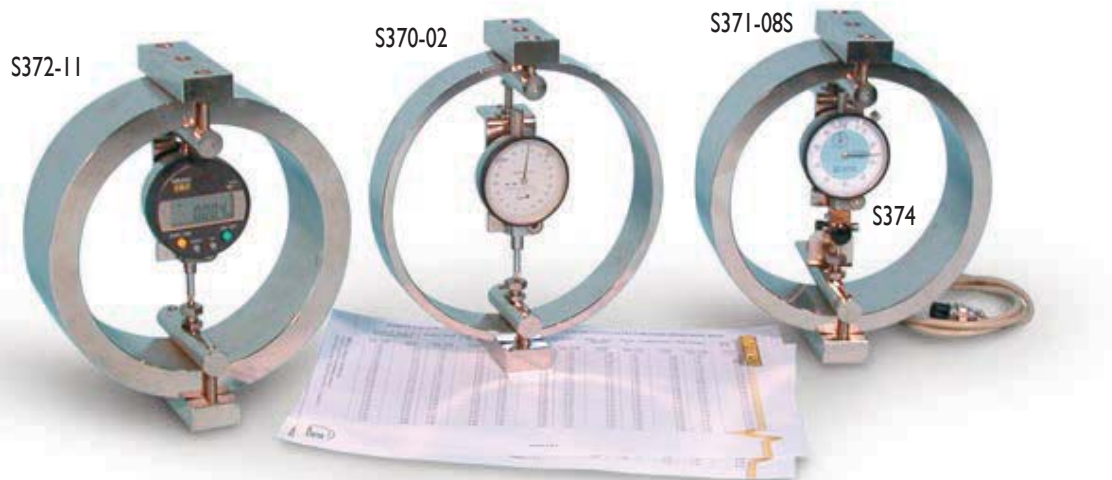
S370 Serie with dial gauge 0,01 mm graduation

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



ACCESSORIES:

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

S374

Stem mechanical brake device, it holds the max. reached value on the dial gauge, with manual zero setting.

S374-02

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

SPARE PART:

S373-05 COUPLING DEVICE between the dial indicator and the load ring.

Dial Indicators

Foreseen on different machines and equipments described in this catalogue.

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

Model	Travel mm	Division mm
S375	5	0,001
S375-01	12	0,002
S376	10	0,01
S377	25	0,01
S378	30	0,01
S379	50	0,01

Digital Dial Indicators

Including battery and RS 232 port for PC connection.

Model	Travel mm	Division mm
S382-01	12,7	0,001
S383	25,4	0,001

ACCESSORY:

S382-13

Software, complete with USB adaptor and cable to connect S382-01 and S383 to PC.

S382-02

Digital Dial Indicator

Travel: 15,3 mm - Division: 0,001 mm
Including battery, but "without" RS232 port.

ACCESSORIES:

S380

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

S374

Stem brake device to hold the max. reached value on the dial gauge.

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

