MATEST®

INNOVATIVE. GLOBAL. MANUFACTURER.

MATERIAL **TESTING** EQUIPMENT

MATEST®

INNOVATIVE. GLOBAL. MANUFACTURER.

A HISTORY OF EXCELLENCE

At the core of our objectives, we have placed value creation, implementing strategies for product and process innovation, while fostering a deep culture of customer service. We have not shied away from aspects such as internationalization, managerial development, digitalization, or the adoption of socially responsible policies.

The challenges we have overcome between continuity and innovation

It is with deep satisfaction that we present the **eleventh edition** of the Matest General Catalogue, which condenses five years of challenges overcome, marked by continuity in tradition while steadfastly embracing change and innovation.

The strong **entrepreneurial culture** of our founder has laid the foundations of a solid and well-capitalized company, vital for having the economic strength necessary to make investments. This culture has facilitated a successful generational transition over the years. Managerial vocation, combined with the dedication of the Matest team and our entire network of distributors, has enabled the company to consistently grow and to effectively implement strategic plans.

We have envisaged a new concept of business in our sector, where the embodiment of our principles and aspirations have created the **Matest Campus**, a hub in which skills, experiences, and prospective needs converge on multiple relational levels, acting as a catalyst for the birth of new projects.

Investing is the key to continuing our mission of serving the customer and satisfying stakeholders. Time is a crucial factor. It is not enough to create a successful company, it must be solid, stable, and long-lasting, generation after generation.

Roberto Maestroni
President

Paola Maestroni
Managing Director

MATEST BUSINESS MODEL

Matest represents a model of excellence, not only for its growth and stability but also for its success in combining technological innovation, quality service, and attention to people's well-being.

EMBRACING OUR ENVIRONMENT

Matest develops technologies that ensure infrastructures and buildings are long-lasting, with a focus on the efficient use of raw materials. The choice of local suppliers supports small and medium-sized enterprises in the area, enhancing the Italian production chain and reducing the environmental impact of logistics.

Self-produced renewable energy

Marisa Maestroni foundation

HUMAN CAPITAL

People are at the heart of Matest's success, positioning itself as an industry of expertise. The focus on employees and distributors creates a comfortable and stimulating work environment, enriched by training initiatives and welfare programmes.

ETHICAL GOVERNANCE

Development strategies are guided by a forward-looking entrepreneurial vision and a commitment to being a benchmark in the industry. Passion, dynamism, and the ethics of the leadership are values conveyed to stakeholders, because the difference in business growth is made by People, who are both participants and creators of this culture.

Breast cancer prevention project

Champion company since 2019

MADE IN MATEST
MADE IN ITALY

Matest's strength lies in the thorough control of the manufacturing process, from design to after-sales support, with a constant commitment to meeting the needs of a global market.

COMPANY WITH
QUALITY SYSTEM
CERTIFIED BY DNV
ISO 9001

1

family-owned company,
that has reached the
second generation

40

years of industry experience

+ 5.000

products comprise the widest
range of testing equipment

35.000 mq

square meters **Matest campus**

15 mln €

stock of finished goods
for just in time deliveries

150

countries served worldwide

BUILDING ON SOLID FOUNDATIONS

Matest laid the foundations of its business in the world of testing machines for concrete, using four-column frames inspired by German design, performing compression and flexural tests according to the most stringent international standards.

Since 2009, Matest has also been accredited as Calibration Laboratory LAT N.00423 for force and deformation measurements, in compliance with EN ISO/IEC 17025 standards and EA and ILAC requirements.

00423

ANTICIPATING TOMORROW

Continuous investments in research and development allow Matest to offer cutting-edge instruments designed to perform complex tests: from tests on fiber-reinforced concrete, which measure energy absorption, to dynamic tests that simulate the stresses induced by vehicular traffic.

Servo Research is Matest's most advanced control unit for hydraulic presses machines, performing customizable automatic tests in load, displacement, and deformation control.

WHEN PERFORMANCE MATTERS

Matest is one of the protagonists of the revolution that has replaced traditional testing on asphalt and bitumen with performance-based evaluations, which simulate the real working conditions of the material and provide useful results for designing durable asphalt mixes.

Thanks to a team of product specialists, Matest has developed a complete range of advanced pavement systems. Skills and experiences which allow us to be members of authoritative industry associations and actively participate in international conferences.

SMARTPULSE

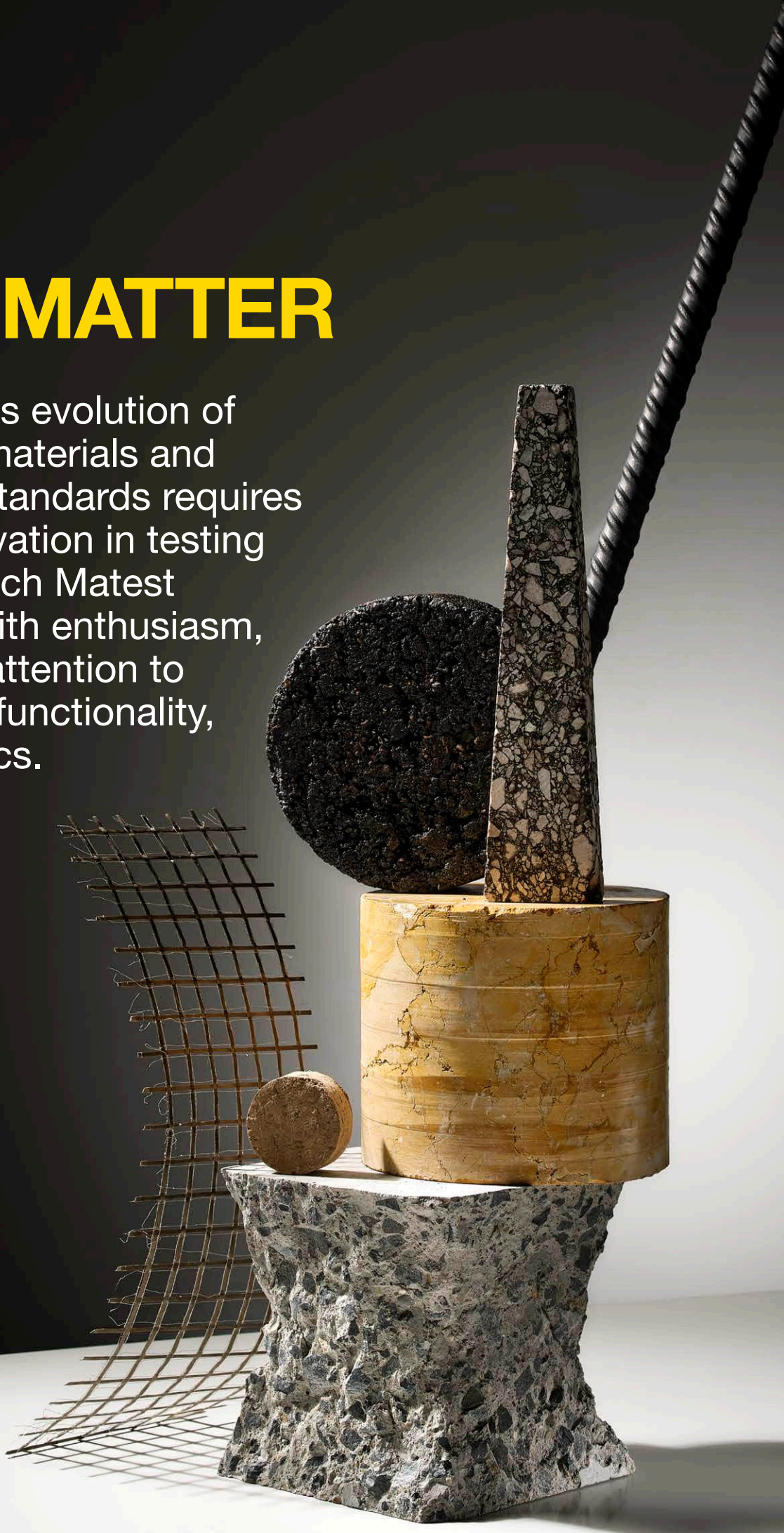
A compact and ergonomic electromechanical machine for static and dynamic tests, capable of performing numerous tests in load, displacement, and deformation control, with controlled temperature. Noteworthy is the wide test chamber and the accessibility provided by the tilting door and its small porthole for use even during ongoing tests.

ASPHALT MIX ANALYZER

The Asphalt Mix Analyzer (AMA) combines all processes related to the separation of components forming the bituminous mixture into a single machine, which can be valued and subjected to any further laboratory analyses. Thanks to its closed-cycle operation, AMA ensures precision of results, quiet operation, and low consumption.

OUR GREY MATTER

The continuous evolution of construction materials and international standards requires constant innovation in testing machines, which Matest approaches with enthusiasm, paying equal attention to performance, functionality, and ergonomics.



SMART SOLUTIONS

We offer not only products but also modern, smart and integrated solutions, that enable complete and efficient laboratory automation.

TESTLAB, THE REFERENCE SOFTWARE FOR ASPHALT

TestLab is recognized as the reference software in asphalt research centres worldwide for its efficiency and precision in the most sophisticated tests, especially dynamic ones, as it can ensure perfect execution even under the most challenging conditions

Open architecture software

Applications for all asphalt tests

Customization of method files

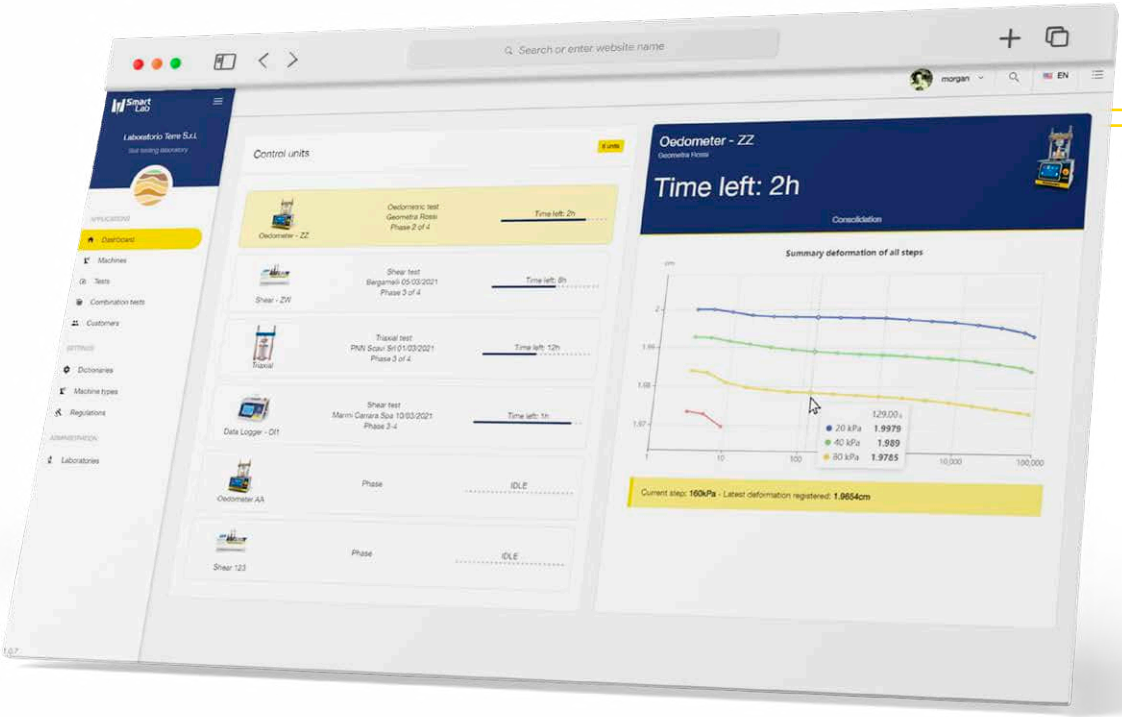
SMARTLAB, THE INNOVATION THAT MAKES A DIFFERENCE

To address the complexities and duration of geotechnical tests, Matest has initiated a complete laboratory automation process, which includes a full range of automatic machines and SmartLab, the innovative and user-friendly software platform for the remote control of all material testing equipment.

An all-in-one platform for multiple test applications

Management of an unlimited number of machines

Remote and real-time test control



A GLOBAL SERVICE

Developing innovative products is our strength, but customer service remains our priority. Matest relies on a team of expert technicians, ready to interpret customer needs and intervene to resolve any issues promptly and effectively.

We guarantee an ultra-long lifespan of over twenty years for our products. Even for the oldest machines, we have original spare parts, ensuring our customers operational continuity and maximum reliability over time.

WORLDWIDE

Our presence is global thanks to a widespread network of distributors, whose specialized technicians operate under the supervision of Matest and receive thorough and continuous training on the operation and maintenance of the machines.

BUYER'S GUIDE

The 11th Edition of Matest catalogue contains a wide range of products, accessories and spare parts which are all identified by a specific code number and divided in sections.

1. **Section Color**
   Each section is identified by a letter and a color.

2. **Standards**
   The most important International Standards referring to the product are mentioned.

3. **Main Features**
   This box describes the product and its main characteristics. All dimensions and weights mentioned in this catalogue are approximate and do not bind Matest company.

4. **Product Codes**
   All item's codes have an initial letter, corresponding to the specific section, and a progressive number which identifies each product.

5. **Electrical Specifications**
   Voltage, Phase, Frequency and Wattage information are specified at the end of the product description. Special voltages and Hz versions are available on request.

6. **Accessories**
   They are additional items that complement, enhance, or enable the use of the main product but are not included as part of its standard package.
   Accessories may be divided into recommended, optional and needed.

7. **Spares**
   Spares to a product are replacement parts or components that are already included with the main product but are also available for purchase separately. These are essential for maintenance, repair, or prolonged use of the product, ensuring that it remains functional over time.

1

SECTION S | SOIL 495

4 S279

LARGE SHEARMEC
300 mm DIRECT SHEAR NEW

ELECTROMECHANICAL SHEAR MACHINE FOR LARGE-SIZED SAMPLES

2 STANDARDS: ASTM D3080 I ASTM D6243 I EN ISO 12957

Large Shearmec is an **electromechanical frame** designed by Matest to perform direct and residual shear tests on samples with coarse or medium grain soils, such as gravel. The **stainless steel shear box** has a size of 300x300 mm, in order to accommodate the largest diameter of the grains and obtain shear strength values for the sample as a whole, not just for the single particles. The shear force and the vertical pressure are applied by 2 electromechanical actuators of 100 kN each, with a travel of 150 mm and 75mm respectively. Stresses are measured by 2 electronic load cells of 100 kN, one for the horizontal force and one for the vertical pressure. To facilitate the sample insertion and access to the test area, Matest has developed an innovative upper plate lifting system with self-locking joint which guarantees the axiality of the load. In addition, the lifting device (S279-25) allows to easily remove/insert the shear box, for a safer specimen insertion. The **Cyber Plus Progress** unit, based on a closed-loop control, manages the system completely and automatically, from data acquisition to real-time graph display. The machine can be controlled even remotely through **SmartLab**, the innovative **software platform** which allows both data acquisition and processing and test results export. Large Shearmec can be configured to perform tests on geosynthetic materials as well.
The machine is supplied complete with shear box, load cells, displacement transducers and containment plates.

5 **Power supply:** 230V 1F 50-60Hz 2kW
Dimensions: 165x78x(h)145 cm.
Weight: 750 kg approx.

3 MAIN FEATURES

- Load application system via electromechanical actuators
- Configurable for both soil tests and geosynthetic materials
- Maximum vertical load 100 kN
- Maximum horizontal load 100 kN
- Specimen insertion system facilitated via an upper tilting plate
- Upper plate equipped with ball joint
- Liquid collection containers on the work top
- Test fully configurable from 7-inch display
- Data storage on USB key
- Smartlab software available for remote control of the machine with data and results management

S279

RECOMMENDED ACCESSORIES

SSW-LINK FIRMWARE UPGRADE to enable SmartLab software. For fully automatic data control, acquisition, processing and display of direct/residual shear tests, with graphics on all the test phases (see p. 20)

TECHNICAL SPECIFICATIONS

- Sample size: shear box 300 x 300 x 150 mm
  optional accessory: shear box 150 x 150 mm
- Vertical and horizontal loads: 100 kN
  (100 kN horizontal and vertical load cells)
- Speed: from 0.00001 to 12.00000 mm/min
- Travel: 75 mm
- Consolidation steps: up to 50
- Control and data acquisition:
  Cyber-Plus Progress 8 channels + PC software (optional)
- Drive: both axis consolidation and direct/residual shear.

ACCESSORIES

S279-20 Shear box 150x150 mm
S279-21 Pair of shear plates 150x150 mm for S279-20
S279-25 Shear box lifting device

SPARE PARTS

S279-10 Shear box 300x300 mm
S279-11 Pair of shear plates 300x300 mm
S336-14 Displacement transducer, 50 mm travel
S336-13 Displacement transducer, 100 mm travel

MATEST

7

6

Matest © Copyright 2025 – No parts of this catalogue may be reproduced without the written permission of Matest. Matest's ongoing research and development could result in new products not yet included in this catalogue. Some new items might be available, others might be discontinued. The pictures and descriptions herein do not bind the company, Matest thus reserves the right to alter any product specifications at any time without notice.

INDEX

SECTION AA | **Software** 18

SECTION A | **Aggregates – Rocks** 22

SECTION B | **Asphalt** 74

SECTION B | **Bitumen** 137

SECTION B | **Pavement Technology** 165

SECTION C | **Concrete** 206

SECTION E | **Cement - Mortar** 354

SECTION H | **Steel** 396

SECTION S | **Soil** 424

SECTION V | **General Equipment** 532

INDEX | **Analytical Index** 559

INDEX | **Standards Index** 570

INDEX | **Product Code Index** 578

SMARTLAB
INNOVATIVE SOFTWARE PLATFORM

SmartLab is an innovative software platform developed by MATEST for remote control and data acquisition of construction materials testing instruments.

One software for multiple tests

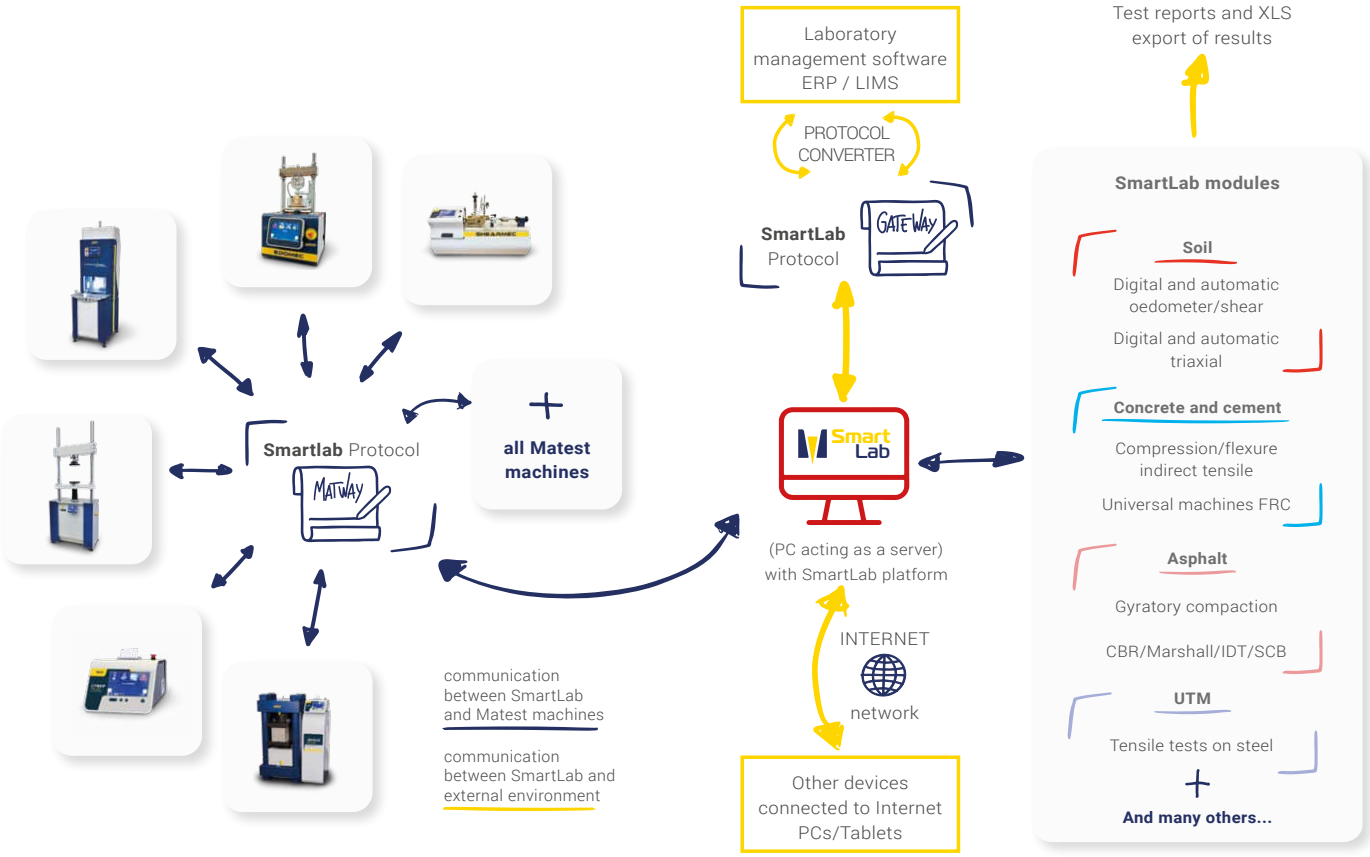
SmartLab is based on a modular and flexible approach to allow each laboratory to configure the software to its specific needs.

The test modules are collected into large groups which can be expanded for future requirements:

- **SmartLab Soil**, includes modules for consolidation, triaxial, shear tests as well as data acquisition modules for general soil applications;
- **SmartLab Concrete**, includes several modules for compression/flexure/indirect tensile tests, as well as advanced tests such as modulus of elasticity, displacement/energy absorption control, dynamic load application;
- **SmartLab Roads**, includes several modules for tests on asphalt and bitumen;
- **SmartLab UTM**, for tests on Universal Testing Machines.
- **SmartLab for general Data Acquisition**

By using a Matest digital controller and a suitable firmware upgrade (SSW-LINK), any testing machines – including those from other brands - can be connected to the SmartLab platform and begin running a test. Its sustainable approach enables the operation of an unlimited number of testing machines with just a single computer and the elaboration of digital reports without the need for paper documents.

How does SmartLab work?



Main Features

Remotely accessible from any device

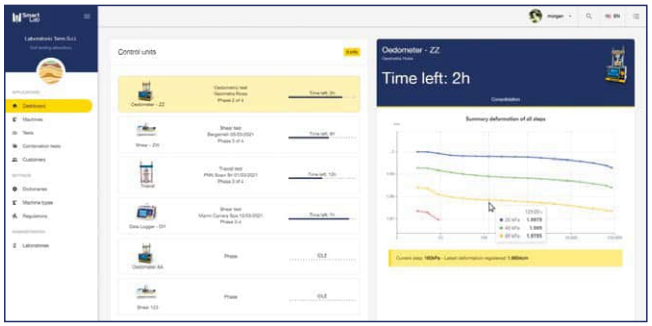
SmartLab is installed on a local laboratory PC that acts as a server and, via the internet, it can be easily and fully utilised remotely from an unlimited number of devices, including tablets. Lab technicians can monitor the progress of the tests, start or stop the machines, share data, start processing, etc. The remote connection also allows them to share selected test information with their customers, e.g. load vs. time diagrams, start/stop times, etc., even while the test is running, making it extremely easy to track results.

Simultaneous connection of machines

Dozens of Matest machines, independently of each other, can be simultaneously and efficiently handled by SmartLab, with the possibility to be expanded and updated over time. SmartLab will become the central hub of the laboratory, creating an interconnected network for the management of all the machines, enhancing efficiency and reducing operative times.

Real time dashboard display

SmartLab menus, screens and interface are extremely user-friendly and allow monitoring and access to all connected machines. Particular care has been taken to design a multi-level structure dashboard: a general screen provides an overview of all machines in the laboratory; for each machine it is possible to check its current operations and open the preview of a single running test.



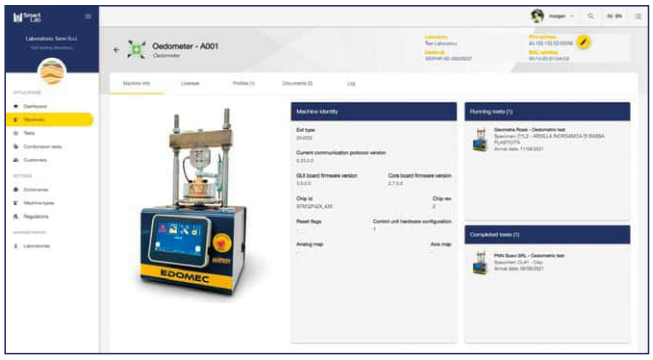
Dashboard display for real-time control of testing equipment status

High reliability and safety

Data protection is guaranteed by strict access control and redundant data archiving. SmartLab is developed by experts, who are well aware of the increasing demand for data protection, so the archiving is particularly structured and the management of authorised login accounts adopts the latest security requirements.

Secure and stable communications

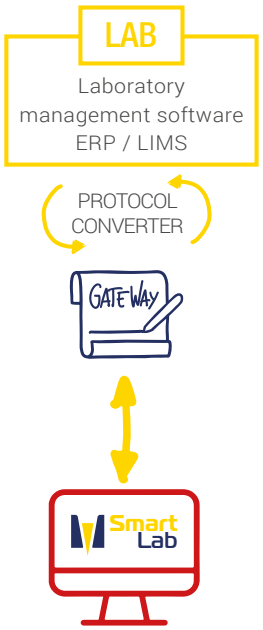
We devised and implemented a completely new communication protocol, SmartLab MATWAY, to allow SmartLab exchanging data with all Matest machines, operating them remotely, acquiring data, and monitoring the test execution. This protocol was validated after a series of rigorous tests under different conditions that proved its reliability.



User-friendly and intuitive interface

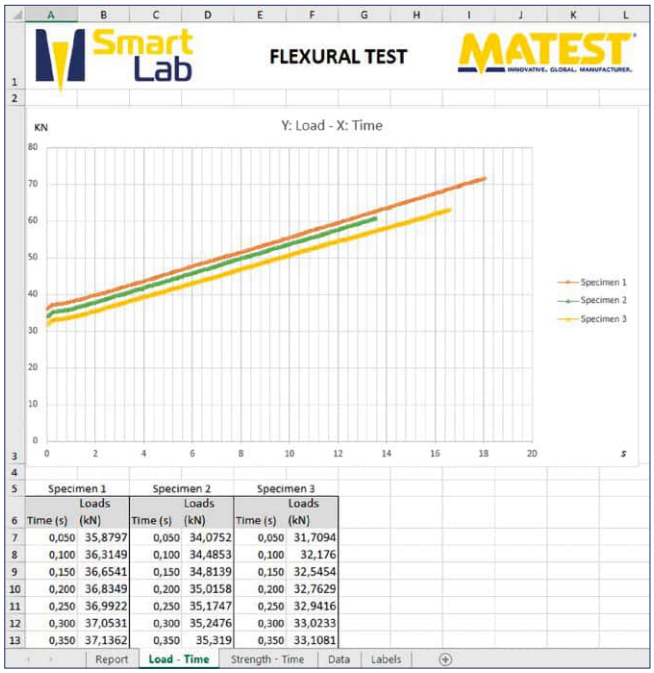
Compatible with LIMS and ERP management software

Each laboratory has its own LIMS/ERP management software, designed according to its customized needs. SmartLab is set up to communicate with any LIMS or ERP via a dedicated protocol called SmartLab Gateway and, through a specific protocol converter, data can flow automatically from/to SmartLab, thus increasing efficiency and preventing human errors.



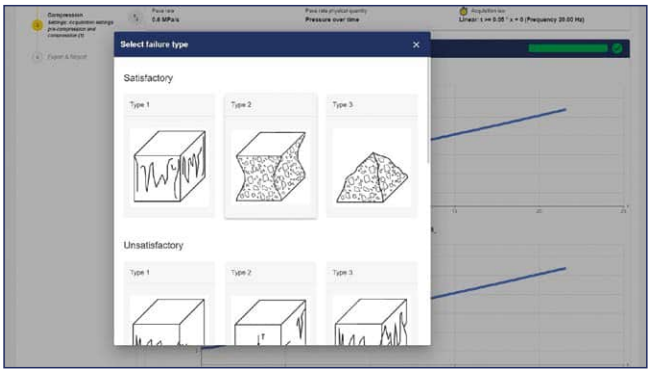
Automatic compilation of test reports

SmartLab provides excellent functions to customize and issue comprehensive, intuitive and easy-to-export test reports, which are essential for any laboratory. SmartLab offers a predefined report
template, in which descriptive data and test results are collected and organized according to the relevant standard. It is also possible to produce a cumulative report of multiple tests previously performed.

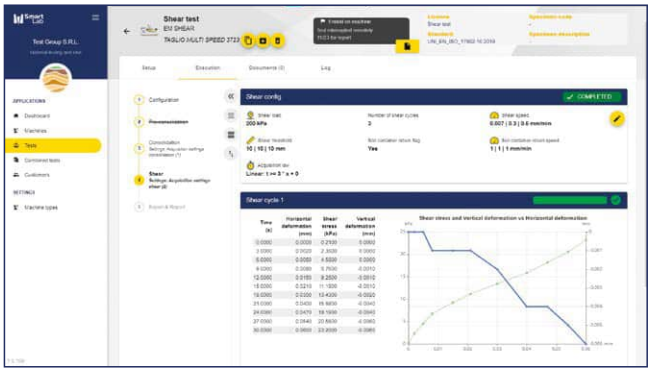


Specimen 1		Specimen 2		Specimen 3	
	Loads		Loads		Loads
Time (s)	(kN)	Time (s)	(kN)	Time (s)	(kN)
0,050	35,8797	0,050	34,0752	0,050	31,7094
0,100	36,3149	0,100	34,4853	0,100	32,176
0,150	36,6541	0,150	34,8139	0,150	32,5454
0,200	36,8349	0,200	35,0158	0,200	32,7629
0,250	36,9922	0,250	35,1747	0,250	32,9416
0,300	37,0531	0,300	35,2476	0,300	33,0233
0,350	37,1362	0,350	35,319	0,350	33,1081

Excel report of three flexural tests



Failure type selection at the end of the test



Display of shear strength, horizontal and vertical deformation curves

In order to use the SmartLab software, it is necessary to purchase the firmware license:
SSW-LINK FIRMWARE UPGRADE which unlocks up to three Matest machines/readout units. SSW-LINK is the code that represents the enabling for SmartLab use of up to 3 digital units of the Cyber-plus Progress type (touchscreen interface) independently of their field of application.

Examples:

- 3 compression machines
- 3 dataloggers
- 2 compression machines and 1 datalogger
- 1 triaxial system for soil (= 1 digital unit) and 2 automatic oedometers
- 3 manual oedometers (= 1 digital unit) and 2 shear machines
- 1 triaxial system for soil with up to 3xPVC (up to 4 digital units). This is the only case where 1 SSW-LINK can enable 4 digital units.
- Other combinations

ACCESSORIES

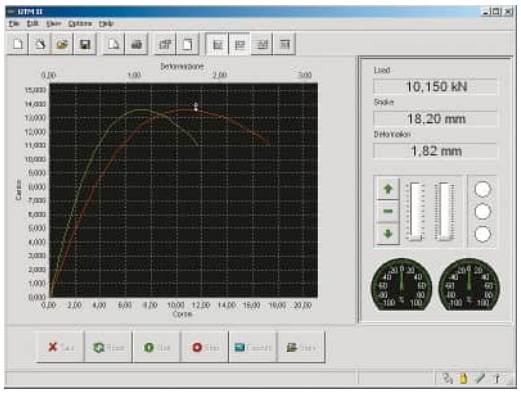
SSW-GWAY SmartLab Gateway, communication protocol for connection to LIMS and ERP.

SPC High performance PC with SmartLab Software already installed: CPU Intel Core i5 or AMD Ryzen 5, 16GB RAM memory, 100GB mass memory dedicated to SmartLab.

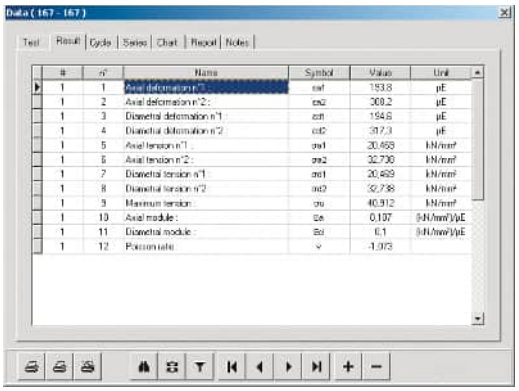
Windows 11 64-bit: Home or Pro version 21H2 or higher, Enterprise or Education version 21H2 or higher. Windows 10 64-bit: Home or Pro 21H1 (build 19043) or higher, Enterprise or Education 20H2 (build 19042) or higher.

UTM2 SOFTWARE

UTM2 is the alternative software for the management of machines that are not yet controlled by SmartLab.
It is based on preset test profiles that are customizable, savable and reusable, in accordance to the specifications of the main standards. This is to facilitate the operator's work and reduce the likelihood of human error.
By connecting the PC to the testing machine, it is possible to easily set up and perform tests. During the test, the screen shows instant loads, provides an instant definition of the load/deformation/stroke graph, and allows remote control of the machine main functions. At the end of the test, final calculations are executed and saved into the software archive, with the option to retrieve them later.
The software also facilitates the printing of test reports by suggesting a preset layout that can be modified and customized by the user.
The code for the software is SSW-UTM2.



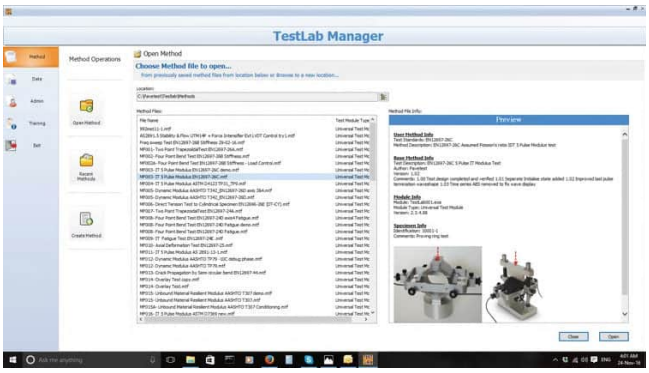
Software indirect tensile test



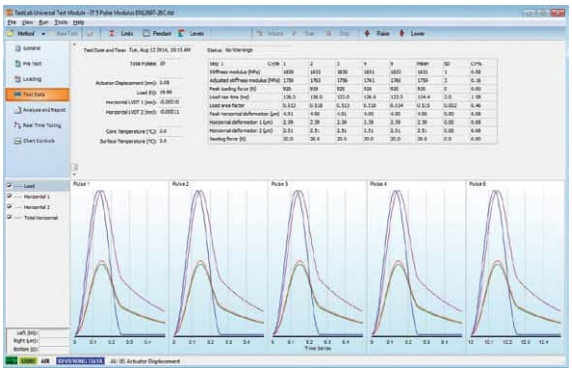
Test data

TESTLAB SOFTWARE

Developed with ultimate flexibility in mind, TestLab test and control is the software for managing and running tests on all **Pavetest's machines**.
The TestLab software is supplied with CDAS2 Control and Data Acquisition System. By using pre-programmed **Method files**, an inexperienced operator can run a range of international test methods without the need for any programming.
Moreover, a test **Wizard**, available with popular tests, can guide the operator step by step based on a recipe book approach. Most importantly, the experienced engineer and/or researcher need not be constrained by the functions and analysis in the method files provided. The operator may clone, modify and/or generate his/her own method file to suit their specific requirements. The Excel based data analysis offers the operator the flexibility to implement alternative analysis and customize reporting facilities.
TestLab allows for real time graphing of results and configurable real time transducer levels display with unprecedented clarity of results and analytical power.



Selection of Method Files



Test Data - EN12697-26C
Indirect tension to cylindrical specimens

SECTION A

AGGREGATES ROCKS

Aggregates represent the main material used in the construction industry to produce concrete, bituminous conglomerates, plasters, road and railway subgrades, etc. International and EN European Standards require many tests on different aggregate properties, including mechanical, physical, geometrical, density, strength and degradability.

A special focus is placed on Rocks with the study of its mechanical characteristics, when subjected to stress conditions such as excavations, handlings, quarries and foundations.

GENERAL PURPOSE DRYING OVENS FORCED VENTILATION

A MORE UNIFORM TEMPERATURE WITH ON/OFF SWITCH OF THE FAN

Designed for drying, baking, conditioning and moisture determination. Sturdy manufacture, double walled with 60 mm thick glass fibre for thermal insulation.
Exterior front part is stainless steel made, while interior chamber, grid shelves and external walls are made of zinc coated steel.
Temperature from ambient to 200 °C is controlled by a **digital precision thermoregulator-indicator**. The ovens are equipped of a power switch industrial type, **dual safety thermostat** with higher thermic threshold to prevent accidental over-temperatures, and a solid-state relay (SSR) to ensure safe working conditions.
The oven is supplied complete with two grid shelves easily removable, which can be positioned at various heights, with pilot light, and exhaust holes for fast cooling.

Power supply: 230V 50-60Hz 1ph

A005-04

A005-04 Detail of the fan

Model	Capacity litres	Inside dimensions mm L D H	Outside dimensions mm L D H	Doors n°	Wattage	Weight kg	Spare grid shelf
A005-01	100	400x420x600	680x685x790	1	1200	40	**A007-51**
A005-04	220	600x620x600	880x885x790	1	2000	60	**A007-52**
A005-05	220	900x410x580	1190x640x745	2	2400	90	**A007-54**
A005-08	440	900x690x820	1180x925x940	2	3600	85	**A007-53**

ACCESSORY

A006-08A Alcohol control thermometer 0-300 °C, div. 1 °C.

A005-08

LABORATORY OVENS, FORCED VENTILATION, DIGITAL THERMOSTAT

HIGH TEMPERATURE UNIFORMITY AND PRECISION

STANDARDS: EN 932-5 I EN 1097-5 I BS 1924 :1
ASTM C127, C136, D558, D559, D560, D698, D1557, D1559

Especially suitable when high temperature uniformity and precision inside the chamber are required.
The temperature accuracy and uniformity meet the tolerances requested by the Standards.
The interior chamber, the grid shelves and the exterior front part are stainless steel made, while external walls are made of zinc coated steel.
Sturdy manufacture, double walled with 60 mm thick glass fibre for thermal insulation.
Temperature from ambient to 200 °C is controlled by a digital precision thermoregulator-indicator. The oven is equipped with a dual safety thermostat with higher thermic threshold to prevent accidental over-temperatures, and to ensure safe working conditions.
The oven is supplied complete with two grid shelves easily removable which can be positioned at various heights with pilot light and exhaust holes for fast cooling.

Power supply: 230V 50-60Hz 1ph

A008-07

Model	Capacity litres	Inside dimensions mm L D H	Outside dimensions mm L D H	Doors n°	Wattage	Weight kg	Spare grid shelf steel
A008-01	100	400x420x600	700x515x910	1	1250	45	**A008-51**
A008-03	220	600x610x600	900x725x910	1	2050	70	**A008-52**
A008-05	440	900x700x700	1250x760x1000	2	3700	95	**A008-53**
A008-07	750	900x640x1300	1250x700x1600	2	4950	140	**A008-54**

MAIN FEATURES

- Forced ventilation airflow.
- Digital temperature control system.
- Temperature precision and uniformity as requested by EN, BS Spec.
- Stainless steel chamber and trays.
- Insulation by 60 mm thick glass fibres.
- Dual thermostat ensuring safe working conditions.

A008-05

ACCESSORY

A006-08A Alcohol control thermometer 0-300 °C div. 1 °C.

HIGH END LABORATORY OVENS. FORCED VENTILATION, DIGITAL THERMOSTAT

HIGH TEMPERATURE UNIFORMITY UP TO 300 °C

STANDARDS: EN 932-5 I EN 1097-5 I ASTM C127, C136, D558, D559, D560, D698, D1557, D1559 I BS 1377 :1, 1924 :1 I UNE 103300

MAIN FEATURES

- Forced ventilation airflow.
- 300 °C maximum temperature.
- High temperature (uniformity ± 2% and precision ± 0.3 °C) fully compliant with Standards.
- Air outlet control by valves manually operated.
- Regulation of fan speed (0-100%).
- High quality thermoinsulation material.
- Double over heat protection system.
- Low power consumption.
- Stainless steel chamber and trays with silicone gasket.
- PID electronic regulator, double digital display.

This range of laboratory ovens is designed to perform demanding thermal treatment in compliance with Standards.
They are especially suitable when high temperature uniformity and precision inside the chamber are required.
A temperature accuracy of ± 0.3% and a uniformity of ± 2% make this oven the best on the market.
The interior chamber and the grid shelves are stainless steel made, while outside casing is in metal sheet, powder coated in gray.
A sturdy double walled structure with 60 mm thick rock wool (complete lack of asbestos) and silicone gasket assure a strong thermal insulation.
High-precision digital microprocessor temperature controllers fitted with self-tuning and manual PID setting allow a high temperature uniformity and accuracy reducing the energy consumption.
The oven is equipped with a thermomagnetic protection and OTP (over temperature protecion) to prevent accidental over-temperatures, and ensure safe working conditions.
The oven is supplied complete with three grid shelves easily removable and positionable at various heights, with a pilot light and exhaust holes for fast cooling.

Power supply: 230V 50Hz 1ph
400V 50Hz 3ph (for A010-02 and A010-03)

Model	Capacity litres	Inside dimensions mm L D H	Outside dimensions mm L D H	Doors number	Wattage kW	Weight kg	Spare grid shelf stainless steel
A010	120	550x400x580	750x780x880	1	2.2	70	**A010-11**
A010-01	220	730x500x620	930x880x915	1	4	102	**A010-12**
A010-02	420	1000x469x863	1248x890x1227	2	6.2	155	**A010-13**
A010-03	700	915x590x1300	1155x960x1655	2	8	240	**A010-14**

A022
MUFFLE FURNACE 1100 °C

STANDARDS: EN 12697-1 clause C, EN 13108

Designed for high temperature heatings.
Structure composed of in sheet-steel, frontal furnace in diecasted steel to avoid the aggretion of the acid smokes. The thermic insulation in ceramic fibre avoids the smallest heating leakage saving energy accordingly. Electronic regulation of the temperature is obtained through a digital thermostat. This furnace is also used for the determination of residual mineral matter deriving the incineration of bituminous mixtures to (EN 12697-1 clause C Standard).
Max. temperature: 1100 °C
Chamber stability: ± 1 °C
Chamber uniformity: absolute
The chamber is made with refractory material and it is not suitable to test aggessive chemical samples.
Inside dimensions: 200 x 300 x (h) 140 mm
Useful volume: 8.4 litres
Outside dimensions: 500 x 700 x (h)650 mm

Power supply: 230V 1ph 50-60Hz 3.2kW
Weight: 60 kg approx.

A022-01: Identical to A022 but with max. temperature of 1200 °C

A022

A024
CERAMIC FURNACE 1100 °C

STANDARDS: EN 196-2, 196-21, 459-2

Used to determine the loss on ignition of cement and lime; chloride, carbon dioxide, alkali content of cement.
Max. temperature: 1100 °C
Chamber stability: ± 1 °C
Chamber uniformity: absolute
The chamber, ceramic made, is not resistant to aggressive chemical material samples.
Inside dimensions: 145 x 250 x (h) 100 mm
Useful volume: 3.6 litres
Outside dimensions: 400 x 580 x (h)540 mm

Power supply: 230V 1ph 50-60Hz 2kW
Weight: 35 kg approx.

A024-01: Identical to A024 but with max. temperature of 1200 °C

A024

A023
MUFFLE FURNACE 1100 °C

This furnace is also suitable for the "Determination of resistance to thermal shock of aggregates according to EN 1367-5 Specification".
Max. temperature: 1100 °C
Chamber stability: ± 1 °C
Chamber uniformity: absolute
The chamber is made with refractory material and it is not suitable to test aggessive chemical samples.
Inside dimensions: 300 x 470 x (h) 180 mm
Useful volume: 25.4 litres
Outside dimensions: 580 x 920 x (h) 750 mm

Power supply: 230V 1ph 50-60Hz 5kW
Weight: 105 kg approx.

A023-01: Identical to A023 but with max. temperature of 1200 °C

A023-01

ACCESSORY for all Muffle Furnaces

A023-11 TEMPERATURE PROGRAMMER TO SET CYCLES.

CLIMATIC CABINETS
535 AND 1200 LITRES CAPACITY
STANDARD: EN 1367-1

Available in two versions:

- Temperature and humidity controlled from -30 to +70 °C and 20% to 95% respectively for testing concrete, cement, aggregates and many other applications (C313N or C313-01N).
- Only temperature controlled from -30 to +70 °C for the determinations of the behavior and resultance to freezing and thawing of aggregates and different other applications on concrete and building materials (C316N).

For further details, see p. 326

MAIN FEATURES

- Real-Time display of temperature and humidity parameters.
- High quality thermal insulation material.
- Temperature control from -30 to +70 °C with high stability (± 0.15 °C).
- Humidity control from 20% to 95% with ± 5% stability and ± 1% accuracy.

C313N + C313-05N

ADHESIVES FOR TILES
DETERMINATION OF TENSILE ADHESION STRENGTH FOR CEMENTITIOUS ADHESIVES
STANDARDS: EN 1348 I EN 12004

C313-05N
INTERNAL FLOODING SYSTEM

Applicable only to temperature and humidity controlled cabinets C313N, C313-01N.
Used for the determination of tensile adhesion strength for cementitious adhesives.

Control panel

Two stage filter

Technical details, available models and accessories: see p. 327

V023-01

V023-01
MOISTURE DETERMINATION BALANCE

See section " V " General Equipment p. 535

A009
MICROWAVE OVEN

Used for speed drying purposes, moisture determination and conditioning.

Power supply: 230V 50Hz 1ph 700W
Weight: 12 kg approx.

A009

CHLORIDE CONTENT, RAPID METHOD

STANDARDS: BS 812:117 I 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.

A106T
MELTING POT

Stainless steel cup with a capacity of approximately two litres, it is used to melt wax and other materials. Suitable also for general laboratory purposes.
Temperature range: from +45 °C to +320 °C
Capacity: 2 litres

Dimensions:
400x280x200(h) mm.
Power supply:
220V 50Hz 1ph 500W
Weight:
3.2 kg approx.

A106T

HOT PLATES, complete with thermoregulator

Power supply: 230V 1ph 50-60Hz

MODELS

V200	Round Ø 185 mm - 1500 W
V200-02	Round Ø 220 mm - 2000 W
B074	Round Ø 160 mm - 1000 W
V200-01N	Rectangular 200x300 mm - 1500 W
V200-03N	Square 380x380 mm - 2000 W
V200-05N	Rectangular 400x500 mm - 2000 W
V200-06N	Rectangular 400x600 mm - 2000 W

For more technical details:
see p. 552

B073-01

HOT PLATE WITH MAGNETIC STIRRER
Complete with thermoregulator for temperature adjustment and magnetic stirrer with electronic adjustment from 150 to 1500 rpm. Suitable for tests in distilled water with softening point between +30 °C to +80 °C.

Power supply: 230V 1ph 50-60Hz 750W
Weight: 4 kg approx.

A106N
MELTING POT

Used to melt wax and other materials, it maintains heat from room temperature to max. 350 °C.
Complete with adjustable thermostat range +50 °C to +350 °C, accuracy ± 1.5 °C pilot lamp fully isolated to CE requirements.

Capacity: 5 litres
Internal dimensions: Ø 200x160 mm
Power supply: 230V 50-60Hz 1ph 800W
Weight: 3 kg

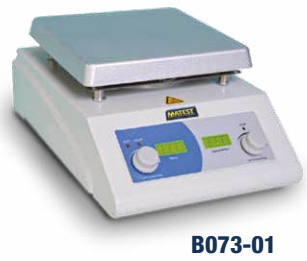
A106-01
MELTING POT

Similar to the above A106 but with capacity of 11.5 litres approx.

Internal dimensions: Ø 270x200 mm
Power supply: 230V 50-60Hz 1ph 1400W
Weight: 8.2 kg approx.

ACCESSORY

V300-19 PARAFFIN WAX, for general laboratory use, having melting point at 50-54 °C. Pack of 5 kg



A028N
UNIVERSAL CARBIDE METER

For a rapid and accurate determination of moisture content in sand, gravel, aggregates, soil etc, based on the calcium carbide method. It is possible to vary the sample weight from 20g to 100g achieving a moisture range 12.5% (20g) - 4.2% (50g) - 2.3% (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, accessories, case but **without ampoules** that have to be ordered separately.

Dimensions: 520x340x140 mm
Weight: 6 kg approx.

A028N

A028 SPN
UNIVERSAL CARBIDE METER

Same as mod. A028N, but with a larger bottle suitable to use 20 g sample weight with a moisture content up to 20%.

A028-01N
DIGITAL UNIVERSAL CARBIDE METER

Same as mod. A028N, but with digital manometer for more accurate readings with pressure and temperature display.

A028-02N
DIGITAL UNIVERSAL CARBIDE METER

Same as mod. A028-01N, with protocol printer to obtain test certificate with up to 7 pressure / time logs.

Weight: 8 kg approx.

A028-02N

A028-12
CALIBRATION KIT

For the universal carbide meters A028N serie, complete with manometer and accessories.

NEEDED ACCESSORIES

A028-11
Carbide Ampoules (pack of 100)

A028-11P
Special ADR packaging for A028-11

A028-11

SPEEDY MOISTURE TESTERS

For accurate moisture reading on field of soil, sand, aggregates. The test system uses the reaction between water and calcium carbide forming a gas. Complete with electronic balance, accessories; portable moulded case **but without reagent tin**.

MODELS

A025-01 SPEEDY MOISTURE TESTER
6 GRAMS CAPACITY.
Moisture range: 0 - 20%
Weight: 6 kg approx.

A026-01 SPEEDY MOISTURE TESTER
20 GRAMS CAPACITY.
Moisture range: 0 - 20%
Weight: 8 kg approx.

A025-01

A026-01

ACCESSORY

A027-11
SPEEDY CALIBRATION KIT

A028-01N

A021-10N
MOISTURE, DIGITAL MICROWAVE PORTABLE METER

For an accurate, fast and easy determination of moisture content in sand, fine and coarse aggregates up to 25 mm diameter.
By using the latest microwave and microprocessor technology, and simply inserting the 5 prongs into the material to be measured, the unit displays the percentage of moisture content.

Measuring range: 0...20% with ± 0.2% accuracy.
Frequency: 50 MHz; USB data link; over 1000 readings storage.
Power: 2 AA batteries
Weight: 1800 g approx.

A021-10N

A021
MOISTURE METER MICROLANCE

This electronic tester directly measures and visualizes on the display the moisture percentage and temperature of sand and fine aggregates up to Ø 10 mm max by inserting the crucible tip. Suitable for both site and laboratory tests.

Moisture range: 0-25%, accuracy 0.5%
Measuring deep: 1000 mm
Temperature range: -20 °C to +60 °C accuracy < 0.5 °C.
Battery: 4x1.5V AA cells
Dimensions: 120x120x1200 mm
Weight: 2 kg approx.

A021-01
MOISTURE METER MICROLANCE

Similar to mod. A021, but with measuring deep up to 2000 mm.

Dimensions: 120x120x2200 mm
Weight: 3 kg approx.

A021

A021 detail

A029
CHAPMAN FLASK

STANDARDS: ASTM C70
AASHTO T142

Used for field determination of the amount of surface moisture in fine aggregates. Graduated to 200 ml between the two bulbs and from 375 up to 450 ml above the second bulb.

Weight: 500 g

A039 A035 A029

DESICCATORS BOROSILICATE GLASS

Complete with perforated porcelain plate.

without vacuum		with vacuum	
A035	Ø 200 mm	A039	Ø 200 mm
A036	Ø. 250 mm	A040	Ø 250 mm
A036-01	Ø 300 mm	A040-01	Ø 300 mm

ACCESSORY

V300-15 DESICCATORS SALTS SILICA GEL BOX 1000 g

A030
REACTION CONTAINER

Standards: ASTM C289 | NF P94-048 | UNI 85209-22
UNI 8520-22

Used for the chemical determination of the potential reactivity of aggregates with alkalies in portland cement concrete.
Manufactured from stainless steel and fitted with an air-tight cover.
Capacity 60 ml approx.

Weight: 2 kg approx.

A030 ASSEMBLED
A030 DISASSEMBLED

SAMPLE SPLITTERS (RIFFLE BOXES)

STANDARDS: EN 933-3 I ASTM C136, 702 I NF P18-553
UNI 8520 I AASHTO T27, T87
BS 812:1, 1377:2, 1924:1 I UNE 83120

Used for splitting materials such as aggregates, sand, gravel and similar into two representative portions. Painted or stainless steel made, they are supplied with two collecting pans.

A063 A062

Model	Material Steel	Slot width	Max. Size Sample mm	Slot Number	Weight kg	Spare collecting pan
A062	Stainless	1-4" - 6.3 mm	5	12	0.8	**A062-02**
A063	Stainless	1-2" - 12.7 mm	10	12	1.2	**A063-02**
A064	Painted	3-4" - 19 mm	13	12	11	**A064-02**
A065	"	1" - 25.4 mm	20	12	11	**A065-02**
A065-01	"	1 1-2" - 38 mm	25	8	11	**A065-02**
A065-03	"	= = - 45 mm	35	8	12	**A065-04**
A066	"	2" - 50.8 mm	40	8	13	**A066-02**
A067	"	2 1-2" - 63.5 mm	50	8	18	**A067-02**

A064 ... A067

A068-05

A068

LARGE CAPACITY SAMPLE SPLITTER

STANDARDS: EN 933-3 I ASTM C136 I NF P18-553 I UNI 8520
AASHTO T27, T87 I BS 812:1, 1377:2, 1924:1
UNE 83120

Designed for the reduction of test samples which are too large in volume to be conveniently handled. Suitable for any material from sand sizes up to Ø 108 mm. Each chute bar is 12 mm wide to get openings of 12 - 24 - 36 - 48 - 60 - 72 - 84 - 96 - 108 mm. Complete with two collecting pans. Clam shell hopper: 30 litres capacity. Very sturdily constructed, it is totally galvanized for rust protection. **Weight:** 55 kg approx.

A068

ACCESSORY

A068-05 SCOOP steel made to collect aggregates.
Dimensions: 700x300x100 mm.
Weight: 5 kg approx.

A068-11 WHEELS (Kit of 4) with brake for an easy displacement of the large splitter in the laboratory.

A068-11

SPARE

A068-01 Collecting pan for mod. A068

BULK DENSITY AND VOIDS MEASURES

STANDARDS: EN 1097:3 I ASTM C29 I BS 812
UNI 8520 :6 I ISO 6872 I CNR N. 62, 63, 64

Used to determine the loose bulk density and voids of aggregates. Stainless steel made, the 10, 20 and 50 litres models have handles.

A069-02 A069-01

A069 Measure 1 litre cap.
A069-01 Measure 5 litres cap.
A069-02 Measure 10 litres cap.
A069-03 Measure 20 litres cap.
A069-04 Measure 50 litres cap.

BAR (GRID) SIEVES
FOR AGGREGATE FLAKINESS INDEX AND PARTICLE SHAPE

STANDARDS: EN 933-3 I UNI 8520-18 I NF P18-561 I NLT 354

The frame is anodized aluminium made and the grids are **stainless steel rod bars having diameter from 5 to 15 mm** according to the slot widths.
Sieve sizes, slot width tolerances and rod bars diameter are checked one by one, and meet EN 933-3 Standard.
Each sieve is supplied complete with identification serial number label.

Sieve dimensions: 271x271x75 mm
Weight: 2 kg each sieve.

A048N-KIT

Model	Slot width mm
A048-01	2.50
A048-02	3.15
A048-03	4.00
A048-04	5.00
A048-05	6.30
A048-06	8.00
A048-07	10.00

Model	Slot width mm
A048-08	12.50
A048-09	16.00
A048-10	20.00
A048-11	25.00
A048-12	31.50
A048-13	40.00
A048-17	50.00

A048N-KIT COMPLETE SET of 14 bar sieves from 2.5 (A048-01) to 50 mm (A048-17) slot width.

A048-14 BAR GRID SIEVE, slot width 9.5 mm. Used to check the wear of the spheres of the Micro-Deval having nominal size 10 mm.

ACCESSORIES for BAR (GRID) SIEVES

A048-20 KIT OF TWO DEVICES, anodized aluminium made, complete with stainless steel screws, to fix one bar sieve over another one, in order to get a cascade to be fitted on mechanical sieve shakers.

A048-21 COVER for Bar Sieves, anodized aluminium made.

A048-22 RECEIVER for Bar Sieves, anodized aluminium made, complete with coupling device to be fixed to the Matest shakers mod. A059-02-KIT I A059-03-KIT I A059-04-KIT A060-01

FLAKINESS SIEVES

STANDARD: BS 812:105.1

Used to determine if aggregate is flaky; i.e. if thickness is less than 0.6 of nominal size. Manufactured from heavy steel sheet, they have dimensions as specified by Standards and are available in the following size openings:

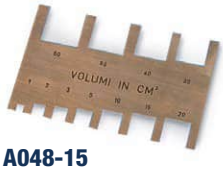
Model	Slot width mm	Slot length mm
A049-01	4.9	30
A049-02	7.2	40
A049-03	10.2	50
A049-04	14.4	60
A049-05	19.7	80
A049-06	26.3	90
A049-07	33.9	100

A049-KIT
COMPLETE SET of n°7 flakiness sieves.
Weight: 15 kg approx.

A048-15
GAUGE FOR AGGREGATE FLATNESS INDEX

STANDARD: UNI 8520 part. 18

Used to determine the volume of each circumscribed sphere.
Made of heavy brass sheet.



A048-15

TEST SIEVES

STANDARDS: EN 933-2 I ISO 3310-1, ISO 3310-2, ISO 565 I ASTM E 11 I BS410 I NF X11-504 I UNI 2331, UNI 2333 I DIN 4187-1 I UNE 7050

All sieves are made with stainless steel woven wire and frame and meet International Specifications.
Perforated plates are made of tinned steel, both square and round holes.
The sieves are available in the following diameters: 200 - 250 - 300 - 315 - 400 - 450 mm and 8”-12”.
Their apertures are clearly marked on the label, including the serial number for the identification and traceability of the sieve.
Each sieve is supplied complete with certificate of conformity.

HOW TO BUY WOVEN WIRE MESH SIEVES

STANDARDS: ISO 3310-1 I EN 933-2, I BS410 I UNE 7050
DIN 4187-1 I NF X11-504 I UNI 2331, 2333
ASTM E11

The available openings of the woven wire mesh sieves are listed in the next pages and are coded from n° 00 to 77.
The buyer has to add to this number:

A052-… for the frame Ø 200 mm
A051-… for the frame Ø 250 mm
A053-… for the frame Ø 300 mm
A054-… for the frame Ø 315 mm
A055-… for the frame Ø 400 mm
A044-… for the frame Ø 450 mm
A050-… for the frame Ø 8”
A043-… for the frame Ø 12”

A052-...

Note: It is possible to test approx. 1000 g of material by using Ø 200 mm sieves; and 3000 g with Ø 300 mm sieves.

HOW TO BUY PERFORATED PLATE SIEVES

“Square Hole”

STANDARDS: EN 933-2 I ISO 3310-2 I BS 410 I DIN 4187-1

The available openings of the perforated plate square hole sieves are listed in the next page, and are coded from n° 01 to 37
The buyer has to add to this number:

A031-… for the frame Ø 200 mm
A032-… for the frame Ø 300 mm
A033-… for the frame Ø 400 mm
A051SP-… for the frame Ø 250 mm

A031-...

Note: EN 933-2 Standard specifies that “sieves with opening 4 mm and over shall be perforated plate square hole”. Below 4 mm they shall be woven wire.

A037-...

HOW TO BUY PERFORATED PLATE SIEVES

“Round Hole”

STANDARDS: UNI 2334

The available openings of the perforated plate round hole sieves are listed in the next page, and are coded from n° 01 to 38
The buyer has to add to this number:

A037-… for the frame Ø 200 mm
A038-… for the frame Ø 300 mm

A041 Official UKAS sieve calibration certificate

TABLE OF THE WOVEN WIRE MESH SIEVES

STANDARDS: EN 933-2 I ISO 3310-1 I ASTM E11 I UNI 2331, UNI 2333 I UNE 7050 I BS 410 I DIN 4187-1 I NF X11-504

Aperture Size mm	ASTM Number	Frame Ø 200 mm	Frame Ø. 300 mm
0.020	635	**A052**	**A053**
0.025	500	**A052-00**	**A053-00**
0.038	400	**A052-01**	**A053-01**
0.040	-	**A052-02**	**A053-02**
0.045	325	**A052-03**	**A053-03**
0.050	-	**A052-04**	**A053-04**
0.053	270	**A052-05**	**A053-05**
0.063	230	**A052-06**	**A053-06**
0.075	200	**A052-07**	**A053-07**
0.080	-	**A052-08**	**A053-08**
0.090	170	**A052-09**	**A053-09**
0.100	-	**A052-10**	**A053-10**
0.106	140	**A052-11**	**A053-11**
0.125	120	**A052-12**	**A053-12**
0.150	100	**A052-13**	**A053-13**
0.160	-	**A052-14**	**A053-14**
0.180	80	**A052-15**	**A053-15**
0.200	-	**A052-16**	**A053-16**
0.212	70	**A052-17**	**A053-17**
0.250	60	**A052-18**	**A053-18**
0.300	50	**A052-19**	**A053-19**
0.315	-	**A052-20**	**A053-20**
0.355	45	**A052-22**	**A053-22**
0.400	-	**A052-23**	**A053-23**
0.425	40	**A052-24**	**A053-24**
0.500	35	**A052-25**	**A053-25**
0.600	30	**A052-26**	**A053-26**
0.630	-	**A052-27**	**A053-27**
0.710	25	**A052-28**	**A053-28**
0.800	-	**A052-29**	**A053-29**
0.850	20	**A052-30**	**A053-30**
1.000	18	**A052-31**	**A053-31**
1.180	16	**A052-32**	**A053-32**
1.250	-	**A052-33**	**A053-33**
1.400	14	**A052-34**	**A053-34**
1.600	-	**A052-35**	**A053-35**
1.700	12	**A052-36**	**A053-36**
2.000	10	**A052-37**	**A053-37**
2.360	8	**A052-38**	**A053-38**
2.500	-	**A052-39**	**A053-39**

Aperture Size mm	ASTM Number	Frame Ø 200 mm	Frame Ø 300 mm
2.800	7	**A052-40**	**A053-40**
3.150	-	**A052-41**	**A053-41**
3.350	6	**A052-42**	**A053-42**
4.000	5	**A052-43**	**A053-43**
4.750	4	**A052-44**	**A053-44**
5.000	-	**A052-45**	**A053-45**
5.600	3,5	**A052-46**	**A053-46**
6.300	1-4”	**A052-47**	**A053-47**
6.700	0.265”	**A052-48**	**A053-48**
7.100	-	**A052-49**	**A053-49**
8.000	5-16”	**A052-50**	**A053-50**
9.500	3-8”	**A052-51**	**A053-51**
10.0	-	**A052-52**	**A053-52**
11.2	7-16”	**A052-53**	**A053-53**
12.5	1-2”	**A052-54**	**A053-54**
13.2	0.530”	**A052-55**	**A053-55**
14.0	-	**A052-56**	**A053-56**
16.0	5-8”	**A052-57**	**A053-57**
19.0	3-4”	**A052-58**	**A053-58**
20.0	-	**A052-59**	**A053-59**
22.4	7-8”	**A052-60**	**A053-60**
25.0	-	**A052-61**	**A053-61**
25.4	1”	**A052-62**	**A053-62**
26.5	1.06”	**A052-63**	**A053-63**
28.0	-	**A052-64**	**A053-64**
31.5	1 1-4”	**A052-65**	**A053-65**
37.5	1 1-2”	**A052-66**	**A053-66**
40.0	-	**A052-67**	**A053-67**
45.0	1 3-4”	**A052-68**	**A053-68**
50.0	2”	**A052-69**	**A053-69**
53.0	2.12”	**A052-70**	**A053-70**
56.0	-	**A052-70S**	**A053-70S**
63.0	2 1-2”	**A052-71**	**A053-71**
75.0	3”	**A052-72**	**A053-72**
80.0	-	**A052-73**	**A053-73**
90.0	3 1-2”	**A052-74**	**A053-74**
100.0	4”	**A052-75**	**A053-75**
106.0	4.24”	**A052-76**	**A053-76**
125.0	5”	**A052-77**	**A053-77**

TABLE OF THE PERFORATED PLATE SIEVES, "SQUARE HOLES"

STANDARDS: ISO 3310-2 I EN 933-2 I BS 410 I DIN 4187-1

Aperture mm	Frame Ø 200 mm	Frame Ø 300 mm
4.00	A031-01	A032-01
4.75	A031-02	A032-02
5.00	A031-03	A032-03
5.60	A031-04	A032-04
6.30	A031-05	A032-05
6.70	A031-06	A032-06
7.10	A031-07	A032-07
8.00	A031-08	A032-08
9.00	A031-34	A032-34
9.50	A031-09	A032-09
10.00	A031-10	A032-10
11.20	A031-11	A032-11
12.50	A031-12	A032-12
13.20	A031-13	A032-13
14.00	A031-14	A032-14
16.00	A031-15	A032-15
18.00	A031-35	A032-35
19.00	A031-16	A032-16
20.00	A031-17	A032-17
22.40	A031-18	A032-18
25.00	A031-19	A032-19
26.50	A031-20	A032-20
28.00	A031-21	A032-21
31.50	A031-22	A032-22
37.50	A031-23	A032-23
40.00	A031-33	A032-33
45.00	A031-24	A032-24
50.00	A031-25	A032-25
53.00	A031-26	A032-26
56.00	A031-36	A032-36
63.00	A031-27	A032-27
75.00	A031-28	A032-28
80.00	A031-37	A032-37
90.00	A031-29	A032-29
100.00	A031-30	A032-30
106.00	A031-31	A032-31
125.00	A031-32	A032-32

TABLE OF THE PERFORATED PLATE SIEVES, "ROUND HOLES"

STANDARD: UNI 2334

Aperture mm	Frame Ø 200 mm	Frame Ø 300 mm
4.00	A037-01	A038-01
4.75	A037-02	A038-02
5.00	A037-03	A038-03
5.60	A037-04	A038-04
6.30	A037-05	A038-05
7.10	A037-06	A038-06
8.00	A037-07	A038-07
9.00	A037-08	A038-08
10.00	A037-09	A038-09
11.20	A037-10	A038-10
12.50	A037-11	A038-11
13.20	A037-12	A038-12
14.00	A037-13	A038-13
15.00	A037-37	A038-37
16.00	A037-14	A038-14
18.00	A037-15	A038-15
19.00	A037-16	A038-16
20.00	A037-17	A038-17
25.00	A037-18	A038-18
28.00	A037-19	A038-19
30.00	A037-38	A038-38
31.50	A037-20	A038-20
35.50	A037-21	A038-21
40.00	A037-22	A038-22
45.00	A037-23	A038-23
50.00	A037-24	A038-24
53.00	A037-25	A038-25
56.00	A037-26	A038-26
63.00	A037-27	A038-27
71.00	A037-28	A038-28
75.00	A037-29	A038-29
80.00	A037-30	A038-30
90.00	A037-31	A038-31
100.00	A037-32	A038-32
106.00	A037-33	A038-33
112.00	A037-34	A038-34
125.00	A037-35	A038-35

WET WASHING SIEVES

Used for wet testing of fine granuled materials.
Frame and woven wire cloth are stainless steel made.
Frame dimensions: Ø 200 mm by 100 or 200 mm height.

MODELS

A045 Cloth opening 0.074 mm by 200 mm height
A045-02 Cloth opening 0.063 mm by 200 mm height
A045-05 Cloth opening 0.074 mm by 100 mm height
A045-06 Cloth opening 0.063 mm by 100 mm height

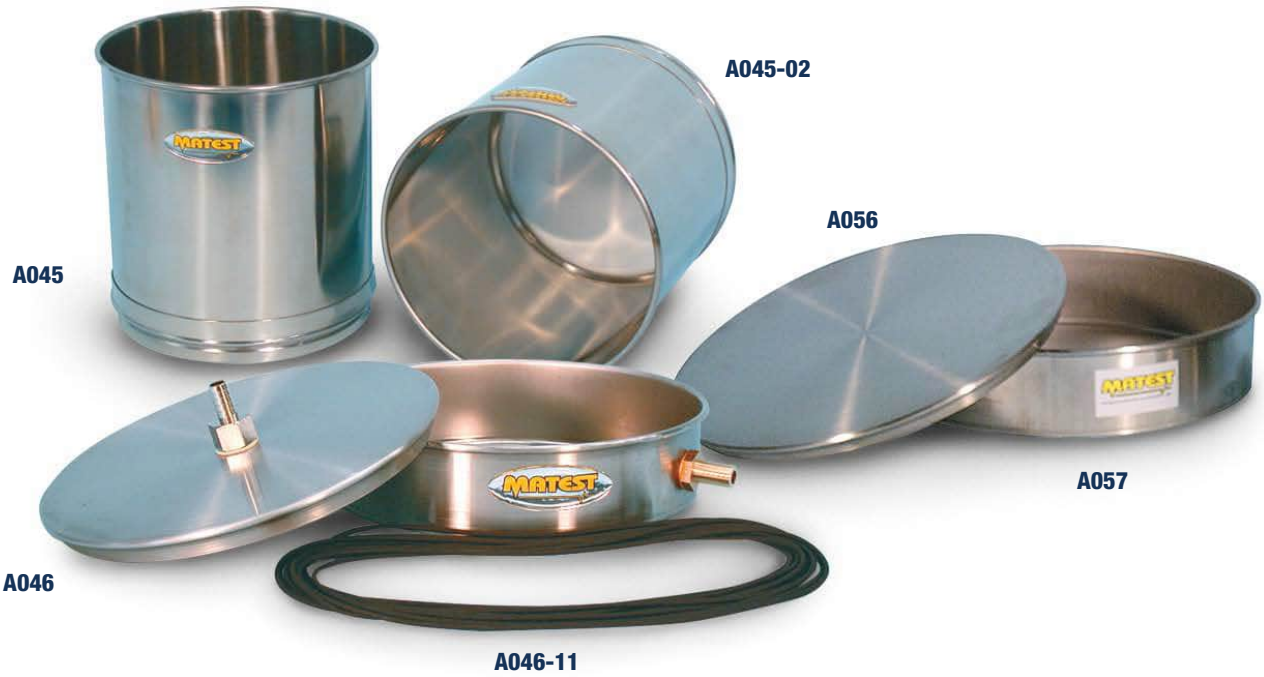
MODELS for ASTM E11 Standard

A045-07 Sieve Ø 8" by 4" height, opening 0.075 mm
A045-08 Sieve Ø 8" by 8" height, opening 0.075 mm

WET SIEVING PAN+LID STAINLESS STEEL

The water enters through the spray nozzle mounted on top of the lid and spill out of the pan with the finest granulated material.
Supplied complete with two watertight seals.

Model	Description	Set of 10 seals
A046	Pan + Lid, Ø 200 mm	A046-11
A046-02	Pan + Lid, Ø 8”	A046-11
A047	Pan + Lid, Ø 300 mm	A047-11
A047-02	Pan + Lid, Ø 400 mm	A047-12



	Ø 200 mm	Ø 300 mm	Ø 250 mm	Ø 315 mm	Ø 8”	Ø 450 mm	Ø 400 mm	Ø 12”
LID	A056	A056-01	A056-02	A056-03	A056-04	A056-05	A056-06	A056-07
RECEIVER	A057 A057PN (Half Rim)	A057-01 A057-01PN (Half Rim)	A057-02	A057-03	A057-04	A057-05	A057-06	A057-07

V179 Bristle Brush, soft hair, Ø 35 mm
V179-02 Double ended, brass and nylon bristle
V179-03 Double ended soft/hard nylon
V179-05 Soft hair Brush, Ø 3 mm BS 812
V179-06 Hard nylon sieve Brush, flat 60 mm

A058-05N
AIR JET SIEVING MACHINE

STANDARD: EN 933-10

The Air Jet Machine is suitable for sieving powder and drying grain products in order to obtain sieving results between 5 to 4000 microns, through appropriate test sieves 200 mm diameter. Its working foundation is based on the use of air that tugs thin particles to make them pass through the sieve.

This effect is obtained with a vacuum machine that provokes a controlled decrease of pressure. It is equipped with an automatic cleaning system of the filter cartridge allowing **to perform many tests** (some tens) before being replaced.

The unit is supplied complete with aspirator device, plexiglass cover, filter cartridge, 5 collecting plastic bags, accessories.

Power supply: 230V 1ph 50-60Hz
Dimensions: 450x600x400 mm
Weight: 25 kg approx.

MAIN FEATURES

- Sieving time from 0 to 99 minutes.
- Vacuum range from 0 to 42 mbar.
- Adjustable calibration function.
- Sieving results from 5 to 4000 microns.
- Automatic cleaning system.

A058-05N with sieve

SPARE

A058-14N Filter cartridge.

A058-15N Plastic bags (pack of 5 pcs).

TABLE OF THE SIEVES 200 MM DIAMETER FOR THE AIR JET SIEVING MACHINE

The frame is stainless steel made.

- Openings from 5 to 41 microns have **nylon mesh**
- Openings from 45 to 4000 microns have **stainless steel mesh**

The sieves include airproof rubber seal.

A058-20...A058-96

Model	Aperture micron	Model	Aperture micron	Model	Aperture micron	Model	Aperture micron
A058-20	5	**A058-38**	71	**A058-65**	280	**A058-81**	1120
A058-21	10	**A058-50**	75	**A058-66**	300	**A058-82**	1180
A058-22	15	**A058-51**	80	**A058-67**	315	**A058-83**	1250
A058-23	20	**A058-52**	90	**A058-68**	355	**A058-84**	1400
A058-24	25	**A058-53**	100	**A058-69**	400	**A058-85**	1600
A058-25	28	**A058-54**	106	**A058-70**	425	**A058-86**	1700
A058-26	30	**A058-55**	112	**A058-71**	450	**A058-87**	1800
A058-27	37	**A058-56**	125	**A058-72**	500	**A058-88**	2000
A058-28	41	**A058-57**	140	**A058-73**	560	**A058-89**	2240
A058-29	48	**A058-58**	150	**A058-74**	600	**A058-90**	2360
A058-97	45	**A058-59**	160	**A058-75**	630	**A058-91**	2500
A058-30	50	**A058-60**	180	**A058-76**	710	**A058-92**	2800
A058-31	53	**A058-61**	200	**A058-77**	800	**A058-93**	3150
A058-32	56	**A058-62**	212	**A058-78**	850	**A058-94**	3350
A058-35	63	**A058-63**	224	**A058-79**	900	**A058-95**	3550
A058-37	70	**A058-64**	250	**A058-80**	1000	**A058-96**	4000

ELECTROMAGNETIC SIEVE SHAKERS

STANDARDS: EN 932-5 I ISO 3310-1

These Sieve Shakers are activated by electromagnetic impulses and thanks to the triple vibrating action (vertical, lateral and rotational) they are recommended to perform sieving tests where high precision and performance are important, and where continual and intense uses are required. Therefore they are suggested for accurate sieving tests, on fine materials too.
These Electromagnetic Shakers are of simple and sturdy construction, they can hold up to 10 sieves and are also suitable for wet sieving tests (accessory mod. A046, A047).

Power supply: 230V 50Hz 1ph 450/750W

MAIN FEATURES

Triple vibrating action:

- Vertical
- Lateral
- Rotational

Digital microprocessor control panel can adjust:

- Timer 0-999 minutes
- Vibration intensity
- Continuous or intermittent vibrating action
- Pause between vibrations (indicated for fine material sieving)
- The control panel can be wall fixed or placed on a bench

A059-01-KIT

A059-02-KIT

Model	Dimensions sieves Ø	Dimensions mm	Weight kg
A059-01-KIT	200 mm - 8”	320x380x850	40 approx.
A059-02-KIT	200 - 250 - 300 - 315 mm - 8” - 12”	380x440x1080	65 ”
A059-03-KIT	200 - 250 - 300 - 315 - 350 - 400 mm - 8” - 12”	430x460x1150	80 ”
A059-04-KIT	200 - 250 - 300 - 315 - 400 - 450 mm - 8” - 12” - 18”	480x500x1150	85 ”

A059-03-KIT

A059-04-KIT

A058N
NOISE REDUCTION CABINET

For the sieve shakers A059 serie and A060-01 manufactured from sheet steel, lined internally with sound-proofing material for noise reduction in compliance with CE Directive.

A058N + A059-03-KIT

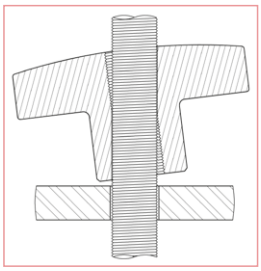
Overall Dimensions: 896x955x1348 mm
Internal Dimensions: 828x886x1308 mm

A059-21

ACCESSORY

A059-21

KNOBS for fast clamping/release of the upper beam.
Useful for fast vertical displacement of the beam.
(Not usable with A059-01-KIT model)
Pack of 2 knobs with rods and reduction rings to adapt the rods to the base of the sieve.



A059-21

A061N
HIGH CAPACITY SIEVE SHAKER

STANDARDS: EN 932-5 I ISO 3310-1

Designed for sieving considerable quantities of any material. The sieve shaker can hold six screen trays and dust pan. Supplied complete with dust pan, but **without** screen trays (to be ordered separately).
It cannot be sold in CE markets without protection (see accessories).

Power supply: 230V 50Hz 1ph 750W
Dimensions: 585x790x850 mm
Weight: 180 kg approx.

A061N
with Sreen Trays

A061N + A061-98

A061N + A061-97

ACCESSORIES

A061-97
SAFETY DOORS, upper and frontal, complete with microswitch, in compliance with CE Safety Directive.
If the door is opened while the shaker is working, it automatically stops. The doors also protect from dust.

A061-98
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 shaker is working, it automatically stops.
The cabinet also protects from dust.
Overall dimensions: 920x1000x1400 mm
Internal dimensions: 828x886x1308 mm

A061-03
TRAY ONLY, without mesh, size 457x660x75 mm, suitable for mesh openings from 125 to 6.3 mm

A061-05
TRAY ONLY, without mesh, size 457x660x75 mm, suitable for mesh openings from 5.6 to 1 mm

A061-06
TRAY ONLY, without mesh, size 457x660x75 mm, suitable for mesh openings from 0.850 to 0.063 mm

SCREEN TRAYS FOR SIEVE SHAKER A061N, SIZE 457X660X75 MM, ROBUST STEEL GALVANIZED FRAME. STAINLESS STEEL WOVEN WIRE MESH.
STANDARDS: EN 933-2 I ASTM E11 I ISO 3310-1

Aperture size mm	ASTM number	Model
0.038	400	**A061-78**
0.045	325	**A061-79**
0.053	270	**A061-80**
0.063	230	**A061-81**
0.075	200	**A061-07**
0.080	-	**A061-08**
0.090	170	**A061-09**
0.100	-	**A061-10**
0.106	140	**A061-11**
0.125	120	**A061-12**
0.150	100	**A061-13**
0.160	-	**A061-14**
0.180	80	**A061-15**
0.200	-	**A061-16**
0.212	70	**A061-17**
0.250	60	**A061-18**
0.300	50	**A061-19**
0.315	-	**A061-20**
0.320	-	**A061-21**
0.355	45	**A061-22**
0.400	-	**A061-23**
0.425	40	**A061-24**
0.500	35	**A061-25**
0.600	30	**A061-26**
0.630	-	**A061-27**
0.710	25	**A061-28**

Aperture size mm	ASTM number	Model
0.800	-	**A061-29**
0.850	20	**A061-30**
1.000	18	**A061-31**
1.180	16	**A061-32**
1.25	-	**A061-33**
1.400	14	**A061-34**
1.600	-	**A061-35**
1.700	12	**A061-36**
2.000	10	**A061-37**
2.360	8	**A061-38**
2.500	-	**A061-39**
2.800	7	**A061-40**
3.150	-	**A061-41**
3.350	6	**A061-42**
4.000	5	**A061-43**
4.750	4	**A061-44**
5.000	-	**A061-45**
5.600	3.5	**A061-46**
6.300	1/4”	**A061-47**
6.700	0.265”	**A061-48**
7.100	-	**A061-49**
8.000	5/16”	**A061-50**
9.500	3/8”	**A061-51**
10.00	-	**A061-52**
11.20	7/16”	**A061-53**
12.50	½”	**A061-54**

Aperture size mm	ASTM number	Model
13.20	0.530”	**A061-55**
14.00	-	**A061-56**
16.00	5/8”	**A061-57**
19.00	¾”	**A061-58**
20.00	-	**A061-59**
22.40	7/8”	**A061-60**
25.00	-	**A061-61**
25.40	-	**A061-62**
26.50	1.06”	**A061-63**
28.00	-	**A061-64**
31.50	1¼”	**A061-65**
37.50	1½”	**A061-66**
40.00	-	**A061-67**
45.00	1¾”	**A061-68**
50.00	2”	**A061-69**
53.00	2.12”	**A061-70**
56.00	-	**A061-70S**
63.00	2½”	**A061-71**
75.00	3”	**A061-72**
80.00	-	**A061-73**
90.00	3½”	**A061-74**
100.0	4”	**A061-75**
106.0	4.24”	**A061-76**
125.0	5”	**A061-77**

A061-96 SPARE collecting pan

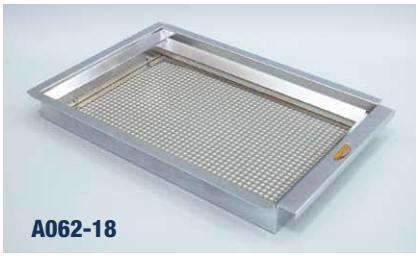
SCREEN TRAYS WITH PERFORATED GALVANIZED PLATE, “SQUARE HOLES”
STANDARDS: EN 933-2 I ISO 3310-2

Aperture mm	Model
4.00	**A062-11**
4.75	**A062-12**
5.00	**A062-13**
5.60	**A062-14**
6.30	**A062-15**
6.70	**A062-16**
7.10	**A062-17**
8.00	**A062-18**
9.00	**A062-19**
9.50	**A062-20**
10.00	**A062-21**
11.20	**A062-22**
12.50	**A062-23**
13.20	**A062-24**
14.00	**A062-25**
16.00	**A062-26**
18.00	**A062-27**
19.00	**A062-29**

Aperture mm	Model
20.00	**A062-30**
22.40	**A062-31**
25.00	**A062-32**
26.50	**A062-33**
28.00	**A062-34**
31.50	**A062-35**
37.50	**A062-36**
40.00	**A062-37**
45.00	**A062-38**
50.00	**A062-39**

Aperture mm	Model
53.00	**A062-40**
56.00	**A062-41**
63.00	**A062-42**
75.00	**A062-43**
80.00	**A062-44**
90.00	**A062-45**
100.00	**A062-46**
106.00	**A062-47**
125.00	**A062-48**

A061-69


A062-18

A060-01
SIEVE SHAKER MOTOR OPERATED

It accepts sieves having diameter 200 - 250 - 300 - 315 mm, and 8"...12".
This simple and low cost Sieve Shaker is activated by an electric motor and can hold up to 8 Sieves Ø 200 mm or 7 Sieves Ø 300 mm plus pan and lid.
It is also possible to perform wet sieving tests (see accessories mod. A046 and A047)
Provided of timer 0 - 60 minutes.

Power supply: 230V 1ph 50Hz 110W
Dimensions: 350x400x950 mm
Weight: 24 kg approx.

A060-01

A058-01
SIEVE SHAKER HAND OPERATED FOR SIEVES Ø 200 MM AND 8"

Designed for tests on site or yard laboratory analysis when electricity is not available.
By rotating the crank, the shaker applies a vertical and rotational vibration action.
It can hold up to 6 sieves Ø 200 mm or 8" plus pan and lid.

Dimensions: 300x450x600 mm
Weight: 16 kg approx.

A058-01

GLASS MICROSPHERES WITH NIST CERTIFICATE FOR SIEVES CALIBRATION

The calibration of the sieves or the inspection of the wear conditions of the mesh can be performed by using glass microspheres.
These models are supplied with NIST Certificate (National Institute of Standard and Technology) in pack of 5 bottles.

A057-31... A057-44

Model	Sieve size (µm)	Weight per bottle (g)
A057-31	45	1
A057-32	63	1
A057-33	75	1
A057-34	90	1
A057-45	106	1
A057-35	125	1
A057-36	150	1.5
A057-37	250	2.5
A057-38	300	2.5
A057-39	425	2.5
A057-40	500	2.5
A057-41	600	2.5
A057-42	1000	7
A057-43	1180	10
A057-46	1600/1700	20
A057-44	2000	20
A057-47	2360	20

Other models for sieves sizes can be supplied upon request.

Note: Cloth openings with larger sizes can be verified by using a precision vernier caliper.

A104N
ULTRASONIC CLEANSING BATH 10 LITRES

Used for a safe and valid cleaning of sieves and glassware, which could be damaged by ordinary cleaning methods.
It is particularly suitable for fine mesh sieves. The bath accepts sieves up to 200 mm and 8" diameter.
Supplied complete with timer 0 - 99 minutes.
Internal diameter: 260 mm, height 200 mm
Stainless steel made, with incorporated electronic generator, frequency 35 KHz.
Complete with lid and discharge cock, but without cleansing liquid that must be purchased locally.

Capacity: 7 litres
Power supply: 230V 50-60Hz 1ph 200W
Dimensions: 274x370 mm
Weight: 8 kg approx.

A104N

A104-01N

A104-01N
ULTRASONIC CLEANSING BATH 25 LITRES

Similar to mod. A104N but with inside dimensions: Ø 400x(h)260 mm
Ultrasonic frequency 35 kHz (not adjustable).
Water heating system, adjustable from ambient to +80 °C
It accepts sieves up to 350 mm diameter.
Heating power: 800W
Ultrasonic power: 600W

Capacity: 25 litres
Power supply: 230V 50-60Hz 1ph
Dimensions: Ø 500x(h)400 mm
Weight: 35 kg approx.

A071-10
VOID CONTENT OF FINE AGGREGATE

STANDARDS: ASTM C1252 I AASHTO TP33

Used to determine the uncompacted void content of a fine aggregate sample. Indicates the angularity, spherically, and workability of fine aggregate in a mixture. Supplied complete.

Dimensions: 205x205x690 mm
Weight: 2 kg approx.

A071-10

A070
FLAKINESS | THICKNESS GAUGE

STANDARD: BS 812:105.1

Suitable to verify if aggregate is flaky; i.e. if its thickness is less than 0.6 of its nominal size. Constructed of heavy gauge stainless steel sheet.

Weight: 600 g

A071
LENGTH GAUGE

STANDARD: BS 812:105.1

Ideal to determine if aggregate is elongated; i.e. if length is more than 1.8 of nominal size. Mounted on a hardwood base.

Weight: 1 kg approx.

DETERMINATION OF THE LIGHTWEIGHT AGGREGATES CRUSHING RESISTANCE

STANDARD: EN 13055-1 method 1 and 2

MODELS

A081-01 METHOD 1

Apparatus for the determination of the crushing resistance of light-weight aggregates having diameter from 4 to 22 mm, and a volumic mass over 150kg/m^3. Composed of: upper and lower cylinder inside diameter 113 mm, ring with adjustable height, piston, base. Made of steel, plated against corrosion.

Dimensions: Ø 180 mm by 260 mm height
Weight: 15 kg approx.

A081-02 METHOD 2

Apparatus for the determination of the crushing resistance of lightweight aggregates having volumic mass lower than 150kg/m^3. Composed of: upper and lower cylinder inside diameter 76 mm, piston, base.
Made of steel, plated against corrosion.

Dimensions: Ø 100 mm by 200 mm height.
Weight: 6 kg approx.

Note: for a complete test configuration, see page 263

A072
SHAPE GAUGE - SHAPE INDEX

STANDARDS: EN 933-4 | DIN 4226 | CNR N.95 | NLT 354

For measuring the length/thickness ratio of individual particles.

Weight: 500 g

A072-10
PROPORTIONAL CALIPER

STANDARD: ASTM D4791

Used either for rapid determination of percentages of flat and elongated particles in coarse aggregate fractions of ⅜" (9.5 mm) or larger. Consisting of 8"x16" (203.2x406.4 mm) base plate with rubber feets, two fixed posts and a 12" (305 mm) pivoting arm, allowing ratios of 1:2, 1:3, 1:4, 1:5 to be obtained.

Weight: 3 kg approx.

GEOMETRICAL PROPERTIES OF AGGREGATES
EFFLUX INDEX OF FINE AGGREGATES

STANDARDS: EN 933 | NF P18-564 | CNR No. 113
ASTM C1252

A073N
EFFLUX INDEX APPARATUS

Used to measure the efflux index of fine aggregates (shape and angularity). The efflux index of an aggregate is the required time in seconds of a known volume of aggregates to flow from a known opening.
The unit is basically formed by aluminium body, Ø 90 mm by 125 mm height, aluminium feed hopper Ø 100 mm by 170 mm height, control shutter, polycarbonate funnel having 85 mm height, 60° conical part, which end has Ø 12 mm, base support, valve, decanter.

Dimensions: 200x240x600 mm
Weight: 8 kg approx.

DETERMINATION OF PARTICLE DENSITY AND WATER ABSORPTION OF AGGREGATES

STANDARDS: EN 12390-7 | EN 1097-6 | UNI 6394-2 | BS 1881:14 | ASTM C128 | AASHTO T84 | DIN 12039 | NLT 154

To perform this test, additional general purpose equipment are required, such as: oven, sieves, balances etc., and the following specific apparatus:

V041
DENSITY BASKET, Ø 200 mm by 200 mm heigh, mesh size 3.35 mm, all stainless steel made.
Other models of density baskets listed at p. 538

V085
SPECIFIC GRAVITY FRAME
Technical data: see Section "V" p. 538

PYKNOMETER,
pyrex glass, complete with stopper, capillary tube and funnel; used to determine the voids and bulk density of aggregates.

V103 Capacity 500 ml
V103-01 Capacity 1000 ml

PYKNOMETER,
pyrex glass, wide mouth Ø 50 mm, complete with capillary tube stopper, used to evaluate the volume density and voids of aggregates.

V105-04 Capacity 500 ml
V105-05 Capacity 1000 ml
V105-06 Capacity 2000 ml

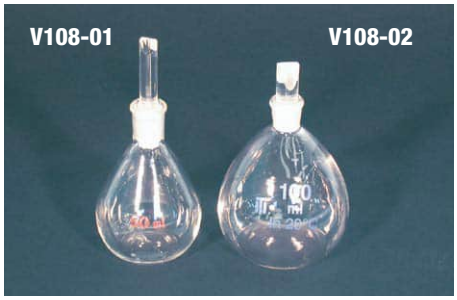
S148
SAND ABSORPTION CONE AND TAMPER, used in determining the specific gravity and absorption of fine aggregates.

DETERMINATION OF THE PARTICLE DENSITY OF FILLER. PYKNOMETER METHOD

STANDARDS: EN 1097-7 | NF P18-558 | BS 812
To perform this test additional general purpose equipment are required such as: oven, sieves, balance etc., and the following specific apparatus:

SPECIFIC GRAVITY BOTTLE, GAY LUSSAC TYPE,
pyrex glass, complete with capillary tube stopper, to determine the particle density and specific gravity of filler in fine aggregates.

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



E136
WATER BATH
Heating/circulating system, all stainless steel made. Equipped with cooling coil device for connection to water net.
Capacity: 40 litres. Digital thermostat
Temperature range: ambient to 60 °C.
Accuracy: ± 0.5 °C.

Inside dimensions:
510x350x230 mm
Overall dimensions:
680x420x420 mm
Power supply:
230V 50-60Hz 1ph 2000W
Weight: 28 kg approx.

MAX. 10 MM SIZE DETERMINATION OF THE RELATIVE DENSITY AND WATER ABSORPTION OF AGGREGATES

STANDARDS:
BS 812:2, 1377:2 | ASTM D 854
AASHTO T100 | EN 1097-6

S147
PYKNOMETER,
glass made, with aluminium cone and rubber seal.
Capacity: 1 kg

A075N
LOS ANGELES ABRASION MACHINE
DETERMINATION OF RESISTANCE TO FRAGMENTATION

STANDARDS: UNI EN 1097-2 I ASTM C131 I EN 12697-17 I NF P18-573 I AASHTO T96 I CNR N° 34

Used to determine the resistance of aggregates to abrasion.
It comprises a heavy steel cylinder of 711 mm inside diameter x 508 mm inside length, mounted on a base frame.
The cylinder rotates at a speed of between 31 and 33 rpm.
The machine is fitted with an automatic digital counter which can be preset to the required number of revolutions of the drum.
The cylinder is counterbalanced so that the filling opening stays in position without tilting;
a push-button allows to position such opening for the loading/ unloading operations.
The control panel can be wall fixed or placed on a bench.
Supplied **without** abrasive charges which have to be ordered separately according to the requested Standards. It cannot be sold on the CE markets without its protections (see accessories).

Power supply: 230V 50Hz 1ph 750W
Dimensions: 1000x800x1000 mm
Weight: 370 kg approx.

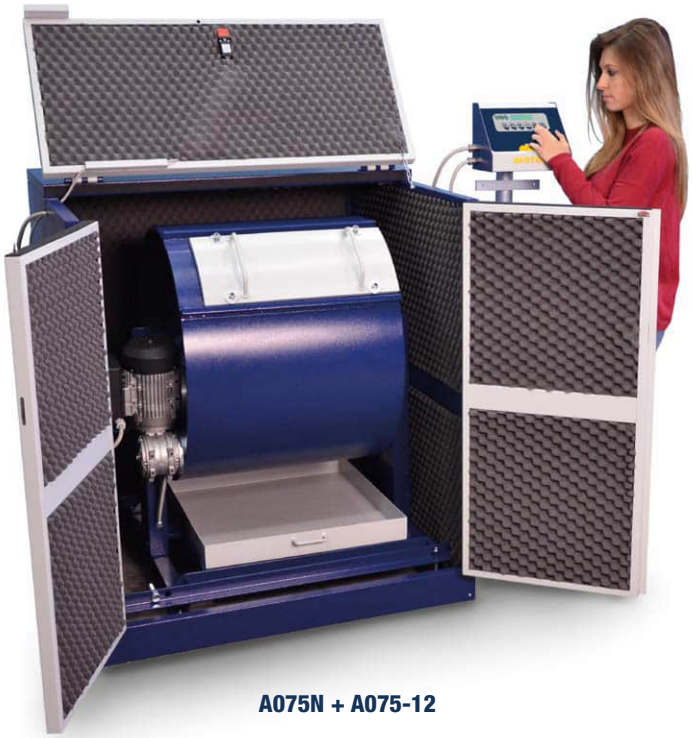
A075N

NEEDED ACCESSORY

A076-01 SET OF 12 ABRASIVE CHARGES, conforming to ASTM AASHTO I CNR I UNE I NLT Standards.

or:

A076-02 SET OF 12 ABRASIVE CHARGES, conforming to EN I UNI I NF Standards.

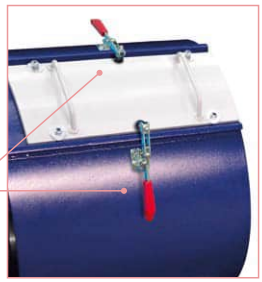

A075N + A075-12

UPGRADING ACCESSORIES

A075-11
SECURITY CABINET, manufactured from sheet steel, conforming to CE Safety Directive.
When opening the cabinet door during Los Angeles working, a microswitch automatically stops the rotation of the drum.

Overal Dimensions: 980x1070x1190 mm
Internal Dimensions: 945x1000x1155 mm
Weight: 150 kg approx.

A076-01

A076-11


A075-12
SECURITY CABINET, manufactured from sheet steel, internally lined with sound-proofing material for noise reduction, conforming to CE Safety Directive.
When opening the cabinet's door during Los Angeles working, a microswitch automatically stops the rotation of the drum.

Overal Dimensions: 980x1070x1190 mm
Internal Dimensions: 945x1000x1155 mm
Weight: 160 kg approx.

A076-11
DEVICE for an easy and fast clamping of the table to the drum.

A077
MICRO-DEVAL TESTING MACHINE
DETERMINATION OF THE RESISTANCE TO WEAR

STANDARDS: EN 1097-1 | EN 13450
ASTM D6928, ASTM D7428 | NF P18-576

Used to determine the resistance of aggregates to abrasion.
The machine essentially comprises a heavy steel frame on which the stainless steel cylinders can be mounted.
The Micro-Deval is supplied complete with separate control panel fitted with a digital automatic revolutions counter.
The control panel can be wall fixed or placed on a bench.
Supplied **without** stainless steel cylinders and without stainless steel spheres which have to be ordered separately (see needed accessories).
It cannot be sold on CE markets **without** security cabinet (see mod. A077-01)

Power supply: 230V 50Hz 1ph 1100W
Dimensions: 1000x450x920 mm
Weight: 150 kg approx.

A077 + A078-15

A078-12 A078-15

A077-01
MICRO-DEVAL TESTING MACHINE

Same as mod. A077, but equipped with a security cabinet, Manufactured from sheet steel, lined with sound-proofing material for noise reduction, conforming to CE Safety Directive.
When opening the cabinet's door during Micro-Deval working, a microswitch automatically stops the rotation of the cylinders.

Dimensions: 1150x600x1150 mm
Weight: 190 kg approx.

NEEDED ACCESSORIES TO EN 1097-1

A078-15 CYLINDER, standard, stainless steel, Ø 200 mm x 154 mm length (up to 4) EN 1097-1

A078-11N SPHERES, stainless steel Ø 10 mm **tolerance 0.05 mm** Pack of 20 kg EN 1097-1

NEEDED ACCESSORIES TO ASTM D6928, D7428

A078-17 CYLINDER, standard, stainless steel
NEW
Ext. diameter within 194 and 202 mm
Int. height within 170 and 177 mm
(up to 4) ASTM D6928/D7428

A078-02 SPHERES, stainless steel Ø 9.5 mm **tolerance 0.5 mm** Pack of 5.5 kg ASTM D6928/D7428

A078-03 MAGNET to remove abrasive charges.

A078-17

UPGRADING ACCESSORIES

A078-12 CYLINDER, stainless steel, Ø 200 mm x 400 length. Conforming to EN 13450, NF EN 1097-1

A078-13 SPHERES, stainless steel, Ø 30 mm Pack of 12 pieces. NF P18-576

A078-14 SPHERES, stainless steel, Ø 18 mm Pack of 52 pieces. NF P18-576

A048-14 BAR GRID SIEVE, sloth width 9.5 mm Used to check the wear of the spheres of the Micro-Deval having nominal size of 10 mm

A078-16 CYLINDER, "HIGH PERFORMANCE", stainless steel, Ø 200 mm x 152 mm length. EN 1097-1

A077-01 + A078-15

A079
DEVAL TESTING MACHINE

STANDARDS: NF P18-577 I ASTM D2-33

Used to determine the resistance of aggregates to abrasion both by dry and wet procedure. The machine essentially comprises a steel frame on which two cylinders are mounted. The machine is supplied complete with a separate control panel fitted with a digital automatic revolution counter and two collecting pans.
It cannot be sold on CE markets without security cabinet (see mod. A079-02).

Power supply: 230V 50Hz 1ph 750W
Dimensions: 1500x520x1280 mm
Weight: 140 kg approx.

A079

A079-02
DEVAL TESTING MACHINE

Same as mod. A079, but equipped with a security cabinet, manufactured from sheet steel, lined with sound-proofing material for noise reduction, conforming to CE Safety Directive.
When opening the cabinet door during Deval working, a microswitch automatically stops the machine.

Dimensions: 1650x650x1400 mm
Weight: 180 kg approx.

A079-02

A087

A080-KIT

A087
SCRATCH HARDNESS TEST APPARATUS

This device is used to determine the quantity of soft particles in coarse aggregates.
The apparatus consists of a metal sliding rod ended with a round point of 1.6 mm diameter, mounted in a suitable frame.
A load of 8.9 ± 0.4 N is applied to the test sample.

Dimensions: 160x200x350 mm
Weight: 8 kg approx.

AGGREGATE IMPACT VALUE APPARATUS

STANDARDS: BS 812 I NF P18-574

Used to determine the impact value of aggregates and select them for a given application. The machine has a trip-action hammer release, blow counter device and a built-in operator safety device. Manufactured in heavy duty form with hardened steel surfaces for minimum wear. The complete assembly galvanized plated for corrosion protection.

Dimensions: 445x300x880 mm
Weight: 60 kg approx.

THE APPARATUS IS AVAILABLE IN TWO VERSIONS:
- one meeting BS812 Standard
- one meeting NF P18-574 Standard

A080-KIT

AGGREGATE IMPACT VALUE APPARATUS. BS 812, METHOD 8.202.8

Consisting of:
A080-04 TEST FRAME ASSEMBLY
A080-02 CYLINDRICAL MOULD, Ø 102x50 mm, cylindrical measure Ø 75x50 mm, tamping rod.

A080-01-KIT

AGGREGATE IMPACT VALUE APPARATUS. NF P18-574

Consisting of:
A080-04 TEST FRAME ASSEMBLY
A080-03 CYLINDRICAL MOULD, Ø 102x52 mm.

S158-KIT
SAND EQUIVALENT TEST SET

STANDARDS: ASTM D2419 I AASHTO T176

Composition of the set: see p. 440

S158-KIT / S158-20-KIT

S158-20-KIT
SAND EQUIVALENT TEST SET (COMPLETE)

STANDARDS: EN 933-8 I NF XP18-598 I UNI 8520-15 I UNE 83131

Composition of the set: see p. 440

S160N
MOTORIZED SAND EQUIVALENT SHAKER

STANDARDS: EN 933-8 I ASTM D2419 I AASHTO T176
NF XP18-598 I UNE 83131 I CNR N.27 I UNI 8520-15

Power supply: 230V 1ph 50Hz 250W
Dimensions: 700x360x350 mm
Weight: 30 kg approx.

Technical details:
see p. 442

S160N + S158-03N + S158-02

S160-01N
MOTORIZED SAND EQUIVALENT SHAKER

Equipped with steel Security Cabinet, conforming to CE Safety Directive. Technical details: see p. 442

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

S159-01-KIT
SAND EQUIVALENT TEST SET (SIMPLE)

STANDARDS: EN 933-8 I NF XP18-598 I UNI 8520-15 I UNE 83131

Composition of the set: see p. 441

S159-11

S159-KIT / S159-01-KIT

S159-KIT
SAND EQUIVALENT TEST SET (SIMPLE)

STANDARDS: ASTM D2419 I AASHTO T176

Composition of the set: see p. 441

S161
SAND EQUIVALENT SHAKER HAND OPERATED

STANDARDS: EN 933-8 I ASTM D2419 I NF XP18-598
AASHTO T176 I UNI 8520-15 I UNE 83131

Dimensions: 700x350x420 mm approx.
Weight: 20 kg approx.

Technical details:
see p. 442

S161

ASSESSMENT OF FINES
GRADING OF FILLERS

STANDARD: EN 933-10

A058-05N
AIR JET SIEVE SHAKER

Suitable for sieving powder and dry grain products up to 5 microns.
Technical details: see p. 38

A058-05N

S157-KIT
BLUE METHYLENE TEST SET
ASSESSMENT OF FINES AGGREGATES

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

Utilized to determine the clay content in the fine portions of the aggregates.
Composition of the set and technical details: see p. 439

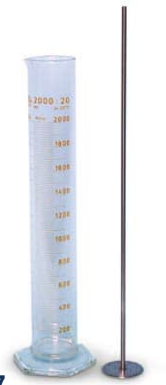
GEOMETRICAL PROPERTIES OF AGGREGATES.
CLASSIFICATION TEST FOR THE CONSTITUENTS OF COARS RECYCLED AGGREGATE

STANDARD: EN 933-11

S156-20
PLUNGER
FOR THE GRADUATED CYLINDER

The test consists of hand sorting particles from a test portion of coarse recycled aggregate into a list of constituents. The proportion of each constituent in the test portion is then determined and expressed as a percentage by mass, except for the proportion of floating particles which is expressed as a volume by mass.
Stainless steel made

Weight: 500 g approx.



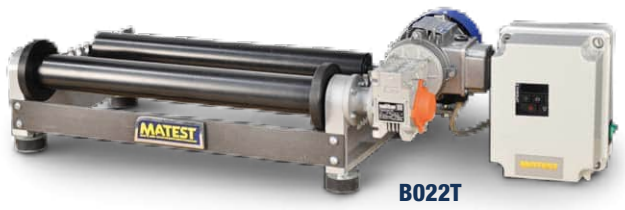
ACCESSORY

V101-07 GLASS GRADUATED CYLINDER, 2000 ml capacity

B022T
BOTTLE-ROLLER WITH VARIABLE SPEED NEW

Suitable for mixing of liquids and, using the special jar, for grinding small specimens. Metal frame and rollers covered in rubber (second roller can be placed in various positions in order to accept different size bottles). 0,5 HP engine.
Variable roller speed: 0-95 rpm.

Power supply: 220V 1F 50Hz
Dimensions: 640x350x140 mm
Weight: 20 kg approx.



B022ST
BOTTLE ROLLER WITH FIX SPEED NEW

Same model as B022T, but with fix speed of the driving roller at 73 rpm.

B022SP
BOTTLE ROLLER
DETERMINATION OF CLAY, SILT AND DUST IN FINE AND COARSE AGGREGATES TO BS SEDIMENTATION METHOD

STANDARDS: BS 812 I ASTM C117
To rotate one up to three bottles or jars simultaneously about their longitudinal axis with rotation speed, adjustable from 0 up to 85 rpm
Supplied complete with timer 0-99 hours

Power supply: 230V 50-60Hz 1ph
Dimensions: 385x295x160 mm
Weight: 10 kg approx.

ACCESSORY

S132-03 BOTTLE, pyrex glass, 1 litre capacity, with airtight stopper.

B022-12 GLASS ROD with a diameter of 6 mm equipped with 30 mm (± 10 mm) long fitting rubber tube.

S144
ANDREASEN PIPETTE,

25 ml capacity, glass made, used for an accurate and precise extraction of suspension material for analysis.

S144-01
PIPETTE STAND,

to accurately raise and lower the Andreasen pipette with no transmission of vibrations.

Weight: 10 kg approx.

A124
FILLER COMPACTION APPARATUS
DETERMINATION OF THE VOIDS CONTENT OF DRY COMPACTED FILLER.

STANDARDS: EN 1097-4 comparable to BS 812 I CNR N° 123 NLT 177

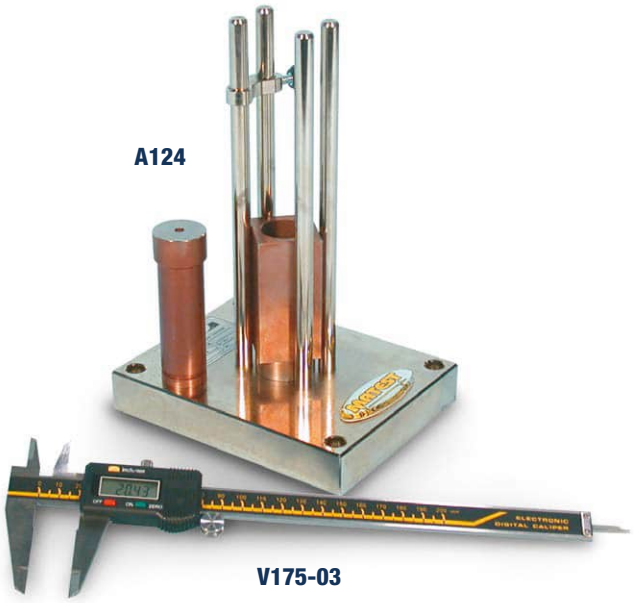
The apparatus consists of:
cylinder with an inside diameter of 25.4 mm; plunger freely sliding into the cylinder with max. lateral play of 0.20 ± 0.05 mm; four columns and metallic base holding the whole.
To perform the test a measuring device (vernier caliper with 0.01 mm accuracy) is required: see accessory.

Weight: 4 kg approx.

ACCESSORIES

A124-01 FILTER PAPER Ø 25 mm (pack of 100).

V175-03 DIGITAL VERNIER CALIPER 0 - 150 mm x 0.01 mm sens.



A082
AGGREGATE CRUSHING VALUE APPARATUS
DIAMETER 150 MM

STANDARD: comparable to BS 812:110

Comprising 150 mm nominal diameter steel cylinder, plunger, base plate, tamping rod and measure 115 mm diameter x 180 mm deep.
Used for aggregate passing 12.7 mm and retained by 9.52 mm sieve.
The complete assembly is galvanized plated for corrosion protection.

Weight: 20 kg approx.

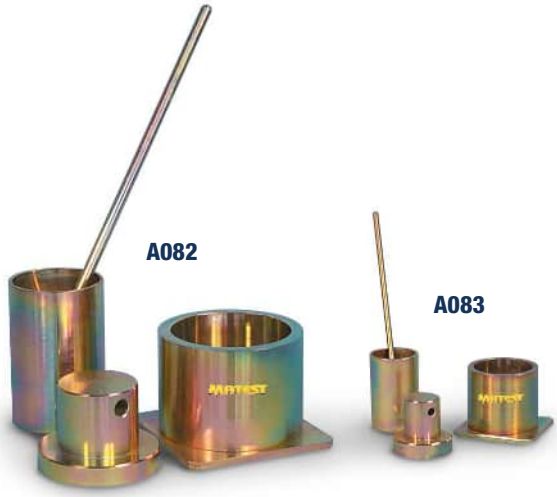
A083
AGGREGATE CRUSHING VALUE APPARATUS
DIAMETER 75 MM

STANDARD: comparable to BS 812:110

Comprising 75 mm nominal diameter steel cylinder, plunger, base plate, tamping rod and measure 57 mm diameter x 90 mm deep.
Used for aggregate smaller than 9.52 mm
The complete assembly is galvanized plated for corrosion protection.

Weight: 8 kg approx.

Note: Further information at p. 262-263.



A085
QUARTERING CANVAS

STANDARD: ASTM C702 - Method B

Used in field for quartering soil and aggregates.
Size: 140x140 cm

A086
VOLUMETER FOR AGGREGATES

STANDARD: BS 812

Used to measure coarse aggregate density through water displacement method.
Formed by a cylindric metal container Ø 160x350 mm fitted with a siphon tube at 250 mm from bottom.

Weight: 3 kg approx.

ACCESSORY

V101-04 GRADUATED GLASS CYLINDER 250 ml capacity

A113
SKID RESISTANCE AND FRICTION TESTER

STANDARDS: EN 1097-8 | EN 1338, 1341, 1342, | EN 13036-4 | EN 1436 | ASTM E303 (model A113-01)

MAIN FEATURES

- Suitable for both site and laboratory applications.
- Perfect for measuring pavement (road asphalt) surface frictional and skid resistance properties.
- Perfect for polished stone value tests on aggregates (curved specimens) from accelerated polishing tests.
- Suitable to perform tests on:
  Natural stones conforming to EN 1341, 1342.
  Concrete block pavers conforming to EN 1338.
- Accurate adjustement operations through an incorporated slider lifting device.
- Simple and reliable height adjusting system.
- High-precision results thanks to an extremely light pointer.

A113

The tester measures the energy loss when a rubber slider edge is propelled over the surface under test.
The release mechanism of the pendulum arm has an original solution reducing the friction to minimum for better accuracy.

The skid tester is supplied complete with:
- Additional incorporated scale for tests on Polished Stone Value specimens.
- Rule, made of plexiglass, for sliding length verification.
- Thermometer range –10 to +110 °C for surface temperature measurement.
- Stool, wash bottle, bristle and tool set for machine use.
- Carrying case.
- Calibration Certificate conforming to EN 1097-8 or ASTM E303 (model A113-01).

The tester is supplied **without** rubber sliders that have to be ordered separately (see accessories).

Case dimensions: 730x730x330 mm
Weight: 32 kg approx.

Note:

The tester is supplied calibrated to meet EN Specifications.
On request the skid tester can be supplied to meet ASTM E303 Spec. (model A113-01)

A113-01
SKID RESISTANCE AND FRICTION TESTER

STANDARD: ASTM E303
As above, but calibrated to meet ASTM E303 Specifications.

ACCESSORIES

A110-03 MOUNTED RUBBER SLIDER, TRL (55) rubber, 76 mm width for site use on road surface, complete with conformity certificate.

A110-01 MOUNTED RUBBER SLIDER, TRL (55) rubber, 32 mm width for Polished Stone Value laboratory tests, complete with conformity certificate.

A110-05 MOUNTED RUBBER SLIDER, 4S (96) rubber, 76 mm width (ceramics, marbles, paving tiles, sidewalk surface) complete with conformity certificate.
Standards: EN 13036-4, EN 16165

A110-06 NEW MOUNTED RUBBER SLIDER, TRL (57) rubber, 76 mm width, complete with conformity certificate. EN 16165

A110-07 NEW MOUNTED RUBBER SLIDER, TRL (57) rubber, 32 mm width, complete with conformity certificate.

A110-11 METAL BASE PLATE for Polished Stone Value tests in laboratory, and for tests on natural stones and concrete block pavers. Supplied **without** specimen clamping devices, to be ordered separately.

A110-12 CLAMPING DEVICE for Polished Stone Value tests in laboratory.

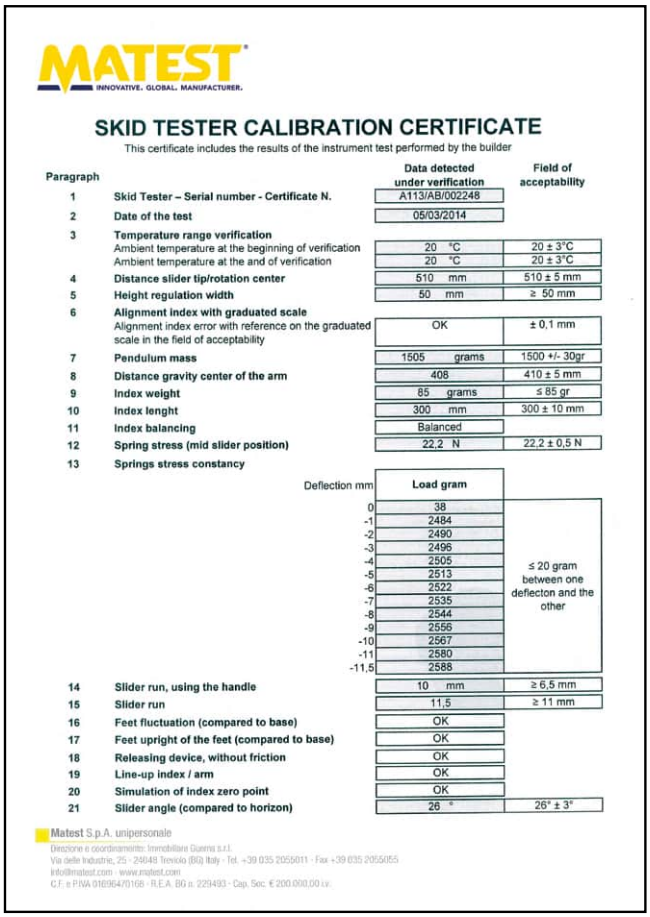
A110-13 CLAMPING DEVICE for tests on natural stones (EN 1341, 1342); for concrete block pavers (EN 1338) and skidding tests on wooden floor (EN 1339).

A110-19 CALIBRATION PLATE float glass, EN 1097-8.

A110-20 PINK LAPPING FILM (10 sheets) for Skid Calibration.

A110-21 NEW GREEN LAPPING FILM (10 sheets) for Skid calibration.

A110-22 NEW PAVIGRES PLATE.



MATEST
INNOVATIVE. GLOBAL. MANUFACTURER.

SKID TESTER CALIBRATION CERTIFICATE

This certificate includes the results of the instrument test performed by the builder

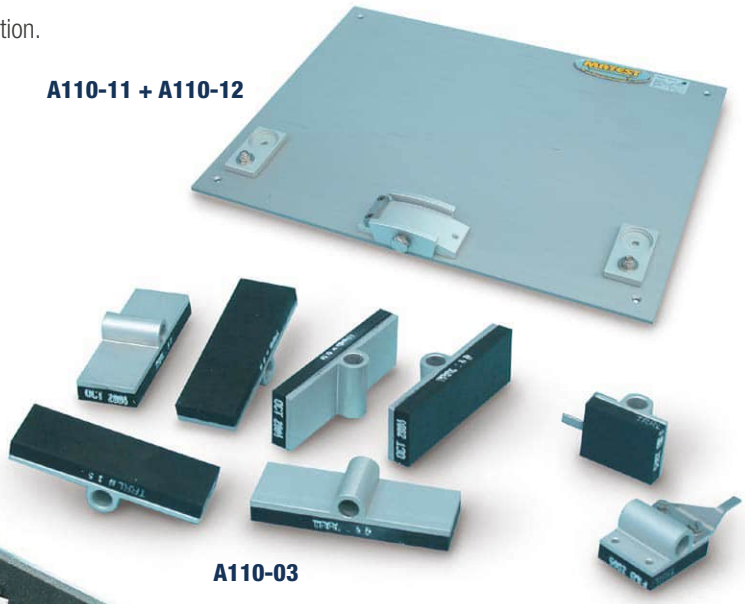
Paragraph		Data detected under verification	Field of acceptability
1	Skid Tester – Serial number - Certificate N.	A113/AB/002248	
2	Date of the test	05/03/2014	
3	Temperature range verification Ambient temperature at the beginning of verification Ambient temperature at the and of verification	 20 °C 20 °C	 20 ± 3°C 20 ± 3°C
4	Distance slider tip/rotation center	510 mm	510 ± 5 mm
5	Height regulation width	50 mm	≥ 50 mm
6	Alignment index with graduated scale Alignment index error with reference on the graduated scale in the field of acceptability	OK	± 0,1 mm
7	Pendulum mass	1505 grams	1500 +/- 30gr
8	Distance gravity center of the arm	408	410 ± 5 mm
9	Index weight	85 grams	≤ 85 gr
10	Index lenght	300 mm	300 ± 10 mm
11	Index balancing	Balanced	
12	Spring stress (mid slider position)	22,2 N	22,2 ± 0,5 N
13	Springs stress constancy		

Deflection mm	Load gram	
0	38	≤ 20 gram between one deflecton and the other
-1	2484	
-2	2490	
-3	2496	
-4	2505	
-5	2513	
-6	2522	
-7	2535	
-8	2544	
-9	2556	
-10	2567	
-11	2580	
-11,5	2588	

14	Slider run, using the handle	10 mm	≥ 6,5 mm
15	Slider run	11,5	≥ 11 mm
16	Feet fluctuation (compared to base)	OK	
17	Feet upright of the feet (compared to base)	OK	
18	Releasing device, without friction	OK	
19	Line-up index / arm	OK	
20	Simulation of index zero point	OK	
21	Slider angle (compared to horizon)	26 °	26° ± 3°

Matest S.p.A. unipersonale
Direzione e coordinamento: Immobiliare Giunni s.r.l.
Via delle Industrie, 25 - 24048 Treviolo (BG) Italy - Tel. +39 035 2055011 - Fax +39 035 2055055
info@matest.com - www.matest.com
C.F. e P.IVA 01619640160 - R.E.A. BG n. 229493 - Cap. Soc. € 200.000,00 i.v.

Calibration certificate to EN 1097-8



A110-11 + A110-12

A110-03

A110-01

A113
in carrying case

A092
LABORATORY JAWS CRUSHER

STANDARDS: ASTM C289 I UNE 83 120
Comparable to EN 933-3, EN 933-6

Designed to crush any sort of material, also the hardest.
The structure is made of cast iron, the shaft of rectified steel, and the jaws of manganese.
Jaws opening is regulated from 2 to 18 mm by a wedge.
Jaw size: 100x60 mm
The crusher is suitable to prepare the material to be reduced to powder with the jar mill A091 serie.
Complete with steel cabinet conforming to CE safety Directive, separate on/off switch and collecting pan.

Power supply: 230V 50Hz 1ph 1100W
Dimensions: 400x900x1170 mm
Weight: 130 kg approx.

A092
without cabinet

A092
with cabinet

A091-10
JAR MILL
CAPACITY 300 G I 1000 G

Designed to reduce from 5 mm to powder granulometric materials like: cement, stones, rocks, hard materials. Supplied **without** jar to be ordered separately (see needed accessory).
This mill can accept jars having capacity 300 cc. or capacity 1000 cc.
Jar is in prokorund material with relevant hard porcelain spheres.
The noise reduction steel cabinet and microswitch are conforming to CE safety Directive.
Built in timer. Rpm: about 400
It can be used only for wet tests.

Power supply: 230V 50Hz 1ph 370W
Dimensions: 350x730x450 mm
Weight: 50 kg approx.

A091-10 + A091-11

Jars Detail

NEEDED ACCESSORY

A091-11 JAR, 300 cc. capacity complete with spheres.

or:

A091-12 JAR, 1000 cc. capacity, complete with spheres.

A091-02
JAR MILL
CAPACITY 1500 CC.

Same as mod. A091-10, but with jar capacity of 1500 cc.
Supplied **complete** with jar and spheres.

A093
DRY MIXER

Designed to mix dry materials like: powders, cement, gypsum and granulometric materials. In a short time it assures a perfect and homogeneous mixture. The mixer consists of two opposite asymmetric cones and a pan for collecting the mixed material. Supplied complete with timer. The volume of the cone is 30 litres.
Mixing capacity: 10 kg of material
Speed rotation: 30 rpm
It cannot be sold on CE markets without security cabinet (see mod. A093-11)

Power supply: 230V 50Hz 1ph 750W
Dimensions: 700x700x1200 mm
Weight: 130 kg approx.

ACCESSORY

A093-11
SECURITY CABINET, manufactured from sheet steel, lined with sound proofing-material for noise reduction, conforming to CE Safety Directive.

Overal Dimensions:
980x1070x1190 mm
Internal Dimensions:
895x876x975 mm
Weight: 100 kg approx.

A093

A128N
ACCELERATED POLISHING MACHINE
DETERMINATION OF THE POLISHED STONE VALUE

STANDARDS: EN 1097-8, EN 1341, 1342, 1343 | BS 812:114 | NF P18-575 | CNR N.105

MAIN FEATURES

- Up to 14 specimens simultaneously.
- Road wheel speed, from 310 to 330 RPM.
- Digital control panel for an easy test execution.
- Resultant specimens perfectly suitable for the skid resistance tester.

It measures the resistance of road aggregates, paving stones and paving blocks to the polishing action of vehicle tyres on a road surface. The specimens are manufactured with suitable moulds and located on the Road Wheel.
The wheel is now rotated and enters in contact with solid rubber tyre, spring loaded. Abrasive charges are continuously introduced by two automatic mechanical feeders (hoppers).
The feeders are held by a suitable support disjoined from the machine body; this solution saveguards feeding calibration and realiability/life of the hoppers from the influence of test execution vibrations.
The water is supplied at a controlled rate through a water container equipped with flow regulator.
During the test execution the display shows the remaining time and the speed rotation of the wheel holding the specimens.
Supplied complete with 2 rubber wheels (one for corn and one for flour emery), set of 4 specimen moulds and 2 mould covers, while control stone, corn and flour emery have to be ordered separately (see accessories).

Power supply: 230V 50Hz 1ph 750W
Dimensions: 1800x820x600 mm
Weight: 175 kg approx.

A128N

ACCESSORIES

A128-02 CORN EMERY, 25 kg pack
A128-02N CORN EMERY, with certificate of conformity, 5 kg pack
A128-03 FLOUR EMERY, 5 kg pack
A128-13 FLOUR EMERY, 5 kg pack in accordance with EN 1097-8:2020
A128-04 CONTROL STONES, ungraded, 20 kg bag, PSV 49
A128-04N CONTROL STONES, ungraded, 5 kg bag, PSV 50-60 conforming to EN 1097-8
A128-04M CONTROL STONES, graded, 5 kg bag, PSV 50-60 conforming to EN 1097-8
A128-05 FRICTION TESTER REFERENCE STONE (Criggion Stone), ungraded, 25 kg bag.
A048-18 FLAKINESS SIEVE, slot 7.2 by 40 mm, used to retain the road aggregates, to EN 1097-8
A128-10 Notched straightedge for wheel alignment check in accordance with EN 1097-8.

C129
ABRASION BÖHME TESTER

STANDARDS: EN 1338, 1339, 1340, 13892-3
EN 14157 | EN 13748-2 | DIN 52108

Used to measure volume loss in a specimen under abrasion stress in tests, such as:
- Paving stones
- Concrete slabs
- Slabs made of natural rocks
- Natural stone slabs

See section "C" Concrete p. 300

C129

SPARES for A128N

A128-11 Mould (without cover) to prepare the specimen.
A128-12 Cover for the mould.

A111N
ABRASION MACHINE
AGGREGATE ABRASION VALUE (AAV) DETERMINATION

STANDARDS: EN 1097-8 | Comparable to BS 812-113

The test measures the resistance of aggregates to surface wear by abrasion. Inadequate abrasion of road-surfacing aggregates leads to an early loss of the texture depth required to keep high-speed skidding resistance.
The machine consists of a heavy duty mainframe on adjustable feet, steel lap wheel 615 mm diameter, which rotates in a horizontal plane at 28/31 r.p.m., precision machined steel shaft and sealed bearings, resilient mounted electric gearmotor, scraper blades for sand removal, revolution counter.
The control panel can be wall fixed or placed on a bench.
Supplied complete with two specimen moulds, two trays, weights and fixing device.

Power supply: 230V 1ph 50-60Hz
Dimensions: 1130x710x1100 mm
Weight: 200 kg approx.

A111N

ACCESSORIES

V179-05 SOFT HAIR BRUSH Ø 3 mm BS 812

A111-11 GRATED SILICA SAND. Pack of 25 kg, compliance with EN 1097-8.

SPARE

A111-12
Two specimen moulds.

A111-12

A112
ABRASION TESTER FOR NATURAL STONES AND CONCRETE
ABRASION RESISTANCE OF NATURAL STONES AND CONCRETE TILES FOR PAVING

STANDARDS: EN 1338, 1339, 1340, 1341, 1342, 1343 | EN 14157
UNI 10532 | BS 6717

Used to determine the resistance to abrasion and wear of concrete products and natural stones, by measuring the length of a groove produced on the specimen surface through a disc with thickness of 70 mm that rotates at controlled speed and makes a constant pressure on the specimen. A charge of abrasive material must be interposed between the disc and the specimen. The instrument is supplied with an electronic speed controller and shutting off device after the set number of revolutions, 1 kg of abrasive material, a calibration plate comparable to boulonnaise marble, accessories and cabinet conforming to CE Safety Directive.

Power supply: 230V 50-60Hz 1ph 500W
Dimensions: 450x420x800 mm
Weight: 85 kg approx.

A112-05

A112 ... A112-10

A112-10
ABRASION TESTER FOR BRICKS AND TILES

STANDARDS: EN 102 | EN 12808-2 | EN 1344, 10545-6, 14617-4
ISO 10545-6 | UNE 127024

Same as mod. A112 but with disc thickness of 10 mm.
Suitable for bricks and ceramic glazed tiles.

A112-11
CONVERSION KIT

Used to convert the abrasion tester mod. A112 into mod. A112-10.
It comprises abrasion disc Ø 200 mm x 10 mm thick, counter weight and hopper.

SPARES

A112-01 Abrasive white corundum sand 80 grade. Pack of 5 kg.

A112-05 Calibration plate comparable to boulonnaise marble.

A105
CALCIMETER, (GASOMETER) DIETRICH-FRÜHLING
CARBONATE CONTENT OF AGGREGATES

Used for the determination of calcium carbonate ($CaCo^3$) in certain products such as limestone and lime marl. It mainly consists of a glass container in which the reaction between the calcium carbonate present in the product and a solution of hydrocloridric acid takes place.
The gased product is collected and measured by a device connected to the container.
As the volume of the produced gas (Co_2) is in relation to the $CaCo_2$ amount contained in the material, it is possible to calculate the percentage of $CaCo_3$

Dimensions: 400x200x1100 mm
Weight: 13 kg approx.

A105

C279-02

A117 + A116-11 + A116-12

A117
END-OVER-END SHAKER

STANDARDS: EN 1997-2 | BS 1377:2

Used to determine the specific gravity of soils, 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 50Hz 1ph 150W
Dimensions: 550x430x500 mm
Weight: 20 kg approx.

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.

A116-11
A116-12

A108
CRUSHING COEFFICIENT MACHINE

STANDARD: CNR N°4
Composed of a metallic guide 500 mm long and 140 mm wide, suitable to contain 500 gr. of testing aggregates.
The guide is slided lengthwise and transversalwise through handwheels.
In the center of the table a metallic wheel of 400 kg weight with band of 50 mm wide is placed.
The test is performed by passing the wheel on the aggregates contained into the guide for twelve times.

Dimensions:
1200x500x1850 mm
Weight: 580 kg approx.

A108

S132N
COLOUR STANDARD GLASS SCALE

STANDARDS: ASTM C40-11 Method D | AASHTO T21 | UNI 8020-14

For the determination of organic impurities in soils and fine aggregates. Chart with 5 glass reference scales.

S132-03 S132-01 S132-02 S132N

S132-01 Graduated impurities test bottle, stopper, pyrex glass, 500 ml - ASTM C40
S132-02 Graduated impurities test bottle, stopper, pyrex glass, 500 ml, marked at 130 and 200 ml - UNI 8020-14
S132-03 Graduated impurities test bottle, stopper, pyrex glass, 1000 ml - ASTM C40

THERMAL AND WEATHERING PROPERTIES OF AGGREGATES

DETERMINATION OF RESISTANCE TO FREEZING AND THAWING

STANDARDS: EN 1367-1 I EN 932-5

It provides the needed informations on aggregates subject to freeze and thaw test cycles.
The cold stress on aggregates depends on the water saturation degree and the freeze percentage. The test can be performed on aggregates having dimensions from 4 to 63 mm.

A103-10 CONTAINER, stainless steel made, having nominal capacity of 2000 ml.
Supplied complete with stainless steel cover.
Weight: 600 g approx.

A103-11 BALLAST for the test container, plated steel made, used for tests on lightweight aggregates.
Weight: 2 kg approx.

Note: To perform the test sieves with different openings according to the dimensions of the aggregates are also requested.

MAGNESIUM SULPHATE TEST

Tests for thermal and weathering properties of aggregates.

STANDARDS: EN 1367-2, also comparable to ASTM C88
UNE 7136 I UNI 8520-10

A103 BASKET, stainless steel mesh, Ø 120 mm x 160 mm high, 3.35 mm opening

A103-01 BASKET, stainless steel mesh, Ø 95 mm x 120 mm high, 1.18 mm opening

A103-02 BASKET, stainless steel mesh, Ø 95 mm x 120 mm high, 0.600 mm opening

A103-03 BASKET, stainless steel mesh, Ø 65 mm x 80 mm high, 0.150 mm opening

V172-05 HYDROMETER, calibrated at 20 °C, range 1200 – 1300 g/ml, accuracy 0.001 g/ml

V125-03 CONTAINER, tinned steel with airtight lid, Ø 200 mm x 200 mm high.

BEHAVIOUR AND RESISTANCE TO FREEZING AND THAWING OF AGGREGATES

STANDARDS: EN 1367-1 I CNR N° 80 I UNI 8520-20
BS 812:124 I ASTM C671, C682

C316N
CLIMATIC CHAMBER,
535 LITRES CAPACITY

Temperature range -30 +70 °C.
Technical details and other models described in section Concrete p. 326

C348T *
ROCK AND MASONRY SAW

It accepts blades up to Ø 400 mm.
Useful cutting height: 130 mm

ACCESSORIES:

C350-14
DIAMOND BLADE Ø 400 mm

C352
DEVICE to clamp cylinders and cores

C353
DEVICE to clamp irregular shaped specimens

*** Note:** Technical details and other saw models described in Section "C" Concrete p. 336

DETERMINATION OF DRYING SHRINKAGE
THERMAL AND WEATHERING PROPERTIES

STANDARDS: EN 1367-4 I BS 812:102

A107
PRISM MOULD 50x50x200 mm, three gangs, complete with steel inserts, to determine the thermal properties and the weathering of aggregates in drying shrinkage of concrete.
The test is developed on concretes of fixed mix proportions and aggregates of 20 mm max. size.

Weight: 8 kg approx.

SPARE

A107-11 Inserts for A107 mould. Pack of 12 pieces

DETERMINATION OF POTENTIAL REACTIVITY OF ALKALI IN AGGREGATES FOR USE IN CONCRETE

STANDARD: UNI 11604

A101M
PRISM MOULD ONE GANG, 75x75x250 mm, complete with inserts and handles to determine the dimensional variations of the specimen.
Steel made, Vickers hardness HV 400 approx.

Weight: 3 kg approx.

A101-01M
PRISM MOULD, same as A101M but **two gangs**.

Weight: 5 kg approx.

A101-05M
CONTAINER, stainless steel made, complete with specimen holder.

Weight: 5 kg approx.

ACCESSORIES

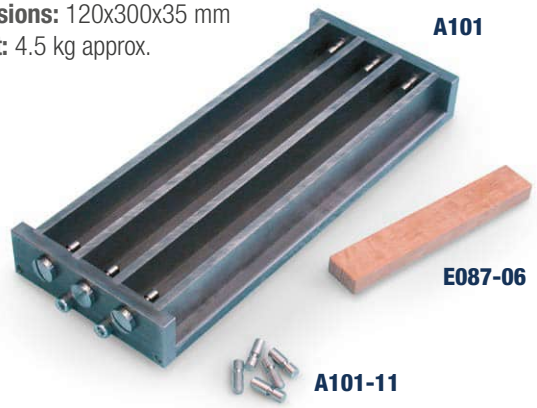
E078-01 REFERENCE ROD 295 mm long UNI 11604.
A101-11M SPARE STEEL INSERTS. Pack of 12 pieces.
E087-06 TAMPER, hard wood made, to compact the specimen.

DETERMINATION OF POTENTIAL REACTIVITY OF ALKALI IN AGGREGATES FOR USE IN CONCRETE

STANDARD: UNI 8520-22

A101
PRISM MOULD, 25x25x280 mm, three gangs, complete with six steel inserts to determine the dimensional variations of the specimen.
Steel made, Vickers hardness HV 400 approx.

Dimensions: 120x300x35 mm
Weight: 4.5 kg approx.



SPARE for A101

A101-11 Spare inserts. Pack of 12 pieces

E078-KIT
LENGTH COMPARATOR with digital dial indicator mod. S382-01, 12 mm travel by 0.001 mm divisions, complete with battery and RS232 connection to PC.
For more details and other models: see p. 368

S382-13 CABLE to connect S382-01 and S383 to PC through USB port for direct visualization and recording of the measurement.
E078-01 Reference rod for A101 mould (UNI 8520-22)
E078-06 Reference rod for A107 mould (UNI EN 1367-4)

E078-KIT + E078-06 E067-05

E067-05
MORTAR BAR CONTAINER
STANDARD: ASTM C227
Technical details: see p. 370

DETERMINATION OF RESISTANCE TO THERMAL SHOCK

A023
MUFFLE FURNACE 1100 °C HIGH CAPACITY

STANDARD: EN 1367-5

Used for the determination of resistance to thermal shock of aggregates subject to heating and drying, in the production of hot bituminous mixtures.
The test is applied to heated and soaked aggregates at 700 °C for 180 seconds, and comparing the strength loss and loss in fines, obtained as per EN 1097-2 Spec. before and after the heating test.
The furnace is also suitable for general purpose laboratory tests
Technical data: see p. 27

Power supply: 230V 1ph 50-60Hz 4Kw

ACCESSORIES

A107-20 TEST PLATE, metal, 440x240x4 mm with 12 mm rim

A107-21 SUPPORT FRAME, for metal test plate.

A107-22 PLATE, fire proof, 445x250x10 mm

A107-23 FABRIC, stainless steel, size 445x250 mm, 2 mm cloth aperture

A023

A115N
MOHS HARDNESS SCALE SET

STANDARD: EN 101

Used for determining the hardness of the surface of the materials.
Composed by a case containing 10 minerals of the Mohs' hardness scale, copper strip, small glass and magnet bar.

Weight: 500 g

A115N

INDEX OF VELOCITY OF ROCKS:

Ultrasonic pulse velocity tester.
See section "C" concrete
mod. C369N...C372M
p. 346-347

C372M

A122
BARTON COMB (PROFILOMETER) 300 MM LENGTH

Used for the evaluation of the surface roughness of rock samples.
This simple device allows very thin steel wires to perfectly lay to the outline of the sample under test, in order to allow its analysis.

Dimensions: 300x120 mm
Weight: 1 kg approx.

A122

A122-01
BARTON COMB (PROFILOMETER) 150 MM LENGTH

Same as mod. A122 but 150 mm long.

A122-01

A109
ABRASIMETER

STANDARDS: EN 154 | EN ISO 10545-7

Suitable to determine the abrasion resistance of glazed tiles and other materials.
The instrument has three stations, and it can work either with wet (PEI) or dry (MCC) abrasive charges.
Eccentricy is 22.5 mm
Revolutions per minute are 300
Complete with cabinet conforming to CE Safety Directive.

Power supply: 230V 50-60Hz 1ph 300W
Dimensions: 400x700x500 mm
Weight: 38 kg approx.

A109

A132
A132-01

A132
GEOLOGICAL HAMMER, pointed tip, for preliminary rock identification. **Weight:** 600 g approx

A132-01
GEOLOGICAL HAMMER, chisel edge, for preliminary rock identification. **Weight:** 800 g approx

A125N
DIGITAL POINT LOAD TESTER 56 KN (ROCK STRENGTH INDEX)

STANDARDS: ASTM D5731 I ISRM

MAIN FEATURES

- High precision electric load cell.
- Capacity 56 kN. (100 kN mod. A126)
- Core specimens up to 4" (101.6 mm).
- Easy reading of the distance between the conical points thanks to a graduated scale.

A125N / A126

A125-02

Used to determine the strength values of a rock specimen both in the field and in the laboratory.
It consists of a load frame for applying loads, on which a manual hydraulic jack is mounted.
The applied load is measured by a high precision electric load cell with a digital display unit range 0-56 kN proving:

- 65.000 divisions
- 0.001 kN resolution
- Linearity: 0.05%
- Hysteresis: 0.03%
- Repeatability: 0.02%

The strength index (IS) is got by the formula P : D^2 where P is the strength and D the space between the two conical points.
Supplied complete with wooden carrying case, goggles, accessories.

Dimensions: 370x520x720 mm **Weight:** 28 kg approx.

A126
DIGITAL POINT LOAD TESTER 100 KN
(ROCK STRENGTH INDEX)

Capacity: 100 kN
Same as mod. A125N, but having load capacity up to 100 kN.
Weight: 38 kg

ACCESSORY for A125N and A126

A125-02 LOWER AND UPPER PLATE with seat ball to modify the Point Load Tester into a portable compression tester (see section "C" concrete, mod. C094N p. 299)

SPARE

A125-01 Set of two hardened conical points.

C390

A095
POLISHER - GRINDER

Used for the preparation of rock and metallurgical specimens from lapping to final polishing. The disc is 200 mm diameter and the rotation speed is 300 rpm. The machine is supplied complete with bakelite working disc. A set of 25 abrasive silicon carbide discs can be purchased as accessory.

Power supply: 230V 50 Hz 1ph 200W
Dimensions: 370x500x300 mm
Weight: 31 kg approx.

NEEDED ACCESSORY

A095-01
Abrasive silicon carbide disc.
Pack of 25.

A095

C381
ROCK CLASSIFICATION HAMMER
LOW IMPACT ENERGY MODEL

STANDARDS: ASTM D5873 I ISRM

This impact hammer is used for rock classification test. The core rock specimen normally NX 54.7 mm diameter is held on a special cradle (accessory) in horizontal position, and the hammer tests the same in all its length, to obtain an average of the readings.

Impact energy: 0.74 Nm
Measuring range: 10...60 N/mm^2
Weight: 2 kg

C381

A121

ACCESSORIES

A121 **ROCK CRADLE** STANDARD: ASTM D5873
To locate EX to NX core rock specimens during the classification tests by the Rock Hammer mod. C381. **Weight:** 20 kg

C390 **CALIBRATION ANVIL**
STANDARDS: EN 12504-2 I ASTM D5873, C805
Used for periodical obligatory verification of the test hammers, as specified by EN Standards.
Technical data: see Section "C" Concrete p. 344
Dimensions: Ø 150x230 mm. **Weight:** 16 kg

A130
SLAKE DURABILITY APPARATUS

STANDARD: ASTM D4644

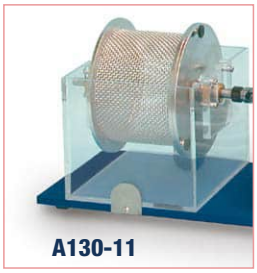
This equipment has been developed to assess the durability of rock to weakening and disintegration when subjected to the simulated effects of climatic slaking.
The rock samples are dried and then submitted to wear stress inside a drum which is rotated into water.
The test is performed different times and the wear is given by the loss in weight of the sample.
The system incorporates a motor drive unit mounted on a baseplate which revolves two (or up to four) stainless steel drums manufactured from 2 mm mesh, 140 mm diameter x 100 mm long.
The tanks are filled with water to a level 20 mm below the drum axis.
A digital timer automatically stops the motor after the preset time.
The equipment is supplied complete with two drums with tanks, and it can accept two additional drums (see accessory).

Power supply: 230V 1ph 50Hz 250W
Dimensions: 350x740x300 mm approx.
Weight: 30 kg approx.

A130

ACCESSORY

A130-11
MESH DRUM, complete with tank, base and accessories, to be connected to A130 unit.


A130-11

C300-08
CORE FACE PREPARATION DEVICE

Used in conjunction with the Grinding Machine, it prepares parallel and flat core faces of rock samples. The device accepts up to 4 core samples from 20 to 55 mm diameter and can be mounted on most grinding machines.

Weight: 7 kg approx.

C300-08

A122-10

A122-10
TILT TEST

The instrument measures the roughness coefficient of a rock specimen or of a joint. The sample is usually a rock core cut in half lengthwise, or a core placed on another two.
The unit is also designed to test the possible fluage tendency of bituminous mixtures covering a slope of a dam subject to high sun radiations. The fluage tendency is the permanent viscous deformation of a material. The apparatus consists of an inclined adjustable plane on which the sample is placed.
Inclination angle: 0 - 75°
Max. sample diameter: 100 mm
The plane is slowly tilted until sliding of the upper surface of specimen on the lower one occurs. The roughness index can be evaluated from the measured inclination angle.

Dimensions: 270x175x265 mm
Weight: 5 kg approx.

C299
AUTOMATIC SPECIMEN GRINDING MACHINE

STANDARDS: EN 12390-2 | ASTM D4543

Designed to grind and polish cubic and cylindrical specimens of concrete, rocks, natural stones.

C299

Note:

Technical details and accessories described at p. 330

C377
MICRO-CORING EQUIPMENT

STANDARD: UNI 10766

The extraction of a micro-core sample from a concrete structure or masonry is an extremely valid non-destructive method, as it allows analysis and accurate evaluations of the manufacture (compression resistance, ecc.) without causing any damages to the structure.
Micro-coring system is additionally valid and reliable if combined with ultrasonic tester and concrete hammer.
The equipment comprises:
- Suitable electric drill. 230V 1F 50Hz
- Flanged guide assembly
- Drilling mask
- Impregnated diamond bit for cores with Ø 28x100 mm and cores with Ø 28x200 mm
- 2 Self-blocking pincers to fit the flanged guide assembly to the surface

Set of accessories including: anchors, bits, wrenches, screws.
Carrying case.

Dimensions: 550x400x200 mm approx.
Weight: 10 kg approx.

ACCESSORIES

C377-01 WATER TANK WITH FOOT PUMP, that leaves the hands of the operators free for coring.

AS ALTERNATIVE:

C377-02 AIR-WATER PRESSURE TANK, 10 liters capacity.

C377-01

C377

SPARES

C377-10 ELECTRIC DRILL, suitable for the microcoring purposes.

C377-15 DIAMOND BIT, Ø 28x100 mm

C377-16 DIAMOND BIT, Ø 28x200 mm

C377-05
TRIMMING/CUT-OFF MACHINE FOR CORES

Suitable to cut and trim cores to be prepared for compression tests, where the flatness of both surfaces is a basic condition to obtain correct results.
The equipment is made of stainless steel and aluminum and is supplied complete with diamond blade Ø 180 mm.
For this purpose it must be used the drill mod. C377-10 (enclosed into micro-coring equipment) and the water tank with foot pump mod. C377-01.

C377-05

Note:
The maximum values foreseen for compression tests on micro-cores are usually lower than 60 kN. Portable compression machine mod. C094N (see p. 299 or a cement compression tester (see p. 384-387) may be conveniently used.
Trimming of cores may be even obtained with the grinding machine mod. C299 + device mod. C300-08 (see p. 330-331)

ACCESSORY for C377-05

C377-10 ELECTRIC DRILL, suitable for the microcoring purposes.

C377-02

A129
ROCK SHEAR BOX APPARATUS

STANDARDS: ASTM D5607* I ISRM

Used to determine the strength and slope stability of rock size max 115x125 mm or cores max. diameter 102 mm, both in the field and in the laboratory.
Complete with two horizontal rams for shear in two directions, vertical loading ram, two bourdon tube load gauges diameter 150 mm with quick release couplings, calibrated 50 kN x 1 kN division, two hand pumps with hydraulic connections and dial gauge 25x0.01 mm.

Dimensions: 600x250x460 mm
Weight: 46 kg approx.

A129

ACCESSORY

A129-03*
SET OF 4 DIAL GAUGES 10 mm stroke x 0.002 mm division, complete with supports for vertical displacement measure, conforming to ASTM D5607 Standard.

A129-01

A129-03

A129-02

A131 + A131-01

A131
ROCK SHEAR BOX APPARATUS
CYBER-PLUS 8 PROGRESS ACQUISITION SYSTEM

STANDARDS: ASTM D5607* I ISRM
Same mechanical design as basic model A129, but equipped with:
n° 2 Pressure transducers for load acquisition, connected to the pumps.
n° 1 Linear displacement transducer for shear measurement.

C405-15M Cyber-Plus 8 Progress Touch-Screen for data acquisition, visualization, processing and storing, directly connected to PC or printer.
Technical details: see p. 477

Weight: 50 kg approx.

ACCESSORY

A131-01*
SET OF 4 LINEAR DISPLACEMENT TRANSDUCERS, complete with supports, for vertical displacement measure, conforming to ASTM D5607 Standard.

ACCESSORIES for A129 and A131

A129-01 MOULD FORMER, to prepare the specimen in the dimensions and geometry as requested by the shear box.

A129-02 PRESSURE MAINTAINER, complete with pump, to absorb volume changes of the specimen and to allow a constant load to be maintained during the test.

A129-04N BRITISH GYPSUM CRYSTACAL PLASTER, for casting specimens into mould assembly, 20 kg bag.

A150M
ELASTIC MODULUS OF ROCK SPECIMENS IN UNIAXIAL AND TRIAXIAL TESTS

C125-12

C134N

A150M + C089-10N

AUTOMATIC SYSTEM WITH PACE RATE CONTROL ALSO WHEN RELEASING THE LOAD

STANDARDS: EN 14580 | EN 1926 | ASTM D7012 | ISRM

It can be used with a MATEST high stability frame with capacity of 2000 or 3000 kN coupled to the Automatic Servo-controlled system Servo-Plus Progress (mod. C104N).

The appliance includes:

- **Hydraulic system**
  It is an hydraulic installation and has a high performance valve directly controlled by the digital unit that grants the automatic control of the pace rate increasing the load, keeps a certain load and then controls the pace rate decreasing the load.
  The setting of the pace rate is regulated by a very sensitive valve controlled by a stepper motor that allows a micrometric action on the pace rate granting excellent results in the control of the load.
  A laser position detector allows a rapid positioning of the piston and a very accurate touch point. This grants a touching sensitivity of test starting of about 0.1 per thousand of the maximum capacity. When used in conjunction with the C104MLPP (see p. 70) for the application of the confining pressure, the hydraulic system permits to maintain the pre-load level with extremely high accuracy.

- **Electronic measuring system**
  The high performance control and data processing unit controlled by a 32 bit microprocessor can manage up to 16 high resolution (24 bits) channels for the control of load cells, transducers and strain gauges.
  The system processes the signals coming from the load cells and from the extensometers giving all the results required for a further processing following the most updated standards for this application.

- **In-built firmware for elastic modulus on rocks**
  The firmware allows to set the initial parameters and to obtain final results locally, according to the relevant Standards. The PC software can be purchased separately (see accessories).

The user must enter data concerning the specimen that will be tested and the kind of test that he wants to make: dimensions, age of the specimen, average expected breaking value, etc. The appliance allows verifying the proper reading of the extensometers and, if everything is within the expected tolerances, it manages the average deformation value read by the transducers and processed by the digital unit.
With code SSW-UTM2, all tests data are transmitted through a serial communication port RJ45 (Network Connection) to a Personal Computer, that can already belong to the end user or be supplied separately (not included with the Software).
This data will be processed by the software and transformed in a graph load/deformation and load/time, following the specific Standards.

The extensometers (proposed in two versions: **A** and **B**) are not included in the supply and must be ordered separately (see needed accessories).

NEEDED ACCESSORIES

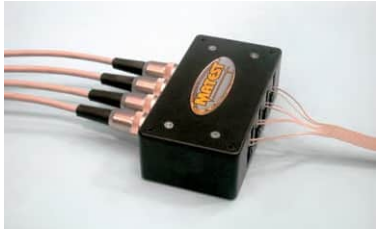
A) Extensometers (strain gauges) single use, electric, for uniaxial and triaxial tests (pack of 10). Available in different sizes:

C125-10 Electric extensometer, base length 10 mm.
C125-11 Electric extensometer, base length 20 mm.
C125-12 Electric extensometer, base length 30 mm.
C125-13 Electric extensometer, base length 60 mm.
C125-14 Electric extensometer, base length 120 mm.

C125-10...C125-14

C125-15
KIT for the application of single use extensometers composed by: glue, welder, solder, cleaning liquid, accessories, the whole in carrying case

C125-09
INTERFACE MODULE, to connect up to 4 electric single use extensometers . This module allows also the automatic calibration of the zero and of the measuring range after a special thermal compensation. This grants a five times better accuracy than the one requested by the Standards.



ALTERNATIVE VERSION:

B) Extensometers/Compressometers, electronic, universal, mechanical frame, for uniaxial tests:

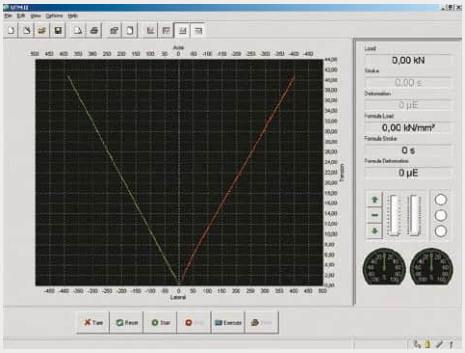
C134N
EXTENSOMETER / COMPRESSOMETER, electronic, universal, mechanical frame.
Technical details: see p. 260

C134N

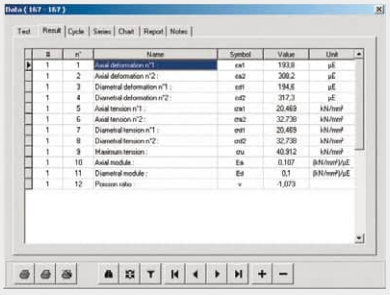
AS ALTERNATIVE:

C134-01N
COMPRESSOMETER / EXTENSOMETER, for short samples.

C134-10
TEMPLATE, to regulate and calibrate the base length of the C134N extensometer



Typical screen representing the longitudinal and transversal deformations.



Test data

ACCESSORY

SSW-UTM2

PC SOFTWARE for remote control.

UNIAXIAL TEST

A147
COMPRESSION DEVICE FOR ROCK CORES

STANDARD: ASTM D7012

Used to perform compression tests on rock core specimens having max. diameter 55 mm and height between 95 and 110 mm.
The loading piston is sustained by two springs; the upper compression platen is fitted with a spherical seat; the lower platen is fitted to the base.
Maximum load capacity: 100 kN
Piston's stroke: 20 mm - Platens diameter: 55 mm
Vertical daylight: max. 112 mm, min. 92 mm
Platens hardness: 60 HRC

Overall dimensions: Ø 151 by height 249 mm
Weight: 10 kg approx.

A147

A147-01
COMPRESSION DEVICE ROCKS, 1300 kN CAP.

STANDARD: ASTM D7012

This compression jig adheres strictly to the ASTM D7012 Test Methods for Rock Core Specimens, specifically meeting the requirements for the ratios of spherical seat to compression plates to specimen diameters. The Rock core specimens used in this jig should have a diameter ranging from 47 mm to 63.5 mm.
The jig comprises a robust twin-column frame, with an upper platen that is spherically seated and held in place by calibrated springs. The lower platen is centred on the base of the frame.
The jig's design incorporates a highly rigid structure and employs high-performance steel for the spherical seat. These features make the device exceptionally well-suited for testing high strength rock specimens that exhibit brittle properties and may undergo explosive failure.

Maximum load: 1300 kN
Dimensions: Ø 200x296 mm approx.
Weight: 20 kg approx.

A147-01

SPLITTING TEST

A148
SPLITTING TEST ROCKS

STANDARD: ASTM D3967

Compression device model designed specifically for indirect tensile testing (splitting tests) in accordance with ASTM D3967.
It performs splitting tensile tests on rock disks within the diameter range of 54 mm to 64 mm.

Maximum load: 700 kN
Dimensions: Ø 150x230 mm
Weight: 13 kg approx.

A148

A148-01
SPLITTING TEST ROCKS DIA 54.74 MM

STANDARD: ISRM

Compression device model designed specifically for indirect tensile testing (splitting tests) in accordance with ISRM.
The model comprises two steel loading jaws, guiding pins, and half ball bearings.
This model has a diameter of 54.74 mm.

Maximum load: 150 kN
Dimensions: 160x30x126 mm
Weight: 4 kg approx.

A148-01

A148-02
SPLITTING TEST ROCKS DIA 63.5 MM

STANDARD: ISRM

Identical to A148-01 but with a diameter of 63.5 mm.

A148-02

TRIAXIAL TESTS ON ROCK SPECIMENS

STANDARDS: EN 1926, EN 14580 I ASTM D7012 I ASTM D2664 I ASTM D3148 I ASTM D5407

MAIN FEATURES

- Axial load and constant isotropic pressure, up to 70 Mpa.
- Real time reading of:
  - poisson value
  - stress value
  - max. or breaking value.
- Specimen breaking between 5 and 10 minutes.

The triaxial test is made on a rock specimen placed into a container (Hoek cell), closed into a latex membrane .

The electric extensometers are directly applied on the surface of the rock specimen and they are used for the automatic reading in real time of the different parameters and find different information such as:

- Radial deformation combined with the axial deformation to obtain the Poisson value.
- Stress value in relation with the axial and radial deformation.
- The maximum or breaking value.
- Tangent and secant Young's modulus measured on the axial deformation curve.
- Maximum stress value in triaxial conditions.

Standards require that during the compression test the load on the rock specimen is applied in a continue way in order to obtain the breaking of the specimen within a time included between 5 and 10 minutes, with a constant increase of the load included between 0.5 and 10 Mpa/second.

For this reason it is recommended the use of a compression load frame with capacity of 1500, 2000 or 3000 kN (see concrete sector) combined with the automatic servo-controlled system Servo-Plus Progress, model C104N, and with the automatic system for the Elastic Modulus on rocks model A150M.

The side pressure set by the user, is kept constant between ± 1% using:

C104MLPP

Automatic servo-controlled system "Servo-Plus Progress" that grants a setting of the pressure up to 70 MPa. The system gives the possibility to perform a multi-stage triaxial test (multiple failure states test) manually. This is an excellent alternative to a series of single-stage triaxial test, necessary to determine the engineering material parameters of rocks. One multi-stage triaxial test may give the complete failure envelope. This is very important especially with a limited number of specimens or limited testing time or the budget for testing program.

C089-10N + A150M + A139 + C104MLPP

A201
AUTOMATIC SYSTEM FOR UNIAXIAL AND TRIAXIAL TESTING OF ROCK CORES

NEW

STANDARDS: ASTM D7012, D2938 | ISRM Suggested Methods | EN 1926, 14580

MAIN FEATURES

- Automatic test execution.
- All-in-one compact design.
- Easy to use, designed to make rock triaxial testing accessible and affordable.
- Hydraulics, electronics, and software are totally integrated, no need of external PC.
- Suitable to measure several mechanical properties of the cores including uniaxial strength, triaxial strength, Mohr circles failure envelope, Stress-path, Young modulus, Poisson modulus.

A201

This innovative all-in-one power and control unit, specifically designed for the automatic execution of uniaxial and triaxial testing on rock cores, features:
- High performing real time electronics, precisely simultaneously controlling multiple axes and channels.
- Large dimension high-definition graphic user interface, minimum 24".
- Double hydraulic power pack contemporaneously supplying fluid to the axial loading and to the confining pressure.
- User friendly software facilitating the test execution, processing results, generating reports, open to the communications with LIMS and ERP adopted in the laboratory.

The complete testing system comprehends:
- All-in-one power unit A201
- Hydraulic compression frame having suitable capacity. The capacity, up to 5.000 kN, shall be selected from the type and size of the rock cores of interest.
- Hoek cell housing the specimen with fluid inlets allowing axial and side loading. The Hoek cell dimension shall be selected from the type and size of the rock cores of interest.
- Axial and radial on-specimen strain sensors and off-specimen displacement sensors with suitable span.

Under uniaxial conditions, the system automatically increases the axial load following the path programmed by the user and measures the axial and radial specimen strains. The complete s-e path can be investigated, including both the hardening and the softening branches. Young and Poisson moduli are calculated and reported.
Under triaxial conditions, the system automatically increases the axial load and the confining pressure keeping isotropic or anisotropic conditions as programmed by the user and measures the axial and radial specimen strains. The complete failure envelope is plotted and reported.

HOEK CELLS FOR ROCK TRIAXIAL TESTS

The basic Hoek cell consists of the following parts:
Cell body complete with two screwed end caps and two self-sealing couplings, two spherical seats and pistons, hardened and ground, one specimen jacket.

A135...A139

MAIN FEATURES

- Perfect with pressure up to 70 MPa.
- Suitable for specimens from 30.10 to 63.5
- Used to measure the strength of cylindrical rock specimens which are subjected to triaxial compression.

Models	Specimen Ø x height	Size	Load spreader pads (pair)	Spare spherical seat + piston	Spare Jacket	Core drilling barrel 200 mm long	Adaptors set for extruder
A135	63.5x127 mm	HQ	**A136-01**	**A135-02**	**A135-03**	**A135-04**	**A141-05**
A136	30.10x60 mm	AX	**A136-01**	**A136-02**	**A136-03**	**A136-04**	**A141-01**
A137	38.10x75 mm	1,5”	**A136-01**	**A137-02**	**A137-03**	**A137-04**	**A141-02**
A138	42.04x85 mm	BX	**A136-01**	**A138-02**	**A138-03**	**A138-04**	**A141-03**
A139	54.74x100 mm	NX	**A136-01**	**A139-02**	**A139-03**	**A139-04**	**A141-04**

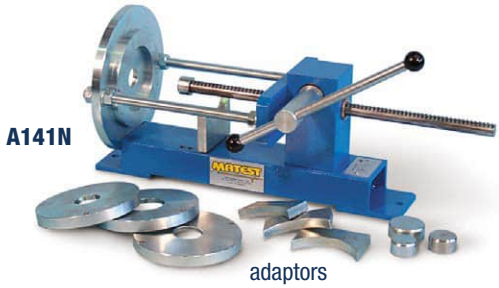
Note: The load spreaders A136-01 are used to avoid the cell’s pistons engrave the platens of the compression machine.
One set of extruder adaptors is formed by back plate, tamper and cell body support.

A140-01
CORING MACHINE

Used in the laboratory to obtain cores from irregular rock samples.
To be used with the Core Drilling Barrels (accessory A136-04... A139-04).
The 2 speed electric motor 1140/2040 rpm at free load and 730/1340 rpm at max load, is equipped with friction device and double safe isolation to CE Directive.
Complete with specimen’s clamp device, water cooling system and water tank.

Power supply:
230V 50-60Hz 1ph 1800W
Weight:
60 kg approx.

A140-01



A141N
EXTRUDER

Used to eject the rock sample from the rubber jacket, avoiding to empty the confining fluid.
Supplied without adaptors to be ordered separately (see table).

Weight: 12 kg approx.

A142N
HYDRAULIC CONSTANT ISOTROPIC CELL PRESSURE SYSTEM

The unit consists of a hand operated pump, complete with precision pressure gauge supplying pressures up to 35 MPa, complete with connections, providing all round pressure source to the Hoek Cell.

Weight: 18 kg approx.

ACCESSORY

A129-02
PRESSURE MAINTAINER, complete with pump, to allow a costant load to be maintained during the test.

A144
PERMEABILITY CONSTANT OIL/WATER PRESSURE SYSTEM

Providing an infinitely variable constant pressure from 0 to 3500 kPa. To be used with the Hoek Cell equipped with Permeability End Caps and Permeability Attachment.
The system consists of a motor hydraulic pump, oil/water vessel, piston/spring device, 10 litres of viscosity oil.
The unit is supplied complete with precision pressure gauge 0 - 3500 kPa range.

Power supply: 230V 50Hz 1ph
Weight: 20 kg approx.

S275N
PERMEABILITY ATTACHMENT

Mounted on tripod, to be connected to the End Cap of the Hoek Cell. Burette 50 ml capacity and 0.1 ml div.

ACCESSORY

S325 NYLON OPAQUE TUBING. Pack of 25 m

A129-02

A142N

A138-05 A137-05

PERMEABILITY OF ROCK WITH HOEK CELLS

To measure the permeability or flow of water through a rock specimen with a controlled water pressure system.
The Hoek Cells can be equipped with the (optional) End Caps, screwed to the body.
The set consists of the upper and lower End Cap, complete with distance block.

MODELS

A135-05 Specimen Ø 63.5 mm
A136-05 Specimen Ø 30.10 mm
A137-05 Specimen Ø 38.10 mm
A138-05 Specimen Ø 42.04 mm
A139-05 Specimen Ø 54.74 mm

S275N

A137-05

A137

A144

MATEST

SECTION B

ASPHALT

Bituminous mixture, also known as asphalt mixture, is mainly composed of aggregates and bitumen, with an infinite variety of mixtures being possible. This section is divided into three parts and shows the whole range of equipment for analyzing each component of the bituminous mixture.

The first part is dedicated to asphalt testing machines used to provide a solution for the whole “asphaltic path”: mixing, compacting, modelling and testing. The equipment meets the needs of those who want to perform quality control or experimentation of new asphalt mixtures.

B003
AMA
ASPHALT MIX ANALYZER AUTOMATIC CLOSED-LOOP SYSTEM

STANDARDS: ASTM D8159 I EN 12697-1

The Asphalt Mix Analyzer (AMA) combines all processes related to bitumen extraction and recovery, setting a new standard for laboratory efficiency.

With its "All-in-one" cycle and silent operation, AMA enhances operational efficiency while significantly reducing energy consumption. This advanced technology goes beyond conventional methods by employing solvent selection from tetrachloroethene, trichloroethylene, or methylene chloride, ensuring a comprehensive analysis. The closed cycle design not only guarantees result precision but also eliminates the release of toxic fumes, fostering a healthier workspace.

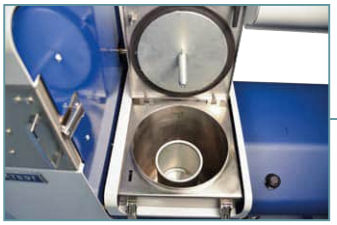
The unit has been designed for the purpose of determining the bitumen content in asphalt mixture and it is the best solution to analyse and characterize the properties of the reclaimed asphalt pavement (RAP).

The unit's solvent-based extraction separates aggregates and filler from bitumen, enabling the verification of recovered granular materials and the determination of the mineral skeleton of the mixture. Simultaneously, bitumen can be isolated for further analysis through rotary evaporation, allowing for comprehensive assessments like DSR, DTT, BBR, and traditional bitumen tests.

MAIN FEATURES

- "All in one" automatic cycle with silent operation
- Combination of ultrasonic impulses and heating effect to a complete bitumen extraction
- Complete extraction in less than 1 hour (depending on the material tested), reducing costs and time
- Automatic sample drying after operation
- Complete close cycle avoiding toxic fumes for healthy environment
- Automatic passage from pre-wash to washing phase
- Possibility of using the distillation chamber only
- Forced distillation made to reduce the bitumen solution at the end of the test
- Customizable cycle: selectable pre-wash phase, number of washings, rinsing and drying cycles
- Up to 10 profiles saved
- Optional direct connection with rotary evaporation flask
- Optional integrated or external balance for automatic determination of the bitumen content

Mesh drum into the washing chamber



Cup into the centrifuge, up to 8000 revolutions per minute

Integrated balance for automatic weight record

Automatic bitumen content calculation

Fully automatic and closed cycle

Sturdy frame and small footprint

B003 with accessories

The unit consists in a **stainless-steel washing chamber** where the user introduces the asphalt sample up to 3.5 kg. Subsequently, thanks to an accurate centrifugation process, the filler is separated and collected into the centrifuge cup while the bitumen solution is drained off to the solvent recovery chamber. Most of the solvent is recovered by condensation and it can be used for other extractions. The remaining part of the bitumen solution can be collected in an extraction flask after distillation, available for further analysis.

In order to perform this cycle, the unit is equipped with a **multi-layer mash washing drum** available with different openings (0.063, 0.075, and 0.090 mm) to contain the aggregates, a **centrifuge cup** to collect the recovered filler and an extraction flask to collect the remaining bitumen solution.

Before starting washing, the unit allows to add a pre-wash phase in order to improve the process of separation and extraction of bitumen.

TECHNICAL SPECIFICATION

- Maximum sample weight: 3.5 kg
- Centrifuge rotation speed: 8000 r.p.m.
- Scale: 10 kg, 0.1 g res.
- Cup dimensions: Ø120 mm x 200 mm height
- Extraction time: Less than 1 hour depending on the mix tested (including drying time)
- Solvent per extraction reused for several tests
- Up to 300 g of filler recovered

Power supply: 380V 50Hz 3Ph
Dimensions: 1400x750x1500 mm approx.
Weight: 240 kg approx.

The unit is supplied without accessories, which must be ordered separately.

The unit presents a **7" colour touch-screen controller** with front panel user interface with easy to use step-thru operation. The user-friendly software allows the operator to set up:

- number and duration of the prewash cycles;
- number and duration of the washing cycles;
- number of rinsing cycles;
- number and duration of the drying cycles.

The door is locked during all test phases to provide a safe environment. Furthermore, the test stops automatically in case of anomalies or malfunctions, showing the type of alarm on the display in real time. The solvent mode extraction has to be selected before supplying the unit, and the machine will be calibrated accordingly.

The Asphalt Mix Analyzer is available using the following solvents:

B003-01 Tetrachloroethylene operation mode
or
B003-02 Trichloroethylene operation mode
or
B003-21 Methylen chloride operation mode

Test results can be exported in TXT format to create a customized report. Unlimited data storage thanks to 2 USB ports.

NEEDED ACCESSORIES

B003-03 Washing drum, mesh with opening 0.063 mm
or
B003-04 Washing drum, mesh with opening 0.075 mm
or
B003-05 Washing drum, mesh with opening 0.090 mm

B003-06 Closing lid for washing drums
B003-07 Centrifuge cup, Ø120 mm, up to 200 g of filler
or
B003-22 Centrifuge cup, Ø120 mm, up to 300 g of filler, needed for bituminous mixtures with a high filler content

B008-11 Lining paper for centrifuge cup. Pack of 100

RECOMMENDED ACCESSORIES

B003-13N Worktop balance for an easy and automatic determination of the bitumen content, 10 kg, accuracy 0.1 g
or
B003-20 External balance, 15 kg, 0.1 g resolution
B003-14 Solvent stabilizator, for recycled tetrachloroethylene
B003-15 Solvent pumping device for safe solvent filling
B003-16 Water cooling system high end
or
B003-19 Water cooling system (B003-19M 230V 1Ph 50Hz)
B003-17 Device for the extraction of the centrifuge cup
B003-18 Fast connection for rotary evaporator flask, for bitumen solution sampling

B008
AUTOMATIC BINDER EXTRACTION UNIT

STANDARDS: EN 12697-1 I ASTM D2172

Used to perform reliable analysis on bituminous mixtures utilizing the perchloroethylene (PCE) or tetrachloroethylene solvent which is classified: R40 (not cancer producing*), for quantitative determination of binder or bitumen contained in pavement samples and hot mixed mixtures.

The system performs in only one complete automatic cycle:
- the washing, disaggregation and separation of the bituminous mixture;
- the separation of the filler from the solution formed by solvent, bitumen and filler;
- the recovery and distillation of solvent material allowing a further utilization.

The unit comprises:
- An electromagnetic sieving unit, insuring high quality double vibrating action (vertical/rotational), with solvent spraying cover for washing and disaggregation of the sample.
- A continuous flow centrifuge having rotation speed of 11000 rpm equipped with a stainless steel beaker Ø 120 mm, filler capacity approx. 400 g.
- A solvent recovery unit having reclaiming capacity of 50 l/h, equipped with cooling system switching ON and OFF the unit to automatically perform the test.
- A separate control panel allows to program all these functions in a fully automatic system. It is also possible to select the manual control.

This unit is supplied complete with:
- Two stainless steel beakers Ø 120 mm
- Four stainless steel sieves Ø 200 mm openings: 0.063 - 0.250 - 0.800 - 2 mm
- Sieve Frame only Ø 200 mm to improve the capacity of the first sieve.
- Set of O ring gaskets for sieves.

Power supply: 400V 3ph 50Hz 5.5kW
Overall dimensions: 1400x680x1820 mm
Total weight: 367 kg approx.

Note: * it is possible to use also the Trichloroethylene (CHC1:CC12), but as per 2001/59/CE Directive, it is classified "R45", and therefore considered a dangerous solvent. (Toxic and cancer-producing)

MAIN FEATURES

- "All in one" automatic cycle.
- Fast analysis reducing extraction costs and time.
- Complete extraction in approx 25 minutes (3500 g mixture per extaction).

B008

B008-10
CABINET WITH ASPIRATOR

It allows housing the automatic bitumen extraction units B008 and B015, to minimize the diffusion of vapours and toxic solvents in the laboratory. The structure is anodized aluminium made and safety glass walls. The unit is supplied with 4 front doors, aspirator centrifugal electric vapour, and appropriate filter group to activated charcoal. A room with internal height at least 3 m is required.

Power supply: 220V 1ph 50Hz 300W
Overall dimensions: 1700x980x2630 mm
Weight: 200 kg approx.

Note: It cannot be sold in CE markets

B008-10 + B008

B015
CENTRIFUGE WITH CONTINUOUS FLOW

NEW

EXTRACTION CAPACITY 400 G

STANDARDS: EN 12697-1 I ASTM D2172

Used to perform reliable analysis on bituminous mixtures utilizing the perchloroethylene (PCE) or tetrachloroethylene solvent which is classified: R40 (not cancer producing*), for quantitative determination of binder or bitumen contained in pavement samples and hot mixed mixtures.

The system performs in only one complete automatic cycle:

- The washing, disaggregation and separation of the bituminous mixture;
- The separation of the filler from the solution formed by solvent, bitumen and filler

The unit comprises:

- A sieving unit with solvent spraying cover for washing and disaggregation of the sample;
- A continuous flow centrifuge having rotation speed of 11000 rpm equipped with a stainless-steel beaker Ø 120 mm, filler capacity approx. 400 g.
- A separate control panel allows to program all these functions in a fully automatic system. It is also possible to select the manual control.

The unit is supplied complete with:

- Two stainless steel beakers Ø 120 mm
- Four stainless steel sieves Ø 200 mm openings: 0.063 - 0.250 - 0.800 - 2 mm
- Sieve Frame only Ø 200 mm to improve the capacity of the first sieve.
- Set of O ring gaskets for sieves.

Power supply: 400V 3ph 50Hz 5.5kW
Overall dimensions: 420x680x1630 mm
Weight: 150 kg approx.

Note: * it is possible to use also the Trichloroethylene (CHC1:CC12), but as per 2001/59/CE Directive, it is classified "R45", and therefore considered a dangerous solvent. (Toxic and cancer-producing)

Note: B015 cannot be used with dichloromethane solvent.

B015

ACCESSORY FOR B008 AND B015

B008-11 LINING PAPER for centrifuge cup.
Dimensions: 370x200 mm. Pack of 100 pcs.

SPARES FOR B008 AND B015

B008-01 Beaker, Ø 120 mm, stainless steel AISI 304 made, with solution heat-treatment
B008-02 Sieve Ø 200 mm water seal with O ring gasket (when ordering please specify mesh opening).
B008-05 Sieve frame only, Ø 200 mm
B008-06 Seal rings, for the Sieves. Pack of 10 pieces.

B005N
BITUMEN CONTENT FURNACE BY IGNITION METHOD MATEST MADE

NEW

STANDARDS: AASHTO T308 I ASTM D6307 I UNI EN 12697-39

B005N

The binder content of bituminous mixtures is one of the major properties related to pavement performance. In particular, it affects the pavement's tendency to permanent deformation, fatigue life and susceptibility to moisture damage. Therefore, the measurement of this property is fundamentally important for **quality control (QC), quality assurance (QA) and research purposes**. In this context the ignition method can determine the binder content with high precision, offering a valid alternative to the solvent extraction methods.

Matest apparatus combines a sophisticated furnace and weighing system to continuously measure weight loss during combustion. It then **automatically calculates binder content at the end of the test**. Moreover, the method can be used for evaluation of mixture composition because the remaining aggregate can be used for determining aggregate gradation and density.

Considering the high temperatures involved (the furnace may reach a temperature of 750° C) the apparatus is equipped with suitable safety systems to ensure that the furnace door is kept closed during the test and that the heating elements are deactivated any time the door is opened. Analysis can be made on a sample weighing maximum 5 kg and most tests are completed in 20 to 45 minutes. Average test times are from 20 mins (for 6 mm aggregates), to 45 mins (for 40 mm aggregates).

MAIN FEATURES

- Fully automatic and customizable test cycle, real-time display of test parameters and results
- Possibility of introducing data of the mix design for a greater accuracy of the results up to 0.11%
- Ignition method reduces testing time and costs.
- 7" touch-screen display with smart interface.
- Integral balance measures loss on ignition to 0.1 g resolution.
- Rapid heating of main chamber with robust Ø 1 mm wire elements
- Integral fan-assisted high-temperature afterburner greatly reduces emissions
- Direct access to the scale to facilitate inspection and maintenance
- Unlimited memory storage with: 2 USB ports, 1 SD card slot, RS232/485 serial port
- On-board graphic printer

An independently controlled afterburner with exhaust fan and vent reduces emissions so low that no aspiration hood is needed.

The machine is supplied complete with 2 sample baskets with holders, safety guards for hot samples, basket loading handle, rolls of printer paper, calibration plate and protective mask. Gloves must be ordered separately.

Outer dimensions: 635x825x1214 mm
Inner dimensions: 350x445x260 mm
Power supply: 400V 3ph 50/60Hz 8500W
Max Temperature: 750 °C
Weight: 170 kg approx.

TECHNICAL SPECIFICATIONS

- Samples weight up to 5000g
- Precise weight measurements displayed to 0.1 g resolution
- Test duration of 20-45 minutes
- Scale: 15,000 g capacity, 0.1 g res., ±0.1 g repeatability
- Closed-loop PID thermo-regulation
- Afterburner temperature is controlled independently from the main chamber
- Failsafe door interlock keeps the door locked during a test
- No need for filters

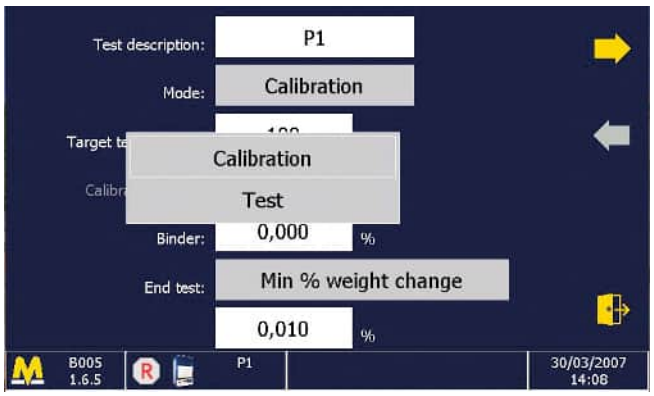
B005NK
Same model as B005N but with power supply 230V 3Ph 60Hz.

B005NM
Same model as B005N but with power supply 230V 50Hz.

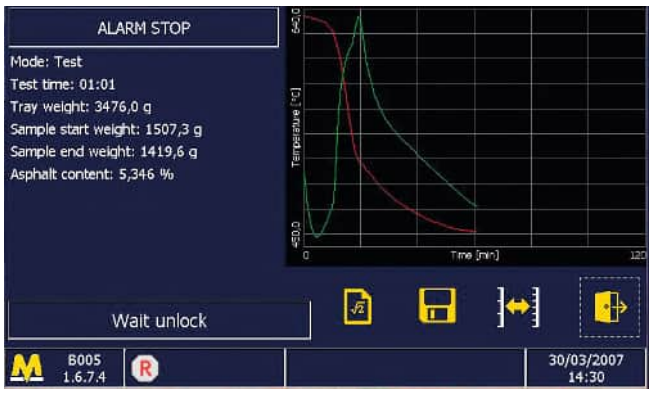
B005NI
Same model as B005N but with power supply 208V 60Hz.

CYBER PLUS PROGRESS - USER INTERFACE AND EASY TO USE STEP-THROUGH OPERATION

B005N presents a **7'' colour Touch screen controller** with front panel user interface and easy to use step-thru operation. The user-friendly software allows the operator to set up the test with the possibility of introducing data of the mix design for a greater accuracy of the results.

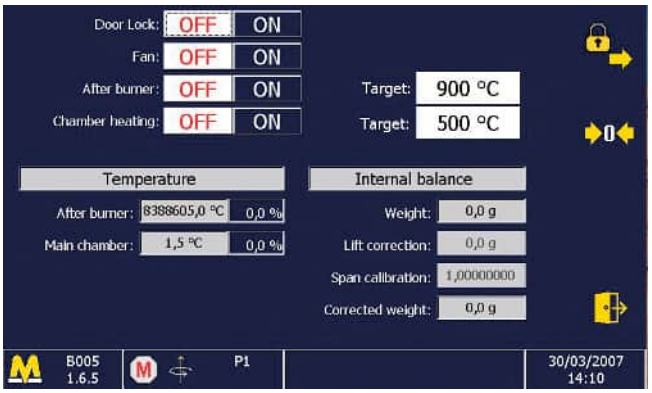


Possibility to select calibration or test mode as required by EN and ASTM.



Continuous measurement of weight loss during combustion and automatic calculation of binder content at the end of the test.

Data can be edited at any time and results can be exported with TXT format to create a customized report. Unlimited data storage.



The innovative diagnostic dashboard allows user to verify and control each component of the machine.

INTERNAL PRINTER

To provide immediate print out of the following data:

Test: PROVA 0004
Test type: Furnace
Test date: 11/2/2021
Test time: 12:33:37 PM
Target temperature: 480.0 °C
Calibration factor: 0.472 %
End test: Min % weight change 0.010 %

END TEST STOP
Mode: Test
Test time: 01:07
Tray weight: 3476.3 g
Sample start weight: 1508.5 g
Sample end weight: 1414.3 g
Asphalt content: 5.773 %

Example of printed report issued by the furnace.

SPARE

B005-11M Two sample baskets, one lid, two handles and one welded metal container base.

B005-11M

ACCESSORY

B005-10N METAL STAND to hold the furnace.

B011
CENTRIFUGE EXTRACTOR
1500 / 3000 g CAPACITY

STANDARDS: EN 12697-1 I ASTM D2172 I AASHTO T164A
Used for the determination of bitumen percentage in bituminous mixtures. It consists of a removable, precision machined aluminium rotor bowl, placed into a cylindrical aluminium box. The separate control panel incorporates an electronic card fitted with AC drive which automatically drives the bowl speed rotation ramp from 0 to 3600 rpm as requested by Standards, with fast stop bowl rotation at the end of the test. Supplied complete with speed regulator and digital display monitoring the frequency. The centrifuge is supplied **without** aluminium bowl+cover and **without** filter discs to be ordered separately (see accessories).
The unit cannot be sold in CE markets (see mod. B011-10)

Power supply: 230V 1ph 50-60Hz 600W
Dimensions: 480x330x530 mm
Weight: 50 kg approx.

B011

B011-01
CENTRIFUGE EXTRACTOR EXPLOSION PROOF
1500 / 3000 g CAPACITY

Same as mod. B011, but equipped with a special explosion proof electric motor. The control panel has to be installed in a non explosive area.

B010T
CENTRIFUGE EXTRACTOR EXPLOSION PROOF
1500 G CAPACITY

STANDARDS: ASTM D2172 I AASHTO T164 I CNR 38 I EN 12697-1
This instrument uses non-flammable trichloroethylene for the cold extraction of bitumen so that its percentage can be calculated.
It consists of a rotating bowl protected by a removable cover, a steel structure and a variable speed driving unit (electric induction motor, 3000 rpm). Capacity of bowl: 1500 g of mixture. The centrifuge's electronic control unit, which has an automatic braking system, is housed in a separate case and safety device.
The motor is flameproof.
Supplied complete with bowl, cover and 100 filter papers.

Power supply: 220V, 50Hz, 1pH, 400W
Dimensions: 450x410x590(h) mm
Weight: 50 kg approx.

B010T

NEEDED ACCESSORIES for B011 and B011-01

B010-11 BOWL AND COVER 1500 g capacity.
Made of precision machined cast aluminium.
Weight: 3.6 kg

B010-15 FILTER DISC, 1500 g capacity. Pack of 100 pieces.

or:

B010-12 BOWL AND COVER 3000 G. CAPACITY.
Made of precision machined cast aluminium.
Weight: 4.6 kg

B010-16 FILTER DISC, 3000 g capacity. Pack of 100 pieces.

UPGRADING OPTION

B011-10
SAFETY ELECTROMAGNETIC MICRO-SWITCH SYSTEM to prevent the opening of the cover when the Centrifuge is working, or during the bowl rotation. Conforming to CE Safety Directive. Not applicable to the Centrifuge explosion proof version mod. B010T.

B014
CONTINUOUS FLOW FILTERLESS CENTRIFUGE

STANDARDS: EN 12697-1 | ASTM D1856

Designed for quick filterless separation of filler from binder solution or other mixtures containing sediments (cement, soil, clay), in suspension. The solution is poured into the top funnel and falls into the rotating test container with Ø 70x200 mm. Because of the centrifugal effect, the liquid rises vertically leaving the filler and mineral particles inside the beaker. The centrifuge is supplied complete with aluminium beaker, two sieves 2 mm and 0.063 mm mesh respectively. The rotation speed is 11500 rpm, with automatic ramp and preset speed control.
Extraction capacity is up to 100 g of filler per test.

Power supply: 230V 1ph 50Hz 600W
Dimensions: 350x600x720 mm
Weight: 60 kg approx.

MAIN FEATURES

- Filler recovery with filterless system.
- Continuous flow at 11500 rpm.
- Automatic speed ramp.
- Highest accuracy thanks to no dispersion of material.

B014-01

B014

SPARE

B014-01 Aluminium beaker Ø 70x200 mm high.

B021
SOLVENT RECOVERY STILL - 10 LITRE/HOUR

This unit, is provided with two tanks: one for the clean solvent and one for the dirty solvent and of a water coolant system which only needs to be connected to a tap. A safety cut out is also supplied, being activated when the solvent level becomes too low or once the process is completed.
Fully stainless steel very high quality (AISI 316) made.
Supplied complete with funnel/tank with sieve insert and 10 m plastic tube.

Power supply: 230V 1ph 50-60Hz 1300W
Dimensions: 320x400x650 mm
Weight: 17 kg approx.

MAIN FEATURES

- Efficient and compact unit.
- Easy to install and totally self-contained.
- All high quality stainless steel (AISI 316) made with copper coils.
- Security devices stopping the unit at the end of the test or in case of overheatings.

B021

B079N

B079N
CABINET with aspirator to exhaust vapours and toxic solvents.
See p. 147

B016-10
HOT EXTRACTOR SET
PAPER FILTER METHOD

STANDARD: EN 12697-1 clause B.1.1 I EN 12697-14

The unit is used to extract the binder from bituminous mixtures, and to determine the moisture content. Consisting of a metallic pot complete with gauze basket and filter, Dean Stark collector, Liebig condenser, filter paper Ø 400 mm (pack of 25 pcs.)

Dimensions: 480x480x900 mm
Weight: 22 kg approx.

B016-10

ACCESSORY

V200-02 HOT PLATE Ø 220 mm. 230V 1ph 50-60Hz 2000W

SPARE

B016-15 Filter paper 400 mm Ø (100 pcs.).

B017-KIT
HOT EXTRACTION APPARATUS
WIRE MESH FILTER METHOD

STANDARD: EN 12697-1 clause B.1.2

This apparatus consists of a cylindrical glass jar containing a stainless steel wire basket double cloth opening 0.063 mm and 0.4 mm.
The asphalt sample (500 to 2000 g) is placed inside the wire basket, the solvent is poured inside the jar. Now the wire basket is inserted into the jar which is covered by a **stainless steel** condenser connected to a water supply. The apparatus is placed on a hot plate and the boiling solvent drips into the basket dissolving out the bitumen. The filler passing through the mesh basket must be separated using the centrifuge extractor.

Dimensions: Ø 160x335 mm
Weight: 4 kg approx.

B017-KIT

V200

ACCESSORIES

V200 HOT PLATE Ø 185 mm 230V 1ph 50-60Hz 1500W.
B017-02 WIRE BASKET stainless steel cloth opening 0.4 mm.
V173-03 WIRE MESH with ceramic centre.

SPARES

B017-01 WIRE BASKET stainless steel, double cloth 0.063 and 0.4 mm openings.
B017-03 Pyrex glass jar.
B017-05 Metal condenser **stainless steel** with ring.

B016-20
SOXHLET MODIFIED METHOD

STANDARD: EN 12697-1 clause B.1.3

Consisting of flask 5000 ml capacity, 2000 ml extractor, cock, vapour tube and condenser; all glass made. Complete with 25 filtering cartridges Ø 80x240 mm, isomantle electric heater, stand and clamps.

Power supply:
230V 1ph 50-60Hz 900W
Dimensions:
400x400x1000 ml approx.
Weight: 20 kg approx.

B016-20

SPARE

B016-23
Filter cartridges for Soxhlet, inner diameter 80 mm height 240 mm (pack of 25 pcs.)

B061
KUMAGAWA EXTRACTOR
1 LITRE CAPACITY

STANDARDS: EN 12697-1 clause B.1.3 I LCPC

Used to extract the bitumen from hot-mixed paving mixtures. Consisting of an electric heating device, balloon 1 litre capacity, glass pipes, cooling unit and 25 filtering cartridges.

Power supply:
230V 1ph 50-60Hz 750W
Dimensions:
400x500x1000 mm approx.
Weight: 20 kg approx

B061

B061-01
KUMAGAWA EXTRACTOR 2 LITRES CAPACITY

Basically similar to mod. B061 but with 2 litres capacity.

SPARES

B061-02 Filter cartridges, Ø 58x170 mm for Kumagawa 1 litre. Pack of 25 pieces.
B061-03 Filter cartridges Ø 70x200 mm for Kumagawa 2 litres. Pack of 25 pieces.

B018
BINDER RECOVERY APPARATUS.
VACUUM PUMP HOT EXTRACTION METHOD

STANDARDS: EN 12697-1 Clause B.3.1 | BS 598:102

Used for the separation of solvent from the binder/solvent solution, and to determine the binder content in an aggregate/bitumen mixture. The apparatus consists of:

- Thermostatic water bath to keep boiling water during all the recovery cycle, complete with cover and digital thermostat, inside dimensions 280x280x230 mm.
  This unit may be used also for general purposes water bath.
- Two glass flasks having 250 ml capacity, complete with rubber bungs, tubing and cocks
- Vacuum gauge (to be connected to the vacuum pump,
- Pyrex flask, 1000 ml capacity, used as vacuum bottle

Power supply: 230V 1ph 50Hz 1000W
Weight: 25 kg approx.

NEEDED ACCESSORY

V205 + V205-10
VACUUM PUMP with vacuum regulator.
Power supply: 230V 1ph 50-60Hz. Weight: 5 kg approx.

B018-10
RECOVERY OF BINDER BY ABSON METHOD

STANDARDS: ASTM D1856 | CNR N°133

This distillation assembly is used for recovery of binder from a solution of a previous extraction, with properties substantially as those of the bituminous mixture. The apparatus consists of glassware complete set, metallic stand supports and electric heating mantle with regulator.

Power supply: 230V 1ph 50-60Hz 750W **Weight:** 12 kg approx.

B019-KIT
REFLUX EXTRACTOR 1000 g CAPACITY

STANDARD: ASTM D2172

This simple apparatus, working on the same operation principle of the mod. B017-KIT, consists of a cylindrical glass jar containing a metal frame supporting two metal cones of stainless steel cloth and a metal condenser on top of the jar.
Supplied complete with 100 filter papers and wire gauze.

Dimensions: Ø 160x510 mm **Weight:** 5 kg approx.

ACCESSORY AND SPARES

V200 Hot plate Ø 185 mm 230V 1ph 50-60Hz 1500W

B019-01 Filter paper, pack of 100
B019-02 Pyrex glass jar
B019-03 Metal condenser
B019-04 N° 2 stainless steel cones with frame
V173-03 Wire mesh with ceramic centre

B020-KIT
REFLUX EXTRACTOR 4000 g CAPACITY

Similar to mod. B019 KIT but having 4000 g capacity.

Dimensions: Ø 280x510 mm **Weight:** 9 kg approx.

ACCESSORY AND SPARES

V200-02 Hot plate Ø 220 mm 230 V 1ph 50-60 Hz 2000 W

B020-01 Filter paper, pack of 100
B020-02 Pyrex glass jar
B020-03 Metal condenser
B020-04 N° 2 stainless steel cones with frame
V173-04 Wire mesh with ceramic centre
B020-05 Wire mesh 300x300 mm

B067N
VACUUM PYKNOMETER 10 LITRES CAPACITY

THEORETICAL MAXIMUM SPECIFIC GRAVITY OF LOOSE ASPHALT MIXTURES (RICE-TEST)

STANDARDS: EN 12697-5 I ASTM D2041 I AASHTO T209

Transparent plexiglass made, complete with valve and gauge, it is used for a rapid determination of bulk specific gravity of aggregates, the max. theoretic specific gravity of bituminous uncompacted road mixtures and the percent air voids in compacted mixtures.
To perform the test a minimum ultimate vacuum of 30mm/Hg is requested.

Dimensions: Ø 300x450 mm high
Weight: 8 kg approx.

B067-01N
VACUUM PIKNOMETER

Same as model B067N but with a higher useful height (270 mm) conforming to TP Asphalt StB T5 standard.

ACCESSORIES

A059-02-KIT
VIBRO-DEAERATOR, ELECTROMAGNETIC with adjustable vibrating intensity.
To vibrate the pyknometer for the evacuation of the air.
Complete with fixing device to the pyknometer.
This unit can be used also as a Sieve Shaker.
Technical details: see Section A p. 40

V205-01 + V205-10 + V205-12 + V230-03
VACUUM PUMP, PORTABLE TWO STAGES, complete with vacuum regulator and condensed water trap, tubing 3 m long.
Technical detais: see Section V p. 553

B065
ROTARY EVAPORATION APPARATUS

STANDARDS: EN 12697-3 I ASTM D5404

This unit is used to recover bitumen from a solvent by minimizing the changes in the asphalt properties.
The test is performed by distilling the residue of the solution of solvent and asphalt.
The rotating distillation flask is partially immersed in a heated oil bath, and the solution is subjected to high vacuum, with fine regulation of pressure (up to ± 0.1 kPa) according to EN 12697-3.
The Rotary Evaporation Apparatus is essentially composed of:
- distillation flask 1000 ml capacity
- motor of variable speed, (suitable to rotate the flask at an adjustable rate of 10 to 280 rpm)
- solvent recovery flask, 1000 ml capacity; condenser, heated oil bath.

The angle of the rotary/distillation flask is 15°
The instrument is supplied complete with glass tubing with three way valve and transparent flexible hose for solution intake.
The Rotatory Apparatus requires a vacuum pump and a vacuum regulating system (see accessories).

Power supply: 230V 1ph 50-60Hz
Dimensions: 740x430xh845 mm
Weight: 15 kg approx.

B065 B065-12 V205-01+V230-03

V205-01 + V205-10 + V205-12 + V230-03 A059-02-KIT

ACCESSORIES

B065-12	VACUUM REGULATING SYSTEM, including regulation valve, pressure gauge and vacuum digital gauge 1 mbar resolution. Dimension: 300x200x350 mm
V205-01	VACUUM PUMP, dual stage. Technical details: see p. 553 230V 1ph 50Hz
V230-03	RUBBER TUBE, lined for vacuum, 3 m long.
B065-14N	DIATHERMIC OIL, can of 18 kg
B065-15	EVAPORATION BALLOON, glass, flat, 3 l capacity
B065-13	DISTILLATION FLASK, 2000 ml capacity (ASTM D5404)
B065-16	FLOW CONTROL DEVICE with flow-meter to ASTM D5404

B067T
PYKNOMETER, 10 LITRE CAPACITY

NEW

STANDARDS: ASTM D2041 I EN 12697-5

For theoretical maximum density of bitumen. Plastic made, 250 mm diameter with valve and vacuum gauge

Weight: 5 kg approx.

B067T

ACCESSORY for B067T

B067T-01 Device to secure B067T to the vibro-deaerator.

B067A
AUTORICE
THE ULTIMATE CONTROL FOR YOUR RICE TEST

STANDARDS: AASHTO T209 I ASTM D2041

The AutoRice is an automatic control unit for the Maximum Specific Gravity test. Rice test results are critical for pavement quality, mixture design and laboratory mixture performance determination.
By pressing a button, the AutoRice starts the vacuum pump, regulates the vacuum pressure, precisely controls the vacuum time and monitors the shaker frequency and acceleration which is a parameter that is not currently monitored during the test. Data from the Rice test can be downloaded via the USB port.
AutoRice has to be connected with a compatible vacuum pump (**V205-01 + V205-12 + V230-03**), vacuum pyknometer (**B067N**) and electromagnetic vibro-deareator (**A059-02A**) in order to perform the rice test as per standards (see page 86).

MAIN FEATURES

- Controls and monitors Rice test (AASHTO T209 & ASTM D2041) vacuum pressure and vacuum time.
- Reduces operator errors improving accuracy and repeatability.
- Provides capability to enter weights and calculate max specific gravity results.
- Replaces vacuum gauge.

TECHNICAL SPECIFICATIONS

- Foot print: 12”x9”x4” (30x22x10 cm)
- Hose connection: 3/8” hose barb
- Max pump power: 3/4 HP
- Vacuum control: ± 0.4 mmHg at 27.5 mmHg
- Power supply: 110/220V
- Weight: 5 lbs (2.5 kg)

B007
ASPHALT SPLITTER

This instrument is used to break and crumble asphalt samples to facilitate bulk density tests and laboratory testing purposes by reducing the granulating time in few minutes with high quality results. A rough asphalt sample of approx. 1 kg is poured into the stainless steel bowl equipped, at its bottom, with three rotating paddles. The cover is closed, the machine started, and the three paddles break and crumble the sample in grains.
The bowl is now tilted to discharge the sample into the self supporting suitable pan supplied with.
A hinged cabinet reducing noise protects the bowl. When opening the cover while the splitter is working, a microswitch automatically stops the machine. Conforming to CE Safety Directive.

TECHNICAL SPECIFICATIONS

- Stainless steel bowl of 6 litres capacity
- Multirange timer: sec/min/hour
- Main switch, Start/Stop button
- Switch for reverse mode of the rotating paddles (very useful when the material restrains between paddle/bowl)
- Paddles speed: 1400 rpm
- Power supply: 230V 50Hz 1500W
- Dimensions: 490x730x855 mm
- Weight: 85 kg approx.

SPARE

B007-11 Kit of three rotating paddles with screws.

B007 Open

PARTICLE LOSS AND RESISTANCE TO FUEL

STANDARDS: EN 12697-17, 12697-43 I EN 1097-2 I ASTM C131
The test concerns the determination of the particle loss by abrasion of porous asphalt mixtures, and the determination of the resistance of a pavement or a bituminous mixture to aviation fuel.
These Standards require, within other specific tests, the abrasion tester:

A075N
LOS ANGELES ABRASION MACHINE

Technical details:
see Section "A"
Aggregates, p. 48

A075N

A122-10
TILT TEST

The instrument measures the roughness coefficient of a joint.
The unit is also designed to test the possible fluage tendency of bituminous mixtures covering a slope of a dam subject to high sun radiations. The fluage tendency is the permanent viscous deformation of a material. The apparatus consists of an inclined adjustable plane on which the sample is placed.
Inclination angle: 0 - 75°
Max. sample diameter: 100 mm
The plane is slowly tilted until sliding of the upper surface of specimen on the lower one occurs. The roughness index can be evaluated from the measured inclination angle.

Dimensions: 270x175x265 mm
Weight: 5 kg approx.

A122-10

B022SP
BOTTLE ROLLING MACHINE

STANDARD: EN 12697-11

To determine the affinity between aggregate and bitumen, expressed by visual registration of the degree of bitumen coverage on uncompacted bitumen-coated mineral aggregate particles after influence of mechanical stirring action in the presence of water. Rotation speed adjustable from 0 up to 85 rpm.
The machine can roll up to 3 bottles at the same time.
Supplied complete with timer **range 0 - 99 hours**, to fully perform the test cycle.

Power supply: 230V 50-60Hz 1ph
Dimensions: 385x295x160 mm
Weight: 10 kg approx.

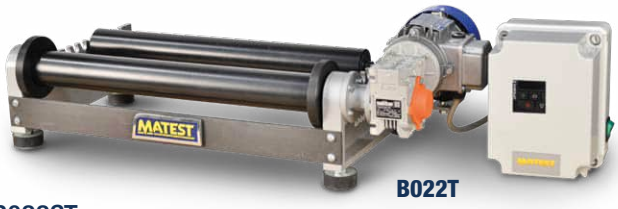
B022SP + S132-01

S132-01
B022-12

B022T
BOTTLE-ROLLER WITH VARIABLE SPEED

Suitable for mixing of liquids and, using the special jar, for grinding small specimens. Metal frame and rollers covered in rubber (second roller can be placed in various positions in order to accept different size bottles). 0,5 HP engine.
Variable roller speed: 0-95 rpm.

Power supply: 220V 1F 50Hz
Dimensions: 640x350x140 mm
Weight: 20 kg approx.


B022T

B022ST
BOTTLE-ROLLER

Same as mod. B022T but with fixed speed at 73 rpm.

NEEDED ACCESSORIES

S132-01 TEST BOTTLE, made of borosilicate glass, 500 ml capacity, diameter 86 mm, height 176 mm, 30 mm neck diameter, as expressly requested by EN Specification.

B022-12 GLASS ROD with a diameter of 6 mm equipped with 30 mm (± 10 mm) long fitting rubber tube.

INDENTATION TEST

USING CUBES OR MARSHALL SPECIMENS

STANDARDS: EN 12697-20, EN 13108-6, EN 12697-21

This EN describes a test method for determining the depth of indentation of mastic asphalt and rolled asphalt, when force is applied to them via a cylindrical indentor pin with a circular flat-ended base. The test applies to aggregates of maximum nominal size less or equal to 16 mm.
This test method is performed on mastic and road constructions asphalts, on waterproofing and floor screeds in building constructions.
The indentation test can be applied also on Marshall specimens. Condition the specimens together with their moulds for at least 60 min under water at the test temperature of 40 °C or 22 °C respectively with ± 1 °C accuracy.

B059-10

B059-10
ASPHALT INDENTATION PENETROMETER

Comprising:
- Rugged basic frame where the screw penetration load device is fixed.
- Two interchangeable penetration pistons having 1 and 5 cm^2 surface.
- Two metallic discs having total weight of 500 N (51 kg) that are positioned on the load device.
- Dial gauge 30 mm, sens. 0.01 mm to measure the penetration.
- Stainless steel water bath complete with water discharge cock.

Heater, cube mould, test mould, **are not included** and have to be ordered separately (see accessories).

Dimensions: 530x600x820 mm
Weight: 160 kg approx.

B059-21

B059-15
B059-16
B059-18
B059-17

ACCESSORIES

B059-15
CUBE MOULD 70.7 mm
To prepare cube specimens.
Steel manufactured, it is easily detachable. Weight: 4350 g

B059-16
PENETRATION (ADJUSTABLE) TEST MOULD 69 mm.
Used during the penetration test of the cube specimen.
Made from aluminium alloy. Weight: 1850 g

B059-17
BASE, steel made, to fix the Marshall specimen into the Penetrometer.
Weight: 1100 g

B059-18
CALIBRATION DEVICE for the Indentation Penetrometer. Weight: 700 g

B059-21
THERMOSTAT DIGITAL HEATING SYSTEM, complete with immersion heating element.
It heats water at the required temperature of 22 °C or of 40 °C with an accuracy within ± 1 °C as requested by Standards.
Power supply: 230V 1ph 50Hz 1500W Weight: 3 kg approx.

B059-14
PENETRATION KIT according to EN 12697-21. It comprises:
- Punch (Ø 6.35 ±0.1 mm)
- Load (311 ±2 N)
- Load (515 ±3 N)
- Mould Ø 100 x 25 mm
- Mould Ø 150 x 25 mm
- Mould 150 x 150 x 25 mm

C306-03

C306-03
SEPARATE CONTROL PANEL,
complete with switch and electric protections, to get the heating system to CE Safety Directive

A113
SKID RESISTANCE AND FRICTION TESTER

STANDARDS: EN 1097-8 | EN 1338, 1341, 1342, | EN 13036-4 | EN 1436 | ASTM E303 (model A113-01)

MAIN FEATURES

- Suitable for both site and laboratory applications.
- Perfect for measuring pavement (road asphalt) surface frictional and skid resistance properties.
- Perfect for polished stone value tests on aggregates (curved specimens) from accelerated polishing tests.
- Suitable to perform tests on:
  Natural stones conforming to EN 1341, 1342.
  Concrete block pavers conforming to EN 1338.
- Accurate adjustement operations through an incorporated slider lifting device.
- Simple and reliable height adjusting system.
- High-precision results thanks to an extremely light pointer.

A113

The tester measures the energy loss when a rubber slider edge is propelled over the surface under test.
The release mechanism of the pendulum arm has an original solution reducing the friction to minimum for better accuracy.

The skid tester is supplied complete with:

- Additional incorporated scale for tests on Polished Stone Value specimens.
- Rule, made of plexiglass, for sliding length verification.
- Thermometer range –10 to +110 °C for surface temperature measurement.
- Stool, wash bottle, bristle and tool set for machine use.
- Carrying case.
- Calibration Certificate conforming to EN 1097-8 or ASTM E303 (model A113-01).

The tester is supplied **without** rubber sliders that have to be ordered separately (see accessories).

Case dimensions: 730x730x330 mm
Weight: 32 kg approx.

Note:

The tester is supplied calibrated to meet EN Specifications.
On request the skid tester can be supplied to meet ASTM E303 Spec. (model A113-01)

A113-01
SKID RESISTANCE AND FRICTION TESTER

STANDARD: ASTM E303
As above, but calibrated to meet ASTM E303 Specifications.

ACCESSORIES FOR SKID TESTER

A110-03 MOUNTED RUBBER SLIDER, TRL (55) rubber, 76 mm width for site use on road surface, complete with conformity certificate.

A110-01 MOUNTED RUBBER SLIDER, TRL (55) rubber, 32 mm width for Polished Stone Value laboratory tests, complete with conformity certificate.

A110-05 MOUNTED RUBBER SLIDER, 4S (96) rubber, 76 mm width (ceramics, marbles, paving tiles, sidewalk surface) complete with conformity certificate.
Standards: EN 13036-4, EN 16165

A110-06 NEW MOUNTED RUBBER SLIDER, TRL (57) rubber, 76 mm width, complete with conformity certificate EN 16165

A110-07 NEW MOUNTED RUBBER SLIDER, TRL (57) rubber, 32 mm width, complete with conformity certificate.

A110-11 METAL BASE PLATE for Polished Stone Value tests in laboratory, and for tests on natural stones and concrete block pavers. Supplied **without** specimen clamping devices, to be ordered separately.

A110-12 CLAMPING DEVICE for Polished Stone Value tests in laboratory.

A110-13 CLAMPING DEVICE for tests on natural stones (EN 1341, 1342); for concrete block pavers (EN 1338) and skidding tests on wooden floor (EN 1339).

A110-19 CALIBRATION PLATE float glass, EN 1097-8.

A110-20 PINK LAPPING FILM (10 sheets) for Skid Calibration.

A110-21 GREEN LAPPING FILM (10 sheets) for Skid calibration. NEW

A110-22 PAVIGRES PLATE. NEW

A113
in carrying case

A110-11 + A110-12

A110-03 **A110-01**

A128N
ACCELERATED POLISHING MACHINE
DETERMINATION OF THE POLISHED STONE VALUE

STANDARDS: EN 1097-8, EN 1341, 1342, 1343 | BS 812:114 | NF P18-575 | CNR N.105

It measures the resistance of road aggregates, paving stones and paving blocks to the polishing action of vehicle tyres on a road surface.
The specimens are manufactured with suitable moulds and located on the Road Wheel.
The wheel is now rotated and enters in contact with solid rubber tyre, spring loaded. Abrasive charges are continuously introduced by two automatic mechanical feeders (hoppers).
The feeders are held by a suitable support disjoined from the machine body; this solution saveguards feeding calibration and realiability/life of the hoppers from the influence of test execution vibrations.
The water is supplied at a controlled rate through a water container equipped with flow regulator.
During the test execution the display shows the remaining time and the speed rotation of the wheel holding the specimens.
Supplied complete with 2 rubber wheels (one for corn and one for flour emery), set of 4 specimen moulds and 2 mould covers, while control stone, corn and flour emery have to be ordered separately (see accessories).

Power supply: 230V 50Hz 1ph 750W
Dimensions: 1800x820x600 mm **Weight:** 175 kg approx.

A128N

Note: Accessories and spares are described at page 57

BULK DENSITY OF ASPHALT SPECIMENS
HYDROSTATIC GRAVITY METHOD

STANDARDS: EN 12697-6, EN 12390-7
ASTM D1186, D2726, C127 I AASHTO T166, T85

V085
SPECIFIC GRAVITY FRAME
Used for specific gravity determination of materials, and specifically the bulk density of laboratory compacted asphalt specimens and asphalt road cores.
Technical details: see section “V” p. 538

ACCESSORIES

V041
DENSITY BASKET, stainless steel, Ø 200 mm by 200 mm high, 3.35 mm mesh.

V075-11
DIGITAL BALANCE 6000 g capacity x 0.1g sens.
Technical details and other models: see section “V” p. 536

A106N
WAX MELTING POT
Technical details:
see section “A” p. 29

V300-19
PARAFFIN WAX, pack of 5000 g

V175-02
DIGITAL VERNIER CALIPER
0-200 mm x 0.001 mm

A106N

BITUMINOUS MIXTURES TEMPERATURE MEASUREMENT
STANDARD: EN 12697-13

V154N
DIGITAL MICROPROCESSOR THERMOMETER
Range : -50 +300 °C, ± 0.4 °C accuracy
Supplied with a penetration probe, 120 mm long.
Technical details and other models: see section “V” p. 546

V154N

ACCESSORY

V154-02 SURFACE PROBE, 260 mm long

BINDER DRAINAGE, BASKET METHOD
To determine the drainage of bituminous samples obtained from different mixtures of mineral fine aggregates or additives, for the evaluation of the drainage results.

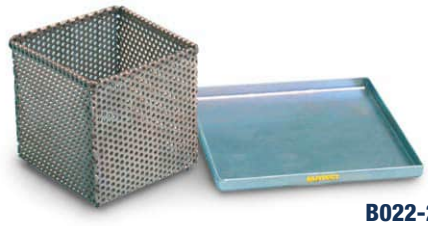
STANDARD: EN 12697-18

B022-20
DRAINAGE BASKET
Dimensions 100x100x100 mm, made from stainless steel sheet with Ø 3.15 mm holes.

Weight: 500 g approx.

B022-21
Tray, stainless steel made, dimensions 160x160x10 mm.

Weight: 500 g aprox.



B114
ASPHALT SAMPLES SEALING DEVICE

STANDARDS: ASTM D6752 I ASTM D6857 I ASTM D7063 I AASHTO T-331

The device is a system for sealing samples for determination of bulk specific gravity (density) of compacted and loose asphalt mixtures. The system can also be used for determining the bulk specific gravity and absorption of aggregate and stone. This product is now the standard for measurement of bulk specific gravity of open graded and absorptive compacted asphalt samples.
The samples are automatically sealed in specially designed puncture resistant polymer bags. Densities measured with this system are highly reproducible and accurate. The results are not dependent on material type or sample porosity.

Vacuum Pump: 1.25 HP
Power supply: 230V 1ph 50Hz 1430W
Dimensions: 490x640x510 mm
Weight: 91 kg approx.

NEEDED ACCESSORIES

B114-11 SMALL POLYMER BAGS 25x36 cm (pack of 100 pcs)
B114-12 LARGE POLYMER BAGS 38x46 cm (pack of 100 pcs)

B115
ASPHALT SAMPLES VACUUM DRYING DEVICE

STANDARDS: ASTM D7227 I AASHTO PP75

The vacuum drying device is specifically designed for rapid drying of compacted asphalt cores and samples. The quick and accurate dry weight, helps contractors determine pavement density close to real time and make adjustments to rolling pattern and material if necessary. It can also provide a matching baseline for density comparison between contractors and agencies.
The device dries specimens near room temperature, ensuring sample integrity and the most accurate & repeatable dry weight. Rapid moisture loss is attributed to electronic desiccation and high vacuum technologies. The system cycles a flow of ambient air and vacuum, ensuring a highly efficient moisture removal process.
The patented thermoelectric cold trap is specifically designed to protect the vacuum pump from damage by capturing moisture extracted from the sample.

Vacuum Pump: 1 HP
Power supply: 230V 1ph 50Hz 1650W
Dimensions: 810x600x880 mm
Weight: 77 kg approx.

B115

B114

B068
MOISTURE INDUCED STRESS TESTER

STANDARD: ASTM D7870

Proper testing and screening of Hot Mix Asphalt (HMA) mixes for moisture susceptibility is a crucial requirement for designing today's high-performing, longer-lasting pavements. This product is designed to simulate HMA pavement asphalt stripping mechanisms, which are due to water and repeated traffic loading. Current moisture sensitivity tests suffer from poor repeatability and test times can take up to seven days. HMA conditioning in the instrument is automatic and can be completed in less than a day.
Plug the unit into a standard wall outlet, place the sample in the chamber, select your settings and the unit does the rest. The device creates pressure cycles within the chamber to simulate the effect of moisture on the asphalt mixture. The data from the unit can be stored and transferred to a PC for evaluation and storage.

Temperature Accuracy: ±1 °C
Pressure Accuracy: 0.25%
Power supply: 230V 1ph 50Hz 1650W
Dimensions: 1210x1210x1570 mm
Weight: 226 kg approx.

B068

LABORATORY BITUMINOUS MIXERS

AVAILABLE MODELS

E094N
MIXER 5 LITRES CAPACITY

This bench mounting Mixer, is used for preparing bituminous mixtures. Thanks to its double mixing action (shaft and planetary) it ensures uniform mixing. Two speed can be selected:
- 140 or 285 rpm for the revolving action
- 62 or 125 rpm for the planetary action

The mixer is supplied complete with stainless steel bowl, but **without** whisk to be ordered separately (see accessories).
It cannot be sold in CE markets without security guards (see mod. E095N).

Power supply: 230V 1ph 50Hz 800W
Dimensions: 450x480x680 mm
Weight: 45 kg approx.

E095N
MIXER 5 LITRES CAPACITY

Same as mod. E094N but equipped with security guards, conforming to CE Safety Directive.

Note:
The proper utilization of the mixers mod. E094N and E095N requires to heat the bowl with the bituminous sample at the temperature specified by the Standards. To this purpose a common laboratory oven is used, and the sample mixing (time: approx 2 minutes) is performed immediately after having taken off the bowl from the oven. As an alternative to this procedure the heater mod. B028-01 can be used.

E094N + B028-03

E095-01

B028-01

E095-03

B028-03

E095N + E095-03

ACCESSORIES FOR E094N and E095N

B028-03 WHISK BEATER, thin wire, stainless steel, to EN Spec.

B028-01 ISOMANTLE ELECTRIC HEATER, complete with thermoregulator. Power supply: 230 V 1ph 50-60 Hz 800 W

E095-03 BEATER, stainless steel made.

SPARE

E095-01 Bowl, stainless steel, 5 litres capacity.

LABORATORY PLANETARY MIXERS

10 AND 20 LITRE CAPACITY

Mixers characterized by a robust construction with stainless-steel bowl and whisk, suitable to ensure homogeneous and uniform mixing through planetary action.
B025N is a table-mounted unit with a capacity of 10 litres, while the B025-01N model has a capacity of up to 20 litres. In accordance with CE directives. These planetary mixers are equipped with safety switches that automatically stop mixing if the grid is lifted by the user.
Each mixer is supplied complete with a stainless-steel bowl and a whisk. Beaters and electric isomantle heaters must be ordered separately (see accessories).
The machines are provided with a variable speed drive allowing to set a wide range of speeds:

- **B025N**:
  - 8 positions 50 to 150 rpm for the planetary action
  - 10 positions 115 to 400 rpm for the revolving action
- **B025-01N**:
  - 8 positions 50 to 150 rpm for the planetary action
  - 8 positions 180 to 540 rpm for the revolving action

NEW

For a proper utilization of the mixers mod. B025N and B025-01N it is necessary to heat the bowl with the bituminous sample at the temperature specified by the Standards. To this purpose a common laboratory oven is used, and the sample mixing (time: approx 2 minutes) is performed immediately after taking the bowl out of the oven. To maintain the temperature during mixing, the mixers must be equipped with the specific **Isomantle heaters** (B025-05N/B025-06N)

B025N

B025-01N

B025-06N

AVAILABLE MODELS

MIXER 10L CAPACITY:

B025N

Power supply: 220V 1ph 50Hz 370 W
Dimensions: 570X340X585 mm. **Weight:** 42 kg approx.

Note:
Available also with power supply 110V 1ph 60Hz (B025NY) or
220V 1ph 60Hz (B025NX)

MIXER 20L CAPACITY:

B025-01N

Power supply: 400V 3ph 50Hz 732 W
Dimensions: 730X610X1180 mm. **Weight:** 128 kg approx.

Note:
Available also with power supply 230V 1ph 50Hz (B025-01NM) or
220V 1ph 60Hz (B025-01NK)

* ISOMANTLE HEATER
Used to heat the bituminous mixtures contained in the mixing bowl of the asphalt mixer up to a maximum of 180 °C.
Complete with electronic temperature regulator. They can be easily fit to the machine bowls by spring arrangement.

ACCESSORIES

ACCESSORIES	B025N (10 litres)	B025-01N (20 litres)
HOOK BEATER	B025-15N	B025-16N
BEATER, ALUMINIUM		B025-13N
BEATER, STAINLESS STEEL	B025-12N	B025-14N
* ISOMANTLE HEATER 230 V 1ph 50-60 Hz 1000 W	B025-05N	B025-06N
WHISK	B025-18N (ø 4mm wire - spare)	B025-10N (Ø 4mm wire)
		B025-19N (Ø 3mm wire - spare)
SPARE BOWL	B025-20N	B025-21N

B026-05N
PAVEMIX
AUTOMATIC ASPHALT LARGE LABORATORY MIXER, 32 LITRES CAPACITY

STANDARD: EN 12697-35

The PaveMix has been expressly designed to prepare homogeneous bituminous mixtures at a strictly controlled temperature.
The preparation of the bituminous mixture is obtained in a short time period (few minutes) to avoid any mechanical aggregate degradation and to fully coat all mineral components, as requested by EN 12697-35.
The helical mixing blades are detachable to facilitate the cleaning procedure.

MAIN FEATURES

- Mixing capacity: 32 litres max.
- Mixing bowl: stainless steel AISI 316.
- **Slot on the top of the lid to pour filler and additives during mixing**.
- Mixing temperature: selectable from ambient up to 260 °C through sensitive probe and digital display control.
- Mixing speed: adjustable from 4 to 40 rpm.
- **Easy tilting unloading operation by electromechanical motion with rotation up to 130°**.
- Strictly controlled temperature.
- Fast preparation of bituminous samples.
- Detachable mixing blades to facilitate the cleaning and maintenance procedure.

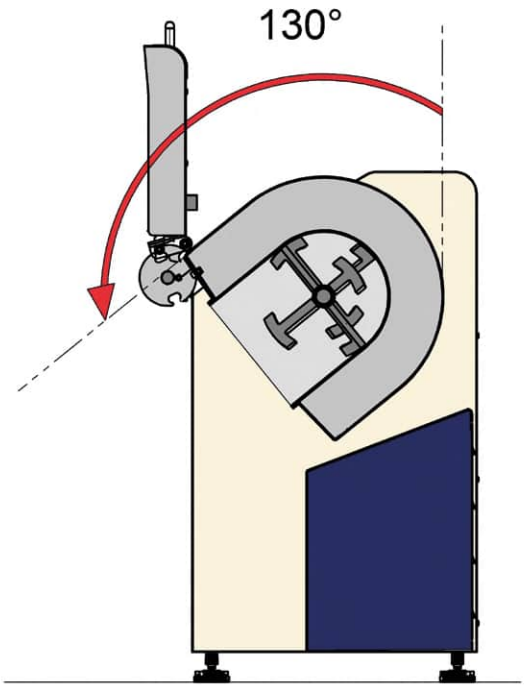
B026-05N

The Pavemix produces bituminous mixtures to perform:
- Gyratory compaction tests (EN 12697-10, EN 12697-31)
- Marshall stability tests (EN 12697-34, EN 13108)
- Wheel tracking wet and dry tests (EN 12697-22)
- Slabs compaction laboratory tests (EN 12697-33)
- Beam fatigue and Stiffness tests (EN 12697-26, EN 13108)
- Asphalt general purpose tests.

PaveMix consists of:
- Main frame holding a horizontal stainless steel bowl with a helical mixing shaft.
- The bowl, double wall insulation made of stainless steel AISI 316, contains an electric heater with probe sensor granting constant and uniform temperature control.
- **An electromechanical motion allows to tilt the bowl facilitate the unloading operation, with total rotation up to 130°**.

The control panel foresees:
- Digital thermo regulator to set temperature and to control the mixing temperature.
- Mixing speed regulator.
- Main and start/stop switches.
- Rotation inversion of the blades.
- Command to tilt the bowl.

Heating power: 3000W
Power supply: 230V 1ph 50-60Hz 4500W
Dimensions: 1280x700x1210 mm
Weight: 350 kg approx.



Unloading procedure.
Easy tilting of the bowl by electric motion with rotation angle up to 130°

ACCESSORY

B026-10N COLLECTING PAN

B026-10N

Detail of the detachable mixing shaft with helical blades

Detail: slot on the top of the lid

B031N1
MARSHALL AUTOMATIC EN (IMPACT) COMPACTOR

STANDARDS: EN 12697-10, 12697-30 | comparable to: BS 598:107

This ruggedly constructed apparatus automatically compacts the bituminous mixture and stops off the motor after the preset number of blows has been completed on the automatic digital display counter.
The trip mechanism is structured so that the sliding hammer falls at the same height at every blow.
The mould is held in position by a fast clamping device.
The compactor includes a vibrated concrete base where a laminate hardwood block is mounted.
Total weight of the compaction hammer (Rod + Foot + Sliding mass): 7850 ± 50 g
Sliding mass weight: 4535 ± 15 g
Free fall height: 457 ± 5 mm
Blow frequency: 50 blows in 55/60 seconds
The machine is equipped with safety door, conforming to CE Safety Directive.
When opened it stops automatically and cannot operate.
The control panel can be wall fixed or placed on a bench.
All moving parts are quickly/easily accessible for maintenance.
The compactor is supplied complete, **except for the mould** that must be ordered separately.

Power supply:
230V 1ph 50Hz 300W
Dimensions:
500x500x1890 mm
Weight: 220 kg approx.

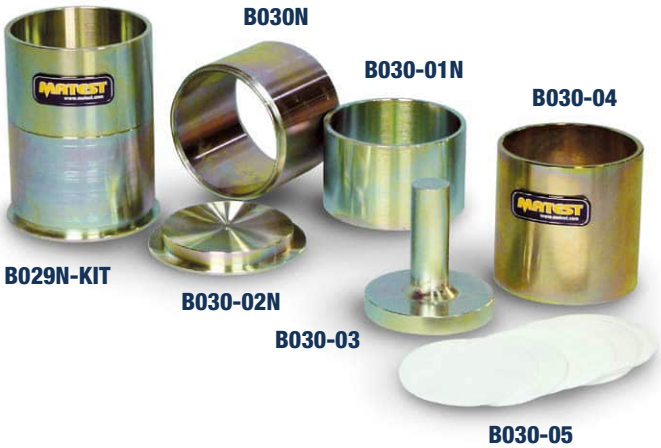
B031N 1 + B031-01

ACCESSORY

B031-01
CABINET, lined with sound-proofing material for noise reduction within CE limits.
Overall Dimensions: 800x670x2250 mm approx.
Internal Dimensions: 652x623x2173 mm
Weight: 100 kg approx.

SPARE

B033-11N Compaction Hammer complete



B031N 1

B029N-KIT
MARSHALL COMPACTION MOULD, Ø 4"

STANDARDS: EN 12697-10 | EN 12697-30 | NF P98-251-2

Inside diameter. 101.6 mm (4")
Steel manufactured, plated against corrosion.

Weight: 3.150 g

Consisting of:

B030N MOULD BODY only. Weight: 1300 g
B030-01N FILLING COLLAR only. Weight: 850 g
B030-02N BASE PLATE only. Weight: 1000 g

Note: French NF P98-251-2 Spec. requires the filling collar with a small different dimension, but fitting perfectly the mould body and the baseplate.

ACCESSORIES

B030-01NF FILLING COLLAR only (NF P98-251-2). Weight: 850g
B030-03 EXTRACTION PLATE, to eject specimens from the mould. It is used in conjunction with B030-04 receiver. Weight: 1400 g
B030-04 SPECIMEN RECEIVER, used to receive the specimens ejected by the B030-03 extruder. Weight: 1300 g
B030-05 FILTER DISC Ø 100 mm. Pack of 100

B033N
AUTOMATIC MARSHALL ASTM COMPACTOR
FOR Ø 4" MOULDS

STANDARDS: ASTM D6926 | Comparable to AASHTO T 245

This ruggedly constructed machine has been designed to eliminate the laborious process of hand compaction. It automatically compacts the specimen and stops off the motor after the preset number of blows has been completed on the automatic digital display counter. The trip mechanism is structured so that the hammer falls at the same height at every blows. The unit incorporates a compaction wooden pedestal. The drive mechanism lifts the 4.53 kg. compaction hammer, plated against corrosion, to the height of 457 mm and allows free fall at nominal 55 blows per minute.
The control panel can be wall fixed or placed on a bench.
This compactor is suitable only for Marshall moulds Ø 4".
The compactor is supplied complete **except** for the mould which must be ordered separately.
It cannot be sold in CE markets without safety guards (see mod. B033-01N and B033-03)

Power supply: 230V 1ph 50Hz 300W
Dimensions: 540x400x1600 mm
Weight: 95 kg approx.

B033N

B033-01N

B033N + B033-03

B033-01N
AUTOMATIC MARSHALL ASTM COMPACTOR
FOR Ø 4" MOULDS

Same as mod. B033N, but equipped with safety guard, conforming to CE Safety Directive.
When opening the guard during Compactor working, a microswitch automatically stops the unit.

ACCESSORIES

B033-03
SOUNDPROOF SECURITY CABINET
Steel made with microswitch, complying to CE Safety Directive, lined with sound-proofing material for noise reduction.
Accessory for B033N model.
If the door is opened while the Compactor is working, it automatically stops.
Overall Dimensions: 660x660x1900 mm
Internal Dimensions: 502x590x1843 mm
Weight: 70 kg approx.

B033-04
STEEL PLATE, Ø 100x50 mm, to heat the Compaction's Hammer.

B033-04

B035-12N B034N

SPARE

B035-12N Compaction Hammer
Complete for B033N, B033-01N Compactors.

B032-KIT
MARSHALL COMPACTOR
HAND OPERATED FOR Ø 4" MOULDS

STANDARD: ASTM D6926

Similar to mod. B033N, but the hammer is lifted and released manually.

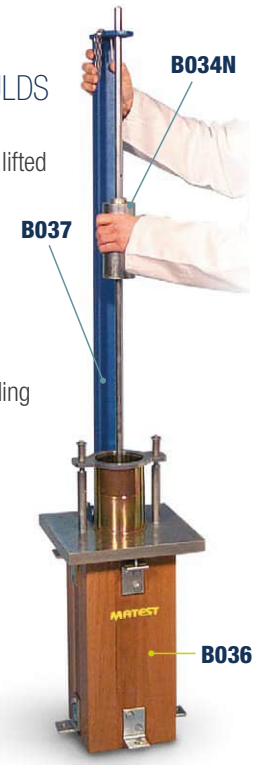
Dimensions: 320x320x1600 mm
Weight: 60 kg approx.

The assembly consists of:

B034N
COMPACTION HAMMER, with 4.53 kg sliding weight, guided on a shaft.
Plated against corrosion.
Weight: 10 kg approx.

B036
COMPACTION PEDESTAL, consisting of a wooden block, capped with a steel plate.
Complete with mould clamp device.
Plated against corrosion.
Weight: 42 kg approx.

B037
SUPPORT and hammer guide.



B032 KIT

B035-01N
AUTOMATIC MARSHALL COMPACTOR
FOR 6" AND 4" Ø MOULDS

STANDARDS: ASTM D6926 I ASTM D5581
comparable to AASHTO T245

This ruggedly constructed apparatus automatically compacts the Marshall specimens 6" and 4" diameter, and stops after the preset number of blows has been completed on the separate automatic digital display counter.
The trip mechanism is structured so that the sliding hammer falls at the same height at every blow. The mould is stationary and the hammer has flat-foot.
The mould is held in position by a fast clamping device.
The unit incorporates a compaction wooden pedestal.
The drive mechanism lifts the 22.5 lbs. compaction hammer (Ø 6"), plated against corrosion, to the height of 18" and allows a free fall at 64 blows per minute.
Sliding mass for the Ø 6" specimen: 22.5 lbs. ± 0.01 lb (10.205 kg)
Sliding mass for the Ø 4" specimen: 4.53 kg
Free fall height: 18" ± 0.1" (457.2 mm)
Blow frequency: 64 per minute ± 4
The unit is equipped by an inverter, allowing to adjust the blow's frequency.
All moving parts are quickly/easily accessible for maintenance.
The control panel can be wall fixed or placed on a bench.
The compactor is supplied complete with collar to fix the mould 6" diameter, but **without the compaction hammer 6" diameter** (mod. B035-11N) **and 4" diameter** (mod. B035-12N), and the moulds, which must be ordered separately (see accessories).
The compactor cannot be sold in CE markets without security guards (see mod. B033-03)

Power supply:
230 V 1ph 50-60 Hz 500 W
Dimensions: 460x570x1700 mm
Weight: 180 kg approx.

Note:
B035-01NGO is available. Same as B035-01N but with a blow frequency of 55 per minute ± 5, according to GOST 58406.9.

B035-01N + B033-03
with mould and hammer

ACCESSORIES

B035-11N COMPACTION HAMMER 6" diameter, complete, for the B035-01N Compactor.

B035-12N COMPACTION HAMMER 4" diameter, complete, for the B035-01N Compactor.

B035-13 REDUCTION COLLAR to fix the mould B029N-KIT+B030-KIT (4" Ø) to the Marshall Compactor B035-01N

B033-03 SOUNDPROOF SECURITY CABINET, steel made, lined with sound-proofing material, complying to CE Safety Directive

B032-01
MARSHALL COMPACTOR, HAND OPERATED,
FOR 6" AND 4" Ø MOULDS

STANDARDS: ASTM D6926, D5581

Supplied complete with compaction hammer 6" diameter, wooden pedestal capped with steel plate and mould clamp device, support/hammer guide.

Dimensions: 320x320x1700 mm
Weight: 70 kg approx.

ACCESSORIES

B034N
COMPACTION HAMMER 4" diameter, complete, for B032-01 Compactor.

B032-11
REDUCTION COLLAR to fix the mould B029N-KIT+B030-KIT (Ø 4") to the Marshall Compactor mod B032-01

B032-11

SPARE

B032-05 Compaction Hammer 6" diameter, complete, for B032-01 Compactor

B032-01

B035-01N
with mould and hammer

B035-11N

B035-12N

B030-KIT
MARSHALL COMPACTION MOULD, Ø 4”

STANDARDS: ASTM D6926 / Comparable to AASHTO T245

Inside diameter 101.6 mm (4”)
Steel manufactured, plated against corrosion.

Weight: 3100 g

Consisting of:

B030N Mould body only. Weight: 1300 g

B030-01N Filling collar only. Weight: 850 g

B030-08 Base plate only. Weight: 950 g

ACCESSORIES

B030-03 EXTRACTION PLATE, to eject specimens from the mould. It is used in conjunction with B030-04 receiver. Weight: 1400 g

B030-04 SPECIMEN RECEIVER, used to receive specimens ejected by the B030-03 extruder. Weight: 1300 g

B030-05 PAPER DISC Ø 100 mm. Pack of 100.

B030-06 BASE PLATE with handles (alternative to mod. B030-08)

B029-01-KIT
MARSHALL COMPACTION MOULD, Ø 6”

STANDARD: ASTM D5581-96

Consisting of:

B029-02 Mould body

B029-03 Filling collar

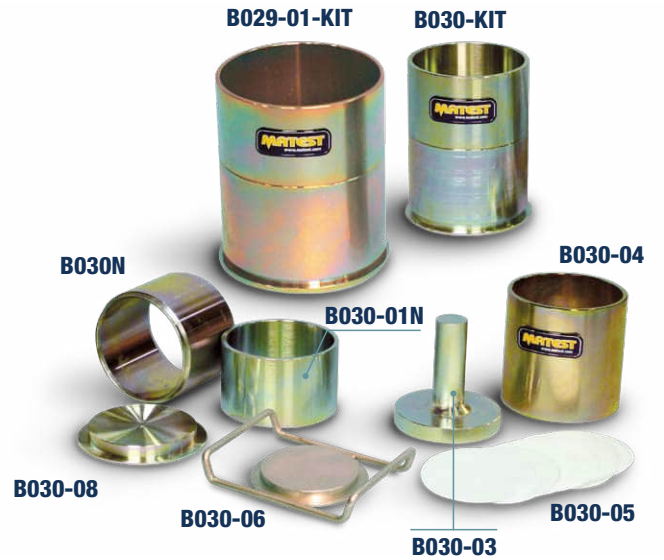
B029-04 Base plate

Steel manufactured, plated against corrosion.

Weight: 5 kg approx.

ACCESSORY

S200-14 Paper disc Ø 150 mm (pack of 100).



S114
UNIVERSAL EXTRUDER

Hand operated, actuated by a 5 tons hydraulic jack, it is designed to extrude samples having Ø 4” and 6”. It can therefore extrude Marshall, CBR, Standard and Modified Proctor specimens.

Dimensions:
Ø 300x500 mm
Weight: 32 kg approx.

S114

VIBRATORY COMPACTION METHOD

PREPARATION OF BITUMINOUS TEST SPECIMENS

Applicable to loose mixtures and cores to determine a density ratio for a bituminous mixture.

STANDARDS: EN 12697-9, 12697-10, 12697-32, 13266-4
1924:2

The equipment consist of:

B097
P. R. D. MOULD

Vertically split on one side, foreseen of clamp attachment to the base plate, plated against corrosion, is utilized for determining the degree of compaction of bituminous mixture, for quality control purpose.

Weight: 12 kg

B097

S197N1
S197-01N

S197N1
VIBRATING HAMMER

Double insulated motor, trigger handle, for bituminous mixture compaction in the percentage refusal density test. It can be used also for the compaction of Proctor and CBR specimens.
Technical details: see Section “S” p. 454

ACCESSORIES

B097-11N SMALL TAMPING FOOT, Ø 102 mm
Complete with shank.

B097-12N LARGE TAMPING FOOT, Ø 146 mm
Complete with shank.

S197-01N SUPPORTING FRAME
for vibrating hammer (see p. 454).
Weight: 75 kg approx.

B097-12N
B097-11N

GYRATORY COMPACTORS

STANDARDS: EN 12697-10, EN 12697-31 | ASTM D6925 | AASHTO T312, TP4 | SHRP M 002 | AS/NZS 2891.2.2

These gyratory compactors, entirely developed and produced by Matest, have multiple uses, both for asphalt and concrete (see page 321) fields. Compacting properly is essential for building quality roads that last over time and well-constructed road enhances safety for passing vehicles and reduces maintenance expenses, making investment in proper construction worthwhile.
They are used: to simulate and reproduce real compaction condition and actual road paving to determine the compaction properties of asphalt in compliance with ASTM, EN and AS Standards.
Electro-pneumatic or electro-mechanical, we provide several models, including for research purposes.

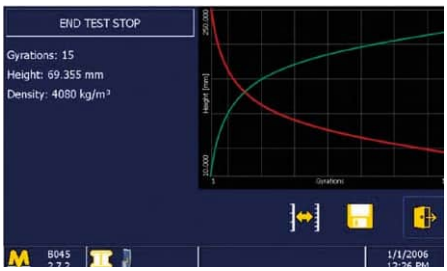
B041M with accessories

B045 with accessories

B045-01 with accessories

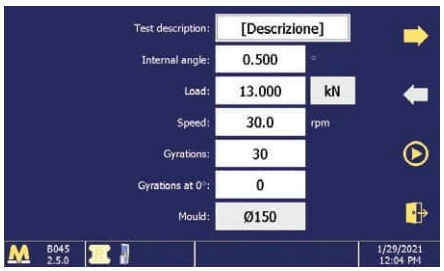
MAIN FEATURES

- Rigid steel frame ensuring excellent angle control.
- 7” touch screen control unit.
- Remote data acquisition communication protocol enabled.
- Electronic angle positioning.
- Dual angle option with double calibration AASHTO, EN and AS at 2 and 3.
- Automatic adjustment of the gyratory angle is defined by the user (GYRORESEARCH).
- Shear stress measurement (GYRORESEARCH).
- Optional integrated electromechanical extruder.
- Optional integrated balance.



End test data (with shear stress value)

Test execution (data pilot)



Setting of test parameters

TECHNICAL SPECIFICATIONS

- Compacted specimen size: Ø 100 and 150 mm; height from 0 to 200 mm for both sizes.
- Mould dimensions: Internal Ø 100 and 150 mm; height 250 mm for both moulds.
- Gyratory angle: adjustable from 0 to 2.4° (up to 3°)
- Number of cycles (gyratory): adjustable from 1 to 5000
- Gyration rate: adjustable from 5 to 60 work cycles/min (30 cycles/min requested by Standards)

Modes of operation:

- Compaction of specimen in accordance to the selected number of rotations.
- Compaction of specimen upon reaching the selected height.
- Compaction of specimen upon reaching the selected density.
- **The machine can also perform a final flattening cycles at "zero" angle to obtain specimens with vertical axis.**

Pneumatic models:

- Applied pressure on Ø 150 mm specimen: adjustable from 10 to 1000 kPa (1000 kPa with 10 bar compressor)
  (800 kPa with 8 bar compressor)
  (700 kPa with 7 bar compressor)
- Applied pressure on Ø 100 mm specimen: adjustable from 23 to 1500 kPa (with 7 bar compressor)
- The vertical pressure on the specimen is automatically controlled and adjusted by the electronic system.
- Require pressurized air, minimum 7 bar.

Electromechanical models:

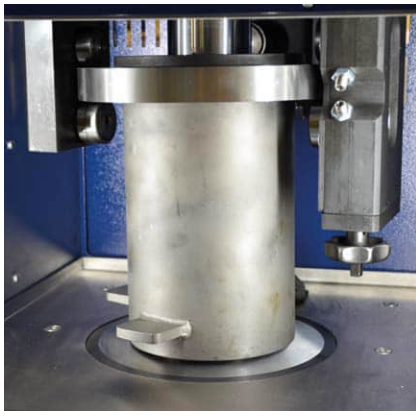
- Applied pressure up to 1000 kPa on Ø 150 mm specimens
- Applied pressure up to 1500 kPa on Ø 100 mm specimens

Power supply: 230V 1ph 50-60Hz 1000W

Data acquisition: number of rotations, specimen height, applied load (to ensure tolerances requested by the Standards).
The Matest Gyratory Compactor is **supplied complete** with lubricant and power cord. **Optionals extra are:** moulds, filter paper, penetration pistons, extruder, bench, air compressor, Accredia official vertical load calibration certificate, to be ordered separately (see accessories).

Dimensions and weight	B041M I B041MEN	B045 I B045EN	B045M I B045MEN	B045-01
With worktop	640x860x2140 mm 350 kg	640x860x2140 mm 370 kg	500x650x1700 mm 150 kg approx.	700x900x2200 mm 380 kg
Without worktop	640x510x1400 mm 260 kg	640x505x1420 mm 280 kg	450x460x1200 mm 110 kg approx.	700x560x1450 mm 300 kg

Overview of mechanical "heart"



Compaction phase

PNEUMATIC MODELS

Gyrotronic compacts in a fully automatic way, by combining the rotary action and the vertical resultant force applied by a mechanical head. Gyrotronic is equipped with a high performance, value engineered, electropneumatic loading system. **Load is applied by an electro-pneumatic cylinder, servo controlled by a precision pressure regulator**; the height is measured by a linear transducer.
The machine is calibrated at Matest factory to the selected internal angle. This concept provides a simple, cost-effective solution with **reduced maintenance requirement**.

B041M
GYROTRONIC - ASTM

STANDARDS: ASTM D6925 I AASHTO T312 I SHRP M-002
The machine is calibrated at Matest factory and supplied with the internal angle set to 1.16° as requested by ASTM, AASHTO Specifications.

ACCESSORIES: See page 105-106

B041MEN
GYROTRONIC - EN

STANDARDS: EN 12697-10, 12697-31
The machine is calibrated at Matest factory and supplied with the internal angle set to 0.82° as requested by EN Specifications.

ELECTROMECHANICAL MODELS

NEW

The electromechanical technology reduces energy consumption without compromising accuracy.
These models of gyratory compactors feature an electromechanical gyratory motion and a vertical load for complete and precise control of sample compaction and extraction, without the use of compressed air.
The machine can also perform automatic final flattering cycles at zero angle to obtain specimens with perpendicular faces.

B045
GYROMEC - ASTM

STANDARDS: ASTM D6925 I AASHTO T312 I SHRP M-002

Electromechanical gyratory compactor, in compliance with ASTM Standards. The load is applied by an electro-mechanical cylinder with a load cell positioned directly on the vertical actuator for precise load measurement. The machine is supplied with the internal angle set to 1.16°.

B045EN
GYROMEC - EN

STANDARDS: EN 12697-10, 12697-31

Same as B045 but in compliance with EN Standards.
The machine is supplied with the internal angle set to 0.82°.

B045M
GYROVAN - ASTM

STANDARDS: ASTM D6925 I AASHTO T312 I SHRP M-002

Lightweight and compact electromechanical gyratory compactor, in compliance with ASTM Standards. Ideal for mobile laboratories. The machine is supplied with the internal angle set to 1.16°.

B045MEN
GYROVAN - EN

STANDARDS: EN 12697-10, 12697-31

Same as model B045M, but in compliance with EN Standards.
The machine is supplied with the internal angle set to 0.82°.

B045-01
GYRORESEARCH

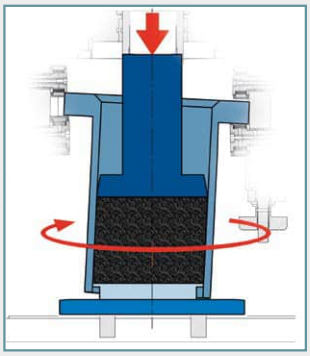
Used for research purposes, this electromechanical compactor allows for the **adjustment of the gyratory angle, selectable in a range between 0° and 3°**, during compaction, real time direct shear stress measurement.

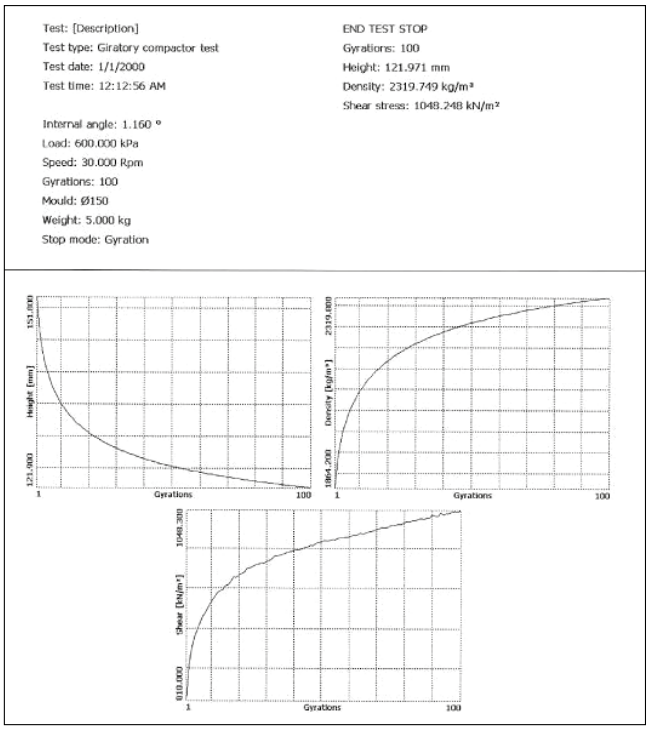
B045-01 with accessories

B045M with accessories

BASED ON U.S. DOT CONCEPT

Compaction is achieved by the simultaneous action of a low static compression, and of the shearing action resulting from the motion of the axis of the mould which generates a conical surface of revolution.
The Matest Gyratory Compactor is designed according to the international standards. Perfect and precise compaction occurs through a stable mechanism, integrated in a solid and robust frame.





Final report

ACCESSORIES to perform the test:

B041-05 HARDENED SPECIMEN CYLINDER Ø 100 mm complete with bottom plate (only for B041M, B041MEN, B045, B045EN, B045-01)

B041-06 HARDENED SPECIMEN CYLINDER Ø 150 mm complete with bottom plate (only for B041M, B041MEN, B045, B045EN, B045-01)

B045M-05 HARDENED SPECIMEN CYLINDER Ø 100 mm complete with bottom plate (only for B045M and B045MEN)

B045M-06 HARDENED SPECIMEN CYLINDER Ø 150 mm complete with bottom plate (only for B045M and B045MEN)

B041-08 HARDENED SPECIMEN CYLINDER Ø 100 mm with holes for cold mix compaction, complete with bottom plate

B041-09 HARDENED SPECIMEN CYLINDER Ø 150 mm with holes for cold mix compaction, complete with bottom plate

B041-11 TOP PENETRATION PISTON Ø 100 mm

B041-12 TOP PENETRATION PISTON Ø 150 mm

Metallic discs, to facilitate the handling of specimens after the test, strongly recommended accessory for low-cohesion mixtures, such as draining asphalts:

B041-13 METALLIC DISC for Ø 100 mm moulds. Pack of 2

B041-14 METALLIC DISC for Ø 150 mm moulds. Pack of 2

Hollow Punches for Gyratory Compactor:

Used to maintain the core in the right shape and store cohesive asphalt samples after compaction.
Some asphalt mixes can be very unstable due to their high void ratio and large particle size. Wrapping the sample around the hollow punch will prevent it from crumbling down or receiving physical deformations once it is ejected from the mould.
The material will then settle down and assume its stiff properties once it cools down after compaction:

B041-17 HOLLOW PUNCH to stabilize and to mature the sample Ø 100 mm

B041-18 HOLLOW PUNCH to stabilize and to mature the sample Ø 150 mm

Paper discs, to prevent asphalt from sticking to the piston and the mould's base plate, and to absorb bitumen in excess:

B030-05 FILTER PAPER for Ø 100 mm moulds. Pack of 100

S200-14 FILTER PAPER for Ø 150 mm moulds. Pack of 100

RECOMMENDED ACCESSORIES

B041-20 WORKTOP FOR B041M, B041M-EN, B045 and B045-EN, it can also house the specimen extruder (B041-23 and B045-23) and the integrated balance (B041-26)

Or:

B041-19 WORKTOP FOR B045-01, it can also house electromechanical specimen extruder (B045-23) and the integrated balance (B041-26).

B045M-20 WORKTOP FOR B045M and B045MEN, it can also house the specimen extruder (B045M-23).

ACCESSORIES

B041-23 PNEUMATIC AUTOMATIC SPECIMEN EXTRUDER, it can be fixed to the worktop B041-19, B041-20, or to any bench.

B045-23 ELECTROMECHANICAL AUTOMATIC SPECIMEN EXTRUDER, it can be fixed to the worktop B041-19 and B041-20.

B045M-23 ELECTROMECHANICAL AUTOMATIC SPECIMEN EXTRUDER, it can be fixed to the worktop B045M-20.

V207 AIR COMPRESSOR, pressure 10 bar.
Technical details: see p. 554

B041-35 FILTER GROUP for condensed water removal from the compressed air. (needed accessory).

B041-21 WHEELS (kit of 4) with brake, for an easy displacement of the Compactor in the laboratory.

B041-30 VERTICAL FORCE TESTING DEVICE with load ring.

As alternative:

B041-31 VERTICAL FORCE TESTING DEVICE with digital dynamometer.

B041-33 KIT OF 2 DISTANCE PIECES of 105 and 115 mm high for the control of the height values measured by the linear transducer.

S337-52 ACCREDIA official vertical load calibration certificate.

V223 Scissor lift table for sample handling. More information at page 556

WEIGHING SOLUTIONS

B041-26

BALANCE, INTEGRATED into the worktop, to facilitate the sample and the mould weightings, by avoiding the stress of lifting them.
The weighing reading values are directly and automatically displayed on the control panel of the Compactor.
Capacity: 30 kg
Accuracy: ± 6 g

OR

B041-27

BENCH for lateral bearing of a weighing balance.
Suggested balance:
V075-13 Capacity 30 kg div. 0.5 g
Or customer's own balance

B041-28

GAM
GYRATORY INTERNAL ANGLE MEASURER

STANDARDS: EN 12697-31 I ASTM D7115 I AASHTO T344

This Gyratory Angle Measurer has been designed by MATEST to provide an angle validating device. In less than 30 minutes the operator may perform the calibration of the Gyratory Compactor.

The device perfectly simulates a HMA specimen as it generates an equivalent tilting moment and shear forces.

GAM can cover a wide range of angles, including the ones specified by EN and ASTM Standards.

The device allows to perform TOP and BOTTOM angle measurements as specified by the Standards; the average of the obtained values is then considered as the **internal angle of the machine**.

An excel spreadsheet, which is supplied along with the device, is used for data acquisition and processing, and provides the precise value of the internal angle according to the calculation procedure specified by EN 12697-31 (Annex-C) and AASHTO T344.

The spreadsheet allows to plot several graphs showing the measured data and it also provides some important indexes about the quality of the data.

MAIN FEATURES

- High accuracy of the measured data.
- Connection to PC through RS232 cable.
- Three modes of data acquisition: Single, Partial or Complete.
- Accuracy: more than 0.01°, as requested by the Standards.
- Data processing is carried out by a specific spreadsheet, which also allows to create the final calibration certificate.
- No need for power supply since the device is battery operated. Also it has an energy saving feature which automatically switch off the device if it is not being used for a while.
- Final calibration certificate.
- Stand-alone device (battery operated).
- Energy sawing with integrated automatic switch off function.

B041-28

TECHNICAL SPECIFICATIONS

- The device is supplied complete with:
  - Two different rings to perform tests either with M=240Nm or M=425Nm
  - Upper and lower base plate
  - RS232 cable
  - Strong practical suitcase
  - Calibration certificate
- Data are read by GAM and then downloaded (via RS232 cable) all together at the end of the measurements, with no need to connect the device to the PC after each measurement
- Possibility to repeat even just one of the measurement, and lately include it in the calculation spreadsheet

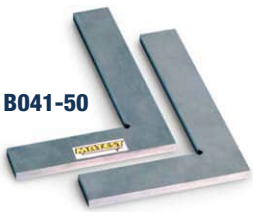
Power supply: n°2 batteries 1.5V type AA
Dimensions: Diameter 150 mm, Height 115 mm
Weight: 5.6 kg

ACCESSORIES

B041-50 GAM CALIBRATION-CHECKING set to ASTM (1.16° angle). The set is composed by two square rules. Supplied complete with factory certificate.

B041-51 GAM CALIBRATION-CHECKING set to EN (0.82° angle). The set is composed by two square rules. Supplied complete with factory certificate.

B041-55 ACCREDIA Official Calibration Certificate of the angle, for the square rules (ASTM and EN).



B041-50

Calibration certificate

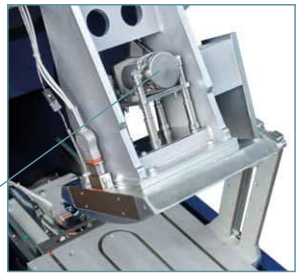
B039N
ARC
ASPHALT ROLLER COMPACTOR
ADVANCED ELECTROMECHANICAL SYSTEM, HIGH LOAD, HOT ROLL, MULTI SIZE

STANDARDS: EN 12697-33 method 5.3 | ASTM D8079 | TP-Asphalt StB 33

GERMAN PROCEDURE TP-ASPHALT StB 33 APPROVED

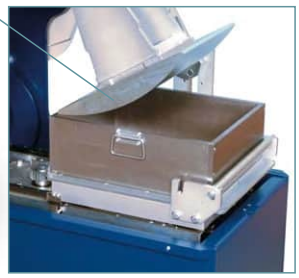
POLICARBONATE SAFETY SYSTEM CONFORMING TO CE STANDARDS

B039N
with open guard



Detail of the rolling vibrating device + heated roller + heated sliding cart

EASY MOULD HANDLING



Detail of mould and roller

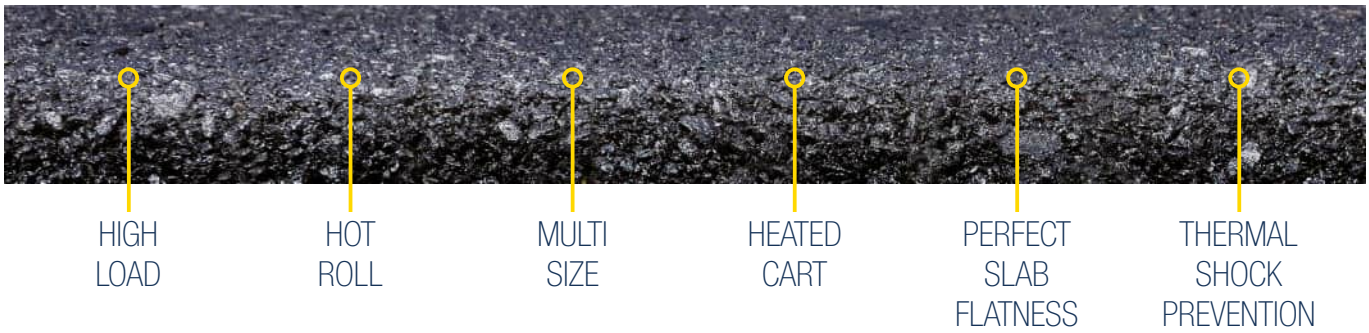
Detail of the INTEGRATED control panel

MAIN FEATURES

- **40 kN vertical force**.
- Sturdy frame made of steel.
- Alternating displacement system, for table displacement and vertical load pressure.
- Integrated touch screen control unit.
- Easy management and analysis of data, test results, graphs.
- Touch-screen icon for an easy parameters set up and an immediate test execution.
- Unlimited memory storage with: 2 USB ports,1 SD card slot.
- Direct Internet and Intranet (LAN) connection for remote technical assistance and for firmware updates.
- **Heating of the segment roller and sliding cart (optional)**.
- Simple and quick roller and mould positioning.
- Perfect horizontal flatness of the slab surface.
- Uniform density and dimensions of the slabs.
- Energy controlled compaction procedure.
- Silent compaction.

B039N

Asphalt Roller Compactor is entirely developed and manufactured by Matest. The machine works with an **electromechanical system, and therefore it does not require any air source (compressor) or hydraulic pressure.**
It is used to produce representative sample slabs of several dimensions of bituminous mixtures laid and compacted on site.
The compaction is performed through a segmented roller with alternated operated rotation which simulates the on-site action of a street roller.
Three transducers are installed to manage the roller and table displacements and vertical load pressure.
These samples are compatible for rut test with Matest Smartracker B038AM (see p. 112). The sample slabs can be also cored or cut off to obtain cylinders and beams for bending fatigue, indirect tensile, static and dynamic creep, stiffness, and 4-point tests.



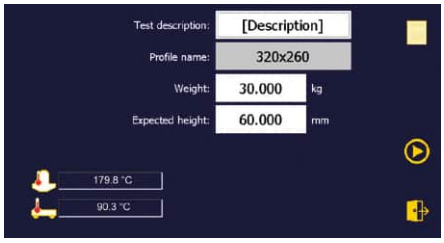
TECHNICAL SPECIFICATIONS

- Possibility to use **standard or heated segment rollers of different sizes** (see accessories): radius 490 mm, width up to 400 mm and length up to 500 mm to obtain slabs of
  500x400 mm, thick up to 180 mm
  400x305x50 to 180 mm thick
  320 x260x50 to 180 mm thick
  305x305x50 to 120 mm thick
- Vertical force selectable up to max. 40 kN (for all machine)
- **Programmable density target compaction**
- Policarbonate safety guard as requested by CE Directive
- Possibility to **perform the two-phase procedure (Pre-compaction and Compaction)** as specified by TP Asphalt-StB 33 and EN 12697-33 annex A
- Possibility to set and control the test by n° passes
- **Sliding carriage speed adjustable** between 3 m/min and 12 m/min
- **Detailed output file** listing each pass and displaying duration, sample height, applied load and eventual roller and cart temperature
- Longitudinal compaction

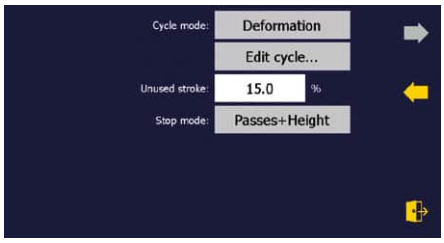
Power supply: 230 V 50-60 Hz 1ph 2100 W (3100W with the heated segment roller)
Dimensions: 2200x1030x1880 mm (2410 mm with opened guard)
Weight: 1300 kg approx.

The compaction cycle can be programmed up to a certain load or deformation value. When deformation value is programmed, the system automatically programs the suitable loads to obtain the selected final thickness.
The flexibility of the program grants the production of samples with uniform density and dimensions, fully meeting Standards Spec. and Research requirements.
A friendly and easy to use interface allows an immediate and fully automatic test execution, data acquisition and processing, test report and file.

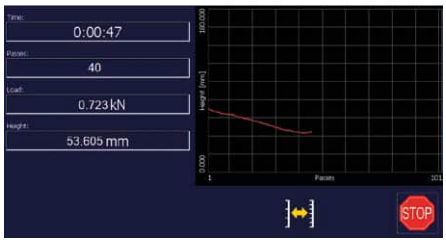
The Roller Compactor is supplied **without** roller segment, slab mould, centering plate, that must be ordered separately (see accessories).



Compactor test configuration



Parameter customizarion



Test execution

ACCESSORIES

STANDARD SEGMENT ROLLER, available models:

Code	Mould dimensions
B039-04	320x260 mm
B039-05	500x400 mm
B039-06N	400x305 mm
B039-07	305x305 mm

STANDARD CENTERING PLATE, available models:

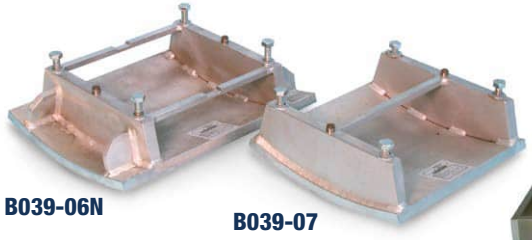
Code	Mould dimensions
B039-21N	400x305 mm
B039-22	305x305 mm
B039-23	320x260 mm
B039-24	300x300 mm

B039-15 ROLLING VIBRATING DEVICE, reproducing street-roller vibrations during asphalt laying off.

V223 Scissor lift table for sample handling. More information at page 556

MOULD to prepare asphalt slabs. Complete with handles.

Code	Dimensions
B038-09	320x260x180 mm
B038-10	305x305x50 mm
B038-11	305x305x100 mm
B038-11H	305x305x120 mm
B038-12	400x305x50 mm
B038-13	400x305x100 mm
B038-15	400x305x180 mm
B038-18	500x400x180 mm
B038-19	400x305x120 mm
B038-20	320x260x50 mm
B038-21	500x305x120 mm
B038-22	300x300x120 mm
B038-23	320x260x100 mm
B038-24	400x500x100 mm



HEATING OF SEGMENT ROLLER AND SLIDING CART

Possibility to heat and control temperature of the Segment Roller mounted on the Compactor and Sliding Carriage to keep the mould warm and avoid thermal shocks the might affect specimen's workability.

The equipment is composed of:

B039-02
CONTROL UNIT

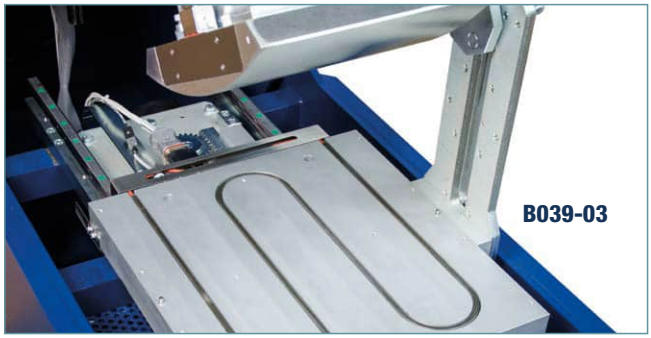
Mounted in the Roller Compactor, it foresees a thermoregulator circuit, complete with probe to measure and to adjust the temperature from room up to 180 °C.
It is connected to the segment roller equipped with heating resistances, to be connected to the control unit B039-02.

HEATED SEGMENT ROLLER, complete with heating resistances. Available dimensions:

B039-04R ROLLER for 320x260 mm mould
B039-05R ROLLER for 500x400 mm mould
B039-06NR ROLLER for 400x305 mm mould
B039-07R ROLLER for 305x305 mm mould
B039-08R ROLLER for 500x305 mm mould
B039-09R ROLLER for 300x300 mm mould

B039-03
SLIDING CART HEATING OPTION

Thermoregulated circuit with temperature probe to set and control cart temperature and keep mould hot. The temperature is adjustable from ambient up to 180 °C.



B039A

ASC
ASPHALT SHEAR BOX COMPACTOR

THE ONLY ELECTROMECHANICAL SHEAR BOX COMPACTOR

STANDARD: ASTM D7981 Standard practice for compaction of prismatic asphalt specimens by means of the Shear Box Compactor.

The ASC is being **used in FHWA Contract** "Deployment of Performance-Based Technologies for Mechanistic-Empirical Pavement Design and Resource Responsible Materials Design" to produce specimens for Level 1 analyses using the AASHTOWare Pavement ME Design software.
It is the only compactor capable of creating specimens for all of the following mechanistic-empirical performance tests:
Dynamic Modulus, AASHTO PP 61
Repeated Load Permanent Deformation, AASHTO TP 79
Flexural Fatigue, AASHTO T321
Low Temperature Creep and Strength, AASHTO T322

MAIN FEATURES

- Servo hydraulic vertical ram with integral hydraulic power supply.
- Integral specimen extruder.
- 2 USB ports, 1 SD card slot, RS232/485 serial port.
- The compaction cycle can be programmed by specifying vertical stress/load and test termination conditions; number of cycles, specimen height and /or density.
- Precision load cell(s) for vertical and shear stress measurement.

B039A

TECHNICAL SPECIFICATION

Vertical force	Up to 100kN
Shearing force	Up to 50kN
Shear angle	4° ± 0.1°
Shearing cycle rate	3 ± 0.1 cycles per minute
Mould width	150mm ± 0.1 mm
Mould length	450mm ± 0.1 mm
Mould surface finish (inside)	Smoother than 0.4µm rms
Mould surface hardness	More than 48 Rockwell C
Mould capacity	Approx. 20 litres
Loading platen width	149 mm ± 0.2 mm
Loading platen length	449 mm ± 0.2 mm
Loading platen smoothness	Smoother than 0.4µm rms
Loading platen surface hardness	More than 48 Rockwell C
Number of cycles	Up to 100
Vertical stress	0.1 to 1.5MPa ± 0.01MPa
Compaction height	0 mm to 200 mm ± 0.1mm

Power supply: 230V 1ph 50-60Hz
Dimensions: 788x1360x1314 mm
Weight: 1200 kg approx.

A RUGGED DESIGN FOR THE BEST SPECIMEN PREPARATION

Asphalt technologists are acutely aware of the importance of a representative specimen during any laboratory performance testing.
The precise shearing motion of the ASC replicates the conditions of field compaction in order to reproduce the field properties of asphalt, quickly and easily under the controlled conditions of a laboratory.
The ASC compacts large asphalt prisms that can be sawn to produce four to six beams or slabs for laboratory wheel tracking; or the prism can be cored to produce three to four 100 mm diameter cylinders, all having essentially identical properties.
The electronic control unit, with touch screen color display, makes a PC an option, not a necessity.
The user friendly touch-screen icon interface allows for easy set up parameter entry, enables immediate (fully automatic test execution) data acquisition/processing, test report, and data file generation.
A LAN connection to Intranet/Internet enables remote communication to receive immediate diagnostic analysis and technical support from Matest technicians, and/or software updates

ACCESSORIES

B039A-01	LOADING CHUTE
B039A-02	TRAY (2 off)
B039A-03	SPREADING COMB
B039A-04	LEVELING BLADE
B039A-05	BUILT-IN MOULD HEATER (optional)

B038AM
SMARTRACKER™
MULTI WHEELS HAMBURG WHEEL TRACKER; TEST ENVIRONMENT: DRY AND WET

STANDARDS: EN 12697-22 I AASHTO T-324 I BS 598:110

PATENT No: US 9, 964, 471

PATENTED

B038AM

THE N° 1 UNIT IN U.S. MARKET

MAIN FEATURES

- Meets and exceeds AASHTO, BS and EN Standards.
- Simultaneous testing of wet and dry samples.
- Indipendent motors for each wheel assure separate rutting analysis of each specimen.
- Wheels retract automatically.
- Sturdy machine, designed for the rugged construction laboratory environment.
- Sliding sample positioning mechanism for easy mould handling and placement in the machine.
- Cyber Plus Progress technology allow to apply a load with a perfect sinusoidal wave in accordance with AASHTO T-324.
- Fully Automatic machine. Detects and stops the test when the target rut depth is reached.
- Touch-screen control unit and new icons for a modern and user friendly approach.
- Each of the two wheel assemblies is equipped with displacement transducers for rut measurement.
- Mechanical recirculating water bath for temperature control within ± 1 °C.
- Easy to load, unload, drain water and clean the unit after each test.
- Compact design to accomodate small construction labs and make maintenance easier.
- Covered by US Patent.

B038AM
SMARTRACKER™
MULTI WHEELS HAMBURG WHEEL TRACKER - **PATENTED**

STANDARDS: EN 12697-22 I AASHTO T-324 I BS 598:110

Meet the Matest model Smartracker™ – a revolutionary wheel tracking device that not only determines Hot Mix Asphalt (HMA) resistance to rutting, stripping, and moisture sensitivity but also pioneers sustainable testing practices. This intelligently designed machine, exceeding EN, BS and AASHTO standards, stands as the most versatile wheel tracker on the market.

Smartracker's independent motors for each wheel, ensuring separate rutting analysis of each specimen. This enables simultaneous wet and dry tests on both wheels, significantly saving time and reducing water consumption.

An exceptional feature of Smartracker™ is its ability to simulate tire movement on asphalt pavement, providing unparalleled accuracy in test results. This not only enhances tyre performance analysis but also signifies a commitment to developing technologies that replicate real-world driving conditions.

Equipped with the latest Cyber Plus Progress technology, Smartracker™ controls wheel movement to obtain a perfect sinusoidal wave. This state-of-the-art machine determines creep slope, stripping inflexion point, and mean wheel-tracking slope with unparalleled accuracy.

MATEST SmarTracker™ has been developed by our R&D engineers and scientific in association with some of the most experienced and reputable industry experts in the USA and the world.

TOUCH-SCREEN 7" FOR TEST EXECUTION AND REAL TIME RESULTS PLOT OF THE RUT DEPTH ALONG WITH THE NO. OF PASSES.

WATER AND AIR TEST IN COMPLIANCE WITH EN STANDARD

UNIQUE SYSTEM TO LOAD-UNLOAD THE MOULD

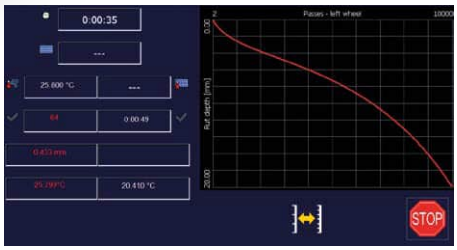
INNOVATIVE WHEELS ROLL OFF MECHANISM (PATENTED)

WATER TEST IN COMPLIANCE WITH AASHTO STANDARD

B038AM

Unique system to Load-unload the mould

Innovative wheels roll off Mechanism (patented)



Real time results plot of the rut depth along with the no. of passes.

follows...

TECHNICAL SPECIFICATIONS

- Wheel load: 705 N
- Wheel speed: from 20 to 30 cycles/minute.
- Number of cycles: up to 30000
- Temperature control:
  EN 12697-22: 2500W heaters for air temperature control, ventilation for temperature uniformity, probe for air temperature, all controlled by the electronic system.
  AASHTO T324: 4000W heaters, recirculating pump, automatic feed and controls level.
- Temperature control range: from ambient up to 75°±1 °C
- Table travel: 180, 230, 260, 280 mm
- Rut depth transducers range: 50 mm ± 0.1 mm accuracy.
- Slab thickness: adjustable from 38 to 120 mm

Power supply: 220V 50-60Hz
Dimensions: 1400x1300x1300 mm
Weight: 450 kg approx.

MAIN FEATURES

- No added stress to operators back from lifting heavy wheel assemblies.
- Sample holders slide into position and eliminate demanding lifting and placement of samples into the unit.
- Hood keeps technicians away from moving parts and provides better temperature control while the test is being conducted.

B038AM-15
SMARTRACKER HAMBURG VERSION AASHTO T324 (WATER TEST ONLY)

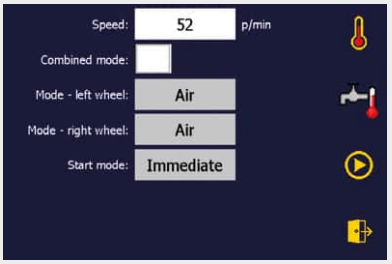
STANDARDS: AASHTO T324, AMAAC Mex Protocol

Same as model B038AM but without cover, it allows water test only.

B038AM-15

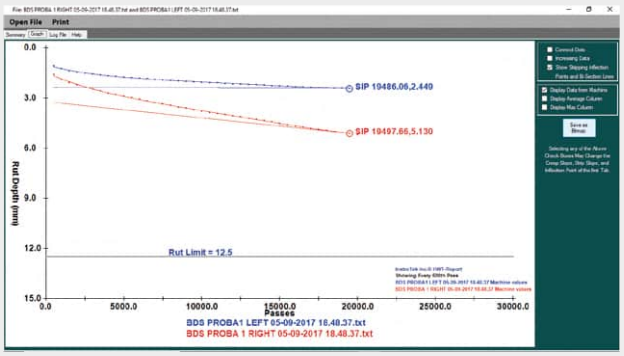
TESTING FIRMWARE

The user-friendly firmware is integrated into the on-board digital control unit based on Windows operating system.
The firmware is fully customizable by the operator according to EN and AASHTO Standards, and the personal needs.
Automatic calculation of stripping inflection point (AASHTO).
Test execution and all parameters, such as water/air temperature, specimen temperature, ruth depth can be monitored in real time.
The firmware also allows exporting test data to an Excel compatible format.



B038A-16 SOFTWARE HWT-REPORT TO AASHTO T324

The Unique HWT-Report software allows the user to analyze the results from the SmarTracker to generate a report and a graph strictly conforming to AASHTO T324. The features of the software include the ability to analyze different locations along the wheel pass, graph maximum and average rut depths, stripping inflection point and detailed reports (selecting all the wheel passes or different sampling rates) that can be presented, printed or emailed.



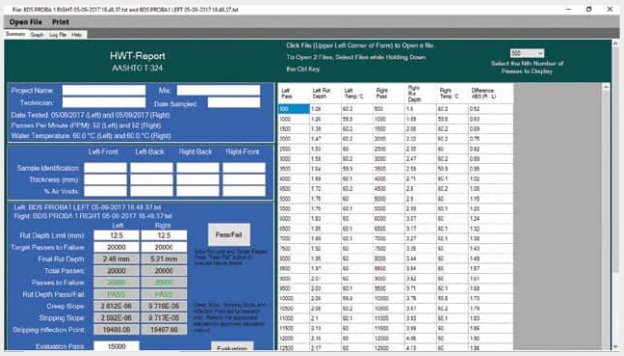
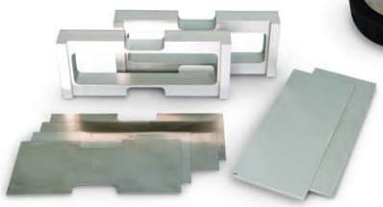


TABLE OF ACCESSORIES TO PERFORM DRY (AIR) AND WET (WATER) TEST FOLLOWING - **EN 12697-22** AND **AASHTO T324** SPECIFICATIONS

Standards	EN 12697-22		AASHTO T324	
Testing mode	Dry (air)	Wet (water)	Wet (water)	* Dry (air)
	2x **B038A-01** Rubber wheel 2x **B038A-11** EN Mould 2x **B038A-12** 2x **B038A-13** Adaptors 1x **B038A-05N** Air heating 2x **B038AM-06** Probe (optional)	2x **B038A-01** Rubber wheel 2x **B038A-11** EN Mould 2x **B038A-12** 2x **B038A-13** Adaptors 2x **B038AM-06** Probe (optional)	2x **B038A-02** Steel wheel 2x **B038AM-06** Probe (optional) FOR CYLINDRICAL SPECIMENS: 2x **B038A-10** AASHTO Mould 2x **B038A-03** Support for AASHTO Mould 2x **B038A-10D** Adaptors FOR SLAB SPECIMENS: 2x **B038A-11** Mould 2x **B038A-12+B038A-13** Adaptors	2x **B038A-02** Steel wheel 2x **B038A-10 or** 2x **B038A-11** Mould 2x **B038A-03** Support for AASHTO Mould 2x **B038A-12 +** 2x **B038A-13** Adaptors 1x **B038A-05N** Air heating 2x **B038AM-06** Probe (optional)

Note: *AASHTO T324 does not require air test.

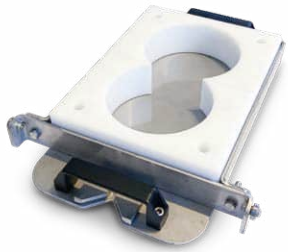
B038A-01
Rubber wheel for EN 12697-22



B038A-13 Horizontal adaptors for EN moulds

B038A-11 EN mould

B038A-02
Steel wheel for AASHTO T324



B038A-10
AASHTO mould

B038A-14

NEEDED ACCESSORIES

EN 12697-22

B038A-01 RUBBER WHEEL Ø 203x50 mm
B038A-11 EN MOULD 400x305x120 mm
B038A-12 SET OF VERTICAL ADAPTORS for EN mould to allow the positioning of specimens lower than 120 mm (up to a minimum specimen thickness of 20 mm)
B038A-13 SET OF HORIZONTAL ADAPTORS for EN mould to allow the positioning of specimens 260x320 mm and 305x305 mm

AASHTO T324

B038A-02 STEEL WHEEL Ø 203x47 mm
B038A-10 AASHTO MOULD (2 cylinders Ø 150x60 mm)
B038A-03 TOOL for AASHTO positioning
or
B038A-07 STAINLESS STEEL SUPPORT for AASHTO positioning
B038A-10D VERTICAL ADAPTORS for AASHTO mould to allow the positioning of specimens with a thickness of 40 mm

BS 598:110 | AG:PT/T231

B038A-08 Rubber wheel Ø 203x50 mm to BS 598:110 and Australian AG:PT/T231 Spec.
B038A-10SP BS mould (one cylinder Ø 200x60 mm)
B038A-03 or **B038A-07** for positioning.

OPTIONAL ACCESSORIES

B038A-04 ELECTROVALVE group for hot water
B038A-05N AIR HEATING SYSTEM for air conditioning test EN 12697-22
B038AM-06 PROBE for specimen's temperature determination
B038A-09 HPDE mould specimen holder.
B038A-14 VERIFICATION KIT for the calibration of the wheel load. The device is composed of a support block with a calibrated load cell and complete with a digital readout. Max. load 1000 N, accuracy 0.05%.
B038A-16 SOFTWARE HWT-Report to AASHTO T324
B038A-20 HWT-Pro Calibration and diagnostics Device for Smartracker.
V223 Scissor lift table for sample handling. More information at page 556

B040M
APS
AUTOMATIC PAVE SAW
DUAL BLADE CONCEPT FOR PERFECT PARALLEL CUTTING

Matest has developed a dual bladed automated sawing system for fast, accurate cutting of cores, prisms and slabs prepared using Matest's range of asphalt compaction machines; Gyratory Compactors, ASC-Asphalt Shear-box Compactor and ARC-Asphalt Roller Compactor for Four Point Bending (4PB), Two Point Bending (2PB), Overlay tester (OT), Semi Circular Bending (SCB) and wheel tracking tests using Matest/ Pave-test's range of leading edge testing systems.

It includes: **cooling water recirculation pump, tank and protection cabinet with interlocks to ensure operator safety.**

B040M

MAIN FEATURES

- Two saw blade design ensures for perfect parallel cutting.
- Motorized feed with automatic retraction of saw carriage.
- Electronic control unit with touch screen colour display, that runs like a standard PC .
- Adjustable cutting speed.
- Slabs and prisms can be sawn safely and accurately.
- Jigs also available for trimming 100 and/or 150mm diameter cylinders/cores.
- Facilitates cutting rectangular beams, trapezoidal prisms, overlay test specimens, semi-circular & wheel tracking specimens, and cylindrical specimens.
- Simple spacer system allows precise preparation of beams and cylinders from 38mm to 160mm long, without the need for measurement.
- Other dimensions can be accommodated using integral ruler.
- Adjustable limit switches facilitates repetitive cutting with minimal saw carriage travel. Secure specimen clamping. Choice of mechanical or pneumatic.
- Protective enclosure, with safety interlocks, combines clean operation with unparalleled operator safety.
- Dynamic breaking system stops saw blade rotation when power is switched off.

THE NEXT GENERATION FULLY AUTOMATED ASPHALT SAWING SYSTEM

Matest's new APS-Automatic Pave Saw is the next generation fully automated asphalt sawing system with integrated specimen clamping. **The APS offers fast and accurate cutting of rectangular beams, trapezoidal prisms, overlay test specimens, semi-circular specimens, and trim- ming of cylindrical specimens.**

The APS uses two blades to ensure perfect parallel cutting of cylinders and beams at set intervals from 38 to 160 mm long.
If equipped with proper blades, the APS cuts not only asphalt but also several other materials.
The APS is controlled using Matest's tried and proven **iTouch electronic** control unit with touch screen colour display for perfect cutting of specimens for AASHTO, ASTM and EN standards without the need for manual measurements. **It is the safest and most advanced asphalt cutting saw** available on the market and is the perfect companion to our range of advanced asphalt preparation and testing equipment.
The APS is capable of cutting prismatic specimens up to 240mm high and a cutting length up to 700mm and cylindrical specimens up to 200mm diameter. **The APS can be configured using one or two blades, with a large range of jigs and fixtures** to cut rectangular beams, trapezoidal prisms, overlay test specimens, semi-circular & wheel tracking specimens, and trim cylindrical specimens accurately, with excellent parallelism and perpendicularity. Various alignment blocks, guides and reference spacers allow operators to easily achieve the most commonly used dimensions specified in a range of international standards with little or no measurement. Any other dimensions can be accommodated with the aid of an integrated ruler.

The **iTouch controller** allows the operator to easily control the cutting speed and sequence and a series of adjustable limit switches minimizes the saw carriage travel during repetitive cutting.
The high grade stainless steel work surface and associated corrosion resistant components ensures the unit will perform well and look good for many years.

The **protective enclosure** provides a high level of operator safety and protection from water spray. Safety interlocks prevent the operator from opening the enclosure and accessing hazardous areas while the blade is rotating. Once the cutting sequence has finished and the blade has stopped rotating, the enclosure is unlocked automatically.

ACCESSORIES

B040-01 APS DIAMOND BLADE, 650 mm diameter (q.ty 1 or 2)
or
B040-02 APS DIAMOND BLADE, 700 mm diameter (q.ty 1 or 2)

B040-03 SET OF SPACERS for mounting the APS Diamond blade, 650 mm diameter (needed for B040-01)

B040-04 SET OF SPACERS for two blades configuration (needed for two blades configuration)

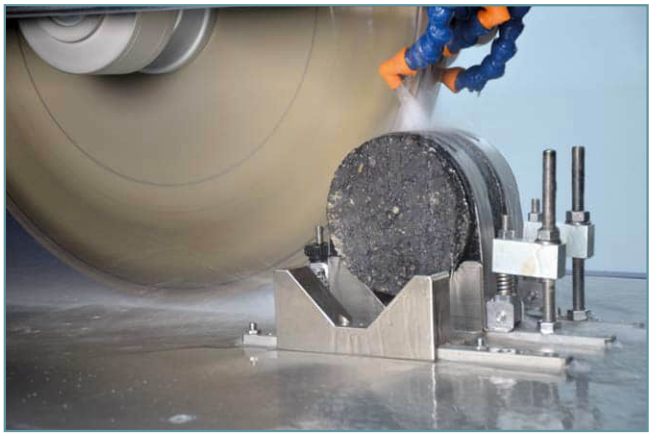
B040-05 SPACER for one blade configuration (needed for one blade configuration)

B040-06 DISPLACEMENT TRANSDUCER for the control of the blade position

B040-07 PNEUMATIC CIRCUIT (needed with B040-10P and B040-13P)

If equipped the unit requires compressed air, minimum 8 bar

V223 Scissor lift table for sample handling. More information at page 556



SPECIFICATIONS

- One or two blade concept
- Blade Diameter(s): 650 mm or 700 mm
- Blade Speed 1,400rpm (50Hz) or 1,680rpm (60Hz)
- Adjustable cutting speed, min 40 mm/min max 200 mm/min
- Max Cutting Depth 200 mm (with 650 mm blade diameter) or 240 mm (with 700 mm blade diameter)
- Cores 100 or 150 mm diameter (38 mm or 200 mm diameter on request)
- Max Prism Length 700 mm
- Cooling water recirculation pump and tank included
- Net Weight 500 kg approx.
- Parallel (Dual blade) cutting distance: 38 mm to 160 mm at set distances
- Dimensions 2370 mm (L) x 1340 mm (D) x 1670 mm (H)
- Air Supply 600 kPa (for pneumatic clamping option)
- Power Supply:
  400V 50Hz 3ph, 230V/220V 50Hz 3ph (B040M)
  400V 60Hz 3ph, (B040MX)
  208V 60Hz 3ph (B040MZ)

CUTTING JIGS

B040-10M APS manual Multi-Slab/Prism jig suitable for slabs and prisms with the following dimensions: 40 - 240 mm depth x 700 mm length.

B040-10P-KIT APS automatic Multi-Slab/Prism jig suitable for slabs and prisms with the following dimensions: 40 - 240 mm depth x 700 mm length.

B040-12M APS manual trapezoidal specimen jig for two point bend (it requires B040-10M or B040-10P-KIT).

B040-13M APS manual core docking jig for Ø 150-100-60-50-40-38 mm cores.

B040-13P APS automatic core docking jig for Ø 150-100-60-50-40-38 mm cores.

B040-14 Instrumentation for Overlay test, wheel tracking core, semi-circular and disk shaped compact tension specimens (it requires B040-13M or B040-13P).

B040-20
ACD
AUTOMATED CORE DRILL

Matest has developed an Automated Core Drill (ACD) for fast, accurate cutting of cores from cylinders, prisms and slabs prepared using Matest's range of asphalt compaction machines; Gyratory Compactors, ASC-Asphalt Shear-box Compactor and field specimens for subsequent testing using Matest/Pavetest's range of leading edge testing systems.

B040-20

MAIN FEATURES

- Three selectable drill speeds.
- Clear protective/splash screen conforming to CE standards.
- Ideal for coring prismatic specimens compacted in Asphalt Shear-box Compactor (ASC).
- Suitable to core cylindrical specimens compacted in Gyratory compactor(s).
- Includes water container/tray.
- Adjustable specimen clamp eliminates specimen movement during coring.
- Three position fixture provides easy and accurate specimen positioning.
- Three core supports at fixed spacing yields two or three cores from one prism.
- Optional cylindrical specimen jig.

TECHNICAL SPECIFICATIONS

Drill Bit Diamond/tungsten alloy, laser welded.
Core diameter 101.5 mm or 150 mm. For other core diameters, see the accessories. Core height up to 40 cm.
Specimen size:
- Cylindrical Sample: 160 mm x 70 mm - 400 mm (ØxH)
- Prismatic Sample:
  200-450 mm x 150-185 mm x 120-420 mm (LxDxH)
  315-340 mm x 220-260 mm x 120-420 mm (LxDxH)

Dimensions: 60 cm (L) x 80 cm (D) x 140 cm (H)
Net weight: 85 kg
Power supply: 230V 10A 50Hz 1ph (540/1, 300/1, 800 rpm)
230V 10A 60Hz 1ph (560/1, 330/1, 850 rpm)
115V 20A 60Hz 1ph (560/1, 330/1, 850 rpm)

NEEDED ACCESSORIES

B040-21 Clamping cylindrical specimen jig to suit from 38 to 101.5 mm diameter specimens

B040-22 DCT specimens drilling jig (only to be used with B040-33, not included)

B040-23 Transversal coring jig for samples with Ø 38 to 75 mm

DRILL BITS

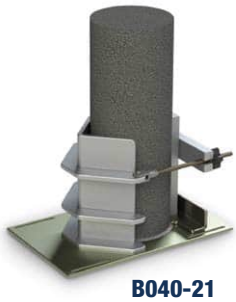
Models	Ø mm	LONG mm
B040-30	38	
B040-31	42	
B040-32	55	
B040-33	25	420
C339-01	50	
C339-02	75	
C339-03B	101.5	
C339-04*	150	

Note*: Only to be used with prismatic specimens.

CORE EXTRACTORS

Models	Ø mm
C346	50
C346-01	75
C346-02	100
C346-03	150

B040-21


B040-21

B042-KIT
MARSHALL MECHANICAL 50 KN LOAD FRAME

STANDARDS: ASTM D6927, D5581, D1559 I AASHTO T245
BS 598:107 I NF P98-251-2

Manufactured with a rugged frame to bear strain and loads, easy to use, it is designed to operate with the minimum of maintenance. Platen rate is 50.8 mm/minute also maintained under load through to an overpowered electric motor. The applied load is measured by a precision proving ring 30 kN capacity incorporating a stem brake holding the maximum reading and it is supplied with relevant calibration certificate. The machine includes an electric device for automatic stop when reaching the max capacity load of the proving ring, in order to prevent any overload damage, limit switches stop the platen at max and min excursions.
The unit is supplied complete with **load ring 30 kN capacity**, stability mould, flow meter with dial gauge.

Power supply: 230V 1ph 50Hz 750W
Dimensions: 410x400x1110 mm
Weight: 110 kg approx.

Note: On request the machine can be supplied with 50 kN capacity load ring.

B042-01 MARSHALL MECHANICAL load frame capacity **"only"** 230V 50Hz 1ph

B047-02
INDIRECT TENSILE TESTING DEVICE

STANDARDS: EN 12697-23 I ASTM D6931 I AASHTO T283

Used to measure the indirect tensile strength and the radial strain of a Marshall specimen Ø 4" and 6", where a vertical load is applied. Supplied complete with loading strips to test specimens having Ø 4" and 6". Steel manufactured, plated against corrosion.

Dimensions: Ø 248x270 mm - **Weight:** 14 kg approx.

Alternative solution:

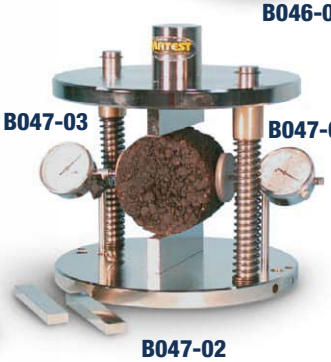
B047-02S
INDIRECT TENSILE TESTING DEVICE for samples Ø 4" and 6" complete. Simple model not accepting the device B047-03 for strain measurements.

ACCESSORY

B047-03 SET OF TWO DIAL GAUGES 10 mm stroke and 0.01 mm sens. complete with adjustable supports for strain measurements, to CNR N.134

B046-03

B047-02S



B047-03
B047-03
B047-02

B042-KIT

SPARES

B046N
STABILITY MOULD, Ø 4" (101.6 mm)
The mould, **aluminium made**, is completely open in the front and the introduction of the specimen becomes very easy thus avoiding disassembling operations. Weight: 6 kg approx.

B046-03
STABILITY MOULD, **steel made**, Ø 4" (101.6 mm) to ASTM D6927. Altenative solution to B046N mould.
Weight: 9 kg approx.

B047
FLOW METER
Mounted on top of the stability mould, holding the dial gauge and incorporating a stem-brake keeping maximum deflection.
Weight: 500 g

B047-01
DIAL GAUGE
Stroke 10 mm,
div. 0.01 mm to be used in conjunction with the Flow Meter B047.

B047-01
B046N
B047

... follows ...

B043-KIT
DIGITAL MARSHALL TESTER 50 KN CAPACITY

STANDARDS: EN 12697-34, 12697-23, 12697-12
ASTM D6927, D5581, D1559 I AASHTO T245
BS 598:107 I NF P98-251-2

The testing frame is the same as for mod. B042 KIT, but the load is measured by an electric cell 50 kN capacity with high precision strain transducers; the flow is measured by an electronic displacement transducer 50 mm stroke and ± 0.1% linearity.
The Cyber-Plus Progress 8 channels digital display unit with microprocessor (technical details: see B044M-SET p. 128, measures and displays at the same time the stability in kN and the flow in mm with peak hold features, with the possibility to transfer them to a PC and a printer through a RS232 port.
Supplied complete with Stability mould.

Power supply: 230V 1ph 50Hz 900W
Dimensions: 650x400x1100 mm
Weight: 120 kg approx.

B043-KIT

ACCESSORIES

SSW-UTM2
SOFTWARE UTM2 (Universal Testing Machine 2)
Data processing program for "X-Y STABILITY/FLOW"
General description and technical details: see UTM2 p. 21

XLS-MAR1
EXCEL SHEET for Marshall test according to EN 12697-34

B046-03
STABILITY MOULD, **steel made**, for Ø 4" (101.6 mm)
Specimens to ASTM D6927.
Alternative solution to B046N mould.
Weight 9 kg approx.

B046-03

B046N

SPARE

B046N
STABILITY MOULD Ø 4" (101.6 mm)
The **aluminium made** mould, is completely open in the front so the introduction of the specimen is made easy as there is no disassembly needed.
Weight: 6 kg approx.

SSW-UTM2: Load/deformation "x-y" graphic example

Note: The Digital Marshall Tester B043-KIT, completed by the specific accessories (listed below) is suitable to perform also the following tests:

DETERMINATION OF INDIRECT TENSILE STRENGTH

STANDARDS: EN 12697-23, EN 12697-12 I ASTM D6931
AASHTO T283

B047-02

INDIRECT TENSILE TESTING DEVICE FOR SAMPLE Ø 4" AND 6"
Used to measure the indirect tensile strength and the radial strain of a Marshall specimen Ø 4" and 6", where a vertical load is applied. Supplied complete with loading strips to test specimens having Ø 4" and 6". Steel manufactured, plated against corrosion.

Dimensions: Ø 248x270 mm
Weight: 14 kg approx.

Alternative solution:

B047-02S INDIRECT TENSILE TESTING DEVICE for samples Ø 4" and 6" complete. Simple model not accepting the device B047-04 for strain measurements.

ACCESSORIES

B047-04 SET OF TWO LINEAR RESISTIVITY TRANSDUCERS, stroke 10 mm, accuracy and linearity ± 0.3% to meet CNR N.134. Complete with supports and accessories for strain measurements.

B044-03 DISPLACEMENT TRANSDUCER, **additional**, 50 mm stroke, for a double measurement of the vertical displacement of the specimen during the indirect tensile strength test. Complete with cable and connector. When used with B043-02N software the average value of the two transducers is given.

SSW-UTM2 SOFTWARE UTM2 (Universal Testing Machine 2) General description and technical details: see UTM2 p. 21

DIRECT SHEAR (LEUTNER) BETWEEN BITUMINOUS MIXTURE LAYERS

STANDARD: ALP A StB T.80 I EN 12697-48

Direct shear test (LEUTNER) on the connection between bituminous mixture layers, carried out on bituminous mixtures cylinder specimens diameter 150 mm or 100 mm obtained from road cores or on laboratory made specimens.

NEEDED ACCESSORIES

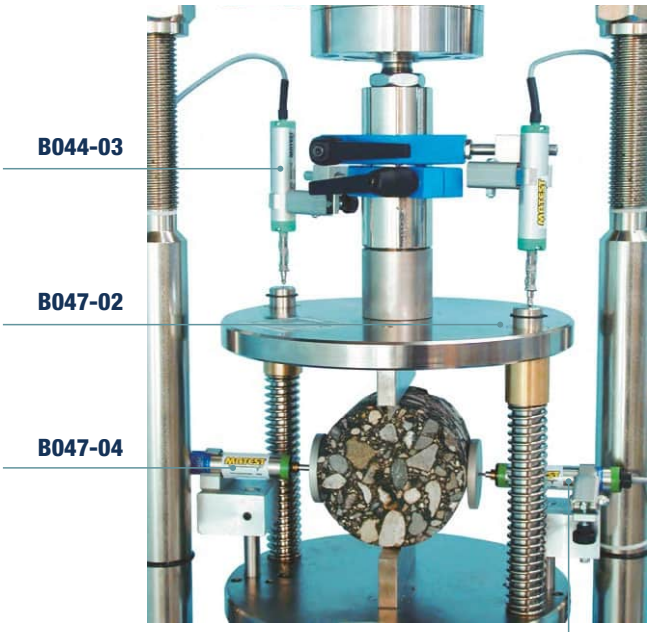
B047-10
LEUTNER testing head for specimens Ø 150 mm

B047-11
SPACERS for Ø 100 mm specimens with Leutner head.

SSW-UTM2
SOFTWARE for UTM2.

S212-05 Load piston

B047-10 + B047-11



B047-04

WATER SENSITIVITY OF BITUMINOUS MIXTURE

STANDARD: EN 12697-12

This test determines the effect of saturation and accelerated water conditioning on the indirect tensile strength of bituminous mixtures, by evaluating the effect of moisture with different sample conditions. Equipment: Digital Marshall tester B043-KIT, indirect tensile strength accessories, and also:

B052-02
WATER BATH, DIGITAL, WITH COOLING DEVICE

Temperature range: +3 to +95 °C, accuracy ± 1 °C. (EN 12697-12 Standard requires a temperature to be selected in the range of +5 to +25 °C).
Capacity: 45 litres
Inside dimensions: 635x360x205 mm
The bath can also be used for Marshall tests and general laboratory purposes. Technical details: see p. 131

B052-02

... follows ...

MULTIFUNCTION TESTING FRAMES:
COMBINED WITH "CYBER-PLUS 8 PROGRESS", COMPUTERIZED DIGITAL DISPLAY SYSTEM

Technical Specifications:
The frame is the same as for the previous load frames (mod. S212M - S213-05N), 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% indipendent linearity. The **CYBER-PLUS 8 PROGRESS** computerized multichannel digital display system (technical details: see mod. B044M-SET on p. 128), measures and displays at the same time load (stability) in kN and deformation (flow) in mm with peak hold features and possibility to print certificates and graphics directly on a laser printer via USB or to transfer them to PC via Ethernet.

S214-05N
CBR/MARSHALL 3 SPEED LOAD FRAME
DIGITAL TOUCH-SCREEN, COMPUTERIZED

Technical details of the frame: see mod. S213-05N, p. 459
Supplied complete with "Cyber-Plus 8 Progress" system (B044M-SET, details on p. 128), load cell and displacement transducer, but **without** accessories to be ordered separately.

S215A
UNIVERSAL MULTISPEED LOAD FRAME
DIGITAL, TOUCH-SCREEN, COMPUTERIZED

Technical Spec. of the frame: see mod. S212M at p. 459
Technical Spec. of S215A: see p. 461
Supplied **without** accessories for Marshall, CBR, Unconfined tests and Software, to be ordered separately.

B046-03

S214-05N + MARSHALL accessories

B046-02

S215A
+ MARSHALL accessories

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

SSW-UTM2 SOFTWARE UTM2 (Universal Testing Machine 2)
Description and technical details of Software UTM2: see p. 21

XLS-MAR1
EXCEL SHEET for Marshall test according to EN 12697-34

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

C128 Laser printer, for the graphic and test certificate printing, to be connected directly to Cyber-Plus 8 through USB.

C127N On board graphic printer on thermo-paper

ACCESSORIES for the frames, mod. S214-05N and S215A

S212-05 LOAD PISTON
B046N STABILITY MOULD Ø 4" **aluminium made**, or
B046-03 STABILITY MOULD Ø 4" **steel made**
B046-02 STABILITY MOULD Ø 6" Standard: ASTM D5581

Note: The frames S214-05N and S215A are suitable also for Indirect tensile strength and direct shear (Leutner) test, by using the specific devices described at p. 461

MULTI-FUNCTION TESTING FRAMES, ALSO SUITABLE FOR MARSHALL TESTS

S213-05N
CBR/MARSHALL 3 SPEEDS FRAME 50 KN

The frame is provided of three fixed speed ranges, easily selectable with a frequency changer (inverter) activated by an electric switch:
1.00 mm/min for CBR tests (as Australian and old BS Standards)
1.27 mm/min. for CBR tests
50.8 mm/min for Marshall tests.
Supplied **without** load ring and accessories which have to be ordered separately.
Technical detail: see p. 459

S212M
UNIVERSAL MULTISPEED LOAD FRAME 50KN

This motorized machine with electronic **digital touch-screen** controlled by microprocessor, is suitable to perform all the tests when the requested speed rate is within:
0.05 to 63 mm/min with max. load of 50 kN
It can therefore perform:
- Marshall test with rate of 50.8 mm/min.
- Indirect tensile strength test on Marshall specimens.
- Unconfined, CBR tests.

Supplied **without** load ring and accessories which have to be ordered separately.
Power supply: 230V 1ph 50-60Hz 750W
Technical Specifications: see p. 459

S212M

B046-03

S213-05N + MARSHALL accessories

ACCESSORIES for S212M and S213-05N frames

MARSHALL test, Ø 4":

S212-05 Load piston
B046N Stability mould Ø 4" (101.6 mm) **aluminium made**
As alternative:
B046-03 Stability mould Ø 4" (101.6 mm), **steel made** to ASTM D6927
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

MARSHALL test Ø 6"

STANDARD: ASTM D5581

S212-05 Load piston
B046-02 Stability mould Ø 6"
B047 Flow meter
B047-01 Dial gauge for flow meter
S370-10S Load ring 50 kN with electric stop safety device
S374 Brake device to hold max. load

B046-02

Note: The frames S212M and S213-05N are suitable also for Indirect tensile strength tests (EN 12697-23, ASTM D6931, AASHTO T283) by using the specific devices described on p. 121

S205M / S205-05M
UNITRONIC 50 KN

UNIVERSAL MULTIPURPOSE TOUCH-SCREEN COMPRESSION, FLEXURAL AND TENSILE FRAME

- COMPRESSION AND FLEXURAL TESTS, 50 KN MAX. CAPACITY LOAD
- TENSILE TESTS, 25 KN MAX. CAPACITY LOAD (OPTION MOD. S205-05M)

With automatic load or displacement/deformation control, for testing:

SOIL:
- CBR (California Bearing Ratio)
- UNCONFINED COMPRESSION
- QUICK TRIAXIAL

ASPHALT:
- MARSHALL
- INDIRECT TENSILE
- DIRECT SHEAR (Leutner) on the connection between bituminous mixtures layers
- AUTO SCB

CONCRETE:
- FLEXURE ON BEAMS AND TILES

CEMENT:
- FLEXURE on 40x40x160 mm specimens
- COMPRESSION on cubes 40, 50, 70 mm
- TENSILE on mortar briquettes (option mod. S205-05M)

METAL, PLASTIC, WIRES, ROPES, TEXTILES, PAPERS ETC.
- TENSILE TESTS, 25kN max capacity load (option mod. S205-05M)

CLAY BLOCKS:
- PUNCHING

ROCK AND STONES:
- UNIAXIAL SPLITTING TENSILE

S205M / S205-05M

Equipped with suitable devices, Unitronic tester performs compression, flexural, splitting tensile and direct tensile tests, with automatic load or displacement/deformation control, within the limits of its max. **50 kN capacity** for compression/flexural and **25 kN for tensile** (model S205-05M,see p. 462). The load is applied by a mechanical jack that is driven by a stepper motor and controlled by an internal microprocessor on a **high precision control board**. Stroke electric end switches are applied to the load piston to save the machine from accidental handlings. The crosshead foresees couplings to fix the different test devices. The stress is measured by an electric load cell and the displacement control is achieved directly by the high technology electronic board incorporated into the machine within a variable **speed range up to 51 mm/min** to cover the Marshall test. Unitronic 50 kN is **supplied without accessories** and software to perform specific tests that must be ordered separately.

Note: further details see p. 462

S206M
UNITRONIC 200 KN
UNIVERSAL MULTIPURPOSE TOUCHSCREEN COMPRESSION/FLEXURAL AND TENSILE FRAME FOR:

- COMPRESSION / FLEXURAL TESTS, 200 kN MAX. CAPACITY LOAD
- TENSILE TESTS, 50 kN MAX. CAPACITY LOAD

With automatic load or displacement/deformation control, for testing:

SOIL:
- CBR (California Bearing Ratio)

ASPHALT:
- DURIEZ
- MARSHALL
- INDIRECT TENSILE
- DIRECT SHEAR (Leutner) on the connection between bituminous mixtures layers

CONCRETE:
- FLEXURE ON BEAMS AND TILES

CEMENT:
- FLEXURE on 40x40x160 mm specimens
- COMPRESSION on cubes 40, 50, 70 mm

METAL, PLASTIC, WIRES, ROPES, TEXTILES, PAPERS ETC.
- TENSILE TESTS, 50kN max capacity load

CLAY BLOCKS:
- PUNCHING

ROCK AND STONES:
- UNIAXIAL SPLITTING TENSILE

S206M

By using suitable devices, Unitronic tester, within the limits of its max. **200 kN capacity for compression/flexural and 50 kN for tensile**, 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 step motor and controlled by a microprocessor. Stroke end electric switches are applied to the load piston to save the machine from accidental handlings. The two crossheads foresee couplings to fix the different test devices. 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. Unitronic 200 kN is supplied complete with: electric load cell 200 kN capacity, crosshead displacement device, upper with seat ball and lower compression platens. Not included: accessories and software for specific tests must be ordered separately.

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

Note: H012 Unimec 300 Universal Multipurpose frame 300 kN compression/tension is available. Further information at page 409

S205M I S206M UNITRONIC AND H012 UNIMEC 300, SPECIFIC APPLICATIONS ON ASPHALT

INDIRECT TENSILE TEST

STANDARDS:
EN 12697-23,12
ASTM D6931
AASHTO T283
CNR 134

Test development with displacement control.

S205M or **S206M** Unitronic or **H012** Unimec
S337-34 Strain gauge load, 50 kN capacity
4xS337-51 Calibration process of load cell/transducer
S212-05 Loading piston
B047-02 Indirect tensile device for samples Ø 4'' and 6''
B047-04 Set of TWO displacement transducers with accessories
B043-02N In-built firmware for Indirect Tensile test
S336-14 Linear displacement transducer 50 mm stroke, complete with cables and connectors
S305-05 Mounting device of the coupling pliers
S335-15 Coupling pliers to hold transducers
S206-31 Flange/connector of the load cell S337-34 (only if S206M is chosen)

DIRECT SHEAR (LEUTNER) BETWEEN BITUMINOUS MIXTURE LAYERS

STANDARDS:
ALP A StB T80, 48A
EN 12697-48

Test development with displacement control.

S205M or **S206M** Unitronic or **H012** Unimec
S337-34 Strain gauge load, 50 kN capacity
2xS337-51 Calibration process of load cell/transducer
S212-05 Loading piston
B047-10 Leutner testing head for specimens Ø 150 mm
B047-11 Spacers for Ø 100 mm specimens with Leutner head
B043-03N In-built firmware for Leutner test
S336-14 Linear displacement transducer 50 mm stroke, complete with cables and connectors
S305-05 Mounting device of the coupling pliers
S335-15 Coupling pliers to hold transducers
S206-31 Flange/connector of the load cell S337-34 (only if S206M is chosen)

Direct shear test (Leutner) on the connection between bituminous mix ture layers, carried out on asphalt cylinder specimens Ø 150 mm or 100 mm obtained from road cores or on laboratory made specimens.

MARSHALL STABILITY TEST

STANDARDS:
EN 12697-34
ASTM D1559
D5581, D6927
AASHTO T245
BS 598:107
NF P98-251-2

Test development with displacement control.

S205M or **S206M** Unitronic or **H012** Unimec
S337-34 Strain gauge load, 50 kN capacity
2xS337-51 Calibration process of load cell/transducer
S212-05 Loading piston
B046N Stability mould
B043-01N In-built firmware for Marshall test
S336-14 Linear displacement transducer 50 mm stroke, complete with cables and connectors
S305-05 Mounting device of the coupling pliers
S335-15 Coupling pliers to hold transducers
S206-31 Flange/connector of the load cell S337-34 (only if S206M is chosen)

IDEAL CT

STANDARD: ASTM 8225
S205M Unitronic 50 kN
B257-KIT or **B250-01** Jig for Ideal CT test
B045-13 Loading piston
S337-34 Load cell 50 kN capacity
S336-15 Transducer type "B" travel 10 mm
S305-05 Mounting device of the coupling pliers
S335-15 Coupling pliers to hold transducers
2xS337-51 Calibration process of the load cell/transducer
B043-04N In-built firmware for Ideal CT test

IDEAL RT

STANDARD: ASTM 8360
S205M Unitronic 50 kN
B256-KIT Jig for Ideal RT test
B045-13 Loading piston
S337-34 Load cell 50 kN capacity
S336-15 Transducer type "B" travel 10 mm
S305-05 Mounting device of the coupling pliers
S335-15 Coupling pliers to hold transducers
2xS337-51 Calibration process of the load cell/transducer
B043-07N In-built firmware for Ideal RT test

Note: further information at page 183.

Note: Needed accessories listed above, are common for different tests. We recommend to check them when ordering, to avoid duplications.
Additional specific applications described at p. 465-470

S205M
SCB-SEMI CIRCULAR BEND TEST
THE FAST AND SIMPLE WAY TO PERFORM ASPHALT FRACTURE TESTING

STANDARDS: EN 12697-44 I AASHTO TP124 I ASTM D8044

The S205M universal frame can perform various versions of the SCB Test for evaluating the fracture characteristics of asphalt mixtures at intermediate service temperature conditions. The load and displacement parameters measured by the Automatic SCB system can be used to predict cracking performance of asphalt mixtures based on the Illinois Flexibility Index (I-FIT) and Critical Strain Energy Release Rate (Jc).

S205M + SCB accessories

S205M UNITRONIC 50 kN

EN 12697-44

B250-01 Basic indirect tensile (idt) jig, for 100-150 mm diameter
B254-01 Scb jig (requires basic idt jig)
B254-51 Pair of scb wear plates
S337-34 Load cell 50 kn capacity
2xS337-51 Calibration process of load cell/transducer
S305-05 Mounting device of the coupling pliers
S335-15 Coupling pliers to hold transducers
B045-13 Loading piston
S336-15 Transducer type "B" travel: 10 mm
B043-05N In-built firmware for auto-scb test

AASHTO TP124 I ASTM D8044

B208 SCB jig
B254-02 Springs
B254-10 Roller support
S337-31(*) Load cell 2,5 kn capacity
B045-13 Loading piston
S336-15 Transducer type "B" travel: 10 mm
S305-05 Mounting device of the coupling pliers
S335-15 Universal coupling pliers for transd./dial
B043-05N In-built firmware for auto-scb test

S206M
DURIEZ TEST SET

STANDARD: NF P98-251-1, NF P98-251-4

Used to determine the mechanical and phisical properties of bituminous mixtures. To perform the test, the specimens have to be temperature conditioned using a suitable climatic chamber (see mod. C313N, p. 326)

S206M UNITRONIC 200 kN

S206-21N In-built firmware for Duriez test

Duriez test set for 120 mm diameter specimens:

B095-01 Testing mould
B095-02 Penetration piston
B095-03* Penetration piston grooved
B095-04 Upper/Lower piston
B095-05* Upper/Lower piston grooved
B095-06 Two temporary supports
B095-07 Demoulding cylindrical container

Duriez test set for 80 mm diameter specimens:

B096-01 Testing mould
B096-02 Penetration piston
B096-03* Penetration piston grooved
B096-04 Upper/Lower piston
B096-05* Upper/Lower piston grooved
B096-06 Two temporary supports
B096-07 Demoulding cylindrical container

* Used for cold mixtures with bituminous emulsions

B095-01...B095-07

OPTIONAL ACCESSORIES FOR SCB SEMI-CIRCULAR BEND TEST

B254-12 Positioning device

(*) As alternative to item S337-31

S337-32 Load cell 10 kN capacity
S337-33 Load cell 25 kN capacity
S337-34 Load cell 50 kN capacity
S337-35 Load cell 5 kN capacity

B044M-SET
CYBER-PLUS 8 PROGRESS TOUCH-SCREEN

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

- Marshall mechanical load frame mod. B042-KIT.
- CBR/Marshall 3 speeds load frame mod. S213-05N.
- CBR loading machine motorized mod. S211-KIT.

Suitable to perform the following tests:

- MARSHALL: EN 12697-34 I ASTM D6927, D5581, D1559
  CNR N. 30 I NF P98-251-2 I BS 598 :107
  AASHTO T245
- INDIRECT TENSILE TEST: EN 12697-23, EN 12697-12
  ASTM D6931, D4123 I AASHTO T283
- DETERMINATION OF THE WATER SENSIBILITY OF BITUMINOUS SPECIMENS: EN 12697-12
- CBR TEST: EN 13286-47 I CNR I UNI 10009 I AASHTO T193
  ASTM D1883 I NF P94-078.
- UNCONFINED TEST: ASTM D2166

MAIN FEATURES

- Acquisition and data processing system up to 8 analogical/digital channels.
- Remote control through PC and UTM2 software.
- Graphic display color Touch-Screen.
- Instant display of load and deformation.
- Automatic correction of the axis origin and automatic calculation of all the results.
- Safety switch-off at max reached load and/or deformation.

B044M-SET

HARDWARE SPECIFICATIONS

- 8 indipendent channels available for the load cells or potentiometrics transducers for load, or displacement measurements;
- Stabilized power supply of the analogical channels: 5 Vcc and 3 Vcc;
- Control frequency = up to 1kHz;
- Sampling frequency = up to 2kHz;
- Nominal resolution: 24 bit;
- Safety discrete On/off output;
- Graphic display colour touch-screen;
- Time and calendar system.

FIRMWARE SPECIFICATIONS

- Instant display of the load measured by an extensometric cell.
- Instant display of the deformation measured by 4 linear displacement transducers.
- Graphic display 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.
- 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.)
- 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 p. 213

B044M-SET is composed of:

B044M
CYBER-PLUS 8 PROGRESS
Unit for data acquisition.
Power supply: 230V 1F 50-60Hz.

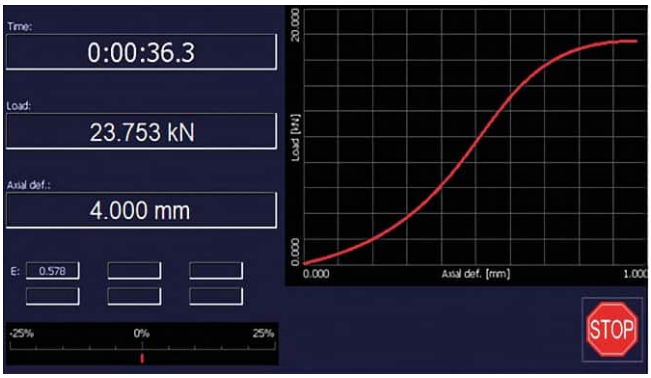
S337-34
LOAD CELL
50kN capacity, with high precision strain transducers, complete with cable and connector.

S336-14
LINEAR DISPLACEMENT TRANSDUCER
50 mm stroke, independent linearity ± 0.1% complete with cable and connector.

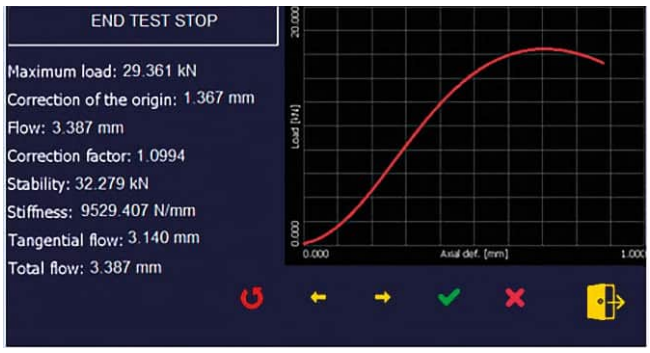
All necessary accessories for fixing the load cell and transducer to the test machine, are provided.
The system is calibrated ready to use and COMPLETE with a calibration certificate.
Every item can be ordered separately.

ACCESSORIES

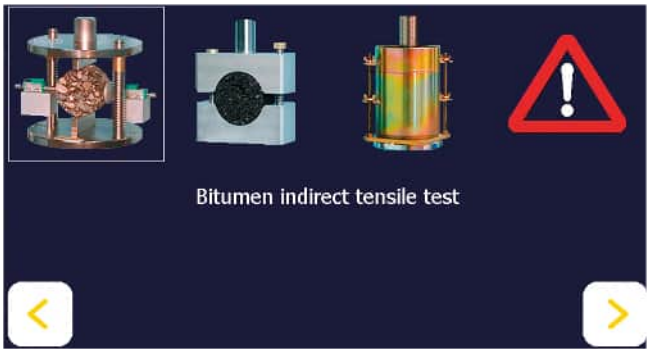
B043-01N
SOFTWARE UTM2 (Universal Testing Machine 2)
Description and technical details of Software UTM2: see p. 21



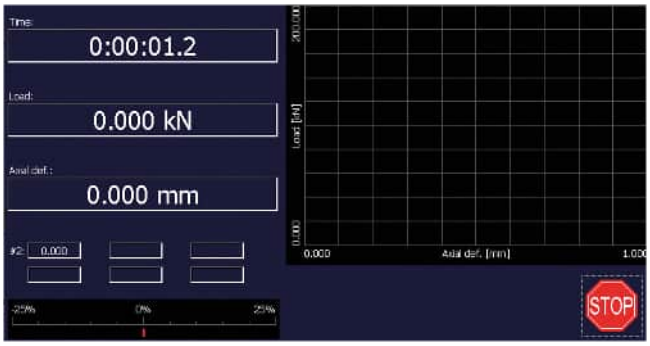
Example of Marshall stability/flow graph



Real time display of final results



Selection of test method on touch-screen panel



Real time results during test

H009-01 / H009-01EN
PERSONAL COMPUTER, complete with LCD monitor 22", keyboard, mouse, connection cables, installation and setting up of the purchased software, available both in Italian or English.

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

C127N On board graphic printer on thermo-paper

WATER BATHS FOR MARSHALL SPECIMENS

STANDARDS: EN 12697-34 I ASTM D6927, D1559, D5581 I AASHTO T245
Used to maintain in water Marshall specimens at costant temperature of 60 °C ± 1 °C and asphalt specimens at 37.8 °C ± 1 °C.
These baths are also ideal for general laboratory use.

B051

MODELS

B051
MARSHALL WATER BATH

The internal tank and cover are stainless steel made, outside box is of painted steel sheet with wool insulation. The specimens are held by a stainless steel perforated shelf spaced from the bottom.
The bath has a capacity of 46 litres and is designed to hold up to 20 Marshall specimens.
Temperature range: from ambient to 95 °C.
Inside dimensions: 615x505x150 mm
Overall dimensions: 660x540x230 mm
The bath is supplied **without** thermostat and heating element to be ordered separately (see accessories).

Weight: 18 kg approx.

B051 + B051-01

NEEDED ACCESSORY for the B051 Bath

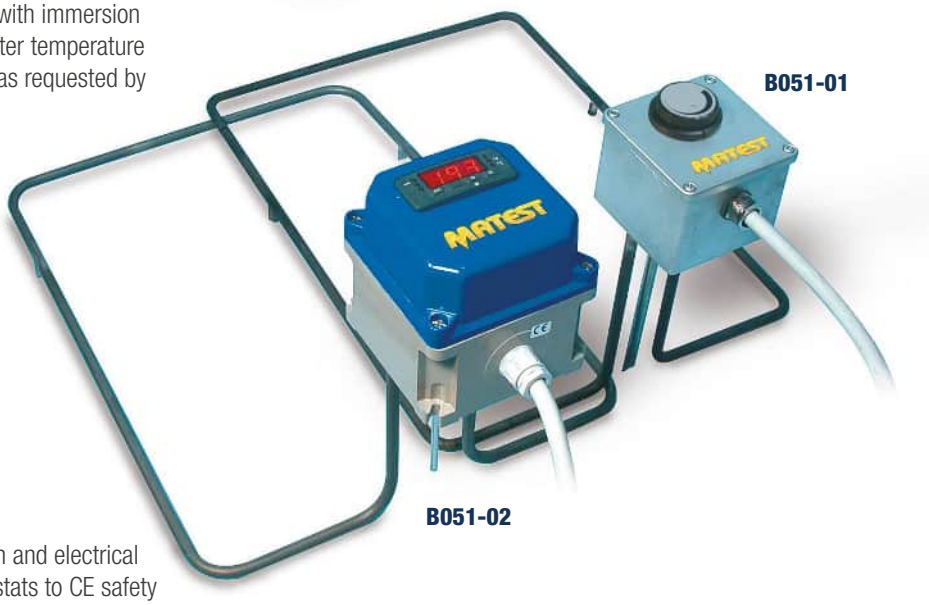
B051-01
THERMOSTAT ANALOGIC Heating System, complete with immersion heating element.

Power supply: 230V 1ph 50-60Hz 1500W

In alternative:

B051-02
THERMOSTAT DIGITAL Heating System, complete with immersion heating element. The digital system ensures a better temperature control of the water at 60 ± 1 °C or 37.8 ± 1 °C as requested by Standards.

Power supply: 230V 1ph 50-60Hz 1500W



B051-01

B051-02

C306-03

C306-03
SEPARATE CONTROL PANEL, complete with switch and electrical protections to get B051-01 and B051-02 thermostats to CE safety Directive.

B052
DIGITAL WATER BATH

This bath is fully double walled stainless steel made with wool insulation. The specimens are held by a shelf spaced out from the bottom. Complete with a digital thermostat and an electric stirrer **for continuous water recirculation**, ensuring a constant and uniform temperature of 60 ± 1 °C or 37.8 ± 1 °C as prescribed by the Standards.
The bath can hold up to 20 Marshall specimens
Capacity: 60 litres
Temperature range: from ambient to 95 °C
The bath is equipped with a dual safety thermostat to prevent accidental over-heatings.

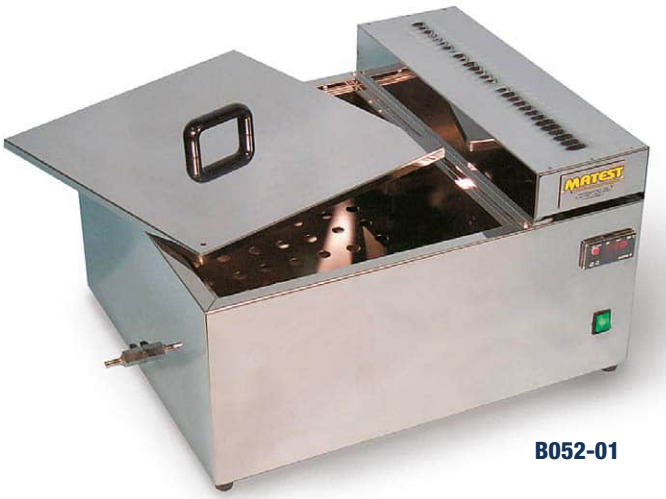
Inside dimensions: 700x550x150 mm
Outside dimensions: 950x660x360 mm
Power supply: 230V 1ph 50-60Hz 1500W
Weight: 20 kg approx.

B052 + B052-10

B052-01
DIGITAL WATER BATH

Identical to mod. B052 but:
Inside dimensions: 430x420x160 mm
Outside dimensions: 620x500x330 mm
The bath can hold up to 9 Marshall specimens

Capacity: 30 litres
Power Supply: 230V 1ph 50-60 Hz 1200W
Weight: 15 kg approx.



B052-01

E136-01
DIGITAL WATER BATH

Identical to mod. B052 but:
Inside dimensions: 900x600x360 mm
Outside dimensions: 1050x680x630 mm
The bath can hold up to 80 Marshall specimens

Capacity: 200 litres
Power Supply: 230V 1ph 50-60 Hz 4000W
Weight: 55 kg approx.

B052-02

B052-02
DIGITAL WATER BATH WITH COOLING DEVICE

Similar to mod. B052 but equipped with cooling unit placed under the bath for controlling water temperatures where the ambient temperature is quite higher.
Temperature range from: + 3 to + 95 °C, accuracy: ± 1 °C.
The bath can hold up to 12 Marshall specimens
Capacity: 45 litres

Inside dimensions: 635x360x205 mm
Outside dimensions: 800x430x1000 mm
Power supply: 230V 1ph 50Hz 1650W
Weight: 60 kg approx

ACCESSORY FOR MOD. B051...B052-02

B052-10A ALCOHOL CONTROL THERMOMETER 0-100 °C subd. 1 °C

B024-10
RADIAL-FLOW FALLING HEAD PERMEAMETER

STANDARD: EN 12697-40

Used to determine the time taken for 4 liters of water to dissipate through an annular area of the surfacing of a pavement under known conditions.

Consisting of:

- acrylic tube 125 mm inside diameter, 560 mm long, marked at 1 liter and at 5 liters
- internal rod with rubber ball valve
- wooden base with sealing gasket

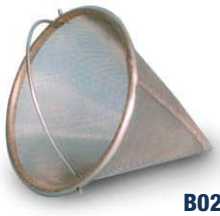
Dimensions: 800x450x680 mm
Weight: 8 kg approx.

B024-10

B024-05
CONICAL SIEVE 0.355 mm MESH

STANDARD: EN 15366

Used to verify the absorption degree of mineral oils and hydrocarbons from granulate products spread on the road during winter time.



B024-05

B024
PERMEAMETER
FOR DRAINING PAVEMENTS IN SITU

STANDARD: ITALIAN HIGHWAY SYSTEM,
COMPARABLE TO MPW OF BELGIUM

Mainly used in situ to perform and to check the permeability and drainage on road carpets, concrete pavements, tamped earth etc. The test consists in filling the cylinder with water, after ermetically positioning it on the carpet under test and then in calculating the time needed by a certain quantity of water to be absorbed by the same. The instrument is composed of a bottomless plexiglass cylinder 140 mm inside diameter, fitted on a base. The cylinder has two black calibration lines: one at zero point and one at 250 mm.

Dimensions:
260x260x425 mm
Weight: 8 kg approx.

B024-01

B024

ACCESSORY

B024-01
WEIGHT KG 5, anular shape, to apply on the base of the permeameter, to improve its adherence to the material under test.

B099-10
SAND PATCH EQUIPMENT

STANDARDS: EN 13036-1 | ASTM E965 | NF P98 216-1

Road and airfield surface characteristics.
Measurement of pavement surface to determine the average macrotexture depth using a volumetric patch technique.
The equipment comprises:
Spreader disc with handle and rubber coated surface. Wind shield
Soft brush. Screw-adjusted compass 500 mm graduated rule.
Metallic cylinder for spheres volume measurement.
Two glass pyknometers with metallic screw top and pouring hole
Three graduated cylinders 10.25 and 50 ml cap. Knee-guard
Carrying case

Weight: 4 kg approx.

B099-10

ACCESSORIES

B099-15 GLASS SPHERES, size 180/212 microns to EN 13036-1 Pack of 5 kg.
B099-16 NATURAL SAND 300/150 microns, 25 kg bag. ASTM E965.
B099-17 NATURAL SAND 150/75 microns, 25 kg bag. ASTM E965

SAMPLING OF ASPHALT ROAD CORES
DETERMINATION OF PHISICAL PROPERTIES AND COMPOSITION

STANDARD: EN 12697-27

C319
PAVEMENT CORE DRILLING MACHINE

Technical details, other models of machines, coring bits etc. described in section "C" p. 334

C319

B098N
TRAVELLING BEAM DEVICE

Used to detect and check any irregularity in both bituminous and concrete road surfaces. The unit consists essentially of a 3 metre long beam fixed on two rigid wheels at the extremities. In the middle of the beam a sensing unit comprising a wheel connected to an indicator provides a magnification of 4:1 and measures deviations of the surface. The deviations are shown on a scale calibrated in increments of 2 mm up to 10 mm and 5 mm up to 25 mm. The beam is supplied as three sub-assemblies which are quickly assembled on site.

Dimension: 790x3200x1080 mm approx.
Weight: 55 kg approx.

ACCESSORIES

B098-01N
AUTOGRAPHIC RECORDING DEVICE

When connected to the Travelling Beam Device mod. B098N, it provides a permanent record of the surface profile.
It records up to 1000 metre surface on the special chart paper rolls.
Supplied complete with 10 chart rolls and 2 fibre-tipped pens.

B098-03N DYE-MARKER with paint bottle, used to identify suspect areas.

B098-05 WOODEN CARRYING CASE to house the Travelling Beam Device. **Dimensions:** 1480x680x510 mm approx.

SPARES

B098-11 Pack of 10 chart rolls for approx. 1000 metre run.
B098-12 Fibre-tipped pen for use with the recorder.
B098-13 Dye-marker paint bottle.

B110
NO NUCLEAR DENSITY GAUGE FOR ASPHALT PAVEMENTS

STANDARDS: ASTM D7113, AASHTO T343

Matest density gauge represents a non-nuclear alternative for determining accurate percentage compactions on asphalt pavements where, in some cases, nuclear technology cannot be used. Using this device, from 12 mm to 125 mm of asphalt pavement can be tested. It has warning provision for influences of moisture presence. auto surface-roughness correction and gauge system checks. Clear results viewing is provided for an entire 24h navigation window, day and night. Quick gauge readings are also allowed using the dedicated quick test button located on top of the gauge handle. At the end of test, the project test results can be downloaded via Bluetooth or an USB connection.

B110

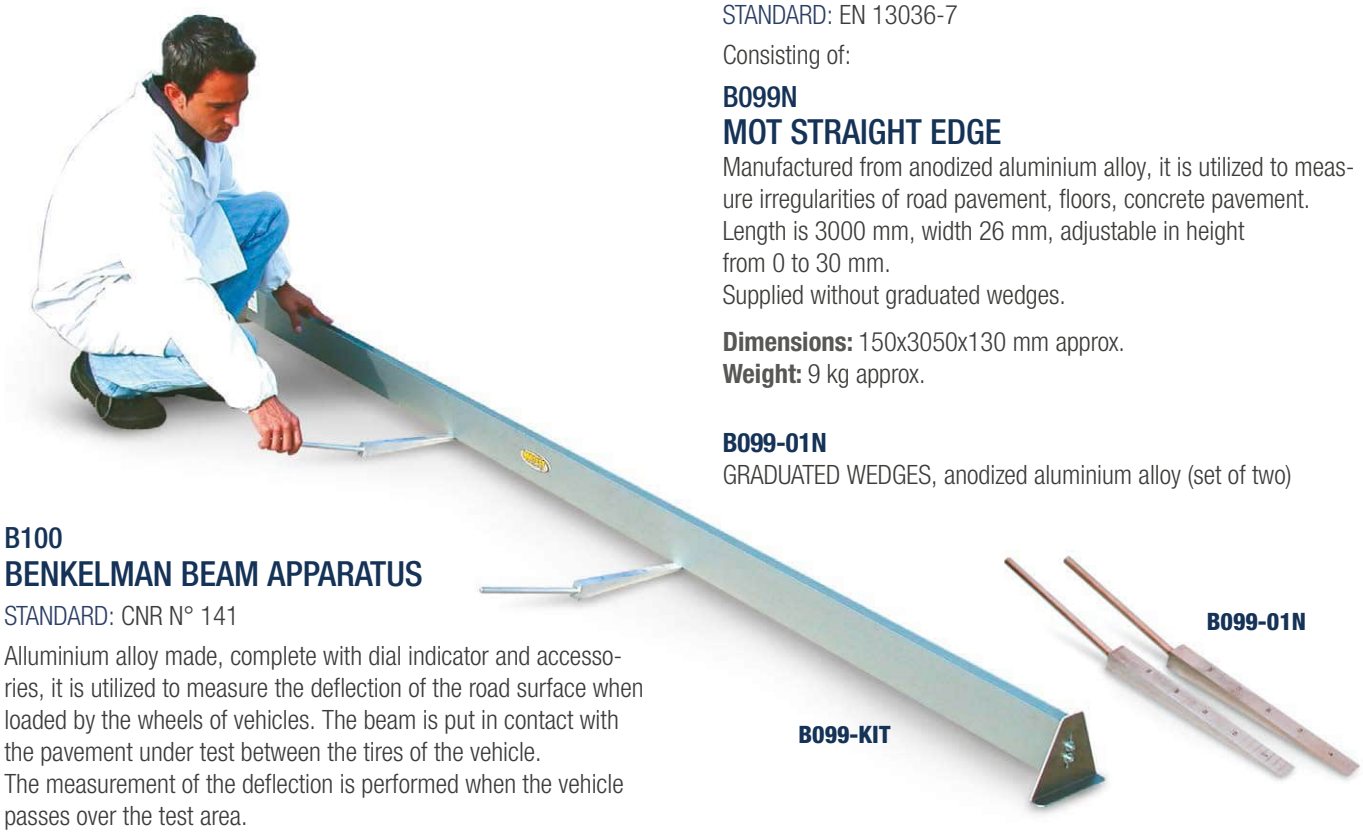
MAIN FEATURES

- Precise density and percent compaction results.
- Automatic correction for surface roughness effect.
- Project and special calibration storage for up to 25 mixes with GPS location.
- Calibration routines for the best accuracy.
- Average of 5 readings to ensure highest degree of accuracy.
- Free Android application for report generation.

TECHNICAL SPECIFICATIONS

- LCD display: 4 x 20 character LCD with backlight
- File storage: 2 GB of storage
- Units: Density (g/cm^3, kg/m^3, lb/ft^3), Temp (°C, °F), Aggregate Size (mm, in)
- Depth Correction: Multi levels measurement systems to provide deep densities and % compactions
- Power: 6 AA Rechargeable NiMetal Hybride
- Battery Life: 20-40 Hours, Depending on Usage
- Displayed Parameters: Density, % Compaction, Surface Temperature and Project ID
- Measurement Area: 13” diameter Sensor Size
- Depth of Measurement: 12 mm (0.5”) to 125 mm (5”)
- Quick Count Button: Button on Handle

Dimensions: H28 x L46 x 35.6 cm **Weight:** 9.07 kg



B099-KIT
MOT STRAIGHT EDGE WITH 2 WEDGES

IRREGULARITY MEASUREMENT OF PAVEMENT SURFACE

STANDARD: EN 13036-7

Consisting of:

B099N
MOT STRAIGHT EDGE

Manufactured from anodized aluminium alloy, it is utilized to measure irregularities of road pavement, floors, concrete pavement.
Length is 3000 mm, width 26 mm, adjustable in height from 0 to 30 mm.
Supplied without graduated wedges.

Dimensions: 150x3050x130 mm approx.
Weight: 9 kg approx.

B099-01N

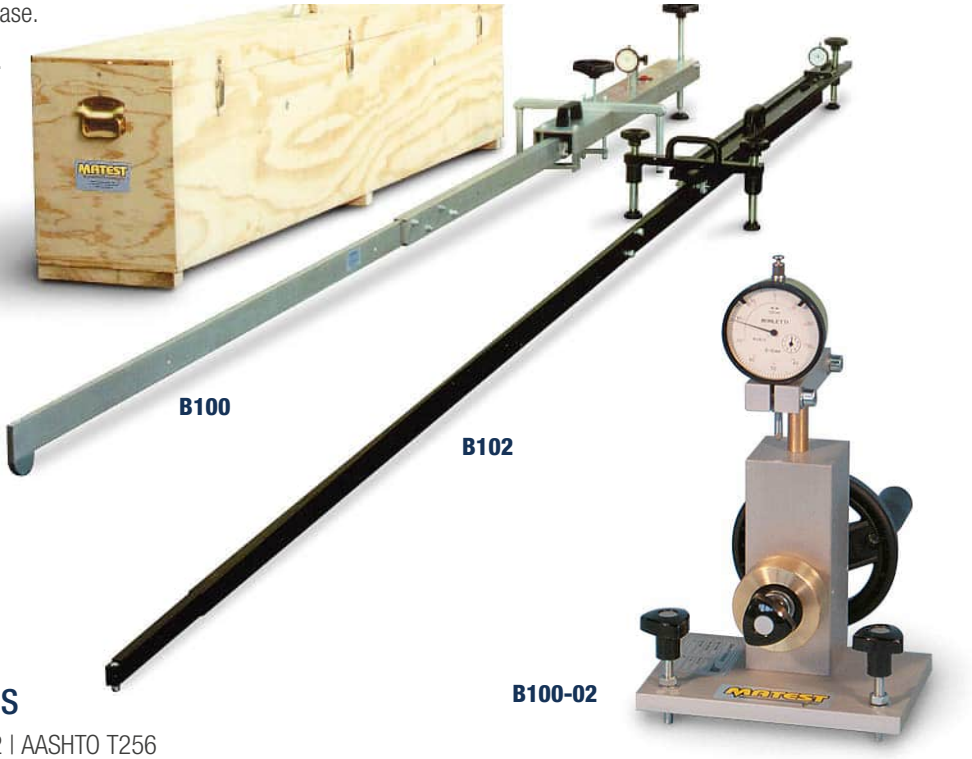
GRADUATED WEDGES, anodized aluminium alloy (set of two)

B100
BENKELMAN BEAM APPARATUS

STANDARD: CNR N° 141

Alluminium alloy made, complete with dial indicator and accessories, it is utilized to measure the deflection of the road surface when loaded by the wheels of vehicles. The beam is put in contact with the pavement under test between the tires of the vehicle.
The measurement of the deflection is performed when the vehicle passes over the test area.
Lenght of the Benkelman beam is 2500 mm.
Beam fulcrum ratio 4:1
Supplied complete with wooden carrying case.

Dimensions: 430x1800x350 mm approx.
Weight: 16 kg approx.



B102
BENKELMAN BEAM APPARATUS

STANDARD: ASTM D4965 | NF P98-200-2 | AASHTO T256

Basically similar to mod. B100 but manufactured according to the French Specifications. Beam fulcrum ratio 2:1
Complete with wooden carryng case.

Dimensions: 430x1800x350 mm approx.
Weight: 16 kg approx.

ACCESSORY

B100-02

BENKELMAN INDICATOR GAUGE CALIBRATION UNIT, complete for mod. B100 and B102. To verify the accuracy of the apparatus.

B103-10
BEARING PLATE 600 MM DIAMETER CAST ALUMINIUM WITH REINFORCING RIBS

STANDARD: NF P94-117-1

The plate is equipped with a central device to measure the static deformation of road pavements (EV2) with the Benkelman Beam, and the bearing capacity of a soil in-situ.
The plate foresees also three screwed lateral holes for three point measurements of the bearing capacity of a soil in-situ.
Supplied complete with coupling device to the hydraulic jack, handles for an easier transport.

Weight: 25 kg approx.

B103-10

B103-05-KIT

B102

USE EXAMPLES OF THE ALUMINIUM BEARING PLATE:

B103-05-KIT
PLATE BEARING EQUIPMENT, 200KN CAPACITY

STANDARD: NF P94-117-1

To determine the static deformation of flexible road pavement (EV2) in the centre of the loading plate.
Used with the Benkelman Beam apparatus mod. B102

The equipment consists of:

B103-10 Bearing plate 600 mm dia. cast aluminium with reinforcing ribs, coupling device and handles for transport.
S225-01 Hydraulic loading jack 200 kN capacity, complete with **double speed hand pump ensuring fast approach**, rubber pipe with fast connector, set of extension rods of different lenghts, carrying case.
S225-02 Precision pressure gauge 0 - 200 kN, div. 1 kN
S226-13 Upper spherical seat.
Total weight: 70 kg approx.

Note: each item can be ordered separately

ACCESSORY

B102 BENKELMAN BEAM APPARATUS according to Standards:
ASTM D4965 | NF P98-200-2
AASHTO T256

B102

Use examples of the aluminium bearing plate Ø 600 mm for bearing tests of a soil in-situ with the 200 kN plate bearing equipment mod S225-KIT (see p. 473 of the catalogue).

S225-KIT + B103-10

B053-10
COHESION TESTER

STANDARDS: ISSA TB139, comparable to EN 12274-4 I ASTM D3910

This instrument is used for cohesion tests on the mix, and to determine the proper consistency or mix design for a slurry seal mixture. The pneumatic cylinder incorporated into the unit applies a pressure to the sample. A hand torque tester supplied with the cohesion unit, measures the torquing strength by determining the complete solidification of the mix.
Supplied complete with torque wrench, 5 moulds Ø 60x6 mm, 5 moulds Ø 60x10 mm, 5 moulds Ø 70x6 mm, 5 moulds Ø 70x10 mm accessories, spare parts.
To perform the test an air pressure source is needed.

Dimensions: 400x250x300 mm approx.
Weight: 20 kg approx

ACCESSORIES

V206 AIR COMPRESSOR. 230V 50Hz 1ph.

SQUARE MOULD to EN 12274-4 with 4 holes to prepare the sample:

B053-12 MOULD 140x140x6.3 mm
B053-13 MOULD 140x140x10 mm
B053-14 MOULD 200x200x13 mm
B053-15 MOULD 200x200x19 mm

B053
"VIALIT" BINDER ADHESION TEST

STANDARDS: EN 12272-3 I NF P98-274-1

Used to evaluate the global adhesion and the active adhesion between bitumen and aggregates for road surfaces realization.
The equipment is formed by:
Six metal test plates
Steel ball weighing 512 g
Metallic base with three vertical support points and metallic rod 500 mm high
Metallic hand operated roller, rubber lined with lead shots ballast.

Weight: 40 kg approx.

B053

SPARE: **B053-01** Metal test plate.

S148
SAND ABSORPTION CONE AND TAMPER
CONSISTENCY DETERMINATION

STANDARDS: EN 12274-3, EN 1097-6
Used for the determination of the absorption and specific gravity of fine aggregates.

Weight: 600 g approx.

B053-10

B053-20
PLANETARY ABRASION TESTER
DETERMINATION OF WEARING

STANDARDS: EN 12274-5 I ASTM D3910 I NLT 320
The unit consists of a planetary mixer in which container the slurry mixture is placed and a weighted special headed rubber hose applies an abrasion action.

Power supply: 230V 1ph 50Hz
Dimensions: 340x460xx500 mm approx.
Weight: 40 kg approx.

NEEDED ACCESSORIES

B053-22 SET OF 4 ROUND METALLIC MOULDS
Ø 279-295 ± 0.5 mm
Heights: 6.3 - 10 - 13 - 19 mm to EN 12274-5 Spec.

B053-23 SET OF 3 ROUND METALLIC MOULDS
Ø 279-295 ± 0.5 mm
Heights: 6.3 - 8.2 - 10.5 mm to ASTM D3910 Spec.

B053-20

B053-05
RATE OF SPREAD DEVICE

STANDARDS: EN 12272-1 I BS 598:108
This apparatus is used for determining the rate of spread of coated chippings on the road surface.
The device consists of a 300 mm square tray, lifted by 4 chains which are fixed on a spring balance.
The rate of spread is directly measured in kg/m^2.

Weight: 1500 g approx.

B053-05

SECTION B

BITUMEN

Bituminous mixture, also known as asphalt mixture, is mainly composed of aggregates and bitumen, with an infinite variety of mixtures being possible. This section is divided into three parts and shows the whole range of equipment for analyzing each component of the bituminous mixture.

This section shows the equipment required for bitumen testing: these include machines to study the rheological properties of bitumen as well as the features of bituminous emulsion. The last part of this pavement section provides better solutions to perform field tests on road surfaces.

B059M
SMARTIP
FULLY AUTOMATIC PENETROMETER

STANDARDS: EN 1426 I ASTM D5 I AASHTO T49 I ASTM D217 I NF T66-004 I DIN 52210 I IP 49 I JIS K 2207

SMARTIP is an automatic apparatus for the determination of the needle penetration value, avoiding any possible operator lack of concentration and ensuring a reliable repeatability of the results. It is a smart instrument thanks to the latest technologies adopted, the integrated microprocessor control and the user-friendly interface.

The instrument automatically reaches the contact point before starting the test and the penetration result is measured thanks to a high performance contactless displacement transducer. An ultra-bright LED lamp helps the operator in checking the touching point of the needle while a stepper motor controls the vertical movement to reach exactly the desired point without any manual movement of the plunger. The needle probe is automatically released for each penetration thanks to an electromagnetic system and automatically blocked at the end of the test.

The plunger comes back at the initial position at the end of each test by a simple recall command in order to re-positioning the needle before the new measurement.

A 7” touch screen display is included in the SMARTIP frame, easy to use. It shows in real time the penetration/time graph, the test temperature and the average result according to the number of tests done. Unlimited results can be saved on USB device for preparing a laboratory report and for further analysis.

SMARTIP is supplied complete with the accessories for determination of the needle penetration according to EN 1426, ASTM D5 and AASHTO T49 standards, and USB flash drive for saving data. Thermostatically controlled water bath, chiller, temperature probe PT100 and mirror can be ordered separately as accessories.

MAIN FEATURES

- Fully automatic test, simply pressing the START button: approach, touch point, penetration.
- Automatic identification of the needle contact point and needle positioning, avoiding any possible operator lack of concentration and ensuring a reliable repeatability of the results.
- Electro-magnetic needle probe release to perform the test.
- Automatic zero at the contact before starting penetration.
- Penetration measurement thanks to a high-tech contactless displacement transducer with 0.01 mm resolution, in a range of 0 - 50 mm.
- 7" touch screen display equipped with an user-friendly firmware and clear interface.
- Real time display of penetration/time curve, average result and test temperature.

B059M

TECHNICAL SPECIFICATION

- Measuring range: 0 – 50 mm;
- Resolution: 0.01 mm;
- 7” touch screen display;
- Test time 5 s (adjustable from 0 to 9999 s);
- Programmable delay time: from 0 to 999 s;
- Programmable reference positions for holder assembly: 8;
- Test simultaneously displayed: up to 10;
- Connection: USB port and LAN port for PC connection;

Power supply: 200V 50-60Hz 1ph
Overall dimensions: 325x400x730 mm
Weight approx.: 25 Kg approx.

B058

B058-01

B058M

B058-01

ACCESSORIES

B058 THERMOSTATICALLY controlled water bath. Technical details: see p. 142

B058-01 WATER BATH DISH with incorporated thermostatic coil, to be connected to the bath mod. B058. It keeps the temperature of the bitumen sample directly on the penetrometer, by avoiding to transfer it. Dimensions Ø 151x90 mm

B058M WATER CHILLER: 7.5 l capacity, with electronic temperature controller with ± 0.1 °C accuracy and fluid temperature range between 5 and 30°C. Suitable for chilling penetrometer water baths or temperature controlled setting time tests.
- 230 V 50-60Hz 1ph
- Power consumption: 350 W
- Overall dimensions: 415x300x420 mm
- Weight: 15 kg approx.

B059M-11 TEMPERATURE PROBE, PT100: Measurement of the sample temperature in real time. It’s connected with the monitor in order to show the temperature during each test.

B057-08A THERMOMETER ALCOHOL, IP 38C

B057-06NM PENETRATION NEEDLE supplied with official **UKAS** and **hardness** certificates.
NEW

B057-06M PENETRATION NEEDLE conforming to EN 1426 and ASTM D5, supplied with official **UKAS** certificate.
NEW

B057-07LM LONG NEEDLE hardened

B057-03 GLASS TRANSFER DISH

B057-09 STANDARD PENETRATION CONE conforming to ASTM D217 and EN 13880-2

SPARES for B059M

V122-05 Sample cup 55x35 mm

V122-06 Sample cup 70x45 mm

B057-07M PENETRATION NEEDLE, individually verified

B057-04N 50 g slotted weight

B057-05N 100 g slotted weight

Note: PENETRATION NEEDLES **B057-06** and **B057-07** are available for the automatic penetrometer B059M with load cell.

B056
STANDARD DIAL PENETROMETER

STANDARDS: EN 1426 | ASTM D5 | BS 1377-2 | NF T66-004
AASHTO T49

Used to determine the consistency of a bituminous sample under fixed conditions of load, time and temperature. The penetration is expressed in distance of tenths of millimeters vertically penetrated by a standard needle. The standard penetrometer has a sturdy aluminium base table with levelling screws, plated vertical rod, **micrometric vertical adjustment device**.
The slider is brass made with free fall. The dial, graduated in 360° (division 0.1 mm), has a diameter of 150 mm.
The penetrometer is supplied with stop and release push button, automatic zero set, micrometer adjustment, set of weights 50 and 100 g penetration needle, brass sample cups Ø 55x35 mm and 70x45 mm.

Dimensions: 220x170x410 mm.
Weight: 11 kg approx.

B057
SEMIAUTOMATIC DIAL PENETROMETER

Basically structured as mod. B056 KIT but having a magnetic controller device with electronic digital programmable timer that automatically releases the plunger head and ensures free falling of the needle during the 5-seconds test.

Power supply: 230V 1ph 50-60Hz 200W
Dimensions: 220x280x410 mm
Weight: 15 kg approx.

ACCESSORIES
for B056, B057, B056-01, B056-02

V122-08 SAMPLE CUP Ø 55x40 mm, aluminium made to BS 1377-2.

B057-02 MIRROR, for an easier setting of the needle.

B057-03 TRANSFER DISH, made of glass, with support.

B057-06 PENETRATION NEEDLE HARDENED STEEL, 42.5 ± 2.5 mm long supplied with certificate having metrological traceability related to the following physical quantities: length, angle and mass. Weight: 2.5 ± 0.05 g

B057-07 PENETRATION NEEDLE HARDENED STEEL, 42.5 ± 2.5 mm long. The needle perfectly meets EN 1426 Specification. Weight: 2.5 ± 0.05 g

B057-01L LONG PENETRATION NEEDLE, not hardened, 52.5 ± 2.5 mm. Comparable to EN, to test specimens where the penetration is expected to exceed 35 mm

B057-07L LONG PENETRATION NEEDLE HARDENED, 52.5 ± 2.5 mm to EN 1426, to test specimens where the penetration is expected to exceed 35 mm

B057-08A TERMOMETER ALCOHOL, IP 38C Range: +23 °C to +27 °C. Grad. 0.1 °C

B089A TERMOMETER ALCOHOL, EN, Range: +19 °C to +27 °C. Grad. 0.1 °C - ASTM 17C

SPARES for B056, B057, B056-01, B056-02

B057-01 Penetration needle, not hardened, 42.5 ± 2.5 mm long. Comparable to EN Spec. Weight: 2.5 ± 0.05 g

B057-04 50 g weight.

B057-05 100 g weight.

V122-05 Sample cup, brass made, Ø 55x35 mm

V122-06 Sample cup, brass made, Ø 70x45 mm

V122-11 Sample cup, aluminum, Ø 55x35 mm

B056-01
STANDARD DIGITAL PENETROMETER

STANDARDS: EN 1426 | ASTM D5 | BS 1377-2 | NF T66-004
AASHTO T49

Used to determine the consistency of a bituminous sample under fixed conditions of load, time and temperature. The penetration is expressed in distance of tenths of millimeters vertically penetrated by a standard needle. The standard penetrometer is ruggedly constructed, with an aluminium base table with levelling screws, plated vertical rod, **micrometric vertical adjustment device**.
The slider is brass made with free fall.
The digital readout of the penetration values has readings in mm and inch, with 0.01 mm resolution, LCD 5 digits display, with zero set in any position.
Power: 1.5V battery.
The penetrometer is supplied with stop and release push button, automatic zero set, micrometer adjustment, set of weights 50 and 100 g penetration needle, brass sample cups Ø 55x35 mm and 70x45 mm.

Dimensions: 220x170x410 mm
Weight: 11 kg approx.

B056-02
SEMIAUTOMATIC DIGITAL PENETROMETER

Basically structured as mod. B056-01 but having a magnetic controller device with electronic digital programmable timer that automatically releases the plunger head and ensures free falling of the needle during the 5-seconds test.

Power supply: 230V 1ph 50-60Hz 200W
Dimensions: 220x280x410 mm
Weight: 15 kg approx.

ACCESSORIES
for B056, B057, B056-01, B056-02

B056-09 PENETRATION BALL. Hot applied jont sealants.
Test method for the determination of penetration and recovery (resilience).
STANDARD: EN 13880-3

B057-09 STANDARD PENETRATION CONE Ø 65 mm for measuring the consistency of lubricating grease.
Brass body and steel point made. Weight: 102.5 g
STANDARDS: EN 13880-2 | ASTM D217 | IP 179
ISO 2137 | DIN 51804

B057-09

B056-09

B016
AIR BATH

Used for softening bitumen before performing a range of tests including ductility, flash point, penetration, loss on heating.
Inner vessel, stainless steel made, has 500 g capacity.
Complete with thermoregulator, pilot lamp.

Power supply: 230V 1ph 50-60Hz 500W
Dimensions: 140x140x350 mm
Weight: 5 kg approx.

B016

B058
THERMOSTATICALLY CONTROLLED WATER BATH FOR PENETROMETER

Provides water at the required temperature of 25 ± 0.1 °C.
The unit consists of a stainless steel water bath 10 litres capacity with wool insulation, immersion heater with digital thermostat, motor pump with connections, cooling coil device, current water operated, to maintain a constant temperature of the bath when room temperature is slightly higher.
The bituminous sample is immersed into the water bath, and placed on the penetrometer only at the time of the test, by eventually using the transfer dish (accessory mod. B057-03).

Power supply: 230V 1ph 50-60Hz 350W
Dimensons: 375x335x420 mm
Weight: 12 kg approx.

B058 detail

ACCESSORY

B058-01
WATER BATH DISH with incorporated thermostatic coil, to be connected to the bath mod. B058.It keeps the temperature of the bitumen sample directly on the penetrometer, by avoiding to transfer it.
Dimensions Ø 151x90 mm

B060
BACON SAMPLER

STANDARDS: EN 58 | CNR N° 81, N° 98
ASTM D140 | AASHTO T40

Used to obtain asphalt or oil samples from various levels within a storage tank by the "thief" method.
Made from brass. Capacity 237 ml

Dimensions: Ø 50x250 mm
Weight: 2 kg approx.

B060

B090
BREAKING VALUE OF CATIONIC BITUMEN EMULSIONS: MINERAL FILLER METHOD

STANDARDS: EN 13075-1 | IP 494

Equipment for the determination of the breaking value of cationic emulsions, (manual version) comprising:
Filler feeding pan, complete with support base and clamp, nickel spatula, two round porcelain dishes.

Weight: 2 kg approx.

ACCESSORIES for Automatic Version

B090-10	ELECTRIC STIRRER having 260 rpm, 230V 50-60Hz 1ph
S157-06	SUPPORT BASE for stirrer.
B090-11	PROPELLER for electric stirrer.
B090-12	METALLIC CONTAINER, 500 ml capacity.
B090-19	REFERENCE FILLER, original Forshammar to EN 13075-1/2. Bucket of 10 kg
B090-19M	REFERENCE FILLER, to EN 13075-1/2. Bucket of 25 kg
B090-19N	REFERENCE FILLER, to EN 13075-1/2. Bucket of 5 kg
B090-20N	REFERENCE FILLER, 25 kg where SIO_2 content and Volumetric Mass conform to EN 13075-1; while grading composition does not conform.

B063-10
PARTICLE CHARGE TESTER

PARTICLE POLARITY OF BITUMEN EMULSIONS

STANDARDS: EN 1430 I ASTM D244 I CNR N. 99

This apparatus is used to identify the particle charge of bitumen emulsions.
The equipment comprises:
- Milliammeter scale up to 10 mA on support base
- Variable resistor
- Two stainless steel electrodes
- Insulating device
- Beaker 250 ml capacity to EN spec.
- Glass rod

Power supply: 250V 1ph 50-60Hz
Dimensions: 200x200x600 mm
Weight: 3 kg approx.

ACCESSORY

B063-11
BEAKER 500 ml capacity to ASTM spec.

B063-10

B072-20
WILHELMI SOFTENING POINT APPARATUS

STANDARDS: EN 1871 I DIN 1996-15

Used for determining the softening point of bituminous materials for road construction, according to Wilhelmi method.
The softening point is the temperature where a layer of thermoplastic material has a deformation given by a steel sphere weighting 13.9 g.
The apparatus comprises a ring divided in two halves on a metal support frame, glass beaker, steel ball 15 mm diameter.

Weight: 2 kg approx.

B072-20 + B072-02

ACCESSORIES for B072-20

B072-02A
THERMOMETER ALCOHOL, ASTM 16C,
scale +30 °C +200 °C , subd. 0.5 °C.

B073-02
ELECTRIC HEATER WITH MAGNETIC STIRRER, suitable for still water and glycerine tests, with softening point up to 150 °C.
Power supply: 230V 1ph 50-60Hz 700W
Weight: 4 kg approx.
See p. 552

B063
EMULSIFIED ASPHALT DISTILLATION APPARATUS

STANDARDS: EN 1431 I ASTM D 244 I AASHTO T 59 I CNR N° 100

Used for the determination of cut-back asphaltic materials by the distillation test. The set is formed by: aluminium still container, glass connectors including condenser, stands, graduated cylinder, two thermometers ASTM 7C range -2 to +300 °C, gas ring burner with gas stop valve controlled by a flame sensor.
It can be sold on CE markets, but not usable in closed spaces.

Weight: 12 kg approx.

SPARE

B063-01A Thermometer alcohol -2 to +300 °C ASTM 7C

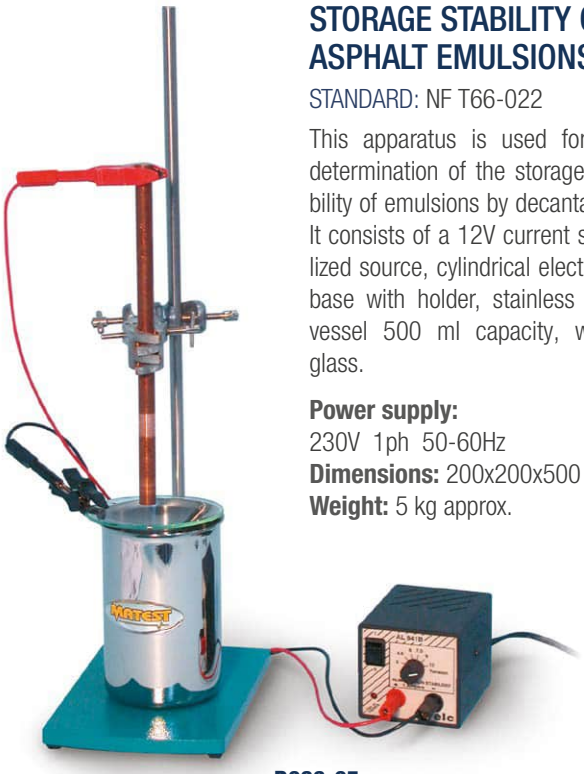
B063

B063-05
STORAGE STABILITY OF ASPHALT EMULSIONS

STANDARD: NF T66-022

This apparatus is used for the determination of the storage stability of emulsions by decantation. It consists of a 12V current stabilized source, cylindrical electrode, base with holder, stainless steel vessel 500 ml capacity, watch glass.

Power supply:
230V 1ph 50-60Hz
Dimensions: 200x200x500 mm
Weight: 5 kg approx.



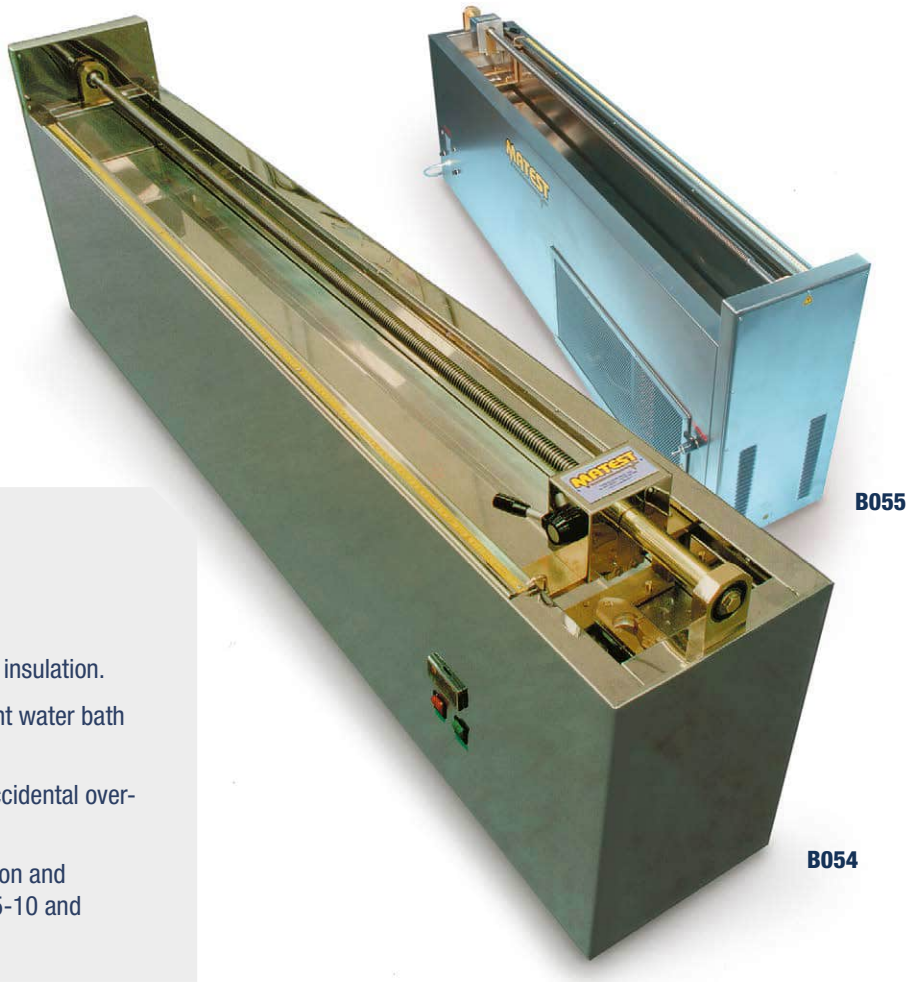
B063-05

B054
DUCTILOMETER

STANDARDS: EN 13398 I ASTM D113, D6084 I AASHTO T51

Used to determine the bituminous ductility, that is the distance to which a briquette of molten bitumen can be extended under controlled conditions, before breaking. The Ductilometer basically consists of a moving carriage travelling along guide ways. The carriage is driven by an electrical motor, inside a large tank fitted with digital thermostat, immersion electric heater, cooling coil for cold water circulation and pump unit.
Max. traction force: 300 N, accuracy: ± 0.1 N
The ductilometer can accept up to 3 specimens simultaneously. Supplied complete **except** for the briquette mould and base plate that must be ordered separately (see accessories).

Power supply: 230V 1ph 50Hz 750W
Dimensions: 1880x360x680 mm
Weight: 95 kg approx.



MAIN FEATURES

- Works automatically.
- Speed 50 mm/min.
- Max stroke 1500 mm.
- Stainless steel made with fibreglass insulation.
- Digital thermoregulator for a constant water bath temperature (25 °C ± 0.5 °C).
- Dual safety thermostat to prevent accidental over-temperature.
- Cyber-plus 8 progress data acquisition and processing system available in B055-10 and B055-20M models.

ACCESSORIES

B054-01A
DUCTILITY BRIQUETTE MOULD
STANDARDS: ASTM D113, AASHTO, GOST
Used to prepare the specimen, it is brass made, accurately machined. Supplied without base plate. Weight: 300 g

B054-03
ELASTIC RECOVERY MOULD - STANDARD: EN 13398
Used to prepare the specimen, it is brass made, accurately machined. Supplied without base plate. Weight: 300 g

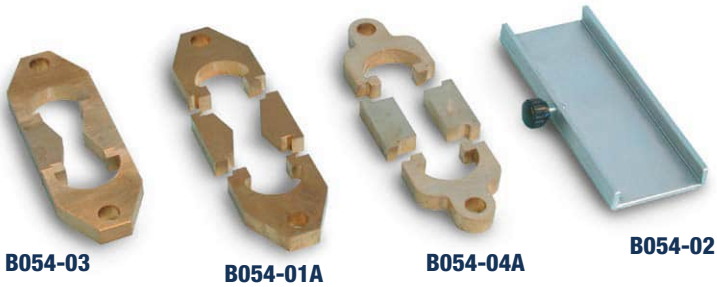
B054-04A
FORCE DUCTILITY METHOD MOULD
STANDARDS: EN 13589, ASTM D6084
Used to prepare the specimen, it is brass made, accurately machined. Supplied without base plate. Weight: 300 g

B054-02 BASE PLATE for ductility briquette mould.

B055
DUCTILOMETER WITH COOLING SYSTEM

Same as for mod. B054 but equipped with incorporated refrigerating unit for tests with water temperature from + 5° to + 25 °C.

Dimensions: 1880x360x680 mm
Weight: 130 kg approx.



B055-10
DUCTILOMETER WITH DATA ACQUISITION

STANDARDS: EN 13398 I EN 13703 I ASTM D113, D6084 I AASHTO T51 I GOST 11505-75, 33138

Same as mod. B054, but upgraded with:
- Cyber-plus Progress data acquisition and processing system, **colour touch screen display**, 24 bit resolution. It automatically performs only load data acquisition and processing. Directly connected to printer (accessory) via USB it prints the test certificate. Equipped with slots for external pendrive or SD card infinite memory support with direct connection to PC. Hardware details: see p. 213
- Communication protocol for remote data acquisition enabled.
- One electric load cell 50 N capacity complete with installation and calibration. (Possibility to install later on up to 3 cells directly by the end user).

Supplied **without** briquette mould and base (see accessories).

ACCESSORIES

B055-15
LOAD CELL electric, 50 N capacity, complete with installation and calibration (possibility to install up to 3 cells).

B055-16
REFRIGERATING UNIT, incorporated into the machine, for tests with water temperature from +5 °C to +25 °C (not possible to fix on later).

Ductility moulds and base plate: see p. 144

B055-10

B055-20M

B055-20M
DUCTILOMETER WITH DATA ACQUISITION
FOR RESEARCH HIGH PERFORMANCE

STANDARDS: EN 13589, 13703, 13398 I ASTM D113, D6084
AASHTO T51, T300, T301
GOST 11505-75, 33138

Developed and manufactured for ductility tests and for research purposes. Stepper motor providing a variable speed range from 1 to 400 mm/min with digital displacement measuring system.
Up to 3 samples can be tested simultaneously.
One electric high capacity load cell 500 N (possibility to install later on up to 3 cells directly by the end user).
Automatic positioning of start test.
Visualization of the elongation in mm and load/elongation chart.
Max elongation recording before breaking failure.
Absorbed energy elaboration.
Temperature setting and visualization of the test execution with continuous recording during the test.
Test certificate print-out (USB connector or local printer).
Cyber-plus Progress data acquisition and processing system **colour touch screen display** (technical details: p. 213).
Communication protocol for remote data acquisition enabled.
Glass upper cover.
Supplied **without** briquette mould and base (see accessories).

Power supply: 230V 1ph 50-60Hz 1000W
Dimensions: 2140x400x650 mm
Weight: 110 kg approx.

ACCESSORIES

B055-15
LOAD CELL electric, 50 N capacity, complete with installation and calibration, suitable for soft bitumen.

B055-25
LOAD CELL electric, 500 N capacity, complete with installation and calibration (possibility to install up to 3 cells).

B055-26
REFRIGERATING UNIT, incorporated into the machine, for tests with water temperature from +0 °C to +25 °C. 230V 1ph 50 Hz (Not possible to fix later on).

C128
LASER PRINTER, bench model, for graphics and certificates with direct connection via USB.

Ductility moulds and base plate: see p. 144

Detail: 3 load cells 500 N

CALIBRATION EQUIPMENT FOR DUCTILOMETERS WITH DATA ACQUISITION

AVAILABLE MODELS

B055-27-KIT
CALIBRATION EQUIPMENT FOR MOD. B055-10

Consisting of:

C138M
UNIVERSAL DIGITAL TESTER WITH MICROPROCESSOR

This user friendly menu driven digital display, connected to the calibration load cell, allows to perform an accuracy's verification of the loads measured from the Ductilometer under control, and it allows to produce the relative certificate.
Technical details: see p. 302

B055-30
CALIBRATION LOAD CELL

Electric, 50 N capacity, complete with installation devices.

TECHNICAL SPECIFICATIONS

- Full Scale nominal output: 2 mV/V
- Linearity + Hysteresis:
- ± 0.1% of full scale
- Repeatability: ± 0.03% of full scale
- CLASS: AA

B055-34
ADAPTER

Coupling device between the load cell and the ductilometer

B055-28-KIT

NEEDED ACCESSORY

C138-05 CALIBRATION PROCESS of the load cell combined with the Universal digital tester, complete with Matest Calibration Certificate.

Alternative:

C138-10 CALIBRATION CERTIFICATE issued by an accredited Calibration Institute (ACCREDIA Centre)

B055-28-KIT
CALIBRATION EQUIPMENT FOR MOD. B055-20M

Consisting of:

C138M
UNIVERSAL DIGITAL TESTER WITH MICROPROCESSOR

This user friendly menu driven digital display, connected to the calibration load cell, allows to perform an accuracy's verification of the loads measured from the Ductilometer under control, and it allows to produce the relative certificate.
Technical details: see p. 302

B055-32
CALIBRATION LOAD CELL

Electric, 500 N capacity, complete with installation devices.

TECHNICAL SPECIFICATIONS

- Full Scale nominal output: 2 mV/V
- Linearity + Hysteresis:
- ± 0.1% of full scale
- Repeatability: ± 0.03% of full scale
- CLASS: AA

B055-35
ADAPTER

Coupling device between the load cell and the ductilometer.

B077
FRAASS APPARATUS BREAKING POINT

STANDARD: EN 12593

This apparatus is used to determine the breaking point of bitumen and bitumen binders at low temperatures. It consists in a flexure device with two concentric sliding resin tubes, jaws for the test specimen, flexure system with handle, cooling device with three containers, plate in special harmonic steel, thermometer ASTM 42C. **Weight:** 4 kg approx.

B077

SPARES

B077-01 Plate (spring) in special armonic steel
B077-02A Thermometer alcohol, ASTM 42C

HUBBARD-CARMICK SPECIFIC GRAVITY

STANDARDS: EN ISO 3838 I ASTM D70
NF T66-007

V111 Cylindrical type, 24 ml
V111-01 Conical type, 25 ml

V111-01 V111

B075
WATER IN BITUMEN EMULSIONS

STANDARDS: EN 1428, 12847 I ASTM D244 I NF T66-023

Used to determine the water in petroleum products or bituminous materials, by distilling them with a water immiscible, volatile solvent.

The equipment comprises:
- Glass balloon 500 ml
- Glass receiver 25 ml capacity with 0.1 ml grad.
- Glass reflux condenser

Electric heater with thermoregulator, clamps.

Power supply: 230V 1ph 50Hz 500W
Weight: 8 kg approx.

B075

B076
WATER IN BITUMINOUS MATERIALS (DEAN-STARK)

STANDARDS: ASTM D95, D244
AASHTO T55 I IP 74-77
CNR No. 101 I NLT 123

Identical to mod. B075 except for the receiver having 10 ml capacity.

BITUMINOUS EMULSIONS
RESIDUE ON SIEVING

STANDARD: EN 1429

B076-21 Sieve, stainless steel, Ø 75 mm, 0.5 mm opening
B076-22 Sieve, stainless steel, Ø 75 mm, 0.16 mm opening
B076-24 Pan and Cover, stainless steel, Ø 75 mm.

STANDARD: ASTM D6935

B076-25 Sieve, stainless steel, Ø 75 mm, 0.18 mm opening
B076-26 Sieve, stainless steel, Ø 75 mm, 1.4 mm opening

B076-21...B076-26

BITUMINOUS EMULSIONS
MIXING STABILITY WITH CEMENT

STANDARD: EN 12848

B076-23 Sieve, stainless steel, Ø 75 mm, 2 mm opening
B076-22 Sieve, stainless steel, Ø 75 mm, 0.16 mm opening
B076-24 Pan and Cover, stainless steel, Ø 75 mm.

B079N
CABINET WITH ASPIRATOR

Double aspiration system, certified to EN 14175-2-3 Bureau Veritas. Used to exhaust vapors and toxic solvents caused by Centrifuge Extractors, Hot Extractors etc., by avoiding they are diffused in the laboratory. Metal frame, monolithic stoneware, 4 sockets + switch, water spout and cock, electric aspirator, electric lighting.
The front transparent door can be lifted by vertical counterweights for an easy access to the operation desk.

Power supply: 230V 1ph 50Hz
Dimensions: 1800x830x2260 mm
Weight: 380 kg approx.

B079-01
B079N

ACCESSORY

B079-01
LOWER CUPBOARDS, bilaminated plastic made, complete with doors and shelves.

B069A
DISTILLATION OF CUT-BACK ASPHALTS, ELECTRIC

STANDARDS: ASTM D402 I AASHTO T78 I NF T66-003
UNE 7112, 7072

Used to measure the amount of the most volatile constituents in cut-back asphaltic products.
The apparatus consists of: electric heater with thermoregolator, distillation flask, condenser tube, adapter, shield, receiver, supports, graduated cylinder, thermometer ASTM 8C -2 to +400 °C, subd.1 °C

Power supply: 230V 1ph 50-60Hz 700W
Weight: 12 kg approx.

B069A

SPARE

B069-11A Thermometer alcohol -2 +400 °C sudd. 1 °C, ASTM 8C

EFFECT OF HEAT AND AIR ON A MOVING FILM OF ASPHALT

B066M
ROLLING THIN-FILM OVEN HIGH PERFORMANCE

STANDARDS: EN 12607-1 I ASTM D2872 I AASHTO T240

New model with enhanced performance and reliable technology needed to study the aging phenomena on traditional and innovative bituminous binders.
The frame and the internal chamber are made of high quality stainless steel with a large door to detect the test room.
This new version is totally controlled by 7'' digital touch-screen panel in terms of test temperatures, start and stop carriage rotation and ventilation system.
Also, when the test starts, the internal room temperature, the air flow and the carriage speed (15 rpm ± 0.2) are shown in real time on the digital display.
Supplied complete with digital flow meter, precision digital thermostat to maintain 163 °C temperature, control thermometer ASTM 13C, ventilation device, eight glass containers Ø 64x140 mm. The unit includes a dual safety thermostat to prevent overheating.

Power supply: 230V 1ph 50-60Hz 1700W
Dimensions: 620x620x910 mm
Weight: 55 kg approx.

B066N closed door

B066N
ROLLING THIN-FILM OVEN RTFOT I ASTM I EN

STANDARDS: EN 12607-1 I ASTM D2872 I AASHTO T240

Used to measure the air and heat effect on a moving film of asphaltic semisolid materials. External frame and internal chamber are stainless steel made with insulated fiberglass intermediate chamber.
Rotation speed of the plate: 15 rpm ± 0.2.
Provided with a large glass door for inspections. The oven must be connected to an air compressor 2 bar max. pressure, or to a diaphragm pump (see accessory). Supplied complete with flow meter, precision digital thermostat to maintain 163 °C temperature, control thermometer ASTM 13C, ventilation device, eight glass containers Ø 64x140 mm.
The oven is equipped with a dual safety thermostat to prevent accidental over-heatings.

Power supply: 230V 1ph 50Hz 1700W
Dimensions: 620x620x910 mm
Weight: 55 kg approx.

MAIN FEATURES

- 7" Touch-screen color display.
- Temperature ramp designed to achieve the target temperature within 10 minutes when the door is closed.
- Flow meter range: from 200 to 14.000 ml/min.
- Temperature accuracy ± 0.1 °C when the target temperature test is achieved.

B066M open door
with touch screen display

B066-02N

ACCESSORY

B066-11N
Portable compressor, including pressure reducer for precise delivery pressure setting. Very low-noise, ideally for indoor use 59db. Max pressure 8 bar, 6 litres air reserve.
Power supply: 230V 50Hz

B066-11N

SPARES

B066-02N Glass container Ø 64x140 mm
B064-03A Thermometer alcohol, ASTM 13C.
Range: +155 °C to +170 °C div. 0.5 °C.

B064
ROTATING SHELF THIN FILM OVEN
DETERMINATION OF LOSS IN MASS AND RESISTANCE TO HARDENING (TFOT)

STANDARDS: EN 12607-2, EN 13303 I CNR N° 50 I ASTM D6, D1754 I AASHTO T47, T179 I BS 2000 I UNE 7110 I NF T66-011

Internal chamber and external frame all made of stainless steel, double wall insulation with fiberglass, double door. Temperature control by digital thermoregulator. The oven is equipped of a dual safety thermostat to prevent accidental over-heatings. The plate rotates at 5-6 rpm. Supplied complete with glass control thermometer ASTM 13C, +155 to +170 °C subd 0.5 °C.
The oven is supplied **without rotating shelf and accessories**, that must be ordered separately.

Power supply: 230V 1ph 50Hz 1500W
Internal dimensions: 330x330x330 mm
Outside dimensions: 460x450x700 mm
Weight: 40 kg approx.

B064 + B064-01
open door

The oven mod. B064 can be equipped in two versions, with the following accessories:

B064-01
Rotating shelf complete with 9 containers Ø 55x35 mm for the **Determination of Loss on Heating** to: EN 13303 I ASTM D6 BS 2000 I NF T066-011 I AASHTO T47 I CNR N° 50 Standards.

B064-02
Rotating shelf, complete with 2 containers Ø 140x9.5 mm for the **Determination of Thin Film** to: EN 12607-2 I ASTM D1754 AASHTO T149 I UNE 7110 Standards.

As alternative

B064-02SP
Rotating shelf, same as B064-02, but complete with 4 containers.

B064-03B
Thermometer +114 +130 °C to EN 12607-2, div. 0.5 °C

B064 + B064-02 closed door

B064-02

B064-01

B064-02SP

SPARES

V122-05	Brass container Ø 55x35 mm
B064-04	Stainless steel container Ø 140x9.5 mm

B072
RING AND BALL SOFTENING POINT APPARATUS

STANDARDS: EN 1427 I ASTM D36 I AASHTO T53 I NF T66-008
Comparable to: BS 2000 I UNI 4161 I DIN 52011 I UNE 7111

The softness of bitumen depends, amongst other factors, on the substance temperature, the more the temperature increases, the more increases the softness of the bitumen.
The unit consists of a pyrex beaker, brass frame, two tapered rings, two ball centering guides and two balls.

Weight: 900 gr

ACCESSORIES

B072-01A THERMOMETER ALCOHOL ASTM 15 C -2 to+80 °C subd. 0.2 °C

B072-02A THERMOMETER ALCOHOL ASTM 16 C +30 to+200 °C subd. 0.5 °C

B072-07
POURING PLATE

Used to pour the bituminous mixture into the brass tapered ring, as required by EN 1427 Specification.

Dimensions: 75x50x10 mm

B074
HOT PLATE

Complete with thermoregulator for temperature adjustment.

Power supply: 230V 1ph 50-60Hz 1000W
Weight: 6 kg approx.

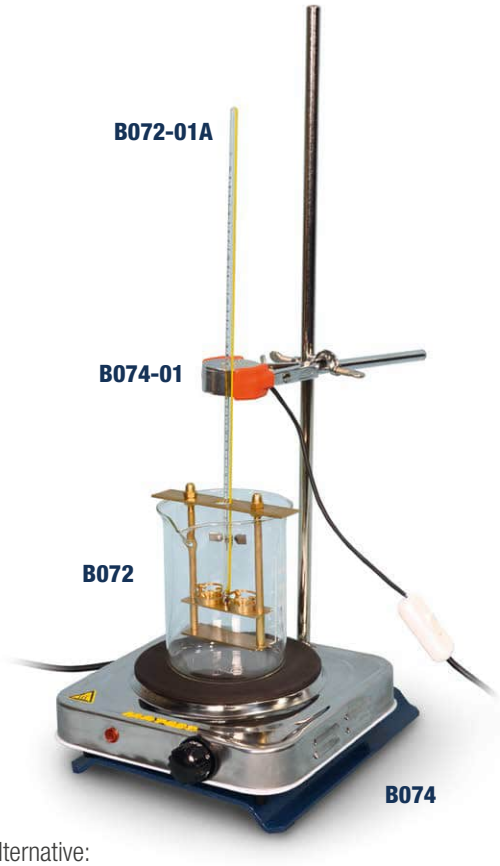
ACCESSORY for B074

B074-01
ELECTRIC STIRRER, ensures a more uniform temperature to the bath. Supplied complete with vertical support and base.
Power supply: 230V 1ph 50-60Hz 100W
Weight: 3 kg approx.

As alternative:

B073-01
HOT PLATE WITH MAGNETIC STIRRER
Complete with thermoregulator for temperature adjustment and magnetic stirrer with electronic adjustment from 150 to 1500 rpm. Suitable for tests in distilled water with softening point between +30 °C to +80 °C.

Power supply: 230V 1ph 50-60Hz 750W
Weight: 4 kg approx.



As alternative:

B073-02
HOT PLATE WITH MAGNETIC STIRRER

Same as mod. B073-01, but with more powerful electric heating resistance, suitable **also** for tests in glycerine with softening point over +80 °C up to +150 °C.

Power supply:
230V 1ph 50-60Hz 700W
Weight: 4 kg approx.

SPARES for B072

B072-03 Steel ball Ø 9.5 mm
B072-04 Brass tapered ring
B072-05 Ball centering guide
B072-06 Pyrex beaker

B070M
SOFTMATIC
AUTOMATIC DIGITAL RING AND BALL APPARATUS

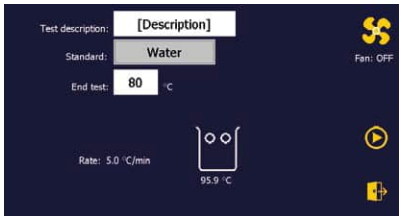
STANDARDS: EN 1427 I ASTM D36 I AASHTO T53 I NF T66-008; DIN 52011 I UNE 7111 I UNI 4161 I CNR N.35

This high technology digital microprocessor tester, designed and manufactured by Matest, automatically determines the softening point of asphalts and pitches.
Two laser sensors detect the balls fall determining the softening point.
The bath temperature is measured by an electronic system maintaining the gradient (5 °C/min) as specified by the Standards.
A magnetic stirrer with electronic speed adjustment from 0 to 160 rpm also ensures a uniform temperature in the vessel during the test execution.
The fan cooling system enables to quickly cool down the samples, allowing to perform many more tests per day.
The **touch-screen** graphical interface allows an easy set up of the parameters and the immediate execution of the test. High resolution color display, 800x480 pixel, offers all the functions of a PC for the management and analysis of data, test results, and graphs.
Two test parameters can be selected in the microprocessor menu:
- test on boiled distilled water for softening point from 30 to 80 °C.
- test on glycerol for softening point from 80 up to 150 °C.

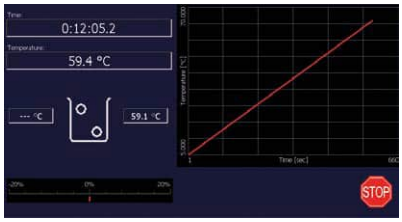
The tester is basically composed of:
- Ceramic-glass heating plate with automatic cut off at the end of the test cycle.
- Motherboard with microprocessor, which controls: heater/stirrer, temperature probe, laser sensors, pre-heating phase of the plate, and memorizes all the test parameters.
- Steel balls centering device.

Power supply: 230V 1ph 50-60Hz 700W
Dimensions: 435x330xh510 mm
Weight: 20 kg approx.

Note: This device is also suitable for determining the softening point of thermoplastic adhesives, in accordance with EN 1238



Test execution



Temperature-Time graph

ACCESSORY

B070-11 RODS WITH SPHERICAL ENDS (set of 2 pieces) for checking and calibration of the instrument.

B070M

MAIN FEATURES

- Real time display of the Time - Temperature (sec,°C) graph along the entire test.
- Touch-screen TFT LCD graphic display, 800x480 pixels, 7 inches.
- Unlimited memory (USB pendrive, internal Micro SD) editable data via PC.
- Multilanguage selection.
- Microprocessor friendly-driven menu to control all the test phases.
- Top quality components: laser sensors, electronic magnetic stirrer, ceramic-glass heating plate.
- Fully automatic.

SPARES

B072-03 Steel ball 9.5 mm diameter
B070-15 Brass tapered ring, chromed
B070-16 Brass centering guide, chromed
B070-17 Pyrex beaker

B065
ROTAVAPOR
ROTARY EVAPORATION APPARATUS
BITUMINOUS BINDERS. RESISTANCE TO HARDENING. ROTATING FLASK TEST: RFT METHOD

STANDARD: EN 12607-3

This unit is used to simulate the hardening of the bitumen binder during mixing process in an asphalt plant, to determine the resistance to hardening under influence of heat and air. The test is performed by putting 100 g of bituminous binder into the rotating flask. The sample is heated at 165°C and ambient temperature air is blowed into the flask containing the binder hardening the same. The hardening effect is evaluated according to penetration, viscosity and softening point tests.
The Rotary Evaporation Apparatus is essentially composed of:
distillation flask 1000 ml capacity rotated by a speed motor at an adjustable rate between 10 and 280 rpm, condenser, solvent recovery flask, heated oil bath.
The angle of the rotary/distillation flask is 15°
The instrument is supplied complete with glass tubing with three way valves and transparent flexible hose for solution intake.
The Rotatory Apparatus requires a vacuum pump and a vacuum regulating system (see accessories at p. 86).

Power supply: 230V 1ph 50-60Hz
Dimensions: 740x430xh845 mm
Weight: 15 kg approx.

B065

B065-01
ROTARY EVAPORATION APPARATUS

STANDARD: EN 12607-3
Same model as B065 but with motorizing lifting device.

B075-05
SOLUBILITY OF BITUMINOUS BINDERS

STANDARDS: EN 12592 I ASTM D2042

The set comprises:
Gooch crucible complete with funnel and rubber ring.
Filter flask 500 ml capacity with rubber stopper.
Whatman filter discs, Ø 25 mm (pack of 100)

Weight: 1000 g approx.

BITUMEN EMULSIONS:

B075-01
GRADUATED CYLINDER WITH SIDE TUBES AND STOPPER
DETERMINATION OF SETTLING TENDENCY

STANDARDS: EN 12847 I IP 485

The cylinder has 600 ml capacity, it is marked at 500 ml and two side tubes are foreseen.

Weight: 800 g approx.

Note: To perform this test the water in petroleum emulsion, equipment mod. B075 is also required. See p. 147

B075-08
GLASS TUBE WITH GLASS FILTER
DETERMINATION OF PENETRATION POWER

STANDARDS: EN 12849 I IP 487

The glass tube has 41.5 mm inside diameter by 115 mm height, and a fused-on glass filter with holes size between 0.160 and 0.250 mm is fitted.

Weight: 300 g approx.

B075-05

B075-01
B075-08

B080
ENGLER DIGITAL VISCOMETER

STANDARDS: ASTM D490, D1665 | AASHTO T54 | BS 2000
NF T66-020 | CNR N° 102

Used to compare the specific viscosity of road-oils and tars to the viscosity of water. It consists of a water bath complete with digital precision thermoregulator, electric stirrer, cooling device, Engler flask. The viscometer is equipped of a dual safety thermostat to prevent accidental over-temperatures.

Power supply:
230V 1ph 50Hz 300W
Dimensions:
265x270x550 mm
Weight: 12 kg approx.

B080 + B082-01A

B081
ENGLER DIGITAL VISCOMETER TWO ELEMENTS

Basically structured as mod. B080 but having **Two elements**, electrically operated, supplied complete.

Weight: 20 kg approx.

ACCESSORIES for Engler

B082-01A THERMOMETER ALCOHOL ASTM 23 C
range +18 +28 °C subd. 0.2 °C

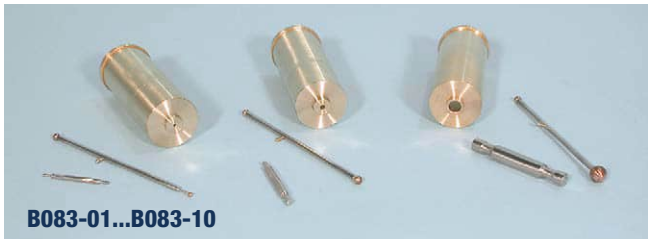
B082-02A THERMOMETER ALCOHOL ASTM 24 C
range +39 +54 °C subd. 0.2 °C

B082-03A THERMOMETER ALCOHOL ASTM 25 C
range+95 +105 °C subd. 0.2 °C

B082-06 KOHLRAUSH CALIBRATION FLASK 200 ml capacity

B082-07 FILTER SCREEN, ASTM N°50

B082-05 SPARE Engler testing flask



B083-01...B083-10

B084-01
STANDARD TAR (BRTA, REDWOOD) DIGITAL VISCOMETER

STANDARDS: EN 12846-01, EN 12846-02, EN 13357 | IP 184
NF T66-005

Used to determine the viscosity of cut-back bitumen and road oil. The instrument consists of a stainless steel bath (tank), agitator, rheostat, immersion electric heater with digital thermostat to take the water to the desired temperature, cooling coil for water supply connection. The viscometer is equipped of a dual safety thermostat to prevent accidental over-temperatures.
Supplied with control glass alcohol thermometer IP 8C, range 0 - 45 °C, subd. 0.2 °C, graduated glass cylinder 100 ml capacity.
Supplied **without** Cup, Go/not go gauge, ball valve to be ordered separately (see accessories).

Power supply: 230V 50-60Hz 1ph 300W
Dimensions: 265 x 270 x 550 mm
Weight: 12 kg approx.

B084-02
TWO PLACES TAR VISCOMETER, DIGITAL

Basically structured as mod. B084-01,
but having **TWO ELEMENTS**

ACCESSORIES for Standard TAR

Standards: EN, NF, IP
B083-01 Go/not go gauge for Ø 4 mm orifice
B083-02 Cup with orifice Ø 4 mm
B083-03 Ball valve Ø 4 mm

Standards: EN, NF, IP
B083-04 Go/not go gauge for Ø 10 mm orifice
B083-05 Cup with orifice Ø 10 mm
B083-06 Ball valve Ø 10 mm

Standard: EN 12846-02
B083-08 Go/not go gauge for Ø 2 mm orifice
B083-09 Cup with orifice Ø 2 mm
B083-10 Ball valve Ø 2 mm

SPARES

B083-07A
Thermometer Alcohol IP 8C,
range 0 - 45 °C,
subd. 0.2 °C.

V101-03
Graduated cylinder, glass,
100 ml capacity.

B084-01
+ accessories

B086A
CLEVELAND OPEN CUP FLASH AND FIRE POINT TESTER

STANDARDS: EN 22592 I ASTM D92 I AASHTO T48
IP 36 I NF T60-118 I ISO 2592

Used to measure the flash and fire points of lubrificated oils and petroleum products.
Complete with brass cup, thermometer IP 28C (ASTM 11C) range -6 +400 °C, electric heater with thermoregulator, double line fuse.
Supplied **without** flame gas device to be ordered separately.

Power supply: 230V 1ph 50-60Hz 600W
Dimensions: 220x285x265 mm approx.
Weight: 10 kg approx.

NEEDED ACCESSORY

B086-02
FLAME GAS device, complete with gas-stop valve controlled by a flame sensor and maximum thermostat with reset button.
It can be sold in CE markets, but not usable in closed spaces.

SPARE

B086-10A Thermometer Alcohol IP 28C (ASTM 11C), range -6 +400 °C.

B087
SAYBOLT DIGITAL VISCOMETER

STANDARDS: ASTM D88 I AASHTO T72

Used to determine the viscosity of petroleum products at specified temperatures between 70 to 210 °F. Stainless steel made, the Saybolt viscometer is supplied complete with two interchangeable orifices **Furol** and **Universal**, oil bath, electric heater with digital thermoregulator, stirrer, cooling coil, viscosity flask. Thermometers, filter funnel, withdrawal tube **are not included** and must be ordered separately. The viscometer is equipped of a dual safety thermostat to prevent accidental over-heatings.

Power supply: 230V 1ph 50-60Hz 500W
Dimensions: 280x260x510 mm
Weight: 12 kg approx.

ACCESSORIES

Saybolt Thermometers Alcohol		Range	Subd.
B089A	ASTM 17C	+19 a +27 °C	0.1 °C
B089-01A	ASTM 18C	+34 a +42 °C	0.1 °C
B089-02A	ASTM 19C	+49 a +57 °C	0.1 °C
B089-03A	ASTM 20C	+57 a +65 °C	0.1 °C
B089-04A	ASTM 21C	+79 a +87 °C	0.1 °C
B089-05A	ASTM 22C	+95 a +103 °C	0.1 °C

B087-11
FILTER FUNNEL complete with wire filter ring mesh.

B087-12
WITHDRAWAL TUBE complete.

SPARES for SAYBOLT

B089-06 Furol orifice
B089-07 Universal orifice
B089-08 Saybolt flask 60 ml capacity

B087-01
TWO TUBE SAYBOLT VISCOMETER

Basically structured as mod. B087 but with two tubes. Supplied complete except thermometers, filter funnel and withdrawal tube.

Dimensions: 270x270x550 mm approx.
Weight: 14 kg approx.

B092A
TAG CLOSED-CUP VISCOMETER. FLASH POINT

STANDARDS: ASTM D56 I API 509

Suitable for testing volatile flammable flashing between 0 and 175 °F (except fuel oils).
Supplied complete with cup, water bath, lid, slide, thermoregulated electronic heating device, thermometer ASTM 9C range -5 to +110 °C and thermometer ASTM 57 C range -20 to +50 °C.
The tester is equipped of a gas flame feeder.

Power supply: 230V 1ph 50Hz 700W
Dimensions: 200x300x400 mm approx.
Weight: 10 kg approx.

B092A

B093A
TAG OPEN-CUP VISCOMETER. FLASH POINT

STANDARDS: ASTM D1310, D3143

For the determination of open cup flash points of volatile flammable materials having flash points between 0 and 175 °F
Supplied complete with cup, water bath, thermoregulated electronic heating device, thermometers ASTM 9C -5 to +110 °C and ASTM 57C -20 to +50 °C.
The tester is equipped of a gas flame feeder.

Power supply: 230V 1ph 50-60Hz 700W
Dimensions: 200x300x400 mm approx.
Weight: 10 kg approx.

B093A

B094A
PENSKY-MARTENS DIGITAL FLASH POINT

STANDARDS: EN 22719 I ASTM D93 I AASHTO T73 I IP 34, 35
ISO 2719

Used for the determination of the flash point of petroleum products by the Closed Cup Test, with a Flash Point between 40 °C to 360 °C.
Supplied complete with stirrer, shield for radiations, cast iron bath, electronic heater with digital thermoregulator two thermometers: ASTM 9C -5 + 110 °C div. 0.5 C, and ASTM 10C +90 +370 °C div. 2 °C
The stirrer allows to perform both "A" and "B" methods.
The tester is equipped of a gas flame feeder.

Power supply: 230V 1ph 50Hz 700W
Weight: 10 kg approx.

B094A

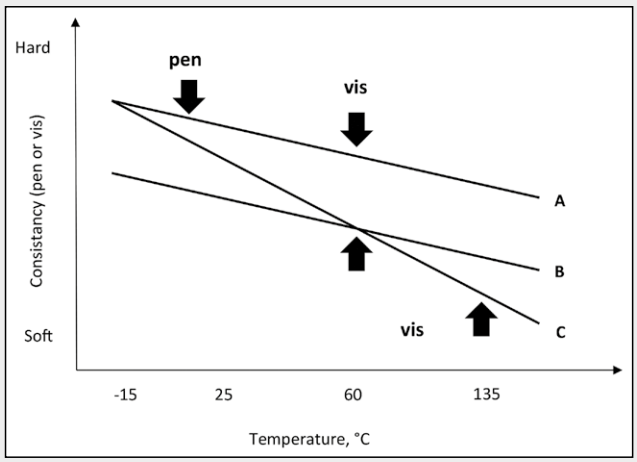
SPARES

B092-10A Thermometer Alcohol ASTM 9C
B092-11A Thermometer Alcohol ASTM 57C
B094-10A Thermometer Alcohol ASTM 10C

BITUMEN SUPERPAVE EQUIPMENT

Bitumen, as with all civil construction materials, is characterized by its mechanical properties. The first classification used in the past, and actually still working in many Countries nowadays, is based on **empirical properties**, such as penetration, softening point, breaking point and ductility. The importance of a performance analysis has been developed only in the last 20 years: by adopting empirical test procedures, bitumen mechanistic behaviour is not investigated, the test procedures are influenced by the operators and innovative binders cannot be properly tested.

Also, the traditional classification (such as penetration or viscosity grade) provides ambiguous results.



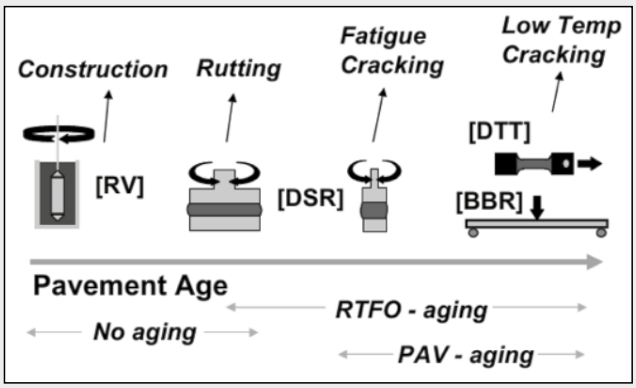
Example of emprical test comparison

In fact, two bituminous binders may have the same properties at different test temperature and much different behaviour at other ones.

The need to understand the mechanical properties and relation between the material and the damage that occurs during the service life of road pavement (low temperature cracking, fatigue cracks and rutting deformations) was the motivation behind the development of a new classification system known as **Superpave**: Superpave is an acronym for **Su**perior **Per**forming Asphalt **Pave**ments and it is a new, comprehensive asphalt mix design and analysis system, developed by Strategic Highway Research Program (SHRP) to improve the performance and durability of roads. This method is different from the previous one and it is based on **PERFORMANCE**: focusing on bituminous binder, the modern classification introduced by Superpave is based on **Performance Grade (PG)**.

A unique feature of the Superpave system is that the tests are performed at temperatures and aging conditions that more realistically represent those encountered by in-service pavements. The Superpave PG binder specification requires the testing of the asphalt binder under project's expected climatic and aging conditions in order to help in reducing pavement distress. SHRP researchers developed new equipment standards as well as incorporated equipment used by other industries to develop the binder tests.

SUPERPAVE EQUIPMENT	PURPOSE
Dynamic Shear Rheometer **(DSR)**	Measure properties at high and intermediate temperatures
Rotational Viscosimeter **(RV)**	Measure properties at high temperatures
Bending Beam Rheometer **(BBR)** and Direct Tension Tester **(DTT)**	Measure properties at low temperatures
Rolling Thin Film Oven **(RTFO)**	Simulate hardening during asphalt production phase
Pressure Aging Vessel **(PAV)**	Simulate hardening during pavement life



PG Testing Procedure

The new performance-based classification system introduces the **binder rheology based innovative testing conditions that real replicate the binder behaviour** from the construction phase including the concept of properties evolution due to ageing. Employing the new Superpave approach measures physical properties that can be related directly to field performance utilizing engineering principles. The key detail is that the Superpave tests characterize asphalt at a wide range of temperatures and aging. Superpave characterizes them at the actual pavement temperatures that they will experience, and at the periods of time when the asphalt distresses are most likely to occur.

DSR & DSR ADVANCED
DYNAMIC SHEAR RHEOMETERS

STANDARDS: EN 13702, 14770, 16659 I ASTM D7175, D4402, D4402M, D7405 I AASHTO T315, T316, T391, R29, T350, M332, M320

The Dynamic Shear Rheometer is used to characterize **the rheological properties of asphalt binder**, to investigate their viscous and elastic components using oscillation measuring mode. Also, the study of flow properties and determination of dynamic viscosity is possible in shear rate or shear stress-controlled tests.

Fast temperature control in a large temperature range is available, using **Peltier temperature control unit**. Especially at medium and high temperatures, which are particularly important for bitumen testing.

Further measuring systems, including cylindrical, cone-plate and others…

Software for tests according to EN, ASTM and AASHTO allows:
- Automatic and fast execution of all bitumen tests
- Automated evaluation and analysis of results according to AASHTO
- Estimation of **Performance Grade**
- Different test types for original binders, RTFO and PAV
- **Grade Determination** and **PASS/FAIL** conditions
- Bitumen Wizard for computer-assisted test execution
- Display and analysis of measuring data
- Pre-set profiles for automatic test execution

Complete with Peltier temperate control, exchangeable basic plate (Ø 25 mm), exchangeable basic plate (Ø 8 mm), measuring plate (Ø 25 mm), measuring plate (Ø 8 mm), set of trimming tools rubber moulds (Ø 25 mm and 8 mm) software.

The Rheometer requires to be connected to a PC, which is not included.

Two models are available:

B085-07N Dynamic Shear Rheometer. Basic model as descripted above.

B085-08N Advanced Dynamic Shear Rheometer. As descripted above but with an additionally **double side temperate measuring system and an automated gap resolution of 0.1 µm**.

TECHNICAL SPECIFICATION

- Torque range: 0.1 to 150 mNm
- Torque resolution: 0.001 mNm
- Bearing: mechanical bearing
- Speed resolution: 0.015 rpm
- Speed range: 0…2000
- Frequency range: 0.001…100Hz
- Temperature range, total: -60 °C to 300 °C
- Temperature range, Peltier: -10 °C to +180 °C (for B085-07N, the temperature range depends on the tempering system) -15 °C to +180 °C (for B085-08N, depending on the coolant)
- Temperature accuracy: ± 0.03 °C

Power supply: 110V or 240V 1 ph 50-60 Hz
Dimensions (length, width, height)**:**
- basic instrument 235 x 240 x 570 mm
- control unit 130 x 295 x 350 mm
- Peltier control unit 180 x 300 x 460 mm

Total weight: 45 kg approx.

B085-08N

B085-07N

Note: optionally expandable with cylinder measuring systems to comply with GOST 33137

B091M
PAV
PRESSURE AGEING VESSEL

STANDARDS: EN 14769 I ASTM D6521 I AASHTO R28

PAV to simulates in-service oxidative aging that occurs in asphalt binders during service after 5 to 10 years (long-term aging). The sample is exposed to high pressure and temperature for 20 hours (selectable up to 99). The Pressure Ageing Vessel (PAV) features 100% compliance with the laboratory standards related to aging the bitumen. The unit consists of a stainless steel vertical pressure vessel (AISI 304 with ASME and CE certifications) enclosed in a cabinet with encased band heaters. A source of compressed air with a pressure of at least 2.1 MPa and a pressure regulator generates and maintains the aging condition required.

MAIN FEATURES

- Sturdy stainless steel frame and vessel.
- Fast pre-heating system selectable up to 80 °C in order to reduce the conditioning time.
- Timer for setting time and date to start the machine at the desired time.
- Innovative cooling system.
- Fully automatic, Semi-Automatic and Manual tests.
- Temperature and pressure monitored in real time.
- Integrated 7' colour Touch screen controller.
- Pressure monitored in real time by transducer and controlled to 2.1 ± 0.1 MPa.
- CE and ASME certification.

The unit is equipped with a 7'' colour Touch screen controller with front panel user interface with easy to use step-thru operation. The user-friendly software allows the operator to carry out the test in different modes:

- **AUTOMATIC:** It's possible to select from 4 different temperatures (85, 90, 100, 110 °C) and 2 different testing time (20 or 65 hours).
- **SEMI-AUTOMATIC:** It's possible to select a temperature from 60 to 120 °C and run the test for 20 or 65 hours as in the automatic mode;
- **MANUAL:** This mode can be used in research and it allows to manually select the temperature from ambient to 130 °C and the testing time from 1 to 99 hours.

Temperature and pressure can be monitored in real time, thanks to a platinum RTD probe and a pressure transducer. Data logs of both temperature, aging time and pressure are saved on USB stick at the end of the test.
A pre-heat mode allows to reach a maximum of 80 °C before introducing the sample in safety conditions reducing the conditioning time of the sample that can reach faster the test temperature. Thanks to an innovative heating system and the pre-heating mode the test can start in around 1 hour.
The instrument is supplied complete with a sample rack for the simultaneous testing of ten specimens, ten specimen pans as per standards, but without compressed air source, 2.1Mpa minimum pressure.

B091M

TECHNICAL SPECIFICATION

- Operating pressure: 2.1 ± 0.03 Mpa (304 psi)
- Programmable temperature range: from ambient temperature to 130 °C, res: ± 0.1 °C
- Programmable pre-heating function: up to 80 °C
- Test temperature uniformity: ± 0.5 °C
- Testing time: up to 99 hours
- Safety equipment in all test conditions: Over pressure relief valve and Over temperature limit switch.

Power supply: 230V 1Ph 50Hz 10A
Dimensions: 450x650x500 mm approx.
Weight: 130 Kg approx.

ACCESSORIES

B091M-11 PRESSURE REGULATOR to connect the compressed air tank to the PAV, for an adeguate inlet pressure.

B091M-14 PORTABLE COMPRESSOR lightweight, quiet, powerful. Brushless motor with inverter circuit for maximum performance. Supplied with a high-pressure tube 10 metres long.
Max. pressure: 34 bars
Air reservoir: 8.6L
Power supply: 230V 50Hz 6A
Dimensions: 583(L)x309(w)x337(h)
Weight: 16 kg

SPARES

B091M-10 Sample rack, for testing up to 10 samples at the same time

B064-04 Stainless steel container, diameter 140x9.5 mm

B091M-10

B091M1-KIT
PAV - RESEARCH VERSION

Same to B091M but implemented with an electronic pressure valve to adjust the test pressure from ambient to 2.4 MPa, regulated from the control panel.

B091M-01
VDO
VACUUM DEGASSING OVEN

STANDARDS: EN 14769 I ASTM D6521 I AASHTO R28

The long-term aging of bitumen and bituminous binders obtained by a Pressure Ageing Vessel (PAV), generates air bubbles which must be removed in according with EN 14769, ASTM D6521 and AASHTO R28 standards. The Vacuum Degassing Oven, (VDO) consists of a stainless still vacuum vessel with a hinged lid to conserve space and access the vacuum chamber. It can hold up to 8 specimen containers. The unit allows selectable working temperature range from ambient to 200 °C with a resolution of ± 0.1 °C, measured by a platinum RTD probe. The VDO guarantees the required operating pressure of 15 ± 1 kpa for the achievement of vacuum.

B091M-01

MAIN FEATURES

- Sturdy stainless steel frame.
- Temperature is measured by Platinum RTD.
- Pressure release valve.
- Over temperature limit switch.
- Fully automatic, Semi-Automatic and Manual test;
- Temperature and pressure monitored in real time.
- Automatic release of the pressure at the end of the test.
- Fast heating and vacuum system to reach set point.
- USB port on front unit with software upgrades and data storage.
- 7" colour touch screen controller with front panel user interface for temperature, vacuum, set points and actual values.

The unit is equipped with a 7'' colour Touch screen controller indicating: temperature and pressure in real time and current stage of each process. The user-friendly software allows the operator to carry out the test in different modes:

- **AUTOMATIC:** Maintains the temperature constant at 170 °C for 30 minutes as required by the standards
- **SEMI-AUTOMATIC:** Selectable test temperature from ambient to 200 °C and the test runs for 30 minutes as in automatic mode
- **MANUAL:** Selectable both test temperature from ambient to 200 °C and time up to 99 minutes for research purposes

At the end of the test is possible to obtain uniform bitumen samples that can be used for further analysis to identify Performance Grade (such as DSR, DTT and BBR) or conventional bitumen properties (such as penetration, ductility, softening point among others)

TECHNICAL SPECIFICATION

- Operating pressure: 15 ± 1 Kpa, res: ± 0.1 Kpa
- Test temperature: 170 ± 4 °C, res: ± 0.1 °C
- Working temperature range: Ambient °C to 200 °C
- Power supply: 230V 1ph 50Hz
- Dimensions: 430x450x470 mm approx
- Weight: 70 kg approx.

SPARE

B091M-20 Sample holder for 4 Ø 70x45 mm sample cup and for 8/10 Ø 55x35 mm sample cup

NEEDED ACCESSORIES

V122-05 Sample cup, brass made, Ø 55x35 mm
V122-06 Sample cup, brass made, Ø 70x45 mm

B091M-20

Backside of **B091M-20**

DYNAMIC VISCOSITY BY ROTATIONAL VISCOMETERS

STANDARDS: EN 13302 I ASTM D2196 I ASTM D4402 I AASHTO T316

A rotational viscometer is used to measure the dynamic viscosity of bitumen at elevated temperatures. The torque on the apparatus-measuring geometry, rotating in a thermostatically controlled sample holder containing a sample of asphalt, is used to measure the relative resistance to rotation. The torque and speed are used to determine the viscosity of the bitumen, expressed in pascal seconds (Pa.s), millipascal seconds (mPa.s), or centipoise (cP).

Two models available:

B085-21N
STANDARD ROTATIONAL VISCOMETER

Supplied with standard stand, bayonet adaptor, temperature probe PT100, datalogger software, connecting cables, power supply cable.

B085-22N

B085-21N

B085-22N
ROTATIONAL VISCOMETER HIGH PERFORMANCE

Huge viscosity range. Supplied with rack stand, spindles bayonet adaptor, temperature probe PT100, datalogger software, connecting cables, power supply cable. It gives the possibility of programming and recording methods for the test. Optional direct control of temperature unit B085-33N

MAIN FEATURES

- High accuracy ± 1% on full scale
- High repeatability ± 0.2%
- Direct measure with time to stop
- User and locked mode
- Data recording and USB transfer
- 7” touch screen display
- Torque gage on display
- Printer connection
- Compatible with Advanced Software

Power supply: 110-240V 50-60Hz
Dimensions: Head: 180x135xH250 mm
Stainless steel rod: Length 500 mm
Hardened steel stand: 400x250xH10 mm
Weight: 6.5 kg approx.

TECHNICAL SPECIFICATIONS	B085-21N	B085-22N
Unlimited rotation speed	0.3 and 250 rpm – free selection	between 0.3 and 1.500 rpm – free selection
Torque Range	0.05 to 13 mNm	0.05 to 30 mNm
Viscosity range	15 to 60 M mPa.s (M for millions)	2 to 140 M mPa.s (M for millions)
PT100 probe to indicate temperatures	between -50°C to 300°C	between -50°C to 300°C
Display showing	viscosity, speed, torque, shear stress, time, temperature, shear rate	viscosity, speed, torque, shear stress, time, temperature, shear rate
Choice of viscosity unit	cP/Poises or mPa.s/Pa.s	cP/Poises or mPa.s/Pa.s
Languages	English, Italian, Spanish, German, French, Russian, Turkish	English, Italian, Spanish, German, French, Russian, Turkish
Connections	PC, Printer and LIMS	PC, Printer and LIMS

NEEDED ACCESSORIES

To perform test according to EN 13302 and ASTM D4402:

B085-29
BATH WITH TEMPERATURE CONTROLLER UP TO 200 °C
Temperature range from 5 °C to 200 °C
Complete with 12 liters tank and lid.
Power supply: 230V 50Hz 2060W
Dimensions: 500x400x500 mm
Weight: 12 kg approx.

or

B085-33N
TEMPERATURE CONTROL CHAMBER BATH DEVICE UP TO 300°C
Electric heating device to reach a sample conditioning temperature of 300°C, performing the test according to the ASTM and EN standard requirements. It can be controlled by the advanced software (B085-26N) when used in combination with B085-22N.
The integrated control unit allows to set the test temperature and perform the test with an accuracy of ± 0.2°C.
Power supply: 110-240V 50-60Hz
Dimensions: 610x340xH650 mm
Weight: 16 kg approx.

B085-29

B085-33N

B085-35 CONTAINER for small sample volumes for spindle TR8 (int. Ø 25 mm)

B085-36 CONTAINER for small sample volumes for spindle TR9, TR10, TR11 (int. Ø 19 mm)

B085-34N SPINDLE COMPLETE SET (TR8, TR9, TR10 and TR11) composed of:

			VISCOSITY RANGE IN mPa.s	
SPINDLE	TR	SHEAR RATE	B085-21N	B085-22N
B085-34N1	8	0.92N	14 to 3M	2 to 7M
B085-34N2	9	0.34N	75 to 16M	12 to 37M
B085-34N3	10	0.28N	146 to 31M	24 to 72M
B085-34N4	11	0.25N	300 to 64M	50 to 149M

B085-34N

ACCESSORIES

B085-26N
ADVANCED SOFTWARE FOR B085-22N
This advanced software allows the remote control of the viscosimeter through a PC, in particular:
- Creation and saving of methods, data transfer and processing.
- Use of mathematical tools for data analysis.
- Creation of free program and report editing.
- New graphical tools allowing the customised view of curves, tables and analysis results.
- Control of temperature device (B085-33N) and creation of temperature ramp.

B085-25N
STANDARD SOFTWARE FOR B085-21N
Same as B085-26N but without the possibility to control the temperature device (B085-33N) and to create temperature ramps.

B085-37 CONTAINERS' SUPPORT
B085-38 CIRCULAR LEVEL
B085-39N SPINDLE SET FROM R2 TO R7
B085-40N EXTERNAL TEMPERATURE PROBE
V174 CRUCIBLE TONGS

B085-39N

V174
B085-37
B085-35
B085-36
B085-38

DYNAMIC VISCOSITY DETERMINATION

B088N
VISCOMETER BATH

STANDARDS: EN 12595 I ASTM D2170

This viscometer bath is used to determine both the Dynamic and Kinematic viscosity of liquid asphalts, keeping the capillary type viscometers at a uniform temperature.
Consisting of:
- Borosilicate glass container 15 liters capacity
- Additional tempered glass container
- Stainless steel base with insulating cork sheet
- Stainless steel control box with selector and digital temperature reading
- Stainless steel lid with five holes for capillaries

Temperature range: room to 150 °C, ± 0.02 °C stability
Allows to simultaneous temperate five capillaries.
Viscometers and thermometers **are not included**.

Power supply: 230V 1ph 50-60Hz 1200W
Dimensions: 600x340x600 mm
Weight: 25 kg approx.

B088N

NEW

B088

B088
VISCOMETER BATH

STANDARD: EN 12595

Similar to model B088N but with ± 0.1 °C stability, according to EN 12595 specifications.
Power supply: 230V 50/60Hz 1200W
Dimensions: 350x350x520 mm
Weight: 15 Kg approx.

ACCESSORIES

B088-03N SILICONE OIL, type 50 cSt, for tests with B088N bath with temperature range: 100 °C up to 150 °C. Can of 20 kg
B088-05N HOLDER, stainless steel made, for Cannon-Manning and Asphalt Institute viscometers
B088-06N HOLDER, stainless steel made, for Cannon-Fenske viscometers
B088-07N HOLDER, stainless steel made, for Zeitfuchs cross-arm viscometers
B088-08N HOLDER, stainless steel made, for Cannon BS reverse flow viscometers
B088-12AG KINEMATIC VISCOSITY THERMOMETER ALCOHOL, range 58.5 to 61.5 °C, type ASTM 47C
B088-13AG KINEMATIC VISCOSITY THERMOMETER ALCOHOL, range 133.5 to 136.5 °C, type ASTM 110C

B088-01N
VACUUM VISCOMETER BATH

STANDARDS: EN 12596 I ASTM D2171 I AASHTO T202 I IP 222

This Vacuum Viscometer Bath is specially designed for tests that require ultra – precise temperature and vacuum control, or processes that need to be followed visually. All wetted parts are made of stainless steel, providing resistance against all usual bath fluids. The bath can be operated from ambient +5 (with a cooling system) up to +230 °C (41...446 °F). The set point can be set in steps of 0.01°C. The system overall accuracy is within ± 0.01 °C. After the temperature control is stable, the offset can even be adjusted with ± 0.005 °C. The Bath is already equipped with the digital vacuum controller, the vacuum manifold to offer 4 positions and all tubing to perform the test. This system further offers high precision and feedback regulation on the vacuum, within 0,5 mm Hg (or mBar) of its set point.

Power supply: 230V, 50-60Hz
Dimensions: 720 x 400 x 590 mm
Weight: 50 Kg approx.

TECHNICAL SPECIFICATIONS

- Temperature Range: Ambient to 230°C;
- Temperature Stability: ± 0.01°C;
- Bath Volume: 40 litres;
- Pressure Range: 30 to 430 mBar (negative pressure);
- Pressure Accuracy: ± 0.5 mBar;
- Digital Vacuum Controller;
- 4 viscometer positions;
- Selectable readout via setup: mm Hg, mBar, PSI

B088-16N

B088-17N

B088-01N

KINEMATIC VISCOSITY DETERMINATION

STANDARDS: EN 12595 I ASTM D2170 I AASHTO T201

CANNON-MANNING VACUUM VISCOMETERS

To determine the viscosity of bitumen at 60 °C.
Supplied complete with calibration certificate.

Model	Viscosity range		
B088-20	0.036	to	0.8
B088-21	0.12	to	2.4
B088-22	0.36	to	8
B088-23	1.2	to	24
B088-24	3.6	to	80
B088-25	12	to	240

Model	Viscosity range		
B088-26	36	to	800
B088-27	120	to	2400
B088-28	360	to	8000
B088-29	1200	to	24000
B088-30	3600	to	80000

Note: to measure the viscosity with the Cannon-Manning viscometers, the B088-01N bath, the B088-05N holder and asphalt institute vacuum viscometers are also needed.

ASPHALT INSTITUTE VACUUM VISCOMETERS

To determine the viscosity of bitumen at 60 °C.
Supplied complete with calibration certificate.

Model	Viscosity range		
B088-34	42	to	800
B088-35	180	to	3200
B088-36	600	to	12800
B088-37	2400	to	52000
B088-38	9600	to	1400000
B088-39	38000	to	5800000

CANNON-FENSKE OPAQUE VISCOMETERS, REVERSE-FLOW TYPE

To determine the kinematic viscosity of bitumen, distillation residues of opaque liquid asphalts, asphalt cements at 135 °C, and road oils at 60 °C. Supplied complete with calibration certificate.

Model	Approx. constant mm^2/s^2	Viscosity range mm^2/s^2		
B088-50	0.002	0.4	to	2
B088-51	0.004	0.8	to	4
B088-52	0.008	1.6	to	8
B088-53	0.015	3	to	15
B088-54	0.035	7	to	35
B088-55	0.1	20	to	100
B088-56	0.25	50	to	200
B088-57	0.5	100	to	500
B088-58	1.2	240	to	1200
B088-59	2.5	500	to	2500
B088-60	8	1600	to	8000
B088-61	20	4000	to	20000
B088-62	45	10000	to	40000
B088-63	100	20000	to	80000

Note:
to measure the kinematic viscosity with the Cannon-Fenske viscometers , the B088N or the B088-01N baths and the B088-06N holder are also needed.

Note:
to measure the kinematic viscosity with the BS viscometers, the B088N or the B088-01N baths and the B088-08N holder are also needed.

ZEITFUCHS CROSS-ARM VISCOMETERS

To determine the kinematic viscosity of bitumen, distillation residues of liquid asphalts, asphalt cements at 135 °C, road oils.
Supplied complete with calibration certificate.

Model	Approx. constant mm^2/s^2	Viscosity range mm^2/s		
B088-70	0.003	0.6	to	3
B088-71	0.01	2	to	10
B088-72	0.03	6	to	30
B088-73	0.1	20	to	100
B088-74	0.3	60	to	300
B088-75	1	200	to	1000
B088-76	3	600	to	3000
B088-77	10	2000	to	10000
B088-78	30	6000	to	30000
B088-79	100	20000	to	100000

Note:
to measure the kinematic viscosity with the Zeitfuchs cross-arm viscometers, B088N or B088-01N and corresponding holders are also needed.

CANNON BS-IP-RF FLOW REVERSE VISCOMETERS

To determine the kinematic viscosity of bitumen, distillation residues of liquid asphalts, asphalt cements at 135 °C,road oils.
Supplied complete with calibration certificate.

Model	Approx. constant mm^2/s^2	Viscosity range mm^2/s		
B088-80	0.003	0.6	to	3
B088-81	0.01	2	to	10
B088-82	0.03	6	to	30
B088-83	0.1	20	to	100
B088-84	0.3	60	to	300
B088-85	1	200	to	1000
B088-86	3	600	to	3000
B088-87	10	2000	to	10000
B088-88	30	6000	to	30000
B088-89	100	20000	to	100000
B088-90	300	60000	to	300000

B023
LABORATORY MIXER

NEW

This laboratory mixer is suitable for a wide range of applications - **mixing, emulsifying homogenising, disintegrating, dissolving** - with an efficiency and flexibility unmatched by other machines.

The **duplex mixing assembly** is a two-arm construction with two heads facing in opposite directions; the upper head pulls materials down from the surface of the mix, while the lower head draws material up from the base of the mixing container. The upper coarse Tooth Disintegrating Head is designed to chop solid materials into small pieces and then expel them beneath the shroud. The lower head simultaneously draws in these partially disintegrated solids and reduces their size further.

Typical Applications:

- Rapid solution of rubbers and polymers into lubricating oils, non-flammable solvents and asphalt for the production of luboils, adhesives and bituminous compounds.
- Disintegration and dissolving solid resin for the production of varnish.
- Addition of powders into high viscosity liquids.

With a **capacity from 1ml up to 12 litres**, it offers excellent reproducibility when scaling up to full scale production and provides an accurate and easy means of forecasting the performance of larger machines under full-scale working conditions. This level of instrumentation is invaluable for applications where process validation and reproducibility are required. The digital display also includes motor RPM, ampere rating and timer settings for operations.

Power supply: 220V 1ph 50-60Hz 746W
Dimensions: 300x500x(h)940 mm **Weight:** 25 kg approx.

Note: The unit is supplied without the head, which has to be purchased separately (see needed accessories).

B062-10
EMULSION LAB MILL

NEW

Simple and compact colloidal mill for bitumen emulsion production in laboratory. Really useful for emulsion mix design analysis in terms of bitumen, water and additives quantity. The possibility to adjust the gap between rotor and stator allows an optimal particle-size distribution and emulsion homogeneity.
The power of this colloidal mill allows to replicate in laboratory the production of bitumen emulsion done in the plant, reproducing the same mixing quality.
Dimensions: 320x150x200 mm
Power Supply: 380V 50Hz 3Ph **Weight:** 42 kg approx.

MAIN FEATURES

- Micrometric gap adjustment.
- Easy and safe operation.
- 8.000 r.p.m. high speed mill.
- One unique hopper for feeding of water phase and bitumen.
- Product quality exactly as industrial production.
- Manual 3-way valve for recirculation, production and washing.

MAIN FEATURES

- Touch screen control with digital tachometer, programmable integral timer and amperage display, all accessed via the control panel.
- Infinitely variable electronic speed control with integral on/off switch.
- Construction of all wetted parts in grade 316L stainless steel, with the exception of the bushing which is bronze alloy.
- A full range of interchangeable workheads and screens are available for all high shear mixers offering great versatility by allowing any machine to be adapted to perform a wide range of mixing operations.
- Motor: 1 hp (746w), 220 Volt, Maximum Speed 10,000 rpm, 5 max rated amp draw at full load.

NEEDED ACCESSORIES

B023-04 Standard Head
As alternative:
B023-05 LDD-Duplex Disintegrator Head

SPARES PARTS

B023-06 Carbon brushes
B023-07 Spare bronze bushing
B023-08 Spare shaft coupling pin

B023 with **B023-05**

B062-10

SECTION B

PAVETEST

Performance and dynamic tests on bituminous mixtures are crucial in road pavement engineering. They make it possible to simulate situations of load and vehicular traffic on the road surface, acquire the material's physical and mechanical response and predict the performance and durability of the pavement itself already at the design stage.

Pavetest is a brand with a strong focus on pavement engineering, created by aggregating the best skills available at the international level and developing, thanks to these skills, a range of highly innovative products, oriented to the new performance requirements of the most advanced road and research laboratories.

CDAS2
CONTROL AND DATA ACQUISITION SYSTEM

Pavetest's compact Control and Data Acquisition System (CDAS2) delivers unparalleled performance, real time control and ultimate versatility in acquisition and provide a flexible and user friendly testing solution.
It provides excellent waveform fidelity from integrated acquisition and control functions, with low level sampling at speeds of up to 200,000 samples per second simultaneously on all channels and 24 bit resolution over the full dynamic input signal range.

MAIN FEATURES

- Directly communicates with the TestLab software, providing automatic test execution and data processing.
- Compact high reliability data acquisition and control.
- Up to 5 kHz data acquisition and feedback control provides excellent waveform fidelity.
- Up to 64 times oversampling gives superior low noise performance.
- Normalized (±10 V) analog data acquisition inputs provide flexibility to use any transducer in any channel.
- Automatic recognition of transducers and upload of calibration files.

B209-16 CDAS2 16 channels

EASY DATA PROCESSING WITH THE INCLUDED SOFTWARE

The CDAS2 includes the TestLab software - supplied on USB flash drive - complete with relevant Method files (based on the test configurations supplied) and calibration files for all the transducers supplied. Software and test methods are expandable for future requirements.

AVAILABLE MODELS

B209-08
8 Channel CDAS2 - Acquisition 8 CH, 24 bit resolution
- Sampling rate up to 200 kHz (all channels)
- Smoothing up to 64 times over-sampling
- Calibration Automatically on power up
- Control Axis 2
- Communication USB or Ethernet

B209-16
16 Channel CDAS2 - Acquisition 16 CH, 24 bit resolution
- Sampling rate up to 200 kHz (all channels)
- Smoothing up to 64 times over-sampling
- Calibration Automatically on power up
- Control Axis 4
- Communication USB or Ethernet

- Up to 24 CH, 6 Axis CDAS2 also available on request

Dimensions: 110(h) x 325(d) x 265(w) mm
Power Supply: 90-264V 50-60Hz 1ph 240W
Weight: 5 kg approx.

TECHNICAL FEATURES

CONTROL:
- Up to 6 high speed, (18 bit) digital servo-control, axis.
- Digital closed loop update sampling rate of 5 kHz per axis.
- Computer programmable, Proportional, Integral and Derivative (PID) control algorithm.
- Adaptive Level Control (ALC) algorithm for best dynamic peak accuracy.
- 3 feedback control modes. E g. force, position and on-specimen strain.
- "Bumpless transfer" between control modes.

ACQUISITION:
- Analog inputs are automatically calibrated on power up.
- Simultaneous sampling of all channels.
- Up to 24 analog (± 10 Volt) input channels.
- Up to 64 times over sampling (set to 8 by default).
- 24 bit digital resolution **(approx. 1/16,777,216)**, no auto ranging required.
- Sampling rate up to 200.000 Hz.

TESTLAB SOFTWARE

Developed with ultimate flexibility in mind, TestLab test and control software caters to all levels of operator experience. By using pre-programmed **Method files**, an inexperienced operator can run a range of international test methods without the need for any programming.
Moreover, a test **Wizard**, available with popular tests, can guide the operator step by step based on a recipe book approach.
Most importantly, the experienced engineer and/or researcher need not be constrained by the functions and analysis in the method files provided. The operator may clone, modify and/or generate his/her own method file to suit their specific requirements. The Excel based data analysis offers the operator the flexibility to implement alternative analysis and customize reporting facilities.
TestLab allows for real time graphing of results and configurable real time transducer levels display with unprecedented clarity of results and analytical power.

MAIN FEATURES

- Open architecture software allows user to inspect calculations and results.
- Integrated data result post processing feature with MS Excel.
- Standard and user customizable test reporting.
- Real time graphing of results and configurable real time transducer.
- Flexible and user-friendly with unprecedented clarity of results and analytical power.
- Full access for advanced user to specify their own calculations, test results and charting.

TESTLAB, A NEW APPROACH

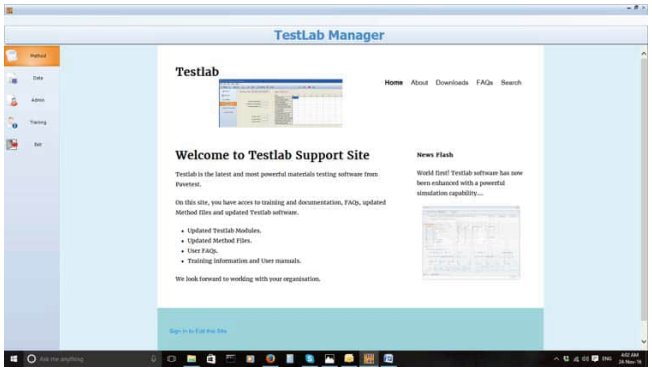
TestLab is an open architecture user programmable software application. Our engineers have taken the time to review all the relevant international test standards and used TestLab **Test Designer** to program method files according to these standards. Basically, any of these tests can be designed, cloned and/or modified by the user within TestLab. The user is no longer restricted to the test applications provided at time of purchase the possibilities are only limited by the skill and imagination of the user.

TESTLAB MANAGER

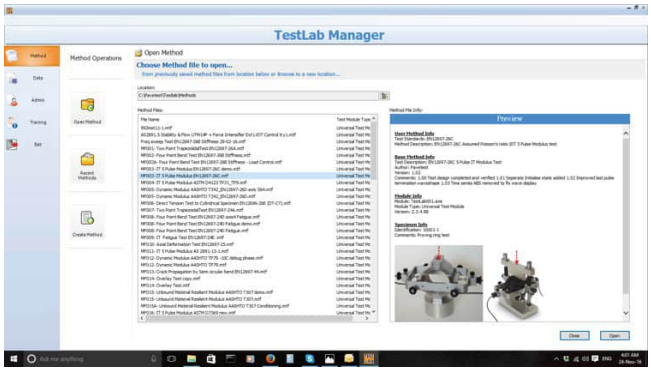
The Testlab materials testing software is a universal approach to materials testing and is designed to interface the CDAS2 – Control and Data Acquisition Systems - and the wide range of Pavetest machines. A Testlab Manager interface allows users to easily and efficiently locate the necessary method files to load and execute.

TEST METHOD SELECTION

The operator can run pre-programmed Method files, in accordance to the requested Standards, or configure an application test and then save that configuration to a customised Method file. This includes the transducer and calibration allocations, control parameters, termination conditions and any other items, which allow users to enter data. Method files may easily be "cloned", adapted and saved to be used at a later stage with pre-set preferences.



Testlab Manager

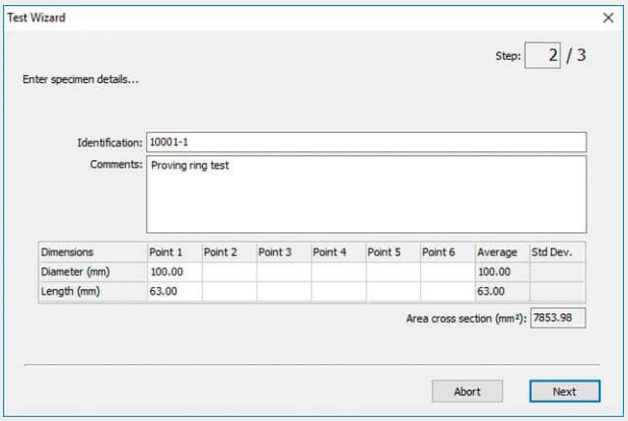


Selection of Method Files

TESTLAB, USER FRIENDLY INTERFACE

TEST WIZARD

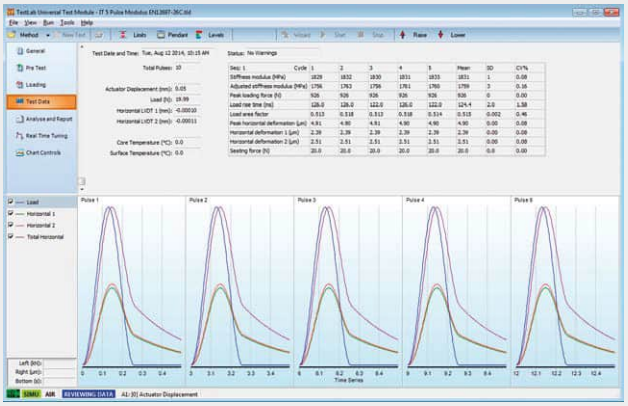
The wizard section provides a prompted menu approach to running a test. The user is driven to enter information throughout a series of easy steps.



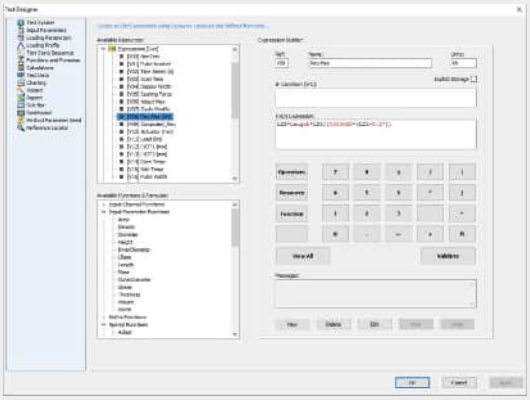
User guided Test wizard

TESTLAB UNIVERSAL TEST

The Test Data section displays run-time information, such as the loading time, cycle count, transducer readings (force, displacement, pressure, temperature), stress calculations, strain calculations and other test specific properties.



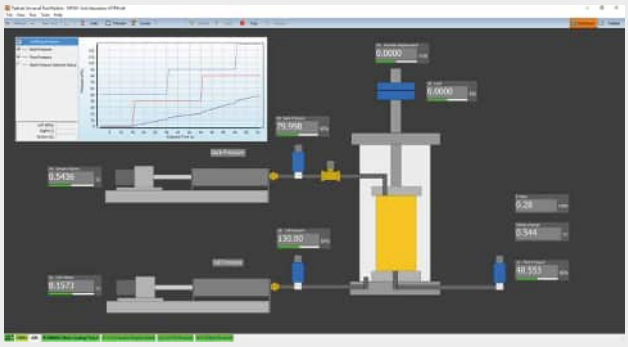
Test Data - EN12697-26C Indirect tension to cylindrical specimens



Test designer – Expressions and calculations editor

REAL TIME DASHBOARD DISPLAY

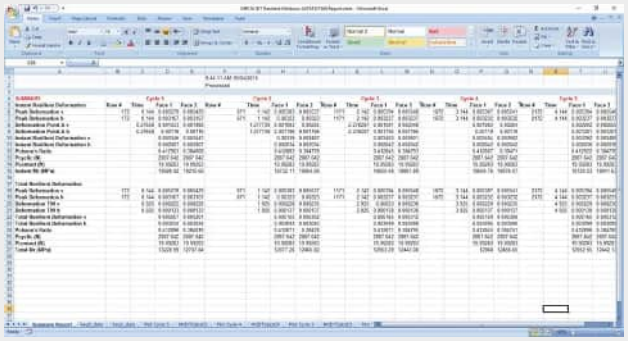
For the more sophisticated tests, Pavetest provides the user with an alternative, simpler and more intuitive representation of the current status of both machine and test method. This dashboard display feature of TestLab shows real time transducer levels, computed data and charted data before, during and after the test has completed.



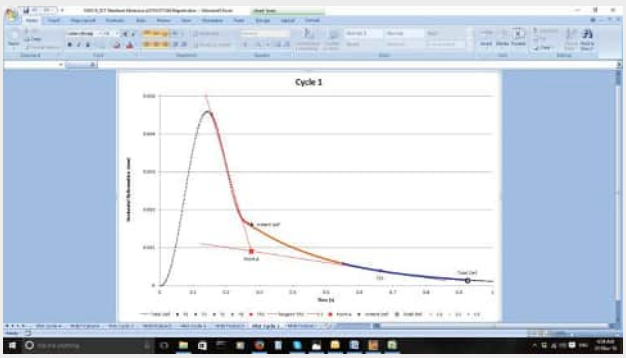
Typical dashboard screen

POST PROCESSING

All Testlab Method file tests provide the facility to send the data directly to an Excel workbook including test input and results data. This facility provides a means of efficiently post processing raw data results and customizing reports from within Excel and optionally displaying summary result in TestLab.



Post processing summary results



Excel post processing report

UPGRADE YOUR UNIVERSAL TESTING MACHINE

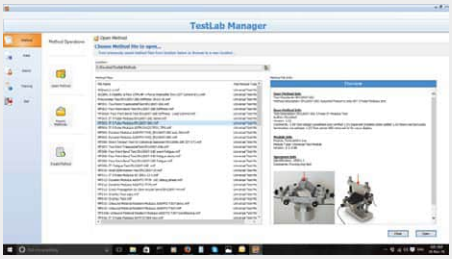
It is a well-known fact that the controller and software is one of the most important aspect of any system and the main reason testing machines become outdated or obsolete.

Pavetest has now made it easier than ever to upgrade third party servo-hydraulic/pneumatic dynamic testing machines, to Pavetest's leading-edge Control and Data Acquisition System (CDAS2) and world acclaimed TestLab software.

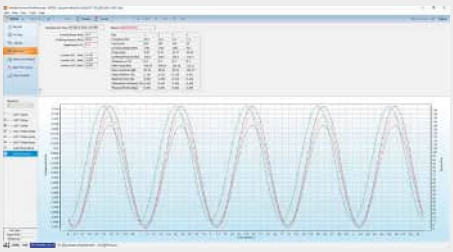
MAIN FEATURES

- TestLab Software provides powerful and flexible solution.
- Comprehensive suite of pre-programmed Method Files.
- Ability to create your own Method Files.
- Adaptable for existing transducers.
- In-line signal conditioners.
- Interfaces to most third party Hydraulic Power Supplies.

TESTLAB PC SOFTWARE



Selection of Method Files

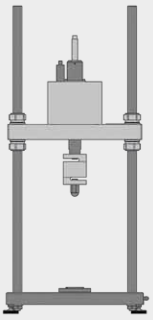


Test Methods

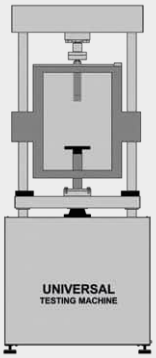
Typical dashboard screen

CDAS2 and HPS interface

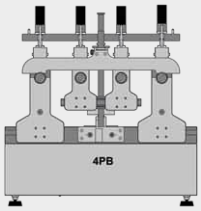
THIRD PARTY TESTING MACHINES



Servo Pneumatic test machine



Servo Hydraulic test machine



4 PT Beam test machine

B265-01
SMARTPULSE ALL-IN-ONE
18 KN ELECTRO-MECHANICAL DYNAMIC TESTING SYSTEM

NEW

SmartPulse is an **electro-mechanical servo-controlled dynamic testing** machine adopting a high-performance long-duration electro-mechanical actuator. It is engineered to deliver precise testing capabilities across tension, compression dynamic loading and is suited to testing a diverse range of materials such as asphalt and other construction materials. This versatile functionality reduces the need for multiple testing machines, optimizing resource utilization.

SmartPulse boasts **18 kN capacity in dynamic** load and **12 kN in static** load. The machine is provided with a gearmotor, so it doesn't require the need for an external compressor or pump. Unlike traditional hydraulic systems that consume large amounts of energy, SmartPulse's electro-mechanical technology minimizes resources consumption without compromising accuracy.

Key to its design is the integrated climatic chamber with low consumption in-built water cooling system ensuring uniform temperature distribution. The **small window** at the front is designed to allow access to the test space with **minimal impact on the chamber temperature**. Thanks to this feature, the machine keeps the temperature stable, reducing the energy consumption. Users can easily monitor and adjust the temperature settings via PC or thermoregulator.

SmartPulse is complemented by Pavetest's **CDAS2** digital controller and **TestLab** software, offering comprehensive integration for seamless operation and precise data analysis.

MAIN FEATURES

- Compact, fully self-contained, precision engineered unit.
- Precision electro-mechanical actuator (silent operation).
- Integrated climatic chamber.
- Fully configurable to suit a large range of testing applications.
- A gull-wing door offering a wide test area with three accessible sides.

B265-01

TECHNICAL SPECIFICATIONS

Load frame
- Between Columns 380 mm
- Vertical Space 778 mm

Servo actuator
- Actuator Stroke 50 mm
- Frequency up to 100 Hz
- 12 kN Static load
- 18 kN Dynamic load

Temperature range: -10 to +60 °C
Power supply: 230V, 50Hz, 1ph, 10A
110V, 60Hz, 1ph, 19A
Dimensions: 1900(h) x 1000(d) x 850(w) mm
Weight: 380 kg approx.

TECHNICAL FEATURES

- **Electro-mechanical unit.** The machine applies static or dynamic waveform loading either in load or displacement control to a specimen.
- **The system comprises** a load frame, a load cell, Control Data Acquisition System (CDAS) and an insulated chamber.
- **Portable refrigeration unit.** Built-in water cooling system, from -10°C to +60°C, to cover a number of international testing standards.

A small window offering access to the test space with minimal disruption to the chamber temperature.

RECOMMENDED ACCESSORIES

B250-07-KIT Temperature measuring kit comprising:
- **B292-01N** Temperature transducer (-80 °C to +80 °C) (2 pieces)
- **B250-10** Asphalt specimen
- **B250-11** 100 mm "O" ring (3 pieces)
- **B250-12** Thermal conducting grease (about 56 g)

H009-01EN
H009-01 PC complete with LCD monitor 22", keyboard, mouse, cables and installation of Testlab software, available in italian or english.

For test configurations and related jigs, please consult p. 180-191

SPARE PARTS

B220-08N Load cell 20 kN with adaptor
B230-04N Actuator LVDT 50 mm
B292-01NSP Temperature transducer -80 °C +80 °C

Thermoregulation display to monitor the temperature in real time.

Recirculation fans ensuring uniform temperature in the chamber.

16 KN SERVO-PNEUMATIC DYNAMIC TESTING SYSTEM

TWO MODELS AVAILABLE:

B220-01-KIT
DTS-16 WITH MANUAL CROSSHEAD

B220-02-KIT
DTS-16 WITH MOTORIZED CROSSHEAD

The DTS-16 Dynamic Testing System is a servo-pneumatically controlled testing machine utilizing digital control of a pneumatic servo valve to provide accurate loading wave shapes up to 70 Hz. The DTS-16 can be operated in tension, compression dynamic loading and is suited to testing a diverse range of materials such as asphalt, soil, unbound granular materials, fibres and plastics.
The DTS-16 is underpinned by Pavetest's leading edge CDAS2 digital controller, TestLab software and a full complement of accessories, hardware and software in perfect unison.

MAIN FEATURES

- Compact, robust 2-Column load frame.
- Precision engineered.
- Optional Motorized crosshead positioning.
- Fully configurable to suit a large range of testing applications.
- Digital Servo-Pneumatic control.
- 4 axis control and 16 Channel Control and Data Acquisition System.

The machines includes:

B220-11 20 kN Load frame with manual crosshead, 16 kN Servo-pneumatic actuator with its LVDT (30 mm stroke), ± 20 kN load cell

or

B220-12 20 kN Load frame with motorized crosshead, 16 kN Servo-pneumatic actuator with its LVDT (30 mm stroke), ± 20 kN load cell
+
B209-16 16 Channel Control and Data Acquisition System (CDAS2) & TestLab software

B270-12 Air reservoir assembly with membrane dryer

It requires pressurized air, minimum 7 bar (not included).

Model	B220-01 KIT	B220-02 KIT
B220-11	▼	
B220-12		▼
B209-16	▼	▼
B270-12	▼	▼

B220-02-KIT
16 kN Servo-Pneumatic dynamic testing system (motorized crosshead) with **B221** Temperature controlled cabinet

TECHNICAL SPECIFICATIONS

Load frame
- Between Columns 345 mm
- Vertical Space 650 mm

Servo actuator
- Capacity ± 16 kN
- Frequency up to 70 Hz
- Stroke 30 mm
- Air supply clean dry air
- Pressure 800-900 kPa
- Minimum rate up to 7 litres/sec

Power Supply: 90-264V 50-60Hz 1ph 240W (B220-11)
230V 50Hz 1ph 100W (B220-12)
230V 50Hz 1ph 1450W (B221)

Dimensions: 1262(h) x 400(d) x 470(w) mm B220-11 load frame
1262(h) x 400(d) x 510(w) mm B220-12 load frame
2170(h) x 840(d) x 760(w) mm load frame with temperature controlled cabinet

Weight: 80 kg load frame B220-11 load frame
125 kg load frame B220-12 load frame
160 kg temperature controlled cabinet

B220-02-KIT
DTS-16 detail

B220-12
20 kN Load frame with motorized crosshead

TECHNICAL FEATURES

- **Optional motorized crosshead.**
  A motorized crosshead allows an easier test set-up in terms of accessories positioning without using any extension rods.
- **Latest technology.**
  The DTS-16 advantage revolves around the Control Data Aquisition System (CDAS2) and TestLab Software.
- **Durable powder coated aluminium base plate** with stainless steel work platen.
- **Air reservoir assembly with membrane dryer.**
  It provides protection to the servo-valve from moisture in the compressed air supply.

RECOMMENDED ACCESSORIES

B221	Temperature controlled cabinet: -30 °C to +70 °C to suit DTS-16 or 4PBA
B250-07-KIT	Temperature measuring kit comprising:
B292-01N	Temperature transducer (-80 °C to +80 °C) (2 pieces)
B250-10	Asphalt specimen
B250-11	100 mm "O" ring (3 pieces)
B250-12	Thermal conducting grease (about 56 g)
H009-01EN **H009-01**	PC complete with LCD monitor 22", keyboard, mouse, cables and installation of Testlab software, available in italian or english.

B270-12
Air reservoir assembly with membrane dryer

SPARE PARTS

B220-01N	Load cell capacity ± 20 kN
B220-02N	Actuator LVDT 30 mm

B250-07-KIT
Temperature measuring kit

For test configurations and related jigs, please consult p. 180-191

B230
30 KN SERVO-HYDRAULIC DYNAMIC TESTING SYSTEM (DTS-30)

The DTS-30 Dynamic Testing System is a servo-hydraulic testing machine utilizing digital control of a high performance servo valve to provide accurate loading wave shapes up to 100 Hz. The DTS-30 can be operated in tension, compression dynamic loading and is suited to testing a diverse range of materials such as asphalt, soil, unbound granular materials, fibres and plastics. The DTS-30 is underpinned by Pavetest's leading edge CDAS2 digital controller, TestLab software and a full complement of accessories, hardware and software in perfect unison.
The DTS-30 Dynamic Testing System is compact, fully integrated, user and environmentally friendly.

MAIN FEATURES

- Compact, robust load frame.
- Small footprint; 90 cm x 135 cm, including hydraulic power supply and climatic chamber.
- Reaction frame embedded in the test chamber.
- Portable temperature control unit.
- Fully configurable to suit a large range of testing applications.
- Digital Servo-Hydraulic control.
- Dynaflo™ HPS provides dynamic speed control of the pump motor ensuring quiet operation.
- 4 axis control and 16 channel data acquisition as standard.

The machine includes:

- Rigid two column load frame
- 30 kN Servo-hydraulic actuator (100 mm Stroke)
- 2.2 kW Hydraulic Power Supply
- 16 Channel Control and Data Acquisition System (CDAS2) & TestLab software
- Load cell (± 30 kN)
- 100 mm actuator LVDT

B230 30 KN
Servo-Hydraulic
Dynamic Testing System with B232 temperature controlled cabinet

TECHNICAL SPECIFICATIONS

Load frame
- Between Columns 600 mm
- Vertical Space 800 mm

Servo actuator
- Capacity ± 30kN static, ± 25kN dynamic
- Frequency up to 100Hz
- Stroke 100 mm

Hydraulic Power Supply
- Pressure up to 160 bar, user defined
- Flow rate up to 7.5 litres/min
- Dimensions: 650(h) x 550(d) x 450(w) mm
- Power Supply: 230V 50-60Hz 1ph 2.5kW

Power Supply:
230V 50-60Hz 1ph 2.5kW (B230)
230V 50Hz 1ph 3.1kW (B232)

Dimensions:
2100(h) x 1220(d) x 800(w) mm load frame
2100(h) x 1800(d) x 800(w) mm with temperature controlled cabinet

Weight:
430 kg approx. load frame
650 kg approx. load frame with temperature controlled cabinet and oil-filled HPS

TECHNICAL FEATURES

- **The DTS-30 fatigue rated, servo-hydraulic actuator utilizes metal labyrinth bearings and seals.**
  The labyrinth bearings and seals are designed to reduce friction and maintain low operating temperatures.
  The bearings experience little-to-no wear, operate at high speeds and offer a long service life.
- **A bottom loading machine.** Before this current crop of universal testing machines, many dynamic testing machines were top loading. More recently, the Asphalt Mixture Performance Tester (AMPT) changed the mindset of the testing community by highlighting the benefits of a bottom loading machine.
- **Portable temperature control unit.** The temperature control unit attaches to the test chamber using a magnetic seal and can be wheeled away when not required or for servicing. It can be removed without dismantling the machine or disrupting the testing program.

NEEDED ACCESSORIES

B232 Temperature controlled cabinet:
-40 °C to +80 °C to suit DTS-30 or DTS-130

B233 Temperature controlled cabinet:
-50 °C to +100 °C to suit DTS-30 or DTS-130

B234 Temperature controlled cabinet:
-50 °C to +80 °C to suit DTS-30 or DTS-130

These temperature controlled cabinets may be supplied with humidity control, if required.

SPARE PART

B230-01N Load cell capacity ± 30 kN

RECOMMENDED ACCESSORIES

H009-01EN
H009-01 PC complete with LCD monitor 22", keyboard, mouse, cables and installation of Testlab software, available in italian or english.

B200-22 Penetration jig for specimen Ø 100 and 150 mm

B250-07-KIT Temperature measuring kit comprising:
- **B292-01N** Temperature transducer (-80 °C to +80 °C) (2 pieces)
- **B250-10** Asphalt specimen
- **B250-11** 100 mm O ring (3 pieces)
- **B250-12** Thermal conducting grease (about 56 g)

We can upgrade your existing UTM (also from other manufacturers)

For test configurations and related jigs, please consult p. 180-191

Can't see the Control and Data Acquisition System (CDAS2)? That's because **it's housed neatly, in the cabinet in front of the machine**.
You won't see a tangle of cables either; they enter the cabinet through the floor of the test chamber or through the back of the cabinet and connect to the CDAS2.
The door of the cabinet can be held ajar to allow transducers to be re-allocated or opened completely for servicing. Unused transducers can also be stored out of harm's way.
Moreover, the DTS-30 reaction frame is symmetrical; **the servo-hydraulic actuator and reaction shaft can be interchanged to make the DTS-30 top loading**.

CDAS2

WHAT MAKES IT DIFFERENT MAKES IT BETTER!

The DTS-30 is Universal Testing Machine (UTM), but not as most people know it. **It does not conform to the "me too" attitude of most UTM manufacturers.** The innovations featured on the DTS-30 are built on many years of experience, developing, studying and using various universal testing machines from a number of manufacturers.
The first thing you will notice about the DTS-30 is the absence of a reaction frame. **The reaction frame** most certainly exists, but it's **embedded in the test chamber.**
Since it is mandatory to control the test temperature of most pavement materials, e.g. asphalt, **the test chamber is insulated and forms part of the temperature controlled cabinet.**
Most UTM manufacturers opt for an elaborate (and expensive) moveable crosshead, only to find that its range (and usefulness) is limited by the climatic chamber. The DTS-30 has a remotely positioned reaction shaft that adjusts the work space. However, you won't need to adjust it often because the **servo-hydraulic actuator has 100 mm of stroke.**

B230 DTS-30 Dynamic Testing System, detail

Portable temperature control unit

DYNAFLO™ HPS
The speed of the pump motor is controlled using a variable-frequency drive (VFD), or inverter. This enables the motor to be slowed down, or turned off, when the oil flow from the pump exceeds the flow required by the actuator at any given time.

QUIET
The servo-hydraulic testing machine is almost silent during the majority of test applications. The equipped Dynaflo-HPS not only reduces noise and heat generation but also offers cost savings, by reducing power consumption.

DESIGN SOLUTION
A neat, compact and integrated solution where the **reaction frame is embedded** in the test chamber, for a very sleek appearance. Moreover, short hydraulic hoses connect the actuator to the HPS that's tucked neatly away behind the machine, under the test chamber.

EASY MAINTENANCE
The **portable temperature control unit** makes servicing, replacing or upgrading the control unit virtually effortless.

DIRECT COMMUNICATION
The test temperature and/or ramp rate may be set and monitored through TestLab software, via the virtual pendant.

B240
130 KN SERVO-HYDRAULIC DYNAMIC TESTING SYSTEM (DTS-130)

The DTS-130 Dynamic Testing System is a servo-hydraulic testing machine utilizing digital control of a high performance servo valve to provide accurate loading wave shapes up to 100 Hz. The DTS-130 is Pavetest's highest capacity Dynamic Testing System and completes the range of standard universal testing machines. The system can be operated in tension, compression dynamic loading and is suited to testing a diverse range of engineering materials and/or large asphalt specimens at very cold temperatures.
The DTS-130 is underpinned by Pavetest's leading edge CDAS2 digital controller, TestLab software and a full complement of accessories, hardware and software in perfect unison.

MAIN FEATURES

- Robust two column load frame.
- Double acting servo hydraulic, equal area type with low friction, long life bearings and seals.
- Portable temperature control unit.
- Fully configurable to suit a large range of testing applications.
- Digital Servo-Hydraulic control.
- Dynaflo™ HPS variable frequency drive (VFD) provides dynamic speed control of the pump motor ensuring quiet operation.
- 4 axis control and 16 channel data acquisition as standard.

The machine includes:

- Rigid two column load frame
- 130 kN Servo-hydraulic actuator (100 mm Stroke)
- 10 kW Hydraulic Power Supply
- 16 Channel Control and Data Acquisition System (CDAS2) & TestLab software
- Load cell (± 130 kN)
- 100 mm actuator LVDT

B240L

Same as B240 but with different frame dimensions:
3000(h) x 1070(d) x 1237(w) mm load frame.
780 kg approx. load frame.

B240
130 kN Servo-Hydraulic Dynamic Testing System with **B232** temperature controlled cabinet

TECHNICAL SPECIFICATIONS

Load frame:
- Horizontal Space: 60 cm
- Vertical Space: 100 cm

Servo actuator:
- Capacity: ± 130kN Static ± 100kN Dynamic
- Frequency: Up to 100Hz
- Stroke: 100 mm

Hydraulic Power Supply:
- Pressure: Up to 210 bar, user defined
- Flow rate: 20 litres/min
- Dimensions: 1150 (h) x 600 (d) x 1100 (w) mm
- Power supply: 380V 50Hz or 208V 60Hz 12kW 3ph

Power Supply:
380V 50Hz 3ph + neutral 12kW or
208V 60Hz 3ph + 12kW (B240)
230V 50Hz 1ph 3.1kW (B232)

Dimensions:
3005 (h) x 1070 (d) x 1090 (w) mm load frame
3005 (h) x 1630 (d) x 1090 (w) mm with temperature controlled cabinet

Weight:
680 kg approx. load frame
1360 kg approx. load frame with temperature controlled cabinet and oil-filled HPS

B240 130 kN Servo-Hydraulic Dynamic Testing System with **H009-01EN** complete PC, **B232** Temperature controlled cabinet, **B240-03** Exchanger oil/water, HPS (hydraulic power supply)

ACCESSORIES			B240-02 Exchanger oil/air	B240-03 Exchanger oil/water *
B240-04	Chiller for water refrigeration (recommended)			▼
B240-05 or B240-06	Set of hoses to connect frame - pumping unit Lg. 3 m Set of hoses to connect frame - pumping unit Lg. 8 m	(needed)	▼ ▼	▼ ▼
B240-07 or B240-08	Set of hoses to connect pumping unit - Exchanger oil/air Lg. 5 m Set of hoses to connect pumping unit - Exchanger oil/air Lg. 10 m	(needed)	▼ ▼	

* (complete with set of hoses to connect pumping unit Exchanger oil/water)

The **Hydraulic Power Supply (HPS)** utilizes a variable flow pump with a working pressure up to 210 Bar. The customer can choose either water (heat exchanger) or air (Electric fan) oil cooling. Features include; low oil, over temperature and dirty filter indication, remote starting and user selectable working pressure (via TestLab).

B232 Temperature controlled cabinet:
-40 °C to +80 °C to suit DTS-30 or DTS-130

B233 Temperature controlled cabinet:
-50 °C to +100 °C to suit DTS-30 or DTS-130

B234 Temperature controlled cabinet:
-50 °C to +80 °C to suit DTS-30 or DTS-130

These temperature controlled cabinets may be supplied with humidity control, if required.

We can upgrade your existing UTM (also from other manufacturers)

RECOMMENDED ACCESSORIES

H009-01EN
H009-01 PC complete with LCD monitor 22", keyboard, mouse, cables and installation of Testlab software, available in italian or english.

B250-07-KIT Temperature measuring kit (refer to p. 173)

B200-22 Penetration jig for specimen Ø 100 and 150 mm

SPARE PARTS

B230-02NSP LVDT actuator 100 mm long cable
B240-01N Load cell capacity ± 130 kN

For test configurations and related jigs, please consult p. 180-191

TWO PIECE TEMPERATURE CONTROLLED CABINET

Pavetest offers a range of temperature controlled cabinet to complement our **DTS-30** and **DTS-130** servo-hydraulic Dynamic Testing Systems (DTS). **Pavetest is the first manufacturer to adopt a two piece temperature controlled cabinet;** comprising an insulate cabinet and a temperature control unit. The cabinet is permanently mounted on the dynamic testing machines, whilst the temperature control unit can be wheeled away when not required, leaving the back of the chamber open to accomodate longer jigs/specimens that do not require a controlled environment. The temperature control unit attaches to the cabinet using a magnetic seal. This isolates the cabinet from mechanical vibrations caused by the refrigeration unit and circulation fans whilst maintaining an air tight seal between the inside and outside of the chamber. This concept also makes servicing, replacing or upgrading the temperature control unit virtually effortless, because it can be removed with-out dismantling the machine or disrupting the testing program.

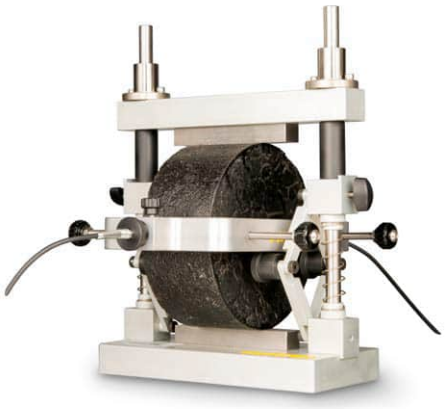
MAIN FEATURES

- Two piece concept makes servicing, replacing or upgrading the temperature control unit effortless.
- Flexible temperature sensor ensures the temperature near the specimen is accurately controlled.
- Operator can monitor, set, adjust or “Auto tune” the temperature controller via the PC.
- Heavy duty stainless steel construction.
- Powerful re-circulation fans ensure even temperature through-out the chamber.
- Triple Glazed, Argon filled, Lo E glass door with built in heater.

Two piece temperature controlled cabinet

B250-KIT
INDIRECT TENSILE MODULUS - IDTM

STANDARDS: AASHTO TP31 Resilient modulus of bituminous mixtures by indirect tension
ASTM D4123 Indirect Tension Test for Resilient Modulus of Bituminous Mixtures
AS/NZS 2891.13.1 Resilient modulus of asphalt - Indirect tensile method
EN 12697-26 Annex C - Indirect tension to cylindrical specimens (IT-CY)
EN 12697-26 Annes F - Cyclic indirect tension to cylindrical specimens (CIT-CY)



B250-KIT Indirect Tensile Modulus
Comprises:

B250-01 Basic IDT Jig
B250-08 Yoke
B250-09 Assembly for B250 KIT
B290-01N LVDT (0.2 mm) (2 pieces needed)

ACCESSORIES

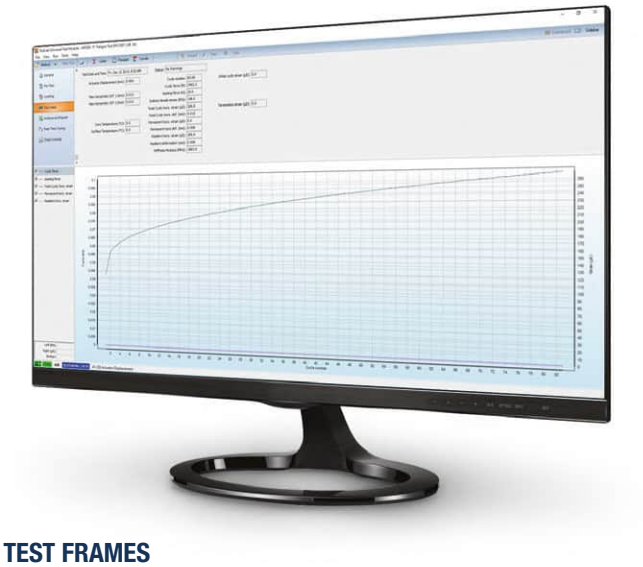
B250-03 Asphalt proving ring
B250-04 100 mm diameter PVC specimen
B250-05 150 mm diameter PVC specimen
B250-06-KIT Torque screwdriver (B250-13) with hexagonal head 4 mm (B250-14)

TEST FRAMES

Manual DTS-16 | Motorized DTS-16
DTS-30 | DTS-130 | SmartPulse

B251-KIT
INDIRECT TENSILE FATIGUE - IDTF

STANDARD: EN 12697-24 Annex E – Indirect tensile test on cylindrical shaped specimens



B251-KIT Indirect Tensile Fatigue
Comprises:

B250-01 Basic IDT Jig
B290-03N LVDT, double ball ended (3.75 mm) (2 pieces needed)
B251-01 LVDT mounting strip gluing jig

ACCESSORIES

B251-51 Pair of LVDT mounting strip to suit 100 mm specimen (**needed** accessory)
And/or
B251-52 Pair of LVDT mounting strip to suit 150 mm specimen (**needed** accessory)
B201-52 5 Minute, two part epoxy 24 ml

TEST FRAMES

Manual DTS-16 | Motorized DTS-16
DTS-30 | DTS-130 | SmartPulse

Note: B252-KIT, combines B250 KIT with B251 KIT, and allows users to perform both IDTM and IDTF tests.

B260-KIT
UNIAXIAL CYCLIC COMPRESSION - UCC

STANDARD: EN 12697-25 Cyclic compression. Test Method A - Uniaxial cyclic compression test with confinement
TP Asphalt-StB 25A1: Dynamic punching test on mastic asphalt
TP Asphalt-StB 25A2: Dynamic punching test on rolled asphalt

B260-KIT Uniaxial cyclic compression
Comprises:
B260-01N Base assembly
B260-02 Chamfered top platen
B290-02N LVDT (10 mm) (2 pieces needed)

TEST FRAMES

Manual DTS-16 | Motorized DTS-16
DTS-30 | DTS-130 | SmartPulse

Note: B263-KIT combines B260-KIT and B261-KIT and allows to perform both UCC and PD.

ACCESSORY

B260-05 Upper loading platen in accordance with method A2 EN 12697-25
B260-06 56.4 mm top loading platen for TP Asphalt-STB Part 25A1
B260-07 80 mm top loading platen for TP Asphalt-STB Part 25A2

B260-10
PULL OFF TENSION JIG

STANDARD: TP Asphalt-StB – Part 81, Adhesive pull strength of thin asphalt layers

B260-10 Pull off tension jig

TEST FRAMES

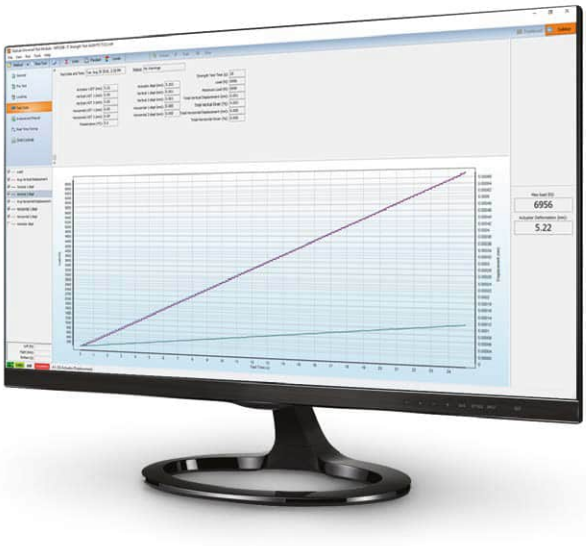
DTS-30

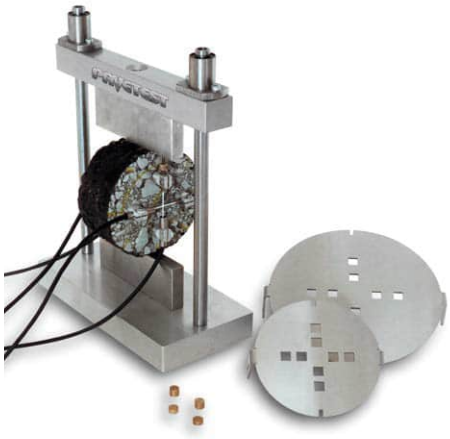
ACCESSORY

B261-01 DTS-30 Tension base (needed)

B253-KIT
INDIRECT TENSILE MODULUS, CREEP COMPLIANCE AND STRENGTH USING ON-SPECIMEN TRANSDUCERS - IDTOS

STANDARDS: ASTM D7369 Resilient Modulus of Bituminous Mixtures by Indirect Tension Test
AASHTO T322 Creep Compliance and Strength of Hot-Mix Asphalt (HMA) Using the Indirect Tensile Test Device





B253-KIT Indirect Tensile modulus, creep compliance and strength using on-specimen transducers

Comprises:

B250-01 Basic IDT Jig
B253-01 AASHTO T322 LVDT mounting Jig
B290-04N Miniature LVDT (1 mm) (4 pieces needed)
B253-02 AASHTO T322 gauge point template (100 mm specimen)
B253-03 AASHTO T322 gauge point template (150 mm specimen)

ACCESSORIES

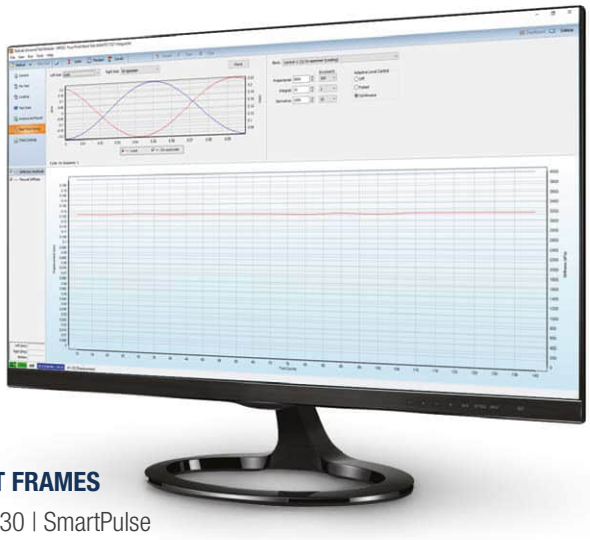
B253-53 Gauge point (24 **needed** pieces)
B201-52 5 Minute, two part epoxy 24 ml
B230-05 Force intensifier, designed specifically for DTS-30. It enables 30 kN machine to perform tests that require more than 100 kN static load, in order to meet also AASHTO T322.

TEST FRAMES

Manual DTS-16 | Motorized DTS-16
DTS-30 | DTS-130 | SmartPulse

B212
FOUR POINT BENDING - 4PB

STANDARDS: AASHTO T321 Fatigue Life of Compacted Hot-Mix Asphalt (HMA) Subjected to Repeated Flexural Bending
ASTM D7460 Fatigue Failure of Compacted Asphalt Concrete Subjected to Repeated Flexural Bending
AG:PT/T233 Fatigue life of compacted bituminous mixes subject to repeated flexural bending
AG:PT/T274 Characterisation of flexural stiffness and fatigue performance bituminous mixes
EN 12697-24 Annex D - Four point bending test on prismatic shaped specimens
EN 12697-26 Annex B - Four point bending test on prismatic specimens (4PB-PR)



ACCESSORIES

B210-02 4PB PVC Beam
B210-03 4PB Reference beam

SPARE PARTS

B210-05N Actuator LVDT 10 mm
B210-06N Load cell capacity ± 15 kN

TEST FRAMES

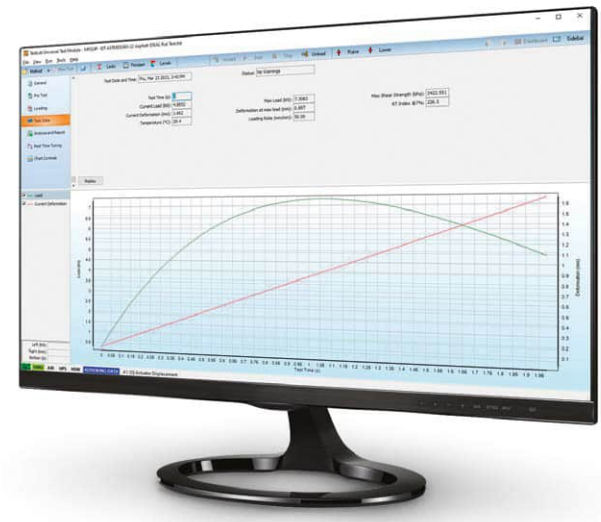
DTS-30 | SmartPulse

Note: More technical specifications at page 193.

B256-KIT IDEAL RT

NEW

STANDARD: ASTM D8360 Standard Method for Determination of Rutting Tolerance Index of Asphalt Mixture Using the Ideal Rutting Test



B256-KIT Ideal RT

Comprises:

B256-01 Ideal RT Jig

B250-01 Basic IDT Jig

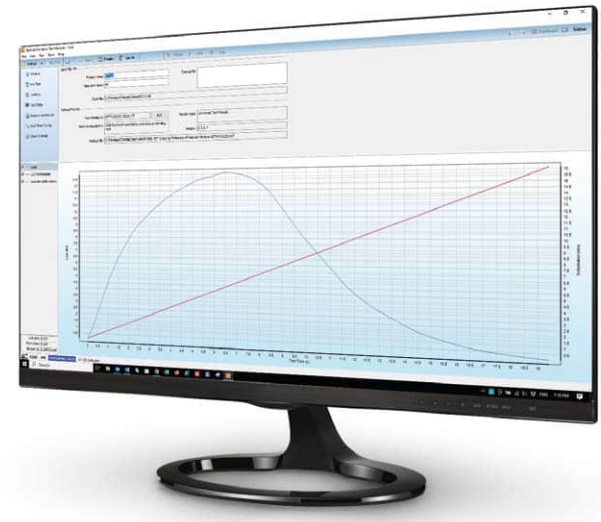
TEST FRAMES

Manual DTS-16 | Motorized DTS-16
DTS-30 | DTS-130 | SmartPulse | Unitronic 50 kN

B257-KIT IDEAL CT

NEW

STANDARD: ASTM D8225 Indirect Tensile Asphalt Cracking Test



Ideal CT

Comprises:

B253 Indirect tensile modulus, creep compliance and strength using on-specimen transducers

B253-06 Loading Strips

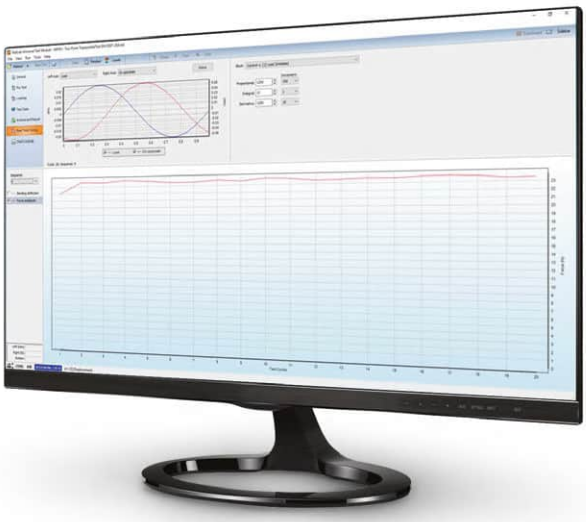
TEST FRAMES

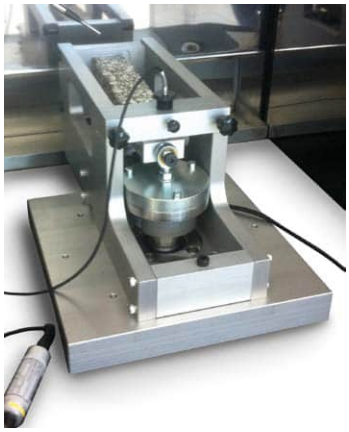
DTS-30 | DTS-130 | Unitronic 50 kN

Note: It is possible to perform Ideal CT also with B250-01 Jig

B280-KIT
TWO POINT BENDING (2PB) - 2PB

STANDARDS: EN 12697-24 Annex A - Two-point bending test on trapezoidal shaped specimens (2PB-TR)
EN 12697-26 Annex A - Two point bending test on trapezoidal specimens (2PB-TR)





B280-KIT Two Point Bending (2PB)
Comprises:
B280-01 2PB Jig
B280-51 2PB Mounting plate (25 mm apex)
B280-52 2PB Mounting plate (50 mm apex)
B280-53 2PB Mounting plate (base)

TEST FRAMES

DTS-30 I SmartPulse

ACCESSORIES

B290-05N LVDT (2 mm) (**needed** accessory)
B280-02 Two point Bending (2PB) gluing jig (**needed** accessory)
B201-52 5 Minute, two part epoxy 24 ml

B261-KIT I B262-KIT
PERMANENT DEFORMATION - PD

STANDARD: AS/NZS 2891.12.1 Determination of the permanent compressive strain characteristics of asphalt - Dynamic creep test
TP Asphalt-StB – Part 25B Uniaxial pressure-fatique testing. Determination of deformation behavior of roller asphalt during heat

B261-KIT

B262-KIT

B261-KIT Permanent deformation
Comprises:
B260-01N Base assembly
B260-03 110 mm top platen
B290-02N LVDT (10 mm) (2 pieces needed)

B262-KIT Permanent deformation
Comprises:
B260-01N Base assembly
B260-04 170 mm top platen
B290-02N LVDT 10 mm (2 pieces needed)

TEST FRAMES

Manual DTS-16 I Motorized DTS-16
DTS-30 I DTS-130 I SmartPulse

Note: B263-KIT combines B260-KIT and B261-KIT and allows to perform both UCC and PD.

B255-KIT
DYNAMIC MODULUS - E*

STANDARD: AASHTO T342 Determining Dynamic Modulus of Hot Mix Asphalt (HMA)

B255-KIT Dynamic modulus
Comprises:

B200-02 105 mm bottom loading platen
B200-03 105 mm top loading platen
B253-04 AASHTO T342 LVDT mounting jig (3 pieces needed)
B290-06N LVDT (1 mm) (3 pieces needed)
B253-05 Screwdriver hex bit with spherical head size 2 mm

TEST FRAMES

DTS-30 | DTS-130 | SmartPulse*

Note*: only on small specimens (see below).

ACCESSORIES

B202 Gauge Point Fixing Jig
B203 Dynamic Verification Device
B253-53 Gauge point (24 **needed** pieces)
B201-52 5 Minute, two part epoxy 24 ml

DYNAMIC MODULUS ON SMALL SPECIMENS | DTS-30/130 and SmartPulse

To test 38 mm (diameter) x 110 mm (h) specimens with DTS-30/130 and SmartPulse, the following items are required

B200-05 Bottom loading platen for 38 x 110 mm (Ø x h) specimen
B200-06 Top loading platen for 38 x 110 mm (Ø x h) specimen
B253-04 AASHTO T342 LVDT mounting jig (3 pieces needed)
B290-06N LVDT (1 mm) (3 pieces needed)
B253-53 Gauge point (24 needed pieces)
B253-05 Screwdriver hex bit with spherical head size 2 mm
B202 Gauge Point Fixing Jig
B202-02 Spacer for 110 mm specimen height to be used with gauge point fixing jig B202
B202-03 38 mm and 50 mm diameter specimen - extension for gauge point fixing jig plungers B202

B203 Dynamic Verification Device (optional)
B201-52 5 Minute, two part epoxy 24 ml (optional)

To test 50 mm (diameter) x 135 mm (h) specimens with DTS-30/130 and SmartPulse, the following items are required:

B200-07 Bottom loading platen for 50 x 135 mm (Ø x h) specimen
B200-08 Top loading platen for 50 x 135 mm (Ø x h) specimen
B253-04 AASHTO T342 LVDT mounting jig (3 pieces needed)
B290-06N LVDT (1 mm) (3 pieces needed)
B253-53 Gauge point (24 needed pieces)
B253-05 Screwdriver hex bit with spherical head size 2 mm
B202 Gauge Point Fixing Jig
B202-01 Spacer for 135 mm specimen height to be used with gauge point fixing jig B202
B202-03 38 mm and 50 mm diameter specimen - extension for gauge point fixing jig plungers B202

B203 Dynamic Verification Device (optional)
B201-52 5 Minute, two part epoxy 24 ml (optional)

B271-KIT
CYCLIC TRIAXIAL COMPRESSION - CCT

STANDARD: EN 12697-25 Cyclic compression. Test Method B - Triaxial cyclic ompression test

B271-KIT Cyclic triaxial compression
Comprises:

B270-01 Triaxial cell, suitable for Ø 100 mm, up to 200 mm height specimens
B270-02 Triaxial cell external LVDT mounting jig
B293-01N Pressure transducer (± 300 kPa)
B270-06 110 mm diameter top loading platen for EN 12697-25B
B270-15 110 mm diameter base pedestal for 100 mm height specimen

TEST FRAMES

Manual DTS-16 | Motorized DTS-16
DTS-30 | DTS-130

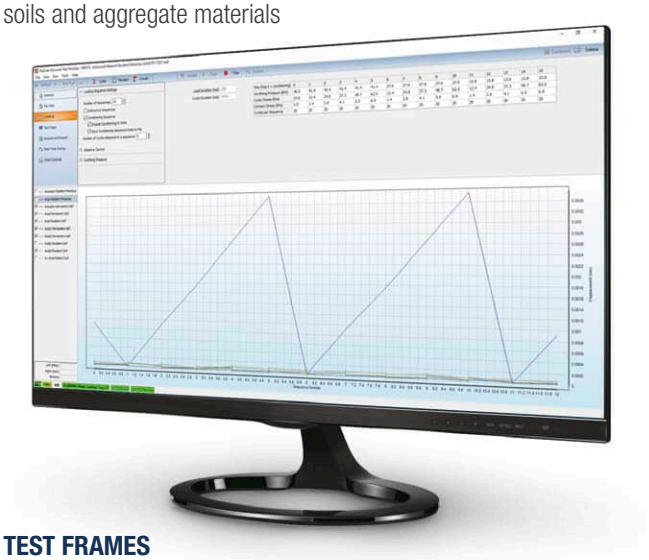
*Requires pressurized air, minimum 7 bar (not included)

ACCESSORIES

B290-02N Displacement transducer (10 mm) (2 pieces **needed**)
B270-04 Air reservoir assembly confining pressure upgrade kit (**needed** accessory for DTS-16)*
or
B270-03 Air reservoir assembly with confining pressure control (**needed** accessory for DTS-30/130*)
B270-17 Ø 200 mm base plate (**needed** accessory for DTS-30)
B270-18 Membrane stretcher for asphalt specimen Ø 100 mm
B201-53 Ø 100 mm rubber membrane 0.3 mm thickness (pack of 10)
S311-03 Ø 100 mm sealing ring (10 pieces)
S316-03 Ø 100 mm porous disc (2 pieces) needed for AASHTO T307
B270-05 Ø 110 mm bottom platen assembly

B272-KIT
TRIAXIAL RESILIENT MODULUS - TRM

STANDARD: AASHTO T307 Determining the resilient modulus of soils and aggregate materials



B272-KIT Triaxial resilient modulus
Comprises:

B270-01 Triaxial cell, suitable for Ø 100 mm, up to 200 mm height specimens
B270-02 Triaxial cell external LVDT mounting jig
B293-02N Pressure transducer (± 600 kPa)
S315-07 100 mm diameter bottom platen
S314-03 100 mm diameter top platen

To test 150x300 mm samples B276-KIT is required. It comprises:

B270-09 Triaxial cell, suitable for Ø 150 mm, up to 300 mm height specimens
B270-02 Triaxial cell external LVDT mounting jig
B293-02N Pressure transducer 600 kPa
B270-03 Air reservoir assembly with confining pressure control
B270-10 Ø 150 mm bottom platen for AASHTO T307/TP46
B270-11 Ø 150 mm top platen for AASHTO T307/TP46

TEST FRAMES

Manual DTS-16 | Motorized DTS-16
DTS-30 | DTS-130

ACCESSORIES

Same accessories of B271-KIT

B274-KIT
DYNAMIC MODULUS AND FLOW NUMBER

STANDARDS: AASHTO T378 Standard Method of Test for Determining the Dynamic Modulus and Flow Number for Asphalt Mixtures

B274-KIT Dynamic Modulus and Flow Number Kit
Comprises:

B270-01 Triaxial cell, suitable for Ø 100 mm x up to 200 mm tall
B293-01N Pressure transducer (± 300kpa)
B200-03 105 mm top loading platen
B270-16 Ø 105 mm base pedestal for 150 mm height specimen

ACCESSORIES

B200-01N AMPT LVDT 2.00 mm (3 needed)
B270-04 Air reservoir assembly confining pressure upgrade jig (needed for DTS-16)*
or
B270-03 Air reservoir assembly with confining pressure control (**needed** for DTS-30/130*)
B270-17 Ø 200 mm base plate (**needed** accessory for DTS-30)
B253-53 Gauge point (24 pieces needed)
B201-52 5 minute, two part epoxy 24 ml
S311-03 Sealing ring Ø 100 mm
B201-53 100 mm rubber membrane 0.3 mm thickness (pack of 10)
B202 Gauge point fixing jig
B203 AMPT dynamic verification device
B200-10 Latex membrane material cut in Ø 100 mm discs (needed for AASHTO T378)

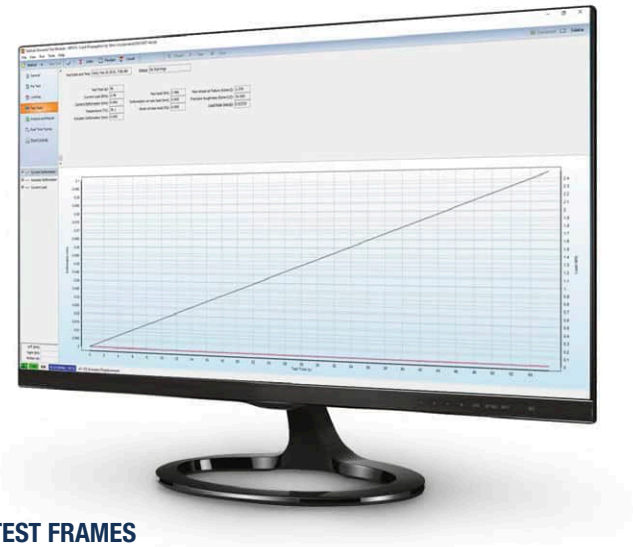
*Requires pressurized air, minimum 7 bar (not included)

TEST FRAMES

Manual DTS-16 | Motorized DTS-16
DTS-30 | DTS-130

B254-KIT
SEMI-CIRCULAR BENDING - SCB

STANDARD: EN 12697-44 Tensile Strength and Fracture Toughness-Crack Propagation



B254-KIT EN SCB testing kit
Comprises:

B254-01 SCB jig
B254-51 Pair of SCB wear plates

ACCESSORIES

B250-01 Basic Indirect Tensile Jig (**needed** accessory)
B290-07N Deformation gauge
B290-02N Displacement transducer (10 mm) (2 optional pieces)

TEST FRAMES

DTS-30 | DTS-130 | SmartPulse

B254-02-KIT
AASHTO I ASTM SCB TESTING KIT

STANDARDS: AASHTO T393 (Method B) Determining the fracture potential of asphalt mixtures using semicircular bend geometry (SCB) at intermediate temperature
ASTM D8044 Evaluation of asphalt mixture cracking resistance using the semi-circular bend test (SCB) at intermediate temperature
AASHTO T394 Determining the fracture energy of asphalt mixtures using the semicircular bend geometry (SCB)

B254-02-KIT AASHTO I ASTM SCB testing kit
Comprises:

B208 SCB frame
B254-10 Roller support
B254-02 Springs and roller

TEST FRAMES
DTS-16 Manual I DTS-16 Motorized
DTS-30 I DTS-130 I SmartPulse

OPTIONAL ACCESSORIES for AASHTO T393, ASTM D8044

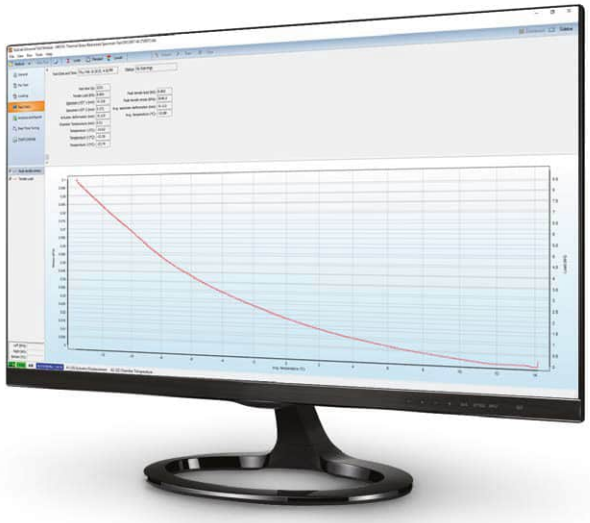
B290-02N LVDT (10mm) (1 or 2)
B254-11 LVDT mounting assembly (q,ty according to B290-02N)
B254-12 Positioning device
B254-03 Upgrade for AASHTO T393 Method A

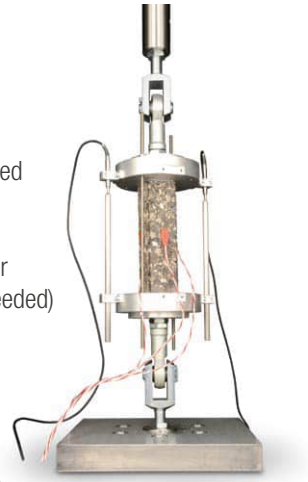
NEEDED ACCESSORIES for AASHTO T394

B254-13 Gauge point template
B254-14 LVDT mounting hardware (2 **needed**)
B254-15 LVDT mounting frame (2 **needed**)
B253-53 Gauge point (2 **needed**)
B290-05N LVDT 2.00 mm (2 needed) or
B290-06N LVDT 1.00 mm (2 needed)
B290-07N SCB deformation gauge

B282-KIT
THERMAL STRESS RESTRAINED SPECIMEN TEST - TSRST

STANDARDS: AASHTO TP10 Thermal Stress Restrained Specimen Tensile Strength
EN 12697-46 Low Temperature Cracking and Properties by Uniaxial Tension
TP Asphalt-StB 46A Cold properties: uniaxial tensile stress test and thermal stress restrained specimen test





B282-KIT Thermal Stress Restrained Specimen Test

Comprises:

B282-01N TSRST Temp Transducer (-80°C to +80°C) (3 needed)
B282-02 Rod End (2 needed)
B282-03 Clevis Yoke and Pin (2 needed)
B282-04 Platen (2 needed)
B282-05 LVDT Holder (2 needed)
B282-06 Invar Rod (250 mm long) (2 needed)
B282-07 Multi tack adhesive squares

TEST FRAMES

DTS-30 | DTS-130

Note: UNIAXIAL THERMAL STRESS AND STRAIN TEST (UTSST) is available combining B282-KIT together with B283-KIT, only for DTS-130.

ACCESSORIES

B290-09N Displacement transducer (5 mm) (2 pieces **needed**)
B261-01 B230 tension base (**needed** accessory for DTS-30)
B282-08 TSRST specimen gluing jig (1 piece **needed**)
B201-52 5 minute, two part epoxy 24 ml

B284-01
DISK SHAPED COMPACT TENSION TEST KIT - DC(T)

STANDARD: ASTM D7313 a Determining fracture energy of asphalt aggregate mixtures using the disk-shaped compact tension geometry

B284-01 Disk Shaped Compact Tension Test Kit

TEST FRAMES

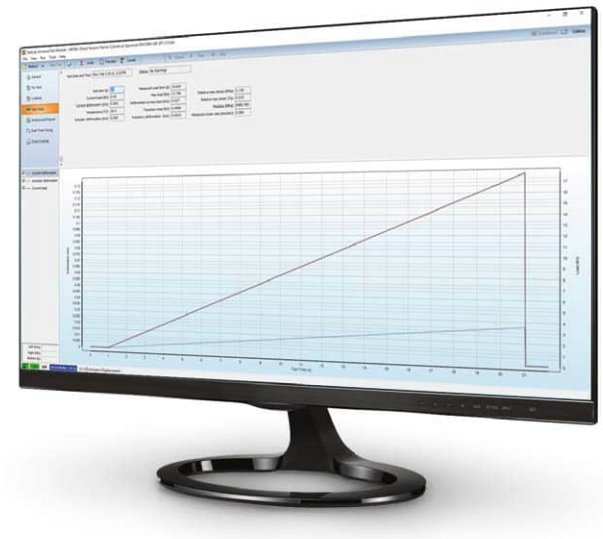
DTS-30 | DTS-130

ACCESSORIES

B261-01 B230 tension base (**needed** accessory for DTS-30)
B290-07N Deformation gauge (**needed** accesory)
or
B290-12N Epsilon Clip-On gauge 12.5 mm +1/-7 mm (**needed** accesory)
C090-18 Knife edge (Pack of 24) only for B290-12N

B264-KIT
DIRECT TENSION TESTING KIT - DTT

STANDARDS: EN 12697-26 Annex E - Test applying direct tension to cylindrical specimens (DT-CY) or to prismatic specimens (DT-PR)
EN 12697-26 Annex D - Direct tension-compression test on cylindrical specimens (DTC-CY)
AASHTO T400 | AASHTO TP107 Standard Method of Test for Determining the Damage Characteristic Curve of Asphalt Mixtures from Direct Tension Cyclic Fatigue Tests



B264-KIT Direct tension testing kit
Comprises:
B261-02 Spherical seat coupling (2 pieces needed)
B261-03 105 mm tension platen (2 pieces needed)

TEST FRAMES

DTS-30 | DTS-130 | SmartPulse

ACCESSORIES

B253-04	LVDT mounting (3 pieces **needed**) jig
B290-06N	LVDT (1 mm) (3 pieces **needed**)
B253-05	Screwdriver hex bit with spherical head size 2 mm
B201-52	5 Minute, two part epoxy 24 ml
B202	Gauge point fixing jig
B202-04	Spacer for 130 mm specimen height to be used with B202 (optional)
B253-53	Gauge Point (24 needed)
B261-01	B230 tension base (**needed** accessory for DTS-30)

AASHTO T400/TP107 ON SMALL SPECIMENS | DTS-30/130 and SmartPulse

To test 38 mm (diameter) x 110 mm (h) specimens with DTS-30/130 and SmartPulse unit, the following items are required:

B200-11	38MM AMPT tension platen (2 pieces needed)
B261-02	Spherical seat coupling
B202	Gauge Point Fixing Jig
B202-02	Spacer for 110 mm specimen height to be used with gauge point fixing jig B202
B202-03	38 mm and 50 mm diameter specimen - extension for gauge point fixing jig plungers B202
B253-04	LVDT mounting (3 pieces needed) jig
B290-06N	LVDT (1 mm) (3 pieces needed)
B253-05	Screwdriver hex bit with spherical head size 2 mm
B201-52	5 Minute, two part epoxy 24 ml
B253-53	Gauge Point (24 needed)

To test 50 mm (diameter) x 135 mm (h) specimens with DTS-30/130 and SmartPulse unit, the following items are required:

B200-12	50MM AMPT tension platen (2 pieces needed)
B261-02	Spherical seat coupling
B202	Gauge Point Fixing Jig
B202-01	Spacer for 135 mm specimen height to be used with gauge point fixing jig B202
B202-03	38 mm and 50 mm diameter specimen - extension for gauge point fixing jig plungers B202
B253-04	LVDT mounting jig (3 pieces needed)
B290-06N	LVDT (1 mm) (3 pieces needed)
B253-05	Screwdriver hex bit with spherical head size 2 mm
B201-52	5 Minute, two part epoxy 24 ml
B253-53	Gauge Point (24 needed)

B204-KIT
OVERLAY KIT ACCORDING TO ASTM WK26816

STANDARD: ASTM WK26816 New Test Method for Determining the Susceptibility of Asphalt Mixtures to Cracking

B204-KIT Overlay kit according to ASTM WK26816
Comprises:
B204-01 Overlay jig
B204-02 Pair of overlay tester (OT) specimen plates
B204-03 OT specimen preparation jig according to ASTM WK26816

NEEDED ACCESSORIES

B261-01 DTS-30 tension base
B261-02 Spherical seat coupling
B290-05N LVDT 2.00 mm or **B290-06N** LVDT 1.00 mm
B204-04 Adapting flange
B204-05 Cutting template for specimen preparation
S307-11 Alignement coupler assembly

TEST FRAMES

Manual DTS-16 | Motorized DTS-16
DTS-30 | DTS-130 | SmartPulse

B204-01-KIT
OVERLAY KIT ACCORDING TO TEX-248-F

STANDARD: TxDOT Designation. TEX-248-F Test Procedure for Overlay Test

B204-01-KIT Overlay kit according to TEX-248-F
Comprises:
B204-01 Overlay jig
B204-02 Pair of overlay tester (OT) specimen plates
B204-13 OT specimen preparation jig according to TEX-248-F

NEEDED ACCESSORIES

B261-01 DTS-30 tension base
B261-02 Spherical seat coupling
B290-05N LVDT 2.00 mm or **B290-06N** LVDT 1.00 mm
B204-04 Adapting flange
B204-05 Cutting template for specimen preparation
S307-11 Alignement coupler assembly

TEST FRAMES

Manual DTS-16 | Motorized DTS-16
DTS-30 | DTS-130 | SmartPulse

B210-KIT
STAND-ALONE SERVO-PNEUMATIC FOUR POINT BENDING (4PB) SYSTEM

STANDARDS: EN 12697-24 Annex D I EN 12697-26 Annex B I AASHTO T321 I ASTM 03 I ASTM D7460

The Pavetest Servo-pneumatic Four Point Bending (4PB) System is a servo-pneumatic testing machine utilizing digital control of a high performance servo valve to provide accurate loading wave shapes up to 60Hz. The 4PB system can be operated in haversine or sinusoidal, controlled stain or sinusoidal controlled stress mode to determine the flexural stiffness/modulus and resistance to fatigue of asphalt beams of various sizes.

MAIN FEATURES

- Robust four point loading frame.
- Backlash free rotation and translation on all load and reaction points.
- Fully configurable to suit a large range of testing applications.
- High performance servo-valve.
- Long life pneumatic actuator.
- Digital Servo-pneumatic control.
- 2 axis control and 8 channel data acquisition.

B210-01
Servo-pneumatic four point apparatus

B210-KIT comprises:

- **B210-01** Servo-pneumatic Four Point Bending (4PB) Device with 10 mm actuator LVDT, ± 5 kN load cell. and 2 mm On-specimen LVDT
- **B209-08** 8 Channel Control and Data Acquisition System (CDAS2) & TestLab software
- **B270-12** Air reservoir assembly with membrane dryer

It requires pressurized air, minimum 7 bar (not included)

The 4PB System is underpinned by Pavetest's leading edge CDAS2 digital controller, TestLab software and a full complement of accessories, hardware and software in perfect unison.

TECHNICAL SPECIFICATIONS

Load frame

- Outer clamp span 355.5 mm (14") and 420 mm
- Nominal beam size(s): 50 mm (h) x 50 mm (w)
  50 mm (h) x 63.5 mm (w)
  70 mm (h) x 70 mm (w)
  70 mm (h) x up to 85 mm (w)

Servo actuator

- Capacity ± 5 kN
- Frequency Up to 60Hz;
- Stroke 10 mm
- Air supply clean dry air
- Pressure 800-900 kPa
- Minimum rate up to 7 litres/sec

On-specimen transducer

- Range ± 1 mm
- Resolution 0.0002 µm
- Accuracy Better than 5 µm

Power Supply: 90-264V 50/60Hz 1ph 240W (B210 KIT)
Dimensions: 590(h) x 250(d) x 570(w) mm (B210-01)
410(h) x 250(d) x 570(w) mm (B212)
Weight: 45 kg approx. (B210-01)
35 kg approx. (B212)

NEEDED ACCESSORIES

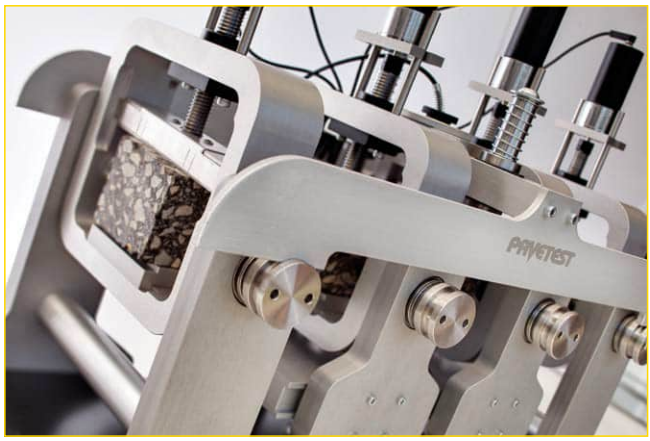
B210-02 4PB PVC Beam
B210-03 4PB Reference beam
B250-07-KIT Temperature measuring kit comprising:

- **B292-01N** Temperature transducer (-80 °C to +80 °C) (2 pieces)
- **B250-10** Asphalt specimen
- **B250-11** 100 mm O ring (3 pieces)
- **B250-12** Thermal conducting grease (about 56 g)

SPARE PARTS

B210-04N Load cell capacity ± 5 kN
B210-05N Actuator LVDT 10 mm

B210-02 PVC Beam



B210-01 Servo-pneumatic four point apparatus, detail

RECOMMENDED ACCESSORIES

B221 Temperature controlled cabinet: -30 °C to +70 °C to suit DTS-16 or 4PBA

H009-01EN
H009-01 PC complete with LCD monitor 22", keyboard, mouse, cables and installation of Testlab software, available in italian or english.

4PBA sharing CDAS2 with DTS16:

B210-01 Servo-pneumatic Four Point Bending (4PB) device with 10 mm actuator LVDT, ± 5 kN load cell and 2 mm Onspecimen LVDT (sharing CDAS2 with DTS 16)

It requires pressurized air (not included).

4PBA sharing CDAS2 with DTS130:

B210-01 Servo-pneumatic Four Point Bending (4PB) device with 10 mm actuator LVDT, ± 5 kN load cell and 2 mm Onspecimen LVDT (sharing CDAS2 with DTS 130)
B270-12 Air reservoir assembly with membrane dryer

It requires pressurized air (not included).

B270-12
Air reservoir assembly with membrane dryer

B200L
AMPT (SPT)
ASPHALT MIXTURE PERFORMANCE TESTER
COMPACT, FULLY SELF CONTAINED, PRECISION ENGINEERED UNIT

STANDARDS: AASHTO T400, AASHTO T411, AASHTO TP132, AASHTO TP134, AASHTO T378, AASHTO TP107

The Pavetest AMPT is a servo-hydraulically controlled testing machine specifically designed to perform the three asphalt tests developed under NCHRP Projects 9-19 and 9-29; Dynamic Modulus, Flow Number and Flow Time. It is also the prescribed equipment in AASHTO T400, AASHTO T411, AASHTO TP132, AASHTO TP134 and AASHTO T378 Standard Method Test for Determining the Dynamic Modulus and Flow Number for Hot Mix Asphalt (HMA) using the Asphalt Mixture Performance Tester (AMPT). In addition, the Pavetest AMPT can also perform AASHTO TP107 for Determining the Damage Characteristic Curve and Fatigue Analysis Parameters of Asphalt Mixtures in the AMPT, Indirect Tensile Dynamic Modulus, Incremental Repeated Load Permanent Deformation, Semi-circular bend, and Overlay Testing of Asphalt Mixtures.
The Pavetest AMPT is underpinned by Pavetest's leading edge CDAS2 digital controller, TestLab software and a full complement of accessories, hardware and software in perfect unison.

MAIN FEATURES

- Thermoelectric (TE) Heating/Cooling
  More reliable and environmentally friendly than mechanical refrigeration & heating elements.
- Magnetically mounted on-specimen transducer system, based on loose core LVDTs or optional epsilon extensometers.
- Gauge point fixing jig facilitates gluing gauge points and the (top and bottom) platens for proposed AMPT Direct Tension Cyclic Fatigue (S-VECD) Test.
- Dynamic Verification Device.
- Dynaflo™ HPS provides dynamic speed control of the pump motor ensuring quiet operation.
- Optional built-in, silent, air compressor with associated air preparation equipment.

The machine includes:

- 8 Channel Control and Data Acquisition System (CDAS2) & TestLab software
- 30 mm Actuator LVDT
- Load cell (± 20 kN)
- Pressure transducer (± 300 kPa)
- Temperature transducer (-80 °C to + 80 °C)
- Magnetically mounted on-specimen LVDT (2 mm) (3 pieces)
- 105 mm bottom loading platen
- 105 mm top loading platen

It requires pressurized air, minimum 4 bar (not included).

B200L AMPT/SPT Asphalt Mixture Performance Tester

TECHNICAL SPECIFICATIONS

Load capacity: 19kN (Static) - 17kN (Dynamic)

Actuator stroke: 30 mm

Specimen size: 100 mm (diameter) x 150 mm (h)

Temperature range: -10 °C to 70 °C *

Confining pressure: 0 to 225 kPa

Noise level: Less than 70 db at 2 m

Power Supply: 230V 50-60Hz 1ph 3.5kW
Dimensions: 1510(h) x 680(d) x 1200(w) mm
1870(h) x 680(d) x 1200(w) mm with raised cell
Weight: 330 kg approx. (including oil)

* At an ambient temperature of +23 °C

Asphalt specimen
with on-specimen LVDTs and load cell

NEEDED ACCESSORIES

B201-KIT AMPT Consumables kit. Comprises:

- **B253-53** Gauge point (24 pieces)
- **B201-52** 5 Minute, two part epoxy 24 ml
- **S311-03** 100 mm Sealing Rings (Pack of 10)
- **B201-53** 100 mm Rubber membrane 0.3 mm thickness (Pack of 10)

B200-10 Latex membrane material cut in 100mm diameter discs (needed for AASHTO T378) (2 **needed** pieces)

B200-04 100 mm AMPT tension platens (2 **needed** pieces) for S-VECD test

B200-04 100 mm AMPT tension platens

OPTIONAL ACCESSORIES

B270-18 Membrane stretcher for asphalt specimen Ø 100 mm
B270-19 Membrane stretcher for Ø 70 mm specimen
B200-20 Bottom loading platen for 70x140 mm specimen
B200-21 Top loading platen for 70x140 mm specimen
B202-05 Extension for Ø 75 mm specimen, for B202
B202-06 Spacer for 120 mm specimen height, for B202
B200-09 Spacer to enable 130mm tall specimens to be tested in tension/compression (S-VECD test on small specimens)
B200-13 AMPT silent air compressor
B200-13X AMPT silent air compressor 230V 60Hz

RECOMMENDED ACCESSORIES

B202 Gauge Point Fixing Jig

B202-04 Spacer for 130 mm specimen height to be used with gauge point fixing jig B202

B203 AMPT Dynamic Verification Device

H009-01EN
H009-01 PC complete with LCD monitor 22", keyboard, mouse, cables and installation of Testlab software, available in italian or english.

B202 Gauge point fixing jig

B203 AMPT Dynamic Verification Device

SPARE PARTS

B220-08N Load cell 20 kN with adaptor
B292-01NSP Temperature transducer -80 °C +80 °C

TESTING KITS

B204-KIT Overlay kit according to ASTM WK26816. Comprises:

- **B204-01** Overlay jig
- **B204-02** Pair of Overlay Tester (OT) specimen plates
- **B204-03** OT specimen preparation jig according to ASTM WK26816

B204-01-KIT Overlay kit according to TEX-248-F. Comprises:

- **B204-01** Overlay jig
- **B204-02** Pair of overlay tester (OT) specimen plates
- **B204-13** OT specimen preparation jig according to TEX-248-F

B207-01-KIT AMPT Indirect Tensile (IDT) kit. Comprises:

- **B207-01** AMPT IDT Jig
- **B253-01** LVDT mounting Jig
- **B253-03** Gauge point template (150 mm specimen)
- **B290-04N** AMPT Miniature LVDT (1 mm) (4 pieces)
- **B253-53** Gauge point (32 pieces)
- **B207-02** Cable gland (4 pieces)

B254-02-KIT AASHTO T393 I ASTM D8044 SCB testing kit. Comprises:

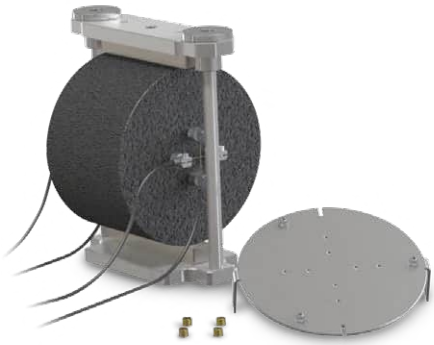
- **B208** SCB frame
- **B254-10** Roller support
- **B254-02** Springs and roller
- **B254-03** Upgrade for AASHTO TP124 Method A

B253-01-KIT Combined IDT/SCB testing kit. Comprises:

- **B253** Indirect tensile modulus, creep compliance and strength using on-specimen transducers
- **B253-01** LVDT mounting jig
- **B253-03** Gauge point template (150 mm specimen)
- **B290-04N** AMPT miniature LVDT (1 MM) (4 pieces)
- **B253-53** Gauge point (32 pieces)
- **B207-02** Cable gland (4 pieces)
- **B254-10** Roller support
- **B254-02** Springs and roller
- **B254-03** Upgrade for AASHTO T393 Method A (2 pieces)

B204-KIT Overlay kit according to TEX-248-F & ASTM WK26816

B254-02-KIT AASHTO T393 I ASTM D8044 SCB testing kit



B207-01-KIT AMPT indirect tensile kit

CDAS2 - Control and Data Acquisition System

Pavetest's compact Control and Data Acquisition System (CDAS2) delivers unparalleled performance, real time control and ultimate versatility in acquisition. The AMPT has a stand-alone CDAS2, which is common to all Pavetest systems.

CDAS2

SMALL SPECIMENS ACCESSORIES | AMPT

For dynamic modulus on 38 mm (diameter) x 110 mm (h) specimen:

B200-05 Bottom loading platen for 38 x 110 mm (Ø x h) specimen

B200-06 Top loading platen for 38 x 110 mm (Ø x h) specimen

B202 Gauge Point Fixing Jig

B202-02 Spacer for 110 mm specimen height to be used with gauge point fixing jig B202

B202-03 38 mm and 50 mm diameter specimen - extension for gauge point fixing jig plungers B202

B253-53 Gauge point (32 pieces)

B201-52 5 Minute, two part epoxy 24 ml

S311 Sealing ring Ø 38 mm (10 pcs)

S310 Rubber membrane Ø 38 mm (10 pcs)

B270-20 Membrane stretcher for asphalt specimen Ø 38 mm

For S-VECD test on 38 mm (diameter) x 110 mm (h) specimen:

B200-11 38MM AMPT tension platen (2 pieces needed)

B202 Gauge Point Fixing Jig

B202-02 Spacer for 110 mm specimen height to be used with gauge point fixing jig B202

B202-03 38 mm and 50 mm diameter specimen - extension for gauge point fixing jig plungers B202

For dynamic modulus on 50 mm (diameter) x 135 mm (h) specimen:

B200-07 Bottom loading platen for 50 x 135 mm (Ø x h) specimen

B200-08 Top loading platen for 50 x 135 mm (Ø x h) specimen

B202 Gauge Point Fixing Jig

B202-01 Spacer for 135 mm specimen height to be used with gauge point fixing jig B202

B202-03 38 mm and 50 mm diameter specimen - extension for gauge point fixing jig plungers B202

B253-53 Gauge point (32 pieces)

B201-52 5 Minute, two part epoxy 24 ml

S311-01 Sealing ring Ø 50 mm (10 pcs)

S310-01 Rubber membrane Ø 50 mm (10 pcs)

B270-21 Membrane stretcher for asphalt specimen Ø 50 mm

For S-VECD test on 50 mm (diameter) x 135 mm (h) specimen:

B200-12 50MM AMPT tension platen (2 pieces needed)

B202 Gauge Point Fixing Jig

B202-01 Spacer for 135 mm specimen height to be used with gauge point fixing jig B202

B202-03 38 mm and 50 mm diameter specimen - extension for gauge point fixing jig plungers B202

B202 Gauge Point Fixing Jig + accessories for small specimens preparation

RECOMMENDED ACCESSORIES FOR AASHTO TP 133 and AASHTO T378

B207-KIT Quad gauge point and tension gluing jig and hardware kit, comprises:

- **B202-07** Quad gauge point and tension gluing jig
- **B202-08** Segment clamp (8 pieces)
- **B202-09** Gauge point (72 pieces)
- **B200-14** 38 mm diameter plate for 110 mm height specimen (8 pieces)
- **B200-15** 100 mm diameter plate for 130 mm height specimen (8 pieces)
- **B200-16** Load cell tension base for cyclic fatigue
- **B200-17** Top loading plate for cyclic fatigue
- **B200-18** Male thread adaptor for cyclic fatigue

B202-07 Gluing jig

B215
SERVO-PNEUMATIC OVERLAY TESTER

The Pavetest Overlay Tester is a servo-pneumatic controlled testing machine utilizing digital control of a high performance servo valve to provide accurate loading wave shapes up to 60Hz, specifically designed to determine the susceptibility of asphalt mixtures to cracking according to Texas DOT test procedure Tex-248-F and proposed ASTM Standard WK 26816.

The machine applies cyclic loading to a specimen that is cut from a 150 mm diameter sample into the shape of a rounded end beam. The system comprises a load frame, with one fixed and one moving plate, temperature control system, Control and Data Acquisition System (CDAS2) and optional silent air compressor. The specimen is glued to two plates and this assembly is placed in the machine for testing. This is intended to simulate the action of movement under an asphalt overlay to assess how failure might occur in the field due to factors such as thermal expansion / contraction and reflective cracking.

The Pavetest Overlay Tester is underpinned by Pavetest's leading edge CDAS2 digital controller, TestLab software and all the necessary accessories, hardware and software in perfect unison.

MAIN FEATURES

- Compact, fully self contained, precision engineered unit.
- Thermoelectric (TE) Heating/Cooling - More reliable and envronmentally friendly than mechanical refrigeration & heating elements.
- Optional silent, air compressor including membrane dryer.
- Built in verification (Dial gauge).
- Integral stand with wheels.

The machine includes:

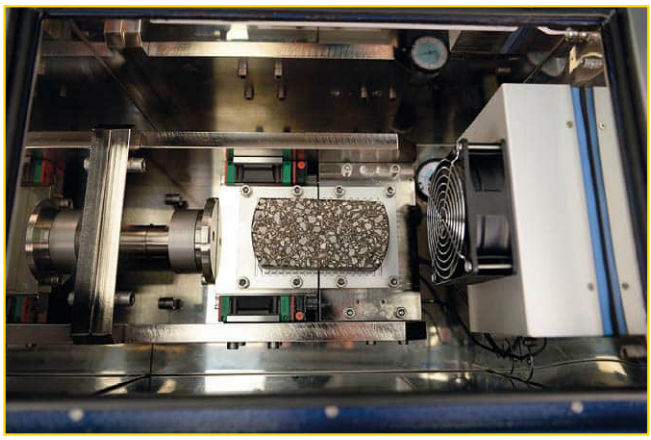
- Load frame with one fixed and one moving plate
- 15 kN Servo-pneumatic actuator (10 mm stroke)
- 8 Channel Control and Data Acquisition System (CDAS2) & TestLab software
- Load cell (± 15kN)
- 10 mm displacement transducer
- Thermoelectric Heating/Cooling system
- Temperature transducer -80 °C to + 80 °C

It requires pressurized air, minimum 7 bar (not included)

B215 Overlay tester

TECHNICAL SPECIFICATIONS

Load Capacity:	Up to 16 kN (Static)
Actuator stroke:	10 mm
Temperature range:	10 to 60 °C
Noise Level:	Less than 70 db at 2 m
Power supply:	110/230V 50-60Hz 1ph 750W
Dimensions:	980 (h) x 475 (d) x 1085 (w) mm
Weight:	150 kg approx.



B215 Overlay tester: detail

TECHNICAL FEATURES

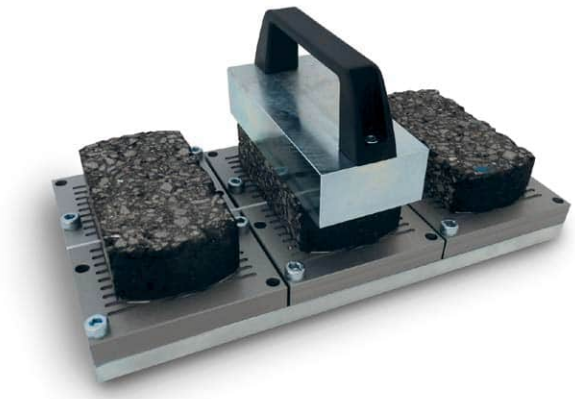
- **Temperature controller.** The overlay tester is fitted with a temperature controller, which controls the heating/cooling provided by the thermo-electric unit fitted to the machine.
- **The specimen preparation jig allows allows users to properly locate and glue the specimen on plates.** It can accomodate up to three sets of platens. It includes 2 mm teflon strip, which helps aligning the specimen plates and eliminate the need to saw the glue afterwards, and a dead weight.
- **The Overlay Tester main unit comes fully assembled.** It can be placed on the folding stand supplied, complete with wheels.

NEEDED ACCESSORIES

B204-02 Pair of specimen plates
B204-03 OT specimen preparation jig according to ASTM WK 26816
B204-13 OT specimen preparation jig according to Tex-248-F

Note: The quantity depends on the customer's need.

Detail of the wheels



B204-03 Specimen preparation jig

B204-02 Specimen plates

OPTIONAL ACCESSORIES

B200-13 Silent air compressor 750W 230V 50Hz
B200-13X Silent air compressor 750W 230V 60Hz

TSRST-MULTI

MULTI STATION THERMAL ASPHALT SYSTEM

STANDARDS:
AASHTO TP10 Standard test method for Thermal Stress Restrained Specimen Tensile strength
EN 12697-46 Test methods for hot mix asphalt Part 46: Low temperature cracking and properties by uniaxial tension tests

FIRST STAND ALONE SERVO-HYDRAULIC TSRST

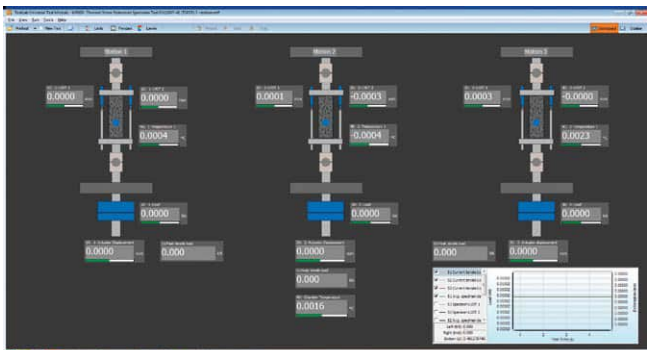
MAIN FEATURES

- Up to three working stations (electromechanical and/or servo-hydraulic stations).
- Servo-hydraulic actuator: 30 kN static, 25 kN dynamic, double acting, fatigue rated and equal area type with long life Labyrinth bearings & seals.
- Dynaflo™ Hydraulic Power Supply: Variable Frequency Drive 2.2 kW pump motor; Silent operation.
- Ability to clone, modify and/or generate user's own method file(s) to suit their specific requirements.
- Programmable test **Wizard** to guide the operator step by step based on a recipe book approach.
- Temperature controller programmed via PC software.

TSRST-MULTI STATION

The machine includes:

- 16 Channel Control and Data acquisition System (CDAS-2) & TestLab software
- Climatic chamber -40°C to + 40°C, cooling rate of 10°C per hour. Optional version -50°C to +40°C (AASHTO TP 10)
- Loading frame(s) with two rigid columns, work space of 240 mm wide and 285 mm high
- Electro-mechanical or Servo-hydraulic actuator(s) based on the chosen configuration
- Load cell(s) ± 30kN, 0,1%
- Refrigeration Unit



TSRST-Multi Dashboard showing the test status for each axes

TECHNICAL SPECIFICATIONS

External dimensions load frame (including environmental chamber):

1853(h) x 1020(d) x 1230(w) mm

Hydraulic Power Supply (for Servo-hydraulic station(s):
700(h) x 520(d) x 570(w) mm

Weight load frame: 200 kg approx. without the selected stations configuration

Electrical requirement for:
Servo-hydraulic station (each): 230V 50-60Hz 1ph 2.2kW

Electro-mechanical station (each):
100-230V 50-60Hz 1ph 0.75kW

Refigeration unit: 380-420V 50Hz 3ph 2.5kW

Electro-mechanical actuator(s)

- 25kN static with ± 50 mm stroke (100 mm)
- Internal displacement transducer

Servo-hydraulic actuator

- 30kN static, 25kN dynamic, double acting, fatigue rated, servo hydraulic actuator, equal area type with long life seals & bearings
- ± 50 mm stroke (100 mm)
- Internal displacement transducer
- Close coupling of servo valve to actuator for best servo performance
- 10 µm pressure line filter at actuator for ultimate contamination control
- 0.5 lt hydraulic accumulator with 40 Bar pre-charge for best pressure line regulation at servo-valve.
- High response, VCD direct drive, servo-valve: -3 db @ 350 Hz, ± 5% amplitude (performance curves available on request)

Load cell(s)

- Low profile Precision Transducers load cell, ± 30kN, 0.1%. Normalized output with in-line signal conditioning

Hydraulic power supply

- Working pressure of up to 160 Bar (low pressure adjustable)
- High/Low pressure selectable from control pendant
- Variable flow rate up to 7.5 liter/min
- Variable Frequency Drive (VFD) 2.2kW pump motor; speed based on demand
- 3 µm return line filtration
- Low oil, over temperature and dirty filter displayed
- Remote starting
- Pressure gauge
- Air cooling (Electric fan)

B282-08 TSRST specimen gluing jig (needed accessory)

Simple and easy to use gluing jig for preparing TSRST specimens. The jig provides for perfect alignment and adjustment for different sized specimens. The clamping force is easily set and ensures the end plates are glued perpendicular to the specimen.

ORDERING INFORMATION

All available configurations are summarized in the following table:

	ELECTROMECHANICAL STATION	SERVO-HYDRAULIC STATION
B282-10	1	-
B282-11	2	-
B282-12*	3	-
B282-13	-	1
B282-14	1	1
B282-15*	2	1

Note:
Multiple stations configuration (B282-11, B282-12, B282-14, B282-15) allow to run tsrst tests with all stations simultaneously. In this configurations, UTST, RT, TCT, UTSST and UCTST tests are performed on one station at a time. With combined configuration (electromechanical and servo-hydraulic) UCTST must be performed with servo-hydraulic station.

***Note:**
Compliant with AASHTO TP10, if using only one station.

TO PERFORM

- Uniaxial tension stress test (UTST)
- Thermal stress restrained specimen test (TSRST)
- Relaxation time, using the relaxation test (RT)
- Tensile creep tests (TCT)
- Uniaxial cyclic tension stress tests (UCTST)**
- Uniaxial thermal stress & strain test (UTSST)***

** Only applicable to servo-hydraulic work station(s)
*** Additional hardware required

ACCESSORIES

B282-08 TSRST specimen gluing jig (needed)
B282-18 TSRST proof test assembly (optional)

Disk Shaped Compact Tension test:
B284-01 Disk-shaped compact tension test jig
B282-02 Rod ends (2 pieces needed)
B290-07N SCB deformation gauge (needed)
or
B290-12N Epsilon (model 3541) clip-on gauge CMOD transducer +1/-7 mm (Alternative to B290-07N)
C090-18 Knife edge (pack of 24) only for B290-12N

B216
BBR PLUS
SERVO-CONTROLLED BENDING BEAM RHEOMETER

NEW

STANDARDS: ASTM D6648 I AASHTO T313 I EN 14771

BBR emerges as a thermoelectrically-cooled bending beam rheometer, transcending conventional practices and embodying a commitment to environmental responsibility. This innovative technology excels in assessing flexural creep of asphalt binders, boasting a temperature range from ambient to -40 °C (± 0.03 °C). Its ability to assess flexural creep in asphalt binders fosters the development of longer-lasting and eco-friendly road surfaces.

The BBR's load application is revolutionized by a miniature servo-controlled actuator capable of applying up to ± 10N with a loading frequency from static to 25Hz, all achieved without the need for a compressed air supply. The BBR's reduced energy consumption and elimination of compressed air supply contribute to lower operational costs, making it a financially and environmentally responsible choice.

Temperature control is a pinnacle of the BBR's design, facilitated by a temperature controller mounted on the front of the machine. Users can effortlessly set the bath temperature using the controller or the intuitive software interface.

At the heart of the BBR system lies Pavetest's industry-leading Control and Data Acquisition System (CDAS2) and the renowned TestLab software.

*The BBR is supplied with a suitable chiller to ensure temperature range between ambient and -40°C.

MAIN FEATURES

- Servo-control eliminates the need for frequent calibration and repeated adjustment of air bearing pressures
- Loading frequency from static to 25Hz
- No need for compressed air supply
- TE-cooled with solid-state Peltier devices
- Includes a separate air-water heat exchanger
- An integrated, self-contained bath cools using ethanol as the bath medium
- Set and monitor the temperature of the bath via the software

TECHNICAL SPECIFICATIONS

- Meets or exceeds ASTM, AASHTO and SHRP requirement for low temperature flexural creep testing of asphalt binders including ASTM D6648 and AASHTO T313
- Temperature range: Ambient to – 40 °C
- Temperature stability: ± 0.03 °C
- Resolves specimen beam deflection to 0.01 µm
- Load cell span: 50 N
- Load cell resolution: 50 µN
- Range: 20 MPa to 1 GPa
- Loading frequency from static to 25Hz

Power supply:
BBR: 100-230V 50-60Hz 1ph 850W
Chiller: 230V 50-60Hz 1ph 590W
110V 50-60Hz 1ph

Dimensions: BBR: 60 x 50 x 52(h) cm
Chiller: 47 x 53 x 40(h) cm

Weight: BBR: 39 kg
Chiller: 48 kg

COMMON APPLICATIONS

- Flexural creep of asphalt binders
- Low temperature characterization of crack seal under load
- ASTM D6648, AASHTO T313, EN 14771, SHRP Binder Provisions For Low Temperature Flexural Creep Testing of Asphalt Binders

CDAS2 - CONTROL AND DATA ACQUISITION SYSTEM

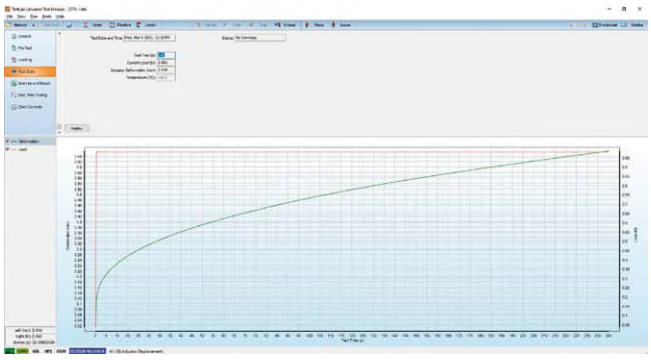
The BBR integrates Pavetest's compact Control and Data Acquisition System, complete with the TestLab Software, delivers unparalleled performance, real time control and ultimate versatility in acquisition and provide a flexible and user-friendly testing solution.

MAIN FEATURES

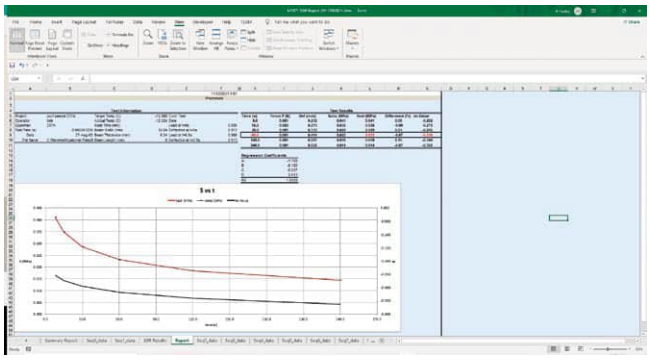
- Compact up to 8 Input, 2 control axis.
- Sampling rate up to 200 kHz over all channels.
- Up to 64 times over-sampling.
- Up to 24 bit resolution over the full range (no auto ranging required).
- Automatic recognition of transducers and upload of calibration files.
- Digital closed loop update sampling rate up to 5 kHz per axis.
- High speed, (18 bit) D/A digital servo-control.
- Modbus/CAN/RS485/RS232 communication among devices connected to the same network.
- Communication USB or Ethernet.
- Optional wireless colour touch screen display/controller.

TESTLAB, A NEW APPROACH - TOTALLY OPEN AND PROGRAMMABLE SOFTWARE

With TestLab software, any kind of test can be designed, cloned and/or modified by the user. The user is no longer limited to the test configuration established at the time of purchase; the possibilities are limited only to her/his ability and imagination.



Suite equipped with pre set or customized Method File



Post elaboration integrated function with Excel data.

ORDERING INFORMATION

NEEDED ACCESSORIES

B216-01 Mould for BBR
B216-06 Calibration Kit comprises:
- **B216-02** Temperature verification device
- **B216-03** Deformation verification: gauge blocks
- **B216-04** Reference beams (thick and thin)
- **B216-05** Load verification kit

OPTIONAL ACCESSORY

B216-09N Additional BBR PT100 probe

SPARE PARTS

B216-07 Strips per mould

UPGRADE BENEFITS

Are you sick of adjusting pressure regulators on your out-dated air bearing BBR? Upgrade to a servo-controlled loading head. Our 40 plus years' experience with servo-controlled systems and instrumentation places us in strong position to restore your outdate system to current day standards.

B225V
STS-25 STATIC TESTING SYSTEM | VERTICAL VERSION
THE MOST VERSATILE TESTING MACHINE IN THE MARKET

STANDARDS: ASTM D7313 | AASHTO TP105 | AASHTO TP124 | ASTM D8044 | ASTM WK 26816 | AASHTO T 314
AASHTO TP10 | TxDOT_ Tex-248-F

The Pavetest 25kN Static Testing System (STS-25) is an electro-mechanical servo-controlled testing machine utilizing digital control of a high performance electro-mechanical actuator to provide accurate loading rates up to 50mm/minute, designed to perform a range of static tests; including: Overlay, SCB, DCT, TSRST and DTT. The unit is fitted with a vertical temperature-controlled cabinet (-40 °C to +80 °C). The STS-25 is underpinned by Pavetest's leading edge CDAS2 digital controller, TestLab software and a full complement of accessories hardware and software in perfect unison.

MAIN FEATURES

- Compact, fully self-contained, precision engineered unit.
- Precision electro-mechanical actuator (silent operation).
- Suitable for a range of testing protocols.
- A range of two piece climatic chambers.
- Operator can monitor, set and "Auto tune" the temperature controller via the PC.

The machine includes:

- Rigid two column load frame
- 25 kN electro-mechanical actuator (30 mm stroke)
- Temperature controlled cabinet -40 °C +80 °C
- 8 channel Control and Data Acquisition System (CDAS) & TestLab software
- Load cell (± 30 kN)
- 30 mm actuator LVDT

B225V STS-25 Static Testing System | Vertical Version

B225H STS-25 Static Testing System | Horizontal Version

B225H
STS-25 STATIC TESTING SYSTEM | HORIZONTAL VERSION

Same model as B225V but with a horizontal temperature-controlled cabinet (-40 °C to +80 °C).

TECHNICAL SPECIFICATIONS

Load Capacity: Up to 25kN
Actuator stroke: 30 mm
Testing space: 400 mm
Loading rate: 0.3mm/min. to 50mm/min.
Power supply: 230V 50-60Hz 1ph (B225V, B225H)
230V 50Hz 1ph (refrigeration unit)
Dimensions: 770x1020x1680 mm (B225V)
700x1610x1160 mm (B225H)
Weight: 450 kg (B225V)
430 kg (B225H)

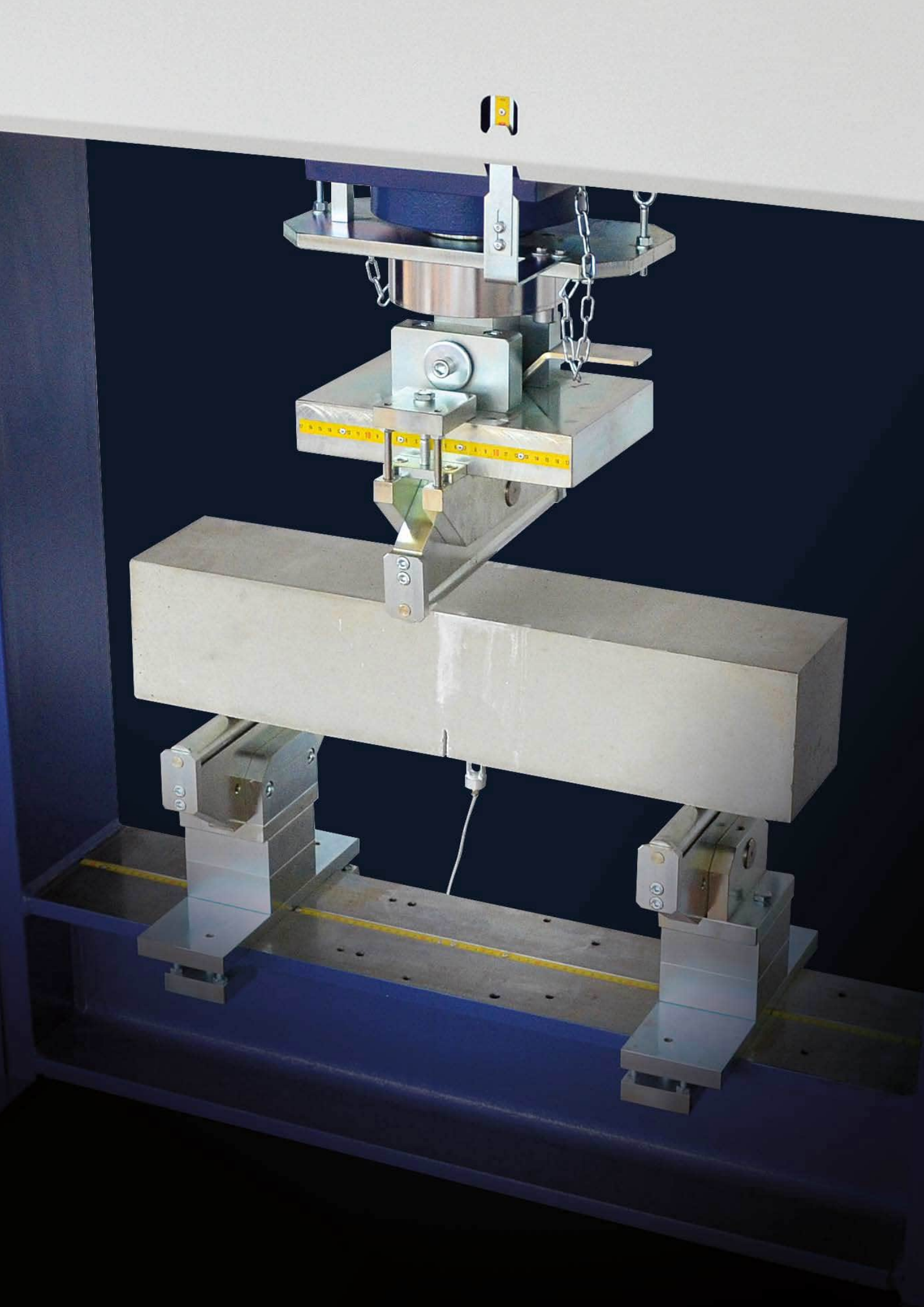
ACCESSORIES for B225V and B225H

H009-01 | **H009-01EN** PC
B250-07-KIT Temperature measuring KIT, described at p. 173

B250-07-KIT
Temperature measuring kit

ORDERING INFORMATION

Test	Model	Testing Kit/Jig/Accessories	Relevant standard(s)	Accessories
Disk-Shape Compact Tension Test - **DC(T)**	B225V B225H	B284-01	ASTM D7313	B290-07N needed or B290-12N + C090-18 needed
Semi-Circular Bending **SCB**	B225V	B254-02-KIT (B208+B254-10+B254-02)	AASHTO TP124 ASTM D8044	B254-16 needed B290-02N (1or 2) optional B254-11 (according to B290-02N q.ty) optional B254-12 optional
Semi-Circular Bending **SCB**	B225V	B254-02-KIT (B208+B254-10+B254-02)	AASHTO TP105	B254-16 needed 2 x B253-53 needed B254-13 needed 2 x B254-14 needed 2 x B254-15 needed 2 x B290-05N or 2 x B290-06N needed B290-07N + C090-18 needed
Overlay test - **OT**	B225H	B204-14	ASTM WK26816	3 x B204-02 needed B204-03 needed B290-02NOT needed
Overlay test - **OT**	B225H	B204-14	Tex 248F	3 x B204-02 needed B204-13 needed B290-02NOT needed
Direct Tension Test **DTT**	B225H	B225-10	AASHTO T314	B225-12 (needed) B225-13 (needed)
Thermal Stress Restrained Specimen Test **TSRST**	B225V	B282-01-KIT (3 x B282-01N+2 x B282-02 +1 x B282-21+1 x B282-09 +2 x B282-04+2 x B282-05 +2 x B282-06+B282-07)	AASHTO TP10	2 x B290-09N needed B282-08 needed B201-52 optional



SECTION C

CONCRETE

Concrete structures are durable and require fewer repairs, ensuring sustainability. Assessing fresh and hardened concrete's quality involves factors like workability, consistency, air content, strength, and dimensional stability. Matest offers extensive testing and research equipment for concrete, adhering to EN, ASTM and most popular international standards. These tools include both conventional and non-destructive testing methods, which evaluate concrete's resilience against challenges like chemical exposure and pollution. This proactive assessment enhances the longevity of concrete infrastructure, providing environmental and economic advantages.

COMPRESSION AND FLEXURAL TESTING MACHINES

Matest proudly offers the most extensive and comprehensive selection of compression and flexural testing machines on the global market, solidifying our position as a leading manufacturer. **Our commitment to sustainability is integral to our design philosophy**. We ensure that our testing machines are not only versatile and flexible, allowing end-users to tailor their compression and flexural testing needs, **but also energy-efficient and built to last**. This approach minimizes environmental impact while meeting the custom requirements of our clients. Matest is dedicated to advancing sustainable practices in the testing machine industry, **fostering the development of longer-lasting and eco-friendly**.

MATEST TECHNOLOGY

In-house developed technology to perform also sophisticated tests, such as elastic modulus, post failure and strain tests.

STURDY FRAME

Extremely strong load frames, available with:
- 1300kN,1500kN, 2000kN, 3000kN, 4000kN, 5000kN capacities to test cubes, cylinders and blocks in compression
- 150kN, 200kN, 320kN, 360kN capacity for flexural tests
- low ranges for tests on cements

HYDRAULIC SYSTEM

Semi-automatic or completely automatic option available, both designed to work at low pressure with a longer life of the hydraulic components and higher precision in the results.
Fast ram approach and multipiston power pump to improve efficiency and load stability.

INTERNATIONAL STANDARDS

Designed to meet international specifications: EN, ASTM, AASHTO, BS, NF, DIN.

CALIBRATION AND PRECISION

All testing machines are calibrated in CLASS 1 (max. error ± 1%) starting from 10% of the full range (or from 1% on request).
Calibration certificate supplied.

COMPRESSION TESTING FRAMES

Matest choice is to provide the most reliable solution with the longest life span possible. For this reason, all the frames of our compression machines are of the 4-column type, german style: this technology grants high stiffness and an optimum response to continuous stress, making Matest frames suitable also for intensive and repetitive use.

Available in different versions:

- **4 COLUMNS REGULAR DESIGN**
  STANDARDS: ASTM C39 I AASHTO T22
  Models described at p. 220...227

- **4 COLUMNS HIGH STABILITY DESIGN**
  STANDARDS: EN 12390-4 I DIN 51220
  Models described at p. 242...248

- **4 COLUMNS HIGH STIFFNESS DESIGN**
  STANDARD: ASTM C39
  Models described at p. 238

MAIN FEATURES

- Extremely strong and oversized structure.
- Precision lapped upper ball seated platen, oiled and equipped with springs for a smooth rotation, to ASTM Standard.
- Precision lapped upper plate with seatball in oil bath. The spherical seat is carefully designed and checked to comply to EN 12390-4 requirements for self-alignment and movement restraint.
- Compression platens are ground finished and surface hardened over 55 HRC.
- Overflow hydraulic outlet to prevent piston overtravel.
- Provided with two threaded holes for eyebolts for easier lifting and positioning.
- Ruler to display the piston stroke.
- Cover carter to protect the piston-cylinder assembly from dust and debris.

Both the versions are available also with a wider horizontal daylight and rectangular platens 320x510mm to allow blocks testing.

Matest offers an extra range of prestressed-columns frames with 3000 an 5000 kN capacity especially meant for test on high strength materials and with “explosive” failure.

Models described at p. 256

PUMPING UNITS

The hydraulic pumping system supplied for Matest machines is available in three versions to suit all customers' needs.
They are also suitable to upgrade existing machines even if not from Matest brand.
The pumping units don't comprise the pressure transducer, the hydraulic oil (C114-10N) and the oil hoses which must be all purchased separately.
See page 293 for further details and for pressure transducers models available.

C113
MANUAL PUMP, HAND OPERATED

This model is activated by a lever that allows to build the oil pressure.

Weight: 20 kg approx.

C113

C114
SEMIAUTOMATIC PUMP, MOTORIZED

This model is electrically powered and comprises the oil tank, the electric motor, the hydraulic pump, the manual pressure regulator and the manual oil drain valve. The tank is equipped with a dipstick to check the oil level and refill.

Power supply: 230V 1ph 50Hz 750W
(also available in different power voltages and frequencies on request)
Weight: 40 kg approx.

C114

C114AUTO
AUTOMATIC PUMP, MOTORIZED

This model is similar to C114 but the manual pressure regulator is replaced by a stepper motor that automatically regulates the oil flow and the manual oil drain valve is replaced by an electro valve that is activated by the electronic system.

Power supply: 230V 1ph 50Hz 750W
(also available in different power voltages and frequencies on request)
Weight: 40 kg approx.

C114AUTO

TECHNICAL FEATURES OF C114 AND C114AUTO

- Working pressure: 0 to 700 bar
- Oil flow: 0 to 1.5 l/min.
- Multipiston power pump to assure continuity of delivery with improved and more silent performances.

LOAD MEASUREMENT SYSTEMS

ANALOG GAUGES

These Bourdon tube type gauges are provided with scales in kN and MPa to show both the load applied and the corresponding compressive strength basing on the sample dimensions. The gauges include maximum load pointer, zero adjustment and a mirrored surface to avoid parallax errors. See page 292 for the available models.

C108N DIGITEC | C098N AUTOTEC

C108N
DIGITEC

Digital system with computerized graphic display and two channels for load sensors. It allows to perform compression, flexural and splitting tests both on concrete and mortar. Digitec acquires, displays, processes, prints and saves test data and report. It can be used also for retrofit of compression and flexural machines also from other brands.

C108N

C098N
AUTOTEC

Digitec with automatic pump.
When the Digitec controller (C108N) is paired with an automatic pump (C114AUTO), the two together take the code C098N (see p. 212 for further details about the hydraulic systems).

C098-01N
AUTOTEC FOR TWO FRAMES

Same as model C098N but comprises also the three way valve for the conncetion of a second frame.

C108N DIGITEC | C098N AUTOTEC

TECHNICAL SPECIFICATIONS

- **2 analogue-digital channels** accepting pressure transducers or load cells at 2 mV/V.
- Simple and immediate parameters set up and test execution, menu driven interface.
- Rapid approaching, touching on and breaking of the specimen under direct pump control (Autotec C098N)
- Automatic control of the pace rate (Autotec C098N)
- Continue load display.
- Breaking load detection.
- Acquisition and data processing system at 24 bit, effective resolution: 17 bit.
- Operator interface composed by 5 multi-functions pushbuttons; function icons shown on the display.
- Electronic and mechanical safety means such as maximum calibration threshold, thermal protection of the motor and different other settable alarms.
- Possibility of personalization for special sized samples.
- RS232 interface:
  it allows to transfer the test results directly to PC (via serial emulator) or the remote control of the system by means of the UTM2 software (accessory).
- Automatic elaboration of the specific resistance value.
- Permanent file up to 1000 tests and file of 100 different types of specimens.
- Graphic display with high resolution: 192x64 pixels.
- Selectable measuring force: kN, lb
- Languages: English, French, German, Spanish, Italian, Polish, Czech, Turkish.
- **Class 1** starting from 10% of the full scale, according to ISO 7500-1 (on request also from 1% of the full scale).

MODELS

C108N
DIGITEC

Two channels unit for data acquisition and elaboration, as described.

Power supply: 230V 1ph 50-60Hz
Dimensions: 260x250x210 mm
Weight: 4 kg

C098N
AUTOTEC

Two channels control system for a fully automatic execution of the test.
The system comprises:
- Digitec C108N data acquisition unit
- Multi-piston electric pump with variable flow (see mod. C114AUTO)

Power supply: 230V 1ph 50Hz
Dimensions: 420x290x950 mm
Weight: 60 kg approx.

C098-01N
AUTOTEC FOR TWO FRAMES

Two channels automatic system, complete with three way hydraulic valve for connection of a second frame.

ACCESSORIES

C127N	On board graphic printer.
C127-11	Spare roll of thermo-paper for printer C127N

SOFTWARE

For the remote execution of the test and the automatic transfers and filing of the results on a computer

C109-10	Software for COMPRESSION test on Concrete
C109-11	Software for FLEXURAL test on Concrete
C109-12	Software for SPLTTING TEST on Concrete specimens
E163	Software for COMPRESSION test on Mortars
E164	Software for FLEXURAL test on Mortars
C123	Software for all the tests listed above.

H009-01EN | H009-01
PERSONAL COMPUTER

Complete with LCD, monitor 22", keyboard, mouse, connection cables. The supply of the PC includes the installation of the purchased software, available in english or italian.

Note: the pressure transducer is not included with Digitec and Autotec and must be purcased separately.
Available models: see p. 293

C109M
CYBER-PLUS PROGRESS

Matest Cyber-Plus Progress is the latest generation digital controller for concrete, cement and steel testing. A versatile compact PC that can be combined with multiple frames for compression, flexural and tensile tests.
Its technology allows to control, acquire, display and transfer data while offering the possibility to connect Matest software for remote control and printout of results and certificates.
Also suitable to upgrade or retrofit non-Matest frames.
Firmware is designed to be easily updated with add-on functions sent by email and just with the help of a USB stick.

MODULAR. REACTIVE. PROGRESSIVE.

- ONE MODEL FITS ALL FRAMES AND TESTS
- CONTROL FREQUENCY UP TO 1 kHz AND SAMPLING FREQUENCY UP TO 2 kHz
- LIMS COMPATIBLE THROUGH **SMARTLAB** SOFTWARE

C109M

Two electronic boards for faster control

Graphic on board printer (accessory C127N)

Safety cut out switch

4, 8 or 16 powerful channels to suit all customers needs

2 USB ports for unlimited memory, LAN port for network connection

In-line keyboard for use with gloves

Wider touch-screen display 7" and user-friendly interface

C104N
SERVO-PLUS PROGRESS, Cyber-Plus Progress with automatic pump

When the Cyber-Plus Progress controller (C109M) is paired with an automatic pump (C114AUTO), the two together take the code C104N (see p. 293 for further details about the hydraulic systems). Also available in stand-alone version (pyramidal shape) if ordered as C104NP.

C104-01N
SERVO-PLUS PROGRESS FOR TWO FRAMES

Same as model C104N but comprises also the three way valve for the connection of a second frame.

C104-02N
SERVO-PLUS PROGRESS FOR THREE FRAMES

Same as model C104-01N but comprises a second three way valve for the connection of a third frame.

C109M+C114 | C104N | C104-01N | C104-01N+C104-04 | C104NP

TECHNICAL SPECIFICATIONS

- 4 channels for semi automatic models and 8 channels for automatic models accepting load, pressure, displacement and deformation sensors
- 10 configuration profiles for a potential of 40 or 80 storable calibrations for an immediate use of multiple sensors
- Channels resolution: 24 bit
- Control frequency: up to 1 kHz
- Sampling frequency: up to 2 kHz
- Simple and immediate parameters set up and test execution through touchscreen interface
- Easy firmware maintenace and update via USB
- Real time display of time, load, deformation, displacement and graph simultaneously
- Selectable measuring system, international or imperial
- Languages: English, Italian, French, German, Spanish, Portuguese, Polish, Greek, Dutch, Ukrainian, Romanian, Czechoslovakian
- LIMS compatible through SmartLab (check p. 219 for further details)
- Operator interface composed by the touchscreen display 800x480 pixels and the 5-buttons keyboard for use also with gloves
- Electronic and mechanical safety means such as maximum calibration threshold, thermal protection of the motor and different other settable alarms
- 2 USB ports for unlimited storage memory and for connection of external devices such as bar code scanner, keyboard and mouse
- LAN port for remote control through the PC and for network connection which allows to directly access the USB memory
- Rapid approaching, touching on and breaking of the specimen under direct pump control (Servo-Plus C104N)
- Automatic control of the pace rate (Servo-Plus C104N)
- Class 1 starting from 10% of the full scale according to ISO 7500-1 (on request also from 1% of the full scale).

MODELS

C109M
CYBER-PLUS PROGRESS
8 channels unit for data acquisition and elaboration.

Power Supply: 230V 1ph 50-60Hz 70W
Dimensions: 260x260x155 mm
Weight: 5 kg approx.

C104N
SERVO-PLUS PROGRESS
8 channels servo controlled unit for a fully automatic execution of the test. The machine comprises:
- Cyber-Plus Progress C109M data acquisition system
- Multi-piston electric pump with variable flow (see mod. C114AUTO) driven by a microprocessor (reliable and noiseless system, also for intensive and extended use)

Power supply: 230V 1ph 50Hz 750W
Dimensions: 420x290x1120 mm
Weight: 60 kg approx.

C104-01N
SERVO-PLUS PROGRESS FOR TWO FRAMES
Servo controlled unit supplied with three way hydraulic valve for the option to connect and use up to TWO TESTING FRAMES.

C104-02N
SERVO-PLUS PROGRESS FOR THREE FRAMES
Servo-controlled unit supplied with four way hydraulic valve for the option to connect and use up to THREE TESTING FRAMES.

C104NP
SERVO-CONTROLLED unit as C104N but stand-alone with pyramidal shape.

ACCESSORIES

C127N
PRINTER on thermo-paper on-board for digital models.

C104-04
CONSOLE HOUSING THE SERVO-PLUS PROGRESS
The pump assembly **lined with sound-proofing material for noise reducion** and the digital system are encased to enhance the design and look of the machine.
Only for C104N, C104-01N, C104-02N models.

C104-05
AFTER SALES TECHNICAL ASSISTANCE
Two hours of remote technical assistance, through a direct connection to the machine via internet. Customers are provided with diagnostics, any software updates or function restoring, all through a remote-access line, via mail, skype or phone, according to their needs.

C104-09
SPECIAL CONFIGURATION OF ADVANCED PARAMETERS
Valid for all MATEST testing machines equipped with SERVOPLUS/CYBERPLUS controlling unit. Through tests on real samples, it's possible to define in details the behavior of the tested material and therefore set the advanced parameters accordingly.

C099N
INVERTER DEVICE
- **Improved motor efficiency** with important reduction of absorbed power and electric consumption.
- **Reduction of noise pollution** thanks to a balanced and efficient delivery of the flow rate.
- **Improved piston speed** for a faster approach to reach the specimen with the result of having a considerable reduction in the overall test time.
- Improved reliability and life of the hydraulic pump thanks to a **decreased heating and mechanical stress**.
- **Better sensitivity** of load, deformation and speed adjustment.
- Accepts both 50Hz and 60Hz supply.
- Applicable only on Servo-Plus machines.

C099N inverter

C099-01
BARCODE SCANNER
This instrument allows specimen file and identification by barcodes reading. It can be connected to cyber-plus / servo-plus control panels by USB, to automatically register specimen code and add it as a description of the test for all tests done with compression and flexure machines. Supplied complete with USB cable.

TECHNICAL SPECIFICATIONS
- Codification capacity: UPC/EAN, UPC/EAN with supplements, Code 128, UCC/EAN 128, Code 39, Code 39 Full ASCII, Code 128 Full ASCII, Codabar, Interleaved 2 of 5, Code 93, MSI, Code 11, ISBN, ISSN, usw, etc…;
- Reader type: bidirectional;
- Light: 650 nm wavelength, laser-diode;
- Resolution: 0.10 mm;
- Reading distance: 3…400 mm;
- Reading angle: inclination angle 45°, elevation angle 60°;

Dimensions: 81x97x165 mm **Weight:** 136 g

SMARTLAB SOFTWARE

FOR COMPRESSION FLEXURAL AND INDIRECT TENSILE TESTS ON CONCRETE

NEW

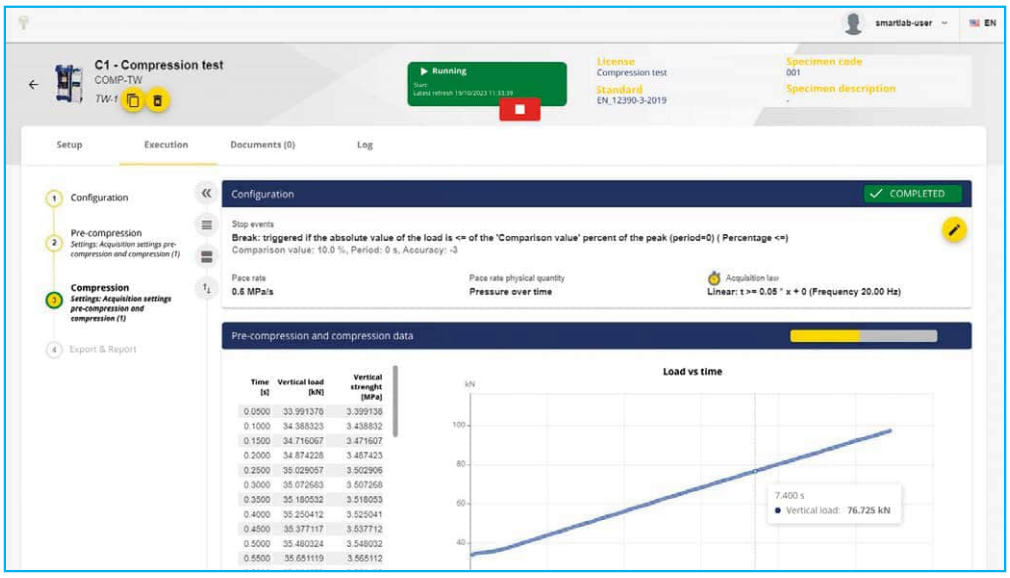
SmartLab for concrete is the module of the software platform **developed by Matest**. It allows the management and control of machines for performing compression, flexural and indirect tensile tests in load or pressure control. In addition the software offers the possibility to **acquire and process data** in accordance with International Standards, guaranteeing accuracy and reliability. Further information see page 18

COMPRESSION TEST

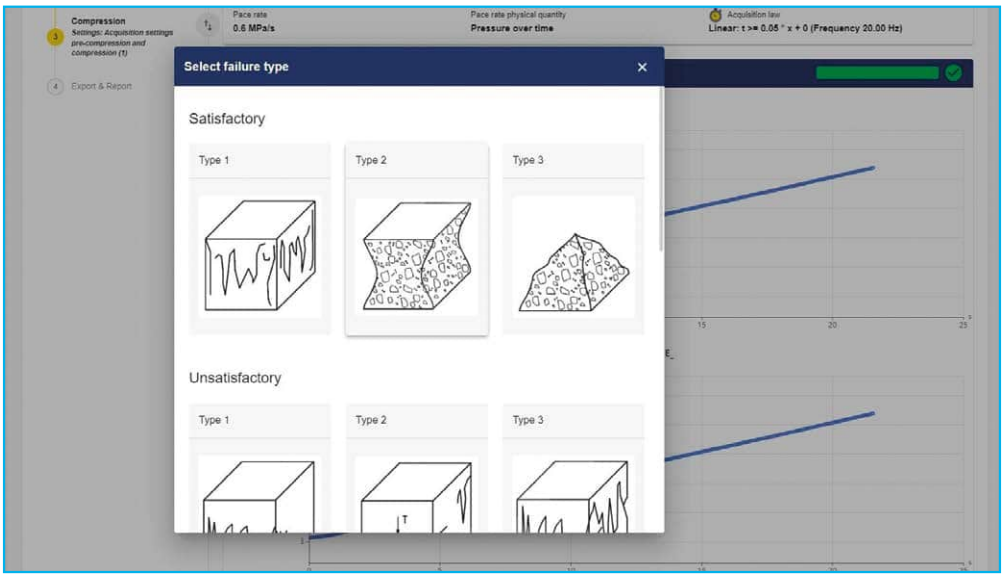
The compression test allows to determine the **behaviour of a cylindrical or cubic specimen** when subject to an increasing compressive load. Thus, determining the compressive strength at failure of concrete.

During the test, SmartLab **automatically plots** the load-time and the strength-time curves. When the failure occurs, the test is stopped automatically.

At the end of the test, SmartLab allows the data of the test to be exported, **providing both a recap of the initial and acquired data and a complete report** with all the processed data and graphs required by ASTM C1314, C140, C39; EN 12390-3, 772-1



Ongoing compression



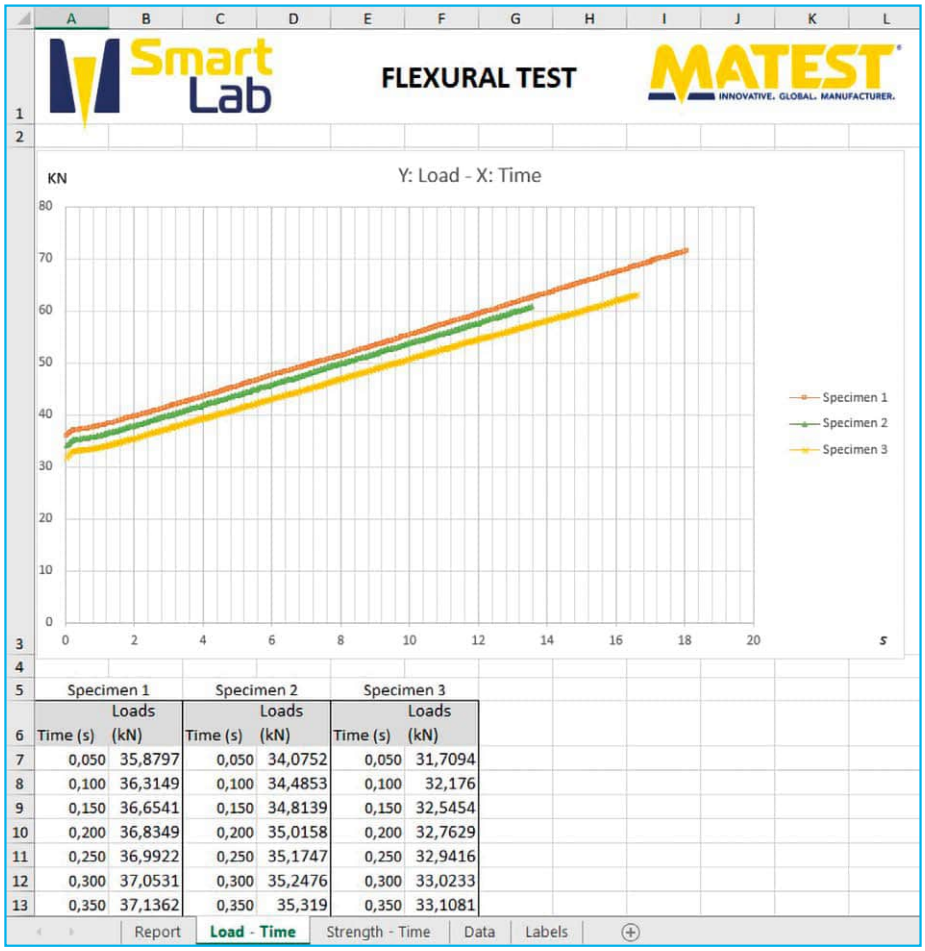
Final results

FLEXURE TEST

The flexure test allows to determine the **flexural strength of a concrete prism** when subject to an increasing load that generates flexural stresses.

When the maximum flexural load is achieved, the sample fails and SmartLab stops the test, **saving the data** relevant **to maximum load and maximum strength**.

According to the relevant verification procedures of concrete quality, SmartLab allows to generate a report including different tests (up to 10) to easily compare the data, following the standards ASTM C140, C293, C78; EN 12390-5, 1339, 1340



Specimen 1		Specimen 2		Specimen 3	
Time (s)	Loads (kN)	Time (s)	Loads (kN)	Time (s)	Loads (kN)
0,050	35,8797	0,050	34,0752	0,050	31,7094
0,100	36,3149	0,100	34,4853	0,100	32,176
0,150	36,6541	0,150	34,8139	0,150	32,5454
0,200	36,8349	0,200	35,0158	0,200	32,7629
0,250	36,9922	0,250	35,1747	0,250	32,9416
0,300	37,0531	0,300	35,2476	0,300	33,0233
0,350	37,1362	0,350	35,319	0,350	33,1081

Excel report for a flexure test

INDIRECT TENSILE TEST

The indirect tensile test allows the evaluation of the strength of cylindrical or prismatic samples: applying a compressive load it is possible to **generate a tensional stress on the diametral plane**, which leads to the failure of the sample. At the end of the test, the **maximum load and strength** achieved are recorded, according to ASTM C496; EN 12390-6, 1338

SSW-LINK
FIRMWARE UPGRADE

In order to use the SmartLab software, it is necessary to purchase the firmware license which unlocks up to 3 machines.
Technical specification: see p. 20

ACCESSORIES

SPC	SmartLab PC
SSW-GWAY	SmartLab Gateway communication protocol

CONTROL UNITS FOR ADVANCED APPLICATIONS

C104N + C125M
AUTOMATIC CONTROL CONSOLE
FOR ELASTIC MODULUS TESTS

This console is composed by C104N (Servo-Plus Progress) and the upgrade KIT for elastic modulus applications C125M which includes special hydraulic and electronic components to allow the control of the load also when decreasing.
The whole system is stand alone and supplied in a pyramidal shaped carter.
See p. 258 for further details.
The console includes 1 hydraulic hose, 1 m long.
The pressure transducer and the hydraulic oil are not included and must be purchased separately.

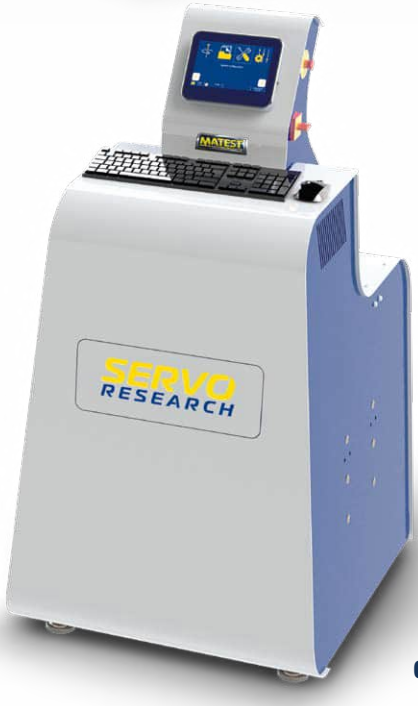
C104N+C125M

C104-03N
SERVO-RESEARCH
AUTOMATIC CONTROL CONSOLE

NEW

FOR TESTS ON FIBER-REINFORCED CONCRETE

This console is completely automatic and is equipped with a special proportional valve allowing to control the load with maximum precision and reactivity. This system is especially designed to respond to the double behaviour of fiber-reinforced concrete: at the beginning the system must control the increasing strength of concrete, but when the concrete fails, the hydraulic and electronic system must instantly react to the load decreas and adjust to the response of the fibres that start working in order to evaluate their residual strength according to the standards.
See p. 282 for further details. The console includes 1 hydraulic hose, 1 m long. The pressure transducer and the hydraulic oil are not included and must be purchased separately.



C104-03N

TECHNICAL FEATURES

C104N + C125M For elastic modulus	C104-03N Servo-research
4 pistons pump, max pressure 700 bar	
Two stepper motors for load and unload control	Servo controlled proportional valve with high control frequency
Inverter device on request	Inverter device included to reduce noise pollution and mechanical stress
Can control up to 3 frames with manual selection	Can control up to 4 frames with automatic selection
16 channels, 24 bit resolution	
Cyber-plus progress technology. See p. 213	
Dimensions: (w)650x(d)560x(h)1260	Dimensions: (w)700x(d)820x(h)1370
Weight: 120 kg approx.	Weight: 200 kg approx.

COMPRESSION TESTING MACHINES, FOUR COLUMNS PRESTRESSED FRAME

REGULAR AND HIGH STIFFNESS DESIGN

These models are described at p. 209

STANDARDS: ASTM C39 | BS 1610 | NF P18-411 | AASHTO T22 | GOST 10180

MAIN FEATURES

- Compression platens are surface hardened over 55 HRC and rectified.
- Device to prevent piston over-excursion during the test.
- The columns are prestressed to provide a very high rigidity.
- Piston having 50 mm stroke and cylinder are coupled with high quality packing set.
- The tank has an oil dipstick and oil discharge.
- Dial speed selector to display, pre-select and control oil flow.
- Multipiston power pump assuring continuity of delivery.
- Fast approach ram device to avoid dead times.
- Ball seating is accurately machined.

Available capacities:

1300 kN | 1500 kN | 2000 kN | 2000 kN BLOCKS | 3000 kN | 3000 kN BLOCKS | 5000 kN

Motorized or hand operated models.
Load measuring system: bourdon type gauges, **DIGITEC** or **CYBER-PLUS** graphic display units, **AUTOTEC** or **SERVO-PLUS PROGRESS** servo-controlled automatic systems.

COMPRESSION TESTING MACHINE 1300 KN AND 1500 KN CAPACITY

TO TEST CUBES UP TO 150 MM SIDE AND CYLINDERS UP TO Ø 160X320 MM

STANDARDS: ASTM C39 I AASHTO T22 I NF P18-411 I BS 1610 I GOST 10180

DIAL GAUGES MODELS

- Gauges Ø 250 mm with specific resistance scales for cubes 150 mm and cylinders Ø 150 - 160 mm
- Gauges divisions: 1300 kN div. 4 kN or
  1500 kN div. 5 kN
  600 kN div. 2 kN

MAIN FEATURES FOR ALL MODELS

- Max. vertical daylight: 336 mm
- **Horizontal daylight between columns: 270 mm**
- Compression platens Ø 216 x 30 mm
- **High stiffness and heavy weight 4 columns frame (german-style).**
- Calibration accuracy: Class 1
- Max. ram travel 55 mm approx.
- Power supply (motorized models): 230V 1ph 50Hz 750W
- Dimensions: 710x400x920 mm approx.
- **Weight: 580...620 kg**

C022

C025A + C127N + C111 + C121

MODEL				LOAD MEASURING SYSTEM			
1300 kN capacity	**1500 kN** capacity	Hand Operated	Motorized	1 Gauge	2 Gauges	Digitec mod. C108N (p. 212)	Autotec mod. C098N (p. 212)
C020	**C036**	▼		▼			
C021	**C037**	▼			▼		
C022	**C038**		▼	▼			
C023	**C039**		▼		▼		
C024D	**C040D**		▼			▼	
C025A *	**C041A** *		▼				▼

Accessories at page 228-229

COMPRESSION TESTING MACHINE HIGH-END MODELS

TO TEST CUBES UP TO 150 MM SIDE CYLINDERS UP TO Ø 160X320 MM

STANDARDS: ASTM C39 I AASHTO T22 I NF P18-411 I BS 1610 I GOST 10180

1300 KN AND 1500 KN CAPACITY

itTECH CYBER PLUS PROGRESS

CYBER-PLUS OR **SERVO-PLUS PROGRESS** DIGITAL TOUCH-SCREEN DISPLAY

Cyber-Plus Progress control unit 7" touch-screen display, up to 8 channels for pressure, load, displacement and other transducers 2 USB and 1 ethernet ports.

C024N

C025N + C127N + C111-01 + C121

MODEL			LOAD MEASURING SYSTEM	
1300 kN capacity	**1500 kN** capacity	Motorized	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)
C024N	**C040N**	▼	▼	
C025N *	**C041N**	▼		▼

Accessories at page 228-229

* Autotec/Servo-Plus models feature fully automatic power pack - electrovalve operated test start (no manual lever).

COMPRESSION TESTING MACHINE 2000 KN CAPACITY

TO TEST CUBES UP TO 150 MM SIDE AND CYLINDERS UP TO Ø 160X320 MM

STANDARDS: ASTM C39 I AASHTO T22 I NF P18-411 I BS 1610 I GOST 10180

DIAL GAUGES MODELS

- Gauges Ø 250 mm with specific resistance scales for cubes 150 mm and cylinders Ø 150 - 160 mm
- Gauges divisions: 2000 kN div. 5 kN
  600 kN div. 2 kN

MAIN FEATURES FOR ALL MODELS

- Max. vertical daylight: 336 mm
- **Horizontal daylight between columns: 270 mm** NEW
- Compression platens Ø 216 x 30 mm
- **High stiffness and heavy weight 4 columns frame (german-style).**
- Calibration accuracy: Class 1
- Max. ram travel 55 mm approx.
- Power supply: 230V 1ph 50Hz 750W
- Dimensions: 750x450x1000 mm approx.
- **Weight: 670...720 kg**

C055D + C111

C056A + C127N

COMPRESSION 2000 kN capacity		LOAD MEASURING SYSTEM			
MODEL	Motorized	1 Gauge	2 Gauges	Digitec mod. C108N (p. 212)	Autotec mod. C098N (p. 212)
C053	▼	▼			
C054	▼		▼		
C055D	▼			▼	
C056A *	▼				▼

Accessories at page 228-229

COMPRESSION TESTING MACHINE HIGH-END MODELS

TO TEST CUBES UP TO 150 MM SIDE AND CYLINDERS UP TO Ø 160X320 MM

STANDARDS: ASTM C39 I AASHTO T22 I NF P18-411 I BS 1610 I GOST 10180

2000 KN CAPACITY

itTECH

CYBER PLUS PROGRESS

CYBER-PLUS OR **SERVO-PLUS PROGRESS** DIGITAL TOUCH-SCREEN DISPLAY

Cyber-Plus Progress control unit 7" touch-screen display, up to 8 channels for pressure, load, displacement and other transducers 2 USB and 1 ethernet ports.

C055N + C127N + C111 | **C056N + C127N + C111 + C104-04 + C121-05**

COMPRESSION 2000 kN capacity		LOAD MEASURING SYSTEM	
MODEL	Motorized	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)
C055N	▼	▼	
C056N *	▼		▼

Accessories at page 228-229

* Autotec/Servo-Plus models feature fully automatic power pack - electrovalve operated test start (no manual lever).

COMPRESSION TESTING MACHINE 2000 KN CAPACITY

TO TEST CUBES UP TO 200 MM SIDE AND CYLINDERS UP TO 280 MM HEIGHT

STANDARDS: ASTM C39 I AASHTO T22 I BS 1610 I GOST 10180

DIAL GAUGES MODELS

- Gauges Ø 250 mm with specific resistance scales for cubes 150 mm and cylinders Ø 150 - 160 mm
- Gauges divisions: 2000 kN div. 5 kN
  600 kN div. 2 kN

MAIN FEATURES FOR ALL MODELS

- Max. vertical daylight: 282 mm
- **Horizontal daylight between columns: 270 mm**
- Compression platens Ø 287 x 51 mm
- **High stiffness and heavy weight 4 columns frame (german-style).**
- Calibration accuracy: Class 1
- Max. ram travel 55 mm approx.
- Power supply: 230V 1ph 50Hz 750W
- Dimensions: 750x450x1000 mm approx.
- **Weight: 670...720 kg**

C058-04D + C127N + C111-22

C058-05A + C127N + C121-05 + C111-26 + C111-22

COMPRESSION 2000 kN capacity		LOAD MEASURING SYSTEM			
MODEL	Motorized	1 Gauge	2 Gauges	Digitec mod. C108N (p. 212)	Autotec mod. C098N (p. 212)
C058-02	▼	▼			
C058-03	▼		▼		
C058-04D	▼			▼	
C058-05A *	▼				▼

Accessories at page 228-229

COMPRESSION TESTING MACHINE HIGH-END MODELS

TO TEST CUBES UP TO 200 MM SIDE AND CYLINDERS UP TO 280 MM HEIGHT

STANDARDS: ASTM C39 I AASHTO T22 I BS 1610 I GOST 10180

2000 KN CAPACITY

itTECH

CYBER PLUS PROGRESS

CYBER-PLUS OR **SERVO-PLUS PROGRESS** DIGITAL TOUCH-SCREEN DISPLAY

Cyber-Plus Progress control unit 7" touch-screen display, up to 8 channels for pressure, load, displacement and other transducers 2 USB and 1 ethernet ports.

C058-04N + C127N + C111-26 + C111-22

C058-05N + C104-04 + C127N + C111-26 + C111-22 + C121-05

COMPRESSION 2000 kN capacity		LOAD MEASURING SYSTEM	
MODEL	Motorized	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)
C058-04N	▼	▼	
C058-05N *	▼		▼

Accessories at page 228-229

* Autotec/Servo-Plus models feature fully automatic power pack - electrovalve operated test start (no manual lever).

COMPRESSION TESTING MACHINE 3000 KN CAPACITY

TO TEST CUBES UP TO 200 MM SIDE AND CYLINDERS UP TO Ø 160X320 MM

STANDARDS: ASTM C39 I AASHTO T22 I NF P18-411 I BS 1610 I GOST 10180

DIAL GAUGES MODELS

- Gauges Ø 250 mm with specific resistance scales for cubes 150 mm and cylinders Ø 150 - 160 mm
- Gauges divisions: 3000 kN div. 10 kN
  600 kN div. 2 kN

MAIN FEATURES FOR ALL MODELS

- Max. vertical daylight: 336 mm
- Horizontal daylight between columns: 272 mm
- Compression platens Ø 287 x 51 mm
- **High stiffness and heavy weight 4 columns frame (german-style).**
- Calibration accuracy: Class 1
- Max. ram travel 55 mm approx.
- Power supply: 230V 1ph 50Hz 750W
- Dimensions: 500x500x1100 mm approx.
- **Weight: 1050...1120 kg**

C070D + C111-05

C071A + C127N + C111-05 + C121-07

COMPRESSION 3000 kN capacity		LOAD MEASURING SYSTEM			
MODEL	Motorized	1 Gauge	2 Gauges	Digitec mod. C108N (p. 212)	Autotec mod. C098N (p. 212)
C068	▼	▼			
C069	▼		▼		
C070D	▼			▼	
C071A *	▼				▼

Accessories at page 228-229

COMPRESSION TESTING MACHINE HIGH-END MODELS

TO TEST CUBES UP TO 200 MM SIDE AND CYLINDERS UP TO Ø 160X320 MM

STANDARDS: ASTM C39 I AASHTO T22 I NF P18-411 I BS 1610 I GOST 10180

3000 KN CAPACITY

itTECH CYBER PLUS PROGRESS

CYBER-PLUS OR **SERVO-PLUS PROGRESS** DIGITAL TOUCH-SCREEN DISPLAY

Cyber-Plus Progress control unit 7" touch-screen display, up to 8 channels for pressure, load, displacement and other transducers 2 USB and 1 ethernet ports.

C070N + C127N + C111-05 | **C071N + C104-04 + C127N + C111-05 + C121-07**

COMPRESSION 3000 kN capacity		LOAD MEASURING SYSTEM	
MODEL	Motorized	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)
C070N	▼	▼	
C071N *	▼		▼

Accessories at page 228-229

* Autotec/Servo-Plus models feature fully automatic power pack - electrovalve operated test start (no manual lever).

ACCESSORIES FOR COMPRESSION MACHINES TO ASTM (1300kN, 1500kN, 2000kN, 3000kN) FROM C020 TO C071N

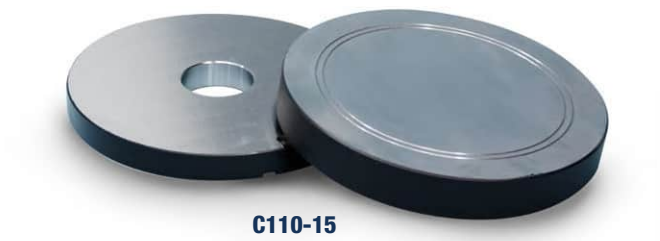
DISTANCE PIECES

Steel distance pieces are placed under the compression machine lower platen, to reduce the vertical daylight.
The number in brackets indicates the height of each distance piece included in the code (note that a code may contain more than one item).

Capacity	Cubes 100 mm & cylinders Ø 50x100 mm	Cubes 150 mm	Cubes 200 mm	Cylinders Ø 100x200 mm	Cylinders Ø 110x220 mm	Cylinders Ø 150x300 mm	Cylinders Ø 160x320 mm
1300 kN 1500 kN	C111-01 (176+50)	C111 (176)	Not possible	C111-03 (100) + C111-30 (20)	C111-03 (100)	C111-30 (20)	None
2000kN (C053 to C056N)	C111-01 (176+50)	C111 (176)	Not possible	C111-03 (100) + C111-30 (20)	C111-03 (100)	C111-30 (20)	None
2000kN (C058 series)	C111-26 (76) + 2xC111-22 (50)	C111-26 (76) + C111-22 (50)	C111-26 (76)	C111-26 (76)	2xC111-22 (50)	Not possible	Not possible
3000kN	C111-06 (126+50+50)	C111-05 (126+50)	C111-04 (126)	C111-04(126)	C111-07 (50+50)	C111-31 (20)	None

Refer to page 295 for more details and other distance pieces.

C110-15 LOWER COMPRESSION PLATEN Ø 216x40 mm, hardened and rectified as a lighter alternative to the standard platen Ø 287 mm. Only for C058 and C068 to C071N series. Technical details: see page 294



C110-15

C112-10 UPPER AND LOWER RECTANGULAR COMPRESSION PLATENS 245x510x55 mm complete **with ball seating**, for tests on blocks too.

TESTING CHAMBER with a vertical clearance of 376 mm, complete with a distance piece, 40 mm high, for testing cylinders Ø 150x300 mm and Ø 160x320 mm with capping retainers (ASTM C1231 AASHTO T22, T851)

C041-11: Model 1300kN and 1500kN
C056-11: Model 2000kN
C068-11: Model 3000kN

Note: DIFFERENT VERTICAL CLEARANCES are available on request.

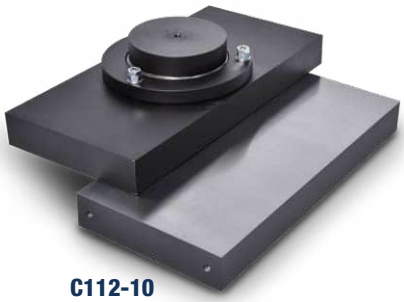
C107-10 CAPPING RETAINERS for Ø 150 mm and 6'' cylinders, set of two

C107-12 CAPPING RETAINERS for Ø 160 mm cylinders, set of two

Note: CAPPING RETAINERS can only be used with testing chambers having a vertical clearance of 376 mm.
For further technical details: see page 291

C110-20 LOWER COMPRESSION PLATEN, hardened over 55 HRC, Ø 165x50 mm to test cubes 100 mm side (as an alternative to the distance piece 50 mm high). Only for C058 series and 3000 kN machines.

C110-20



C112-10

C107-10 + C107-20

C107-20 NEOPRENE PADS for cylinders Ø 150 mm, 60 shore A, set of two

C107-21 NEOPRENE PADS for cylinders Ø 150 mm, 70 shore A, set of two

C107-25 NEOPRENE PADS for cylinders Ø 160 mm, 60 shore A, set of two

C107-26 NEOPRENE PADS for cylinders Ø 160 mm, 70 shore A, set of two

SAFETY MEANS

Model	Safety guards	Stop switch for the safety guards	Stop switch for the piston stroke
1300kN 1500kN	C121	C121-51	C121-52
2000kN	C121-05	C121-51	C121-52
3000kN	C121-07	C121-51	C121-52

C115-01 | -02 | -03
TWO WAY HYDRAULIC VALVE, connected to the motorized pumping unit of the machine to activate a second frame. **In order to choose the correct model** and for technical details see p. 293

C110-30 UPPER COMPRESSION PLATEN+SPHERICAL SEAT, to be fixed on the testing machine, in replacement of the standard platen + seat ball to obtain an increased vertical clearance of the testing chamber and to meet the ASTM C39, C1231 and AASHTO T22, T851. Platen dimensions: Ø 165x30 mm, suitable for 6" and 4" cylinders. Weight: 10 kg approx. Technical details: see p. 295

C115-01

C110-30

C097-05 CALIBRATION CLASS 1, starting from 1% of the full range. With a special calibration procedure, it is possible to grant Class 1 practically on the full range of the compression machine. Applicable only on digital machines.

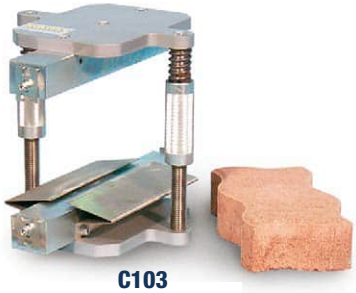
C097-01 DUAL LOW CAPACITY DIGITAL RANGE complete with appropriate pressure transducer, only for digital machines. Recommended range 0-250kN. Technical details: see page 288

AUTO-CENTERING DEVICE for cubes 100 and 150 mm side, and cylinders Ø 100 and 150 mm. Technical details: see p. 291

C107 Model for 1300 kN, 1500 kN, 2000 kN (from C053 to C056N). Suitable for plates with Ø 216 mm.

C107-01 Model for 2000 kN (series C058) and 3000 kN. Suitable for plates with Ø 287 mm.

C107-01


C103

C100

E170

C100 SPLITTING TENSILE test device for cylinders. EN 12390-6 | ASTM C496.
Technical details and other models: see p. 289

C103 SPLITTING TENSILE test device for cubes and self-blocking pavers. EN 1138, 12390-6.
Technical details: see p. 289

C106 FLEXURAL TEST DEVICE for concrete beams. EN 12390-5 | ASTM C78, C293 | AASHTO T97.
Technical details: see p. 290

E170 COMPRESSION DEVICE to test cement specimens 40.1x40 mm. EN 196-1 | ASTM C349.
Technical details and other models: see p. 290

Note: All the accessories from C100 to E170 need C097-01 and suitable distance pieces basing on their height.

C104-10N FIRMWARE AND SOFTWARE to allow displacement control and displacement measurement during a compression test. For Servo-plus machines only, it needs the addition of a displacement transducer.

C126 BENCH to hold the compression machine.
Technical details: see p. 292

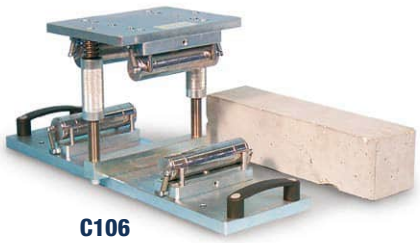
C104-04 CONSOLE HOUSING THE SERVO-PLUS PROGRESS
The pump assembly lined with sound proofing material for noise reduction and the digital system are encased to enhance the design and look of the machine.
Technical details: see p. 215

C127N GRAPHIC PRINTER on thermo-paper on board for digital models.

C127-11 THERMO-PAPER roll for printer (pack of 10 rolls).

C099N INVERTER DEVICE applicable only on Servo-Plus Progress machines. C104-04 is required. Technical details see page 215

C099-01 BAR CODE SCANNER allowing specimen file and identification. Supplied complete with USB cable.


C106

SSW-LINK
FIRMWARE UPGRADE
To enable SmartLab software (pack of 3).
Only for touch screen models. Further details at page 20

Note: UTM2 software is also available on request.

COMPRESSION TESTING MACHINE 2000 KN CAPACITY

TO TEST BLOCKS MAX. 500X300 MM, CUBES UP TO 300 MM SIDE AND CYLINDERS UP TO Ø 160X320 MM

STANDARDS: EN 772-1 | ASTM C39, C140, C1314 | AASHTO T22 | NF P18-411 | BS 1610, 6073 | GOST 10180

DIAL GAUGES MODELS

- Gauges Ø 250 mm with specific resistance scales for cubes 150 mm and cylinders Ø 150 - 160 mm
- Gauges divisions: 2000 kN div. 5 kN
  600 kN div. 2 kN

MAIN FEATURES FOR ALL MODELS

- Max. vertical daylight: 336 mm
- Horizontal daylight between columns: 324 mm
- Compression platens 510x320x55 mm
- **High stiffness and heavy weight 4 columns frame (german-style).**
- Calibration accuracy: Class 1
- Max. ram travel 55 mm approx.
- Power supply: 230V 1ph 50Hz 750W
- Dimensions: 510x810x1100 mm approx.
- **Weight: 850...900**

C077D + C127N + C105 + C111-08

C078A + C105 + C111-08

COMPRESSION 2000 kN capacity		LOAD MEASURING SYSTEM			
MODEL	Motorized	1 Gauges	2 Gauges	Digitec mod. C108N (p. 212)	Autotec mod. C098N (p. 212)
C075	▼	▼			
C076	▼		▼		
C077D	▼			▼	
C078A *	▼				▼

Accessories at page 234-235

COMPRESSION TESTING MACHINE HIGH-END MODELS

TO TEST BLOCKS MAX. 500X300 MM, CUBES UP TO 300 MM SIDE AND CYLINDERS UP TO Ø 160X320 MM

STANDARDS: EN 772-1 | ASTM C39, C140, C1314 | AASHTO T22 | NF P18-411 | BS 1610, 6073 | GOST 10180

2000 KN CAPACITY

itTECH CYBER PLUS PROGRESS

CYBER-PLUS OR **SERVO-PLUS PROGRESS** DIGITAL TOUCH-SCREEN DISPLAY

Cyber-Plus Progress control unit 7" touch-screen display, up to 8 channels for pressure, load, displacement and other transducers, 2 USB and 1 ethernet ports.

C077N + C127N + C111-22

C078N + C104-04 + C127N + C105 + C111-08

COMPRESSION 2000 kN capacity		LOAD MEASURING SYSTEM	
MODEL	Motorized	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)
C077N	▼	▼	
C078N *	▼		▼

Accessories at page 234-235

* Autotec/Servo-Plus models feature fully automatic power pack - electrovalve operated test start (no manual lever).

COMPRESSION TESTING MACHINE 3000 KN CAPACITY

TO TEST BLOCKS MAX. 500X300 MM, CUBES UP TO 300 MM SIDE AND CYLINDERS UP TO Ø 160X320 MM

STANDARDS: EN 772-1 I ASTM C39, C140, C1314 I AASHTO T22 I NF P18-411 I BS 1610, 6073 I GOST 10180

DIAL GAUGES MODELS

- Gauges Ø 250 mm with specific resistance scales for cubes 150 mm and cylinders Ø 150 - 160 mm
- Gauges divisions: 3000 kN div. 10 kN
  600 kN div. 2 kN

MAIN FEATURES FOR ALL MODELS

- Max. vertical daylight between platens: 336 mm
- Horizontal daylight between columns: 340 mm
- Compression platens 510x320xh55 mm
- **High stiffness and heavy weight 4 columns frame (german-style).**
- Calibration accuracy: Class 1
- Max. ram travel 55 mm approx.
- Power supply: 230V 1ph 50Hz 750W
- Dimensions: 870x590x1100 mm approx.
- **Weight: 1150...1220 kg**

C079-05D + C105 + C127N + C111-28

C079-06A + C105 + C111-28

COMPRESSION 3000 kN capacity		LOAD MEASURING SYSTEM			
MODEL	Motorized	1 Gauge	2 Gauges	Digitec mod. C108N (p. 212)	Autotec mod. C098N (p. 212)
C079-03	▼	▼			
C079-04	▼		▼		
C079-05D	▼			▼	
C079-06A *	▼				▼

Accessories at page 234-235

COMPRESSION TESTING MACHINE HIGH-END MODELS

TO TEST BLOCKS MAX. 500X300 MM, CUBES UP TO 300 MM SIDE AND CYLINDERS UP TO Ø 160X320 MM

STANDARDS: EN 772-1 | ASTM C39, C140, C1314 | AASHTO T22 | NF P18-411 | BS 1610, 6073 | GOST 10180

3000 KN CAPACITY

itTECH CYBER PLUS PROGRESS

CYBER-PLUS OR **SERVO-PLUS PROGRESS** DIGITAL TOUCH-SCREEN DISPLAY

Cyber-Plus Progress control unit 7" touch-screen display, up to 8 channels for pressure, load, displacement and other transducers 2 USB and 1 ethernet ports.

C079-05N + C127N + C111-22

C079-06N + C105 + C127N + C104-04 + C111-28

COMPRESSION 3000 kN capacity		LOAD MEASURING SYSTEM	
MODEL	Motorized	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)
C079-05N	▼	▼	
C079-06N *	▼		▼

Accessories at page 234-235

* Autotec/Servo-Plus models feature fully automatic power pack - electrovalve operated test start (no manual lever).

ACCESSORIES FOR 2000 kN and 3000 kN BLOCKS MACHINES

C111-31 DISTANCE PIECE, 20 mm high for cylinders Ø 150x300 mm

C111-04 DISTANCE PIECE, 126 mm high for cubes 200 mm side

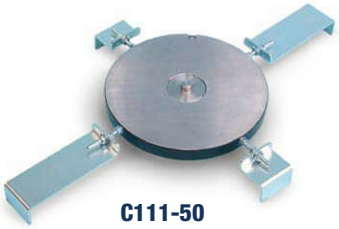
C111-05 DISTANCE PIECES, 126+50 mm high for cubes 200 and 150 mm side

C111-06 DISTANCE PIECES 126+50+50 mm high for cubes 200, 150 and 100 mm side

C111-22 DISTANCE PIECE 50 mm high

Note: Cylinders Ø 160x320 mm do not require any distance piece.

C111-50 DISTANCE PIECE, it eliminates the heavy procedure to lift the lower rectangular platen and to add distance pieces. Technical details: see p. 295



C111-50

AS AN ALTERNATIVE:

C112-05 KIT of 4 HANDLES to lift the lower platen, making the positioning of distance pieces easier. Technical details: see p. 295

C112-05

TESTING CHAMBER with a vertical clearance of 376 mm, complete with a distance piece, 40 mm high, for testing cylinders Ø 150x300 mm and Ø 160x320 mm with capping retainers (ASTM C1231 and AASHTO T22, T851)

C056-11 Model 2000 kN

C068-11 Model 3000 kN

Note: different vertical clearances are available on request.

AS AN ALTERNATIVE to standard distance pieces:

C105 CENTRAL SCREW, to get easier the adjustment between the big sized compression platens. Technical details: see p. 288

C111-27 SLOTTED DISTANCE PIECE, 20 mm high for central screw

C111-23 SLOTTED DISTANCE PIECE, 50 mm high for central screw

C111-28 SLOTTED DISTANCE PIECE, 76 mm high for central screw

C111-08 SLOTTED DISTANCE PIECE, 126 mm high for central screw

C127N GRAPHIC PRINTER on thermo-paper on board for digital models

C127-11 THERMO-PAPER roll for printer (pack of 10 rolls)

SAFETY MEANS

Model	Safety guards	Stop switch for the safety guards	Stop switch for the piston stroke
1300kN 1500kN	C121	C121-51	C121-52
2000kN	C121-01	C121-51	C121-52
3000kN	C121-08	C121-51	C121-52

C107-10 CAPPING RETAINERS (set of two) for cylinders 150 mm and 6". Other models: see p. 291

C107-20 NEOPRENE PADS (set of two) for cylinders Ø 150 mm 60 shore A. Other models: see p. 291

C107-10 + C107-20

C110-30

C110-30 UPPER COMPRESSION PLATEN+SPHERICAL SEAT, to be fixed on the testing machine, in replacement of the standard platen + seat ball to obtain an increased vertical clearance of the testing chamber and to meet the ASTM C39, C1231 and AASHTO T22, T851
Platen dimensions: Ø 165x30 mm, suitable for 6" and 4" cylinders.
Weight: 10 kg approx.
Technical details: see p. 291

C115-01 | -02 | -03
TWO WAY HYDRAULIC VALVE, connected to the motorized pumping unit of the machine to activate a second frame.
In order to choose the correct model and for technical details see p. 293

C115-01

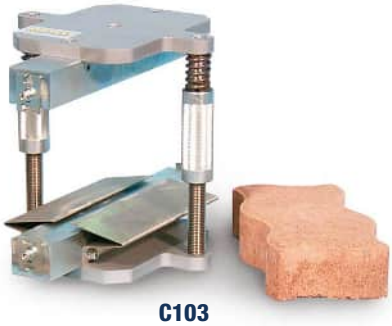
C097-05 CALIBRATION CLASS 1, starting from 1% of the full range. With a special calibration procedure it is possible to grant Class 1 practically on the full range of the compression machine. Applicable only on digital machines.

C097-01 DUAL LOW CAPACITY DIGITAL RANGE, complete with **appropriate pressure transducer**, only for digital machines. Recommended range 0-250kN.
Technical details: see p. 288

C100 SPLITTING TENSILE test device for cylinders.
EN 12390-6 I ASTM C496
Technical details and other models: see p. 289

C100

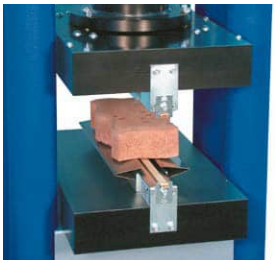
C103 SPLITTING TENSILE test device for self blocking pavers and cubes. EN 1338, 12390-6.
Technical details: see p. 289



C103

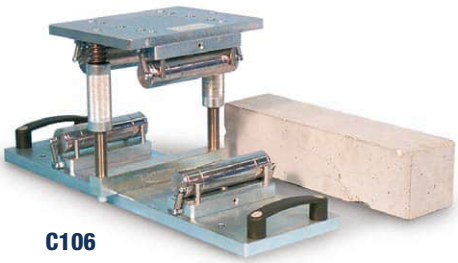
AS AN ALTERNATIVE:

C103-01 SPLITTING TENSILE test device for self blocking pavers and cubes having max. dimensions 300x500mm, directly fixed on the large compression platens.
EN 1338, 12390-6. Technical details: see pag. 289



C103-01

C106 FLEXURAL TEST DEVICE for concrete beams.
EN 12390-5 I ASTM C78, C293 I AASHTO T97
Technical details: see p. 290



C106

E170 COMPRESSION DEVICE to test cement specimens 40.1x40 mm EN 196-1 I ASTM C349
Technical details and other models: see p. 290

E170

Note: All the accessories from C100 to E170 need C097-01 and suitable distance pieces basing on their height.

C126 BENCH to hold the compression machine. See p. 292

C104-04 CONSOLE HOUSING THE SERVO-PLUS PROGRESS
The pump assembly **lined** with sound proofing material for noise reduction and the digital system are encased to enhance the design and look of the machine.
Technical details: see p. 215

C079-06N **C104-04**

C099N INVERTER DEVICE
Applicable only on Servo-Plus Progress machines.
C104-04 is required. Technical details: see p. 215

C099-01 BARCODE SCANNER This instrument allows specimen file and identification by barcodes reading.
Technical details: see p. 215

SSW-LINK
FIRMWARE UPGRADE
To enable SmartLab software (pack of 3).
Only for touch screen models. Further details at page 20

Note: UTM2 software is also available on request.

COMPRESSION TESTING MACHINE 5000 KN CAPACITY HIGH-END MODELS

TO TEST CUBES UP TO 300 MM SIDE AND CYLINDERS UP TO Ø 250X500 MM

STANDARDS: BS 1610 I NF P18-411 I ASTM C39 I AASHTO T22 I GOST 10180

5000 KN CAPACITY

MAIN FEATURES FOR ALL MODELS

- Max. vertical daylight: 530 mm
- Horizontal daylight between columns: 340 mm
- Compression platens 310x310x68 mm
- Calibration accuracy: Class 1
- Max. ram travel 60 mm approx.
- **High stiffness and heavy weight 4 columns frame (german-style).**
- Power supply: 230V 1ph 50Hz 750W
- Dimensions: 970x750x1800 mm approx.
- Weight: 2800...2900 kg approx.

CYBER-PLUS OR **SERVO-PLUS PROGRESS** DIGITAL TOUCH-SCREEN DISPLAY

Cyber-Plus Progress control unit 7" touch-screen display, up to 8 channels for pressure, load, displacement and other transducers, 2 USB and 1 ethernet ports.

C086-02N + C127N

C086-03N + C086-10

COMPRESSION 5000 kN capacity		LOAD MEASURING SYSTEM	
MODEL	Motorized	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)
C086-02N	▼	▼	
C086-03N *	▼		▼

* Servo-Plus model feature fully automatic power pack - electrovalve operated test start (no manual lever).

ACCESSORIES FOR 5000 kN MACHINES

C086-10 DISTANCE PIECE, 50 mm high

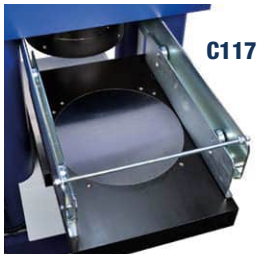
C086-11 DISTANCE PIECE, 25 mm high

Note: Vertical daylight between the compression platens is 530 mm. The operator will have to buy the needed distance pieces to reduce the daylight between the compression platens to achieve the dimensions of the specimen under test plus approx. 10 to 15 mm of free space.

C112-11

C112-11 UPPER+LOWER LARGE COMPRESSION PLATENS+SEAT BALL 310x510x55 mm to test **also** blocks. It is necessary to have also the sliding rail carriage mod. C117

C117 SLIDING RAIL CARRIAGE, for an easy removal of the large block upper platen



C117

C127N GRAPHIC PRINTER on thermo-paper on board

C127-11 THERMO-PAPER roll for printer (pack of 10 rolls)

C121-04 SAFETY GUARDS, polycarbonate, with hinges and lock, to CE Directive. See p. 292

C121-51 STOP SWITCH on safety guard. See p. 292

C121-52 STOP SWITCH to prevent piston over travel

C115-01 | -02 | -03
TWO WAY HYDRAULIC VALVE, connected to the motorized pumping unit of the machine to activate a second frame. **In order to choose the correct model** and for technical details see p. 293

C115-01

C097-01 DUAL LOW CAPACITY DIGITAL RANGE, complete with **appropriate pressure transducer**. Recommended range 0-250kN. Technical details: see p. 288

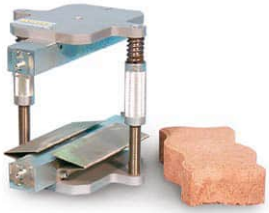
C097-01

C097-05 CALIBRATION CLASS 1, starting from 1% of the full range. With a special calibration procedure it is possible to grant Class 1 practically on the full range of the compression machine.

C100
SPLITTING TENSILE test device for cylinders.EN 12390-6 | ASTM C496
Technical details and other models: see p. 289

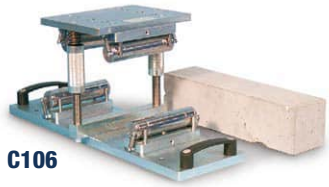
C100

C103
SPLITTING TENSILE test device for self blocking pavers and cubes.
EN 1338, 12390-6.
Technical details: see p. 289



C103

C106
FLEXURAL TEST DEVICE for concrete beams.
EN 12390-5 | ASTM C78, C293 | AASHTO T97
Technical details: see p. 290



C106

E170
COMPRESSION DEVICE to test cement specimens 40.1x40 mm EN 196-1 | ASTM C349
Technical details and other models: see p. 290

E170

Note: All the accessories from C100 to E170 need C097-01 and suitable distance pieces basing on their height.

C099N
INVERTER DEVICE
Applicable only on Servo-Plus Progress machines.
Highly recommended.
Technical details: see p. 215

C099N

C099-01
BAR CODE SCANNER allowing specimen file and identification.
Supplied complete with USB cable.

SSW-LINK
FIRMWARE UPGRADE
To enable SmartLab software (pack of 3).
Only for touch screen models. Further details at page 20

Note: UTM2 software is also available on request.

COMPRESSION TESTING MACHINE 2000 KN HIGH STIFFNESS

TO TEST CYLINDERS Ø100X200 MM / 4''X8'' AND Ø150X300 MM / 6''X12''

STANDARDS: ASTM C39 I AASHTO T22

NEW

2000 KN / 450'000 lb

MAIN FEATURES

- Max. vertical daylight: 387 mm / 15"
- Upper compression platen: 165 mm / 6.5"
- Calibration accuracy: Class 1
- Max. ram travel: 60 mm / 2.3" approx.
- High stiffness and heavy weight 4 columns frame
- Weight: 1000...1070 kg / 2200…2360 lb

itTECH CYBER PLUS PROGRESS

Spherical seat with Ø 165 mm / 6.5"

Metallic safety guards, long durability

Automatic pump for pace rate control

Ergonomic bench for a comfortable operation height

Thanks to the distance piece included (15 mm / 0.6'' high), the vertical daylight is reduced to 372 mm / 14'' which is optimal for cylinders Ø150x300 mm or 6''x12'' equipped with capping retainers. The large bottom platen is suitable also to be used as a work surface, so that the sample can be fitted with capping retainers directly on the platen and then simply slid in the correct position for the load application.

Models	Description	Cyber-Plus Progress Semi-Automatic	Servo-Plus Progress Automatic	Horizontal Daylight (mm/inch)	Lower Compression Platen (mm/inch)	Dimensions (mm/inch)
C082	Compression machine, safety guards, bench		▼	340/13	475x320x55 18x12.5x2	890x620x1530 35x24.5x60
C082-01	Compression machine		▼	340/13	475x320x55 18x12.5x2	890x620x1000 35x24.5x39.5
C083	Compression machine, safety guards, bench		▼	260/10	475x245x55 18x9x2	810x620x1530 31x24.5x60
C083-01	Compression machine		▼	260/10	475x245x55 18x9x2	810x620x1530 31x24.5x60
C084	Compression machine, safety guards, bench	▼		340/13	475x320x55 18x12.5x2	890x620x1530 35x24.5x60
C084-01	Compression machine	▼		340/13	475x320x55 18x12.5x2	890x620x1000 35x24.5x39.5
C085	Compression machine, safety guards, bench	▼		260/10	475x245x55 18x9x2	810x620x1530 31x24.5x60
C085-01	Compression machine	▼		260/10	475x245x55 18x9x2	810x620x1000 31x24.5x39.5

Note: other capacities are available on request.

ACCESSORIES FOR MACHINE FROM C082 TO C085-01

C111-24 DISTANCE PIECE 50 mm high for cylinders Ø150x300 mm and 6”x12” without capping retainers.

C111-15 DISTANCE PIECES 50+50 mm high for cylinders Ø100x200 mm and 4’’x8’’ cylinders with capping retainers.

3 x C111-24 DISTANCE PIECES 50+50+50 mm high for cylinders Ø100x200 mm and 4”x8” without capping retainers.

C111-32 DISTANCE PIECE 20 mm / 0.7’’ high.

C111-25 DISTANCE PIECE 73 mm / 2.87'' high.

C111-35 DISTANCE PIECE 15 mm / 0.6'' high.

Note:
cylinders Ø150x300 mm / 6’’x12’’ **with capping retainers** do not require any distance piece.

C107-09 CAPPING RETAINERS (couple) for Ø100x200 mm and 4”x8” cylinders.

C107-18 NEOPRENE PADS (couple) 60 shore A for Ø100x200 mm and 4”x8” cylinders.

C107-19 NEOPRENE PADS (couple) 70 shore A for Ø100x200 mm and 4”x8” cylinders.

C107-10 CAPPING RETAINERS (couple) for Ø150x300 mm and 6x12” cylinders.

C107-20 NEOPRENE PADS (couple) 60 shore A for Ø150x300 mm and 6”x12” cylinders.

C107-21 NEOPRENE PADS (couple) 70 shore A for Ø150x300 mm and 6”x12” cylinders.

C107-10

C107-20

C121-51 STOP SWITCH on safety guards

C121-52 STOP switch for maximum piston stroke

C127N GRAPHIC PRINTER on thermo-paper, on board

C127-11 THERMO-PAPER roll for printer (pack of 10 rolls)

C115-01 | -02 | -03
TWO WAY HYDRAULIC VALVE, connected to the motorized pumping unit of the machine to activate a second frame. **In order to choose the correct model** and for technical details see p. 293

C115-01

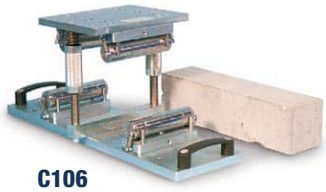
C097-01 DUAL LOW-CAPACITY DIGITAL RANGE, complete with appropriate pressure transducer, only for digital machines. Recommended range 0-250kN.
Technical details: see p. 288

C097-05 CALIBRATION CLASS 1, starting from 1% of the full range. With a special calibration procedure, it is possible to grant Class 1 practically on the full range of the compression machine. Applicable only on digital machines.

C100
SPLITTING TENSILE test device for cylinders.
EN 12390-6 | ASTM C496
Technical details and other models:
see p. 289

C100

C106
FLEXURAL TEST DEVICE for concrete beams.
EN 12390-5 | ASTM C78, C293 | AASHTO T97
Technical details: see p. 290



C106

C082-02 BENCH for C082-01 and C084-01

C083-02 BENCH for C083-01 and C085-01

C082-03 SAFETY GUARDS METALLIC for C082-01 and C084-01

C083-03 SAFETY GUARDS METALLIC for C083-01 and C085-01

C099-01 BARCODE SCANNER This instrument allows specimen file and identification by barcodes reading.
Supplied complete with USB cable.
Technical details: see p. 215

SSW-LINK
FIRMWARE UPGRADE
To enable SmartLab software (pack of 3).
Only for touch screen models. Further details at page 20

Note: UTM2 software is also available on request.

COMPRESSION AND FLEXURAL FRAMES ONLY

The compression frame is supplied complete with upper compression platen + spherical seat and lower compression platen, pressure transducer and flexible connection hose for connection to the control console (1 m long). The two-way hydraulic valve mod. C115-01 | -02 | -03 (see p. 293), the distance pieces and all the other accessories are not included and must be ordered separately.

Code	Capacity	Technical details at pages	Cube/Cylinder	Blocks	ASTM Spec.	EN High Stability Spec.
C036F	1300/1500 kN	220	▼		▼	
C051F	2000 kN	222	▼		▼	
C058F	2000 kN	224	▼		▼	
C073F	2000 kN	230	▼	▼	▼	
C066F	3000 kN	226	▼		▼	
C079-01F	3000 kN	232	▼	▼	▼	
C089F	2000 kN	242	▼			▼
C089-22F	2000 kN	250	▼	▼		▼
C089-06F	3000 kN	244	▼			▼
C089-15F	3000 kN	252	▼	▼		▼
C090F	150 kN	266	beams		▼	▼
C091-01F*	150 kN	268	multipurpose		▼	▼
C090-06F*	200 kN	270	multipurpose		▼	▼
C093F	150 kN	278	multipurpose		▼	▼
C095F*	320 kN	272	multipurpose		▼	▼
C096F*	360 kN	273	multipurpose		▼	▼

*Note: rollers are not included

C051F

C089F

C095F

C090F

C090-06F

C091-01F

COMPRESSION TESTING MACHINES TESTED FOR HIGH STABILITY

FOUR COLUMNS PRESTRESSED FRAME

The compression machines **tested for high stability** meet the stringent requirements of the:
EN 12390-4 | BS 1881:115 | DIN 51220 | UNI 6686, part 3 | NF P18-411 | UNE 83304 | ASTM C39 | AASHTO T22

The machines are manufactured with specific quality features (processing, tolerances) of frame, piston/cylinder group, spherical seat, compression platens, distance pieces etc., conforming and meeting the high stability verification. (force distribution).
The conformity of the stability is certified with the verification of the self-alignment (foot-meter test) of the machines components and the restraint on movement of the upper spherical seat/platen, by using a special electric strain load column at 5 measuring points which is connected to its suitable datalogger (technical details: see p. 301)

An incorrect and not uniform load application to the specimen causes irregular, unsatisfactory and premature failure. The obtained compression resistance can be substantially lower than the effective resistance.

The most important feature of the high stability frames is their uniform distribution of the applied load on the whole specimen surface under test. The sample breakage is satisfactory and the strength results are correct, high and true.

- The four columns frame is prestressed on 8 ring nuts and the clamping is obtained and checked by a dynamometric spanner, allowing to get a very high stiffness and stability on all load range and to keep these features over time.
- The spherical seat, with zero axial backlash and in oil bath, is studied and manufactured to grant, during the starting phase of the test, an accurate self-alignment without frictions of the upper compression platen to the specimen. By applying the load, the ball seating assembly locks and keeps the position until the specimen's failure.
- Piston and cylinder are coupled with high quality packing set.
- Compression platens are hardened over 55 HRC and rectified.

Available in the capacities: 2000 kN | 2000 kN blocks | 3000 kN | 3000 kN blocks | 4000 kN | 5000 kN
Load measuring system:
- Bourdon type gauge
- **Digitec** or **Cyber-Plus Progress** graphic display unit
- Servo-controlled automatic system **Autotec** or **Servo-Plus Progress** with optional **Servo-Strain** and **Elastic Modulus** determination.

Described and pictured in the next p. 242...257

COMPRESSION TESTING MACHINE 2000 KN CAPACITY TESTED FOR HIGH STABILITY

TO TEST CUBES UP TO 200 MM SIDE AND CYLINDERS UP TO Ø 160X320 MM

STANDARDS: EN 12390-4 | BS 1881:115 | DIN 51220 | ASTM C39 | NF P18-411 | AASHTO T22 | GOST 10180

DIAL GAUGES MODELS

- Gauges Ø 250 mm with specific resistance scales for cubes 150 mm and cylinders Ø 150 - 160 mm
- Gauges divisions: 2000 kN div. 5 kN
  600 kN div. 2 kN

MAIN FEATURES FOR ALL MODELS

- Max. vertical daylight: 334.5 mm
- Horizontal daylight between columns: 260 mm
- Compression platens Ø 287X60 mm
- Calibration accuracy: Class 1
- Max. ram travel 60 mm approx.
- **High stiffness and heavy weight 4 columns frame (german-style).**
- Power supply: 230V 1ph 50Hz 750W
- Dimensions: 750x470x1130 mm approx.
- **Weight: 850...920 kg**

C089-02D+C127N+C121-06+C111-13

C089-04A+C127N+C111-13

COMPRESSION 2000 kN High Stability		LOAD MEASURING SYSTEM			
MODEL	Motorized	1 Gauge	2 Gauges	Digitec mod. C108N (p. 212)	Autotec mod. C098N (p. 212)
C089	▼	▼			
C089-01	▼		▼		
C089-02D	▼			▼	
C089-04A *	▼				▼

Accessories at page 246-247

COMPRESSION TESTING MACHINE TESTED FOR HIGH STABILITY HIGH-END MODELS

TO TEST CUBES UP TO 200 MM SIDE AND CYLINDERS UP TO Ø 160X320 MM

STANDARDS: EN 12390-4 | BS 1881:115 | DIN 51220 | ASTM C39 | NF P18-411 | AASHTO T22 | GOST 10180

2000 KN CAPACITY

itTECH

CYBER PLUS PROGRESS

CYBER-PLUS OR **SERVO-PLUS PROGRESS** DIGITAL TOUCH-SCREEN DISPLAY

Cyber-Plus Progress control unit 7" touch-screen display, up to 8 channels for pressure, load, displacement and other transducers, 2 USB and 1 ethernet ports.

C089-02N+C111-13

C089-04N+C104-04+C127N+C121-06+C111-13

COMPRESSION 2000 kN High Stability		LOAD MEASURING SYSTEM	
MODEL	Motorized	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)
C089-02N	▼	▼	
C089-04N *	▼		▼

Accessories at page 246-247

* Servo-Plus/Autotec models feature fully automatic power pack - electrovalve operated test start (no manual lever).

COMPRESSION TESTING MACHINE 3000 KN CAPACITY TESTED FOR HIGH STABILITY

TO TEST CUBES UP TO 200 MM SIDE AND CYLINDERS UP TO Ø 160X320 MM

STANDARDS: EN 12390-4 | BS 1881:115 | DIN 51220 | ASTM C39 | NF P18-411 | AASHTO T22 | GOST 10180

DIAL GAUGES MODELS

- Gauges Ø 250 mm with specific resistance scales for cubes 150 mm and cylinders Ø 150 - 160 mm
- Gauges divisions: 3000 kN div. 10 kN
  600 kN div. 2 kN

MAIN FEATURES FOR ALL MODELS

- Max. vertical daylight: 334.5 mm
- Horizontal daylight between columns: 272 mm
- Compression platens Ø 287X60 mm
- Calibration accuracy: Class 1
- Max. ram travel 60 mm approx.
- **High stiffness and heavy weight 4 columns frame (german-style).**
- Power supply: 230V 1ph 50Hz 750W
- Dimensions: 800x470x1200 mm approx.
- **Weight: 1200...1250 kg**

C089-08D + C127N + C111-13

C089-10A + C127N + C111-13

COMPRESSION 3000 kN High Stability		LOAD MEASURING SYSTEM			
MODEL	Motorized	1 Gauge	2 Gauges	Digitec mod. C108N (p. 212)	Autotec mod. C098N (p. 212)
C089-06	▼	▼			
C089-07	▼		▼		
C089-08D	▼			▼	
C089-10A *	▼				▼

Accessories at page 246-247

COMPRESSION TESTING MACHINE TESTED FOR HIGH STABILITY HIGH-END MODELS

TO TEST CUBES UP TO 200 MM SIDE AND CYLINDERS UP TO Ø 160X320 MM

STANDARDS: EN 12390-4 | BS 1881:115 | DIN 51220 | ASTM C39 | NF P18-411 | AASHTO T22 | GOST 10180

3000 KN CAPACITY

itTECH

CYBER PLUS PROGRESS

CYBER-PLUS OR **SERVO-PLUS PROGRESS** DIGITAL TOUCH-SCREEN DISPLAY

Cyber-Plus Progress control unit 7" touch-screen display, up to 8 channels for pressure, load, displacement and other transducers, 2 USB and 1 ethernet ports.

C089-08N + C127N + C111-13 | **C089-10N + C104-04 + C121-07 + C111-13**

COMPRESSION 3000 kN High Stability		LOAD MEASURING SYSTEM	
MODEL	Motorized	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)
C089-08N	▼	▼	
C089-10N *	▼		▼

Accessories at page 246-247

* Servo-Plus/Autotec models feature fully automatic power pack - electrovalve operated test start (no manual lever).

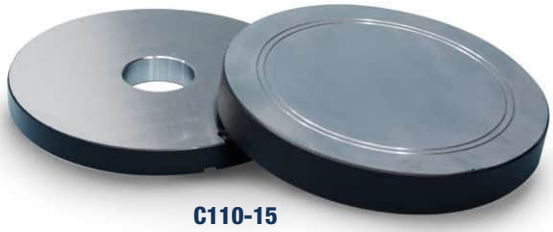
ACCESSORIES FOR COMPRESSION MACHINES TO EN (2000kN, 3000kN) FROM C089 TO C089-10N

DISTANCE PIECES

To be placed under the lower platen in order to reduce the vertical daylight. The number in brackets is the height of each distance piece included in the code (a code may contain more than one distance piece).
The distance pieces are available with standard or threaded centring pin. This second option is especially suitable to perform tests on high strength samples.

Capacity	Cubes 100 mm and cylinders Ø 50x100 mm	Cubes 150 mm	Cubes 200 mm and cylinders Ø 100x200 mm	Cylinders Ø 110x220 mm	Cylinders Ø 150x300 mm	Cylinders Ø 160x320 mm
2000 kN 3000 kN	C111-14 (73+50+50+50)	C111-13 (73+50+50)	C111-12 (73+50)	C111-15 (50+50)	C111-32 (20)	None
2000 kN 3000 kN Threaded distance pieces	C111-14SC (73+50+50+50)	C111-13SC (73+50+50)	C111-12SC (73+50)	C111-15SC (50+50)	C111-32SC (20)	None

C110-15 LOWER COMPRESSION PLATEN Ø 216x40 mm, hardened and rectified as a lighter alternative to the standard platen Ø 287 mm.
Technical details: see page 294



C110-15

C110-20 LOWER COMPRESSION PLATEN, hardened over 55 HRC, Ø 165x50 mm to test cubes 100 mm side (as an alternative to the distance piece 50 mm high).

C110-20

TESTING CHAMBER with vertical clearance of 376 mm, complete with distance piece 40 mm high, that allows to test cylinders Ø 150x300 mm and 160x320 mm with capping retainers.

C089-11: for 2000 kN model

C089-12: for 3000 kN model

Note: different vertical clearances are available on request.

C107-10 CAPPING RETAINERS for Ø 150 mm and 6'' cylinders, set of two

C107-20 NEOPRENE PADS for cylinders Ø 150 mm, 60 shore A, set of two

C107-10 + C107-20

SAFETY MEANS

Model	Safety guards	Stop switch for the safety guards	Stop switch for the piston stroke
2000kN	C121-06	C121-51	C121-52
3000kN	C121-07	C121-51	C121-52
3000kN with C089-12	C121-11	C121-51	C121-52

C115-01 | -02 | -03
TWO WAY HYDRAULIC VALVE, connected to the motorized pumping unit of the machine to activate a second frame. **In order to choose the correct model** and for technical details see p. 293

C110-30 UPPER COMPRESSION PLATEN+SPHERICAL SEAT, to be fixed on the testing machine, in replacement of the standard platen + seat ball to obtain an increased vertical clearance of the testing chamber and to meet the ASTM C39, C1231 and AASHTO T22, T851.
Platen dimensions: Ø 165x30 mm, suitable for 6" and 4" cylinders.
Weight: 10 kg approx.
Technical details: see p. 295

C115-01

C110-30

C097-05 CALIBRATION CLASS 1, starting from 1% of the full range. With a special calibration procedure, it is possible to grant Class 1 practically on the full range of the compression machine. Applicable only on digital machines.

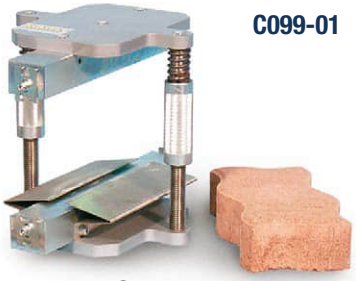
C097-01 DUAL LOW CAPACITY DIGITAL RANGE complete with appropriate pressure transducer, only for digital machines. Recommended range 0-250kN.
Technical details: see page 288

C097-08 OFFICIAL ACCREDIA (Equivalent UKAS, ENAC, DAKKS, SAS, COFRAC etc.) HARDNESS CERTIFICATE of upper and lower compression platens, Ø 287.
Minimum hardness: 55 HRC. See p. 288

C107-01 AUTO-CENTERING DEVICE for cubes 100 and 150 mm side, and cylinders Ø 100 and 150 mm only for Ø 287 plates.
Technical details: see page 291

C107-01

C100



C103

E170

C100 SPLITTING TENSILE test device for cylinders.
EN 12390-6 I ASTM C496.
Technical details and other models: see p. 289

C103 SPLITTING TENSILE test device for cubes and self-blocking pavers. EN 1138, 12390-6.
Technical details: see p. 289

C106 FLEXURAL TEST DEVICE for concrete beams.
EN 12390-5 I ASTM C78, C293 I AASHTO T97.
Technical details: see p. 290

E170 COMPRESSION DEVICE to test cement specimens 40.1x40 mm. EN 196-1 I ASTM C349.
Technical details and other models: see p. 290

Note: All the accessories from C100 to E170 need C097-01 and suitable distance pieces basing on their height.

C125M FIRMWARE, SOFTWARE AND HYDRAULIC UPGRADE to control the load both when increasing and decreasing. Allowing to apply load cycles on the sample.
See page 258

C104-10N FIRMWARE AND SOFTWARE to allow displacement control and displacement measurement during a compression test. For Servo-plus machines only, it needs the addition of a displacement transducer. See p. 263

C126 BENCH to hold the compression machine.
Technical details: see p. 292

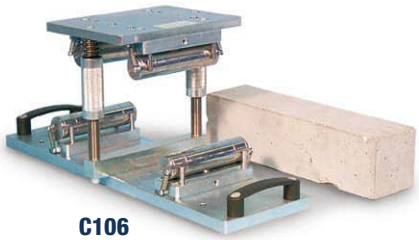
C104-04 CONSOLE HOUSING THE SERVO-PLUS PROGRESS
The pump assembly lined with sound proofing material for noise reduction and the digital system are encased to enhance the design and look of the machine.
Technical details: see p. 215

C127N GRAPHIC PRINTER on thermo-paper on board for digital models

C127-11 THERMO-PAPER roll for printer (pack of 10 rolls)

C099N INVERTER DEVICE applicable only on Servo-Plus Progress machines. C104-04 is required. Technical details: p. 215

C099-01 BAR CODE SCANNER allowing specimen file and identification. Supplied complete with USB cable.



C106

SSW-LINK
FIRMWARE UPGRADE
To enable SmartLab software (pack of 3).
Only for touch screen models. Further details at page 20

Note: UTM2 software is also available on request.

COMPRESSION TESTING MACHINE 4000 KN CAPACITY TESTED FOR HIGH STABILITY HIGH-END MODELS

TO TEST CUBES UP TO 200 MM SIDE AND CYLINDERS UP TO Ø 160X320 MM

STANDARDS: EN 12390-4, EN 13503-2 | BS 1881:115, BS 812-110, 812-111 | DIN 51220 | NF P18-411 | ASTM C39 | AASHTO T22 GOST 10180 | API RP 19C

4000 KN CAPACITY

MAIN FEATURES FOR ALL MODELS

- Max. vertical daylight: 376 mm
- Horizontal daylight between columns: 340 mm
- Compression platens Ø 287x60 mm
- Calibration accuracy: Class 1
- Max. ram travel 60 mm approx.
- **High stiffness and heavy weight 4 columns frame (german-style).**
- Power supply: 230V 1ph 50Hz 750W
- Dimensions: 1220X550X1300 mm approx.
- **Weight: 1800...1900 kg**

itTECH

CYBER-PLUS OR **SERVO-PLUS PROGRESS** DIGITAL TOUCH-SCREEN DISPLAY

Cyber-Plus Progress control unit 7" touch-screen display, up to 8 channels for pressure, load, displacement and other transducers 2 USB and 1 ethernet ports.

C088-11N **C088-10N + C127N**

COMPRESSION 4000 kN capacity		LOAD MEASURING SYSTEM	
MODEL	Motorized	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)
C088-10N	▼	▼	
C088-11N *	▼		▼

* Servo-Plus model feature fully automatic power pack - electrovalve operated test start (no manual lever).

ACCESSORIES FOR 4000 kN MACHINES

C111-32 DISTANCE PIECE, 20 mm high

C111-24 DISTANCE PIECE 50 mm high

C111-25 DISTANCE PIECE 73 mm high

C110-15 LOWER COMPRESSION PLATEN, Ø 216x40 mm, hardened and rectified, as a lighter alternative to the standard platen Ø 287 mm
Technical details: see p. 294

Note: Vertical daylight between the compression platens is 376 mm. The operator will have to buy the needed distance pieces to reduce the daylight between the compression platens to achieve the dimension of the specimen under test plus approx. 10 to 15 mm of free space.

C112-11 UPPER+LOWER LARGE COMPRESSION PLATENS 320x510x55 mm to test **also** blocks. It is necessary to have also the sliding rail carriage mod. C117

C117 SLIDING RAIL CARRIAGE, for an easy removal of the large block upper platen. See p. 257

C127N GRAPHIC PRINTER on thermo-paper on board

C127-11 THERMO-PAPER roll for printer (pack of 10 rolls)

C104-10N FIRMWARE AND SOFTWARE to allow displacement control and displacement measurement during a compression test. The final results obtained are maximum load, maximum strength and displacement. It is for Servo-plus machines only and it needs the addition of a displacement transducer. See p. 263

C125M FIRMWARE, SOFTWARE AND HYDRAULIC UPGRADE to control the load both when increasing and decreasing. Allowing to apply load cycles on the sample.
See p. 258

C121-02 SAFETY GUARDS, polycarbonate, with hinges and lock, to CE Directive. See p. 292

C121-51 STOP SWITCH on safety guard. See p. 292

C121-52 STOP SWITCH to prevent piston over travel.

C115-01 | -02 | -03
TWO WAY HYDRAULIC VALVE, connected to the motorized pumping unit of the machine to activate a second frame. **In order to choose the correct model** and for technical details see p. 293

C097-05 CALIBRATION CLASS 1, starting from 1% of the full range. With a special calibration procedure it is possible to grant.
Class 1 practically on the full range of the compression machine.

C115-01

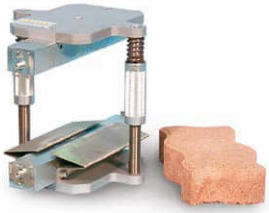
C097-01 DUAL LOW CAPACITY DIGITAL RANGE, complete with **appropriate pressure transducer**. Recommended range 0-250kN. Technical details: see p. 288

C097-01

C097-08 OFFICIAL ACCREDIA (Equivalent UKAS, ENAC, DAKKS, SAS, COFRAC etc.) HARDNESS CERTIFICATE of upper and lower compression platens. Minimum hardness: 55 HRC. See p. 288

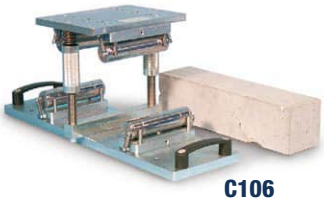
C107-01 AUTO-CENTERING DEVICE for cubes 100 and 150 mm side, and cylinders Ø 100 and 150 mm.
Technical details: see p. 291

C103
SPLITTING TENSILE test device for self blocking pavers and cubes.
EN 1338, 12390-6.
Technical details: see p. 289



C103

C106
FLEXURAL TEST DEVICE for concrete beams.
EN 12390-5 | ASTM C78, C293 | AASHTO T97
Technical details: see p. 290



C106

E170
COMPRESSION DEVICE to test cement specimens 40.1x40 mm
EN 196-1 | ASTM C349
Technical details and other models: see p. 290

Note: Accessories from C103 to E170 need C097-01 and suitable distance pieces basing on their height.

C099N
INVERTER DEVICE
Applicable only on Servo-Plus Progress machines.
Technical details: see p. 215

C099N

C099-01 BAR CODE SCANNER allowing specimen file and identification. Supplied complete with USB cable.

SSW-LINK
FIRMWARE UPGRADE
To enable SmartLab software (pack of 3).
Only for touch screen models. Further details at page 20

Note: UTM2 software is also available on request.

COMPRESSION TESTING MACHINE 2000 KN CAPACITY TESTED FOR HIGH STABILITY

TO TEST BLOCKS MAX 500X300 MM, CUBES UP TO 200 MM SIDE AND CYLINDERS UP TO Ø 160X320 MM

STANDARDS: EN 12390-4, EN 772-1 | BS 1881:115, 6073 | DIN 51220 | NF P18-411 | ASTM C39, C140, C1314 | AASHTO T22 | GOST 10180

DIAL GAUGES MODELS

- Gauges Ø 250 mm with specific resistance scales for cubes 150 mm and cylinders Ø 150 - 160 mm
- Gauges divisions: 2000 kN div. 10 kN
  600 kN div. 2 kN

MAIN FEATURES FOR ALL MODELS

- Max. vertical daylight to test blocks: 283 mm
- Horizontal daylight between columns: 340 mm
- Compression platens for blocks: 510x320x55 mm
- Max. vertical daylight to test cubes and cylinders: 334.5 mm
- Compression platens to test cubes, cylinders: Ø 287x60 mm
- Calibration accuracy: Class 1
- Max. ram travel 60 mm approx.
- **High stiffness and heavy weight 4 columns frame (german-style).**
- Power supply: 230V 1ph 50Hz 750W
- Dimensions: 830x520x1200 mm approx.
- **Weight: 1000...1070 kg**

C089-21D + C127N

C089-22A + C127N

COMPRESSION 2000 kN High Stability Blocks		LOAD MEASURING SYSTEM			
MODEL	Motorized	1 Gauge	2 Gauges	Digitec mod. C108N (p. 212)	Autotec mod. C098N (p. 212)
C089B	▼	▼			
C089-01B	▼		▼		
C089-21D	▼			▼	
C089-22A *	▼				▼

Accessories at page 254-255

COMPRESSION TESTING MACHINE TESTED FOR HIGH STABILITY HIGH-END MODELS

TO TEST BLOCKS MAX 500X300 MM, CUBES UP TO 200 MM SIDE AND CYLINDERS UP TO Ø 160X320 MM

STANDARDS: EN 12390-4, EN 772-1 | BS 1881:115, 6073 | DIN 51220 | NF P18-411 | ASTM C39, C140, C1314 | AASHTO T22 | GOST 10180

2000 KN CAPACITY

itTECH

CYBER PLUS PROGRESS

CYBER-PLUS OR **SERVO-PLUS PROGRESS** DIGITAL TOUCH-SCREEN DISPLAY

Cyber-Plus Progress control unit 7" touch-screen display, up to 8 channels for pressure, load, displacement and other transducers, 2 USB and 1 ethernet ports.

C089-21N

C089-22N + C127N + C104-04

COMPRESSION 2000 kN High Stability Blocks		LOAD MEASURING SYSTEM	
MODEL	Motorized	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)
C089-21N	▼	▼	
C089-22N *	▼		▼

Accessories at page 254-255

* Servo-Plus/Autotec models feature fully automatic power pack - electrovalve operated test start (no manual lever).

COMPRESSION TESTING MACHINE 3000 KN CAPACITY TESTED FOR HIGH STABILITY

TO TEST BLOCKS MAX 500X300 MM, CUBES UP TO 200 MM SIDE AND CYLINDERS UP TO Ø 160X320 MM

STANDARDS: EN 12390-4, EN 772-1 | BS 1881:115, 6073 | DIN 51220 | NF P18-411 | ASTM C39, C140, C1314 | AASHTO T22 | GOST 10180

DIAL GAUGES MODELS

- Gauges Ø 250 mm with specific resistance scales for cubes 150 mm and cylinders Ø 150 - 160 mm
- Gauges divisions: 3000 kN div. 10 kN
  600 kN div. 2 kN

MAIN FEATURES FOR ALL MODELS

- Max. vertical daylight to test blocks: 283 mm
- Horizontal daylight between columns: 340 mm
- Compression platens for blocks: 510x320x55 mm
- Max. vertical daylight to test cubes and cylinders: 334.5 mm
- Compression platens to test cubes, cylinders: Ø 287x60 mm
- Calibration accuracy: Class 1
- Max. ram travel 60 mm approx.
- **High stiffness and heavy weight 4 columns frame (german-style).**
- Power supply: 230V 1ph 50Hz 750W
- Dimensions: 870x600x1300 mm approx.
- **Weight: 1350...1400 kg**

C089-17D + C127N

C089-19A + C127N

COMPRESSION 3000 kN High Stability Blocks		LOAD MEASURING SYSTEM			
MODEL	Motorized	1 Gauge	2 Gauges	Digitec mod. C108N (p. 212	Autotec mod. C098N (p. 212
C089-15	▼	▼			
C089-16	▼		▼		
C089-17D	▼			▼	
C089-19A *	▼				▼

Accessories at page 254-255

COMPRESSION TESTING MACHINE TESTED FOR HIGH STABILITY HIGH-END MODELS

TO TEST BLOCKS MAX 500X300 MM, CUBES UP TO 200 MM SIDE AND CYLINDERS UP TO Ø 160X320 MM

STANDARDS: EN 12390-4, EN 772-1 | BS 1881:115, 6073 | DIN 51220 | NF P18-411 | ASTM C39, C140, C1314 | AASHTO T22 | GOST 10180

3000 KN CAPACITY

itTECH

CYBER PLUS PROGRESS

CYBER-PLUS OR **SERVO-PLUS PROGRESS** DIGITAL TOUCH-SCREEN DISPLAY

Cyber-Plus Progress control unit 7" touch-screen display, up to 8 channels for pressure, load, displacement and other transducers, 2 USB and 1 ethernet ports.

C089-17N

C089-19N + C104-04 + C127N

COMPRESSION 3000 kN High Stability Blocks		LOAD MEASURING SYSTEM	
MODEL	Motorized	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)
C089-17N	▼	▼	
C089-19N *	▼		▼

Accessories at page 254-255

* Servo-Plus/Autotec models feature fully automatic power pack - electrovalve operated test start (no manual lever).

ACCESSORIES FOR 2000 kN AND 3000 kN BLOCKS MACHINES FROM MOD. C089B TO C089-19N

C111-32 DISTANCE PIECE, 20 mm high for cylinders Ø 150x300 mm

C111-12 DISTANCE PIECE, 73+50 mm high for cubes 200 mm side

C111-13 DISTANCE PIECES, 73+50+50 mm high for cubes 200 and 150 mm side

C111-14 DISTANCE PIECES 73+50+50+50 mm high for cubes 200, 150 and 100 mm side

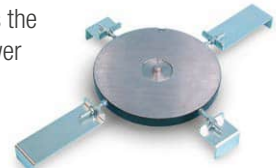
C111-15 DISTANCE PIECES 50+50 mm high for cylinders Ø 110x220 mm

C111-24 DISTANCE PIECE 50 mm high

C111-25 DISTANCE PIECE 73 mm high

Note: The cylinders Ø 160x320 mm do not require any distance piece.

C111-50 DISTANCE PIECE, it eliminates the heavy procedure to lift the lower rectangular platen and to add distance pieces. Technical details: see p. 295



C111-50

TESTING CHAMBER with a vertical clearance of 376 mm, complete with a distance piece, 40 mm high, for testing cylinders Ø 150x300 mm and Ø 160x320 mm with capping retainers.

C089-11 Model 2000 kN

C089-12 Model 3000 kN

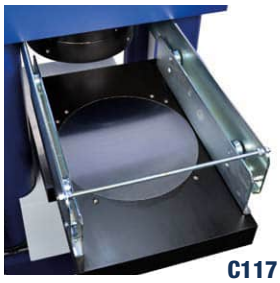
Note: different vertical clearances are available on request.

AS AN ALTERNATIVE:

C112-05 KIT of 4 HANDLES to lift the lower platen, making the positioning of distance pieces easier. Technical details: see p. 295

C112-05

C117 SLIDING RAIL CARRIAGE, for an easy removal of the upper block platen, to perform tests on blocks or on standard cubes and cylinders.



C117

C127N GRAPHIC PRINTER on thermo-paper on board for digital models

C127-11 THERMO-PAPER roll for printer (pack of 10 rolls)

Model	Safety Guards	Stop Switch for the Safety Guards	Stop Switch for the Piston Stroke
2000 kN	C121-10	C121-51	C121-52
3000 kN	C121-08	C121-51	C121-52
3000kN with C089-12	C121-12	C121-51	C121-52

Note: the safety guards are CE only of the stop switch C121-51 is added. See page 292

C115-01 | -02 | -03
TWO WAY HYDRAULIC VALVE, connected to the motorized pumping unit of the machine to activate a second frame. **In order to choose the correct model** and for technical details see p. 293

C115-01

C097-05 CALIBRATION CLASS 1, starting from 1% of the full range. With a special calibration procedure it is possible to grant Class 1 practically on the full range of the compression machine. Applicable only on digital machines.

C097-08 OFFICIAL ACCREDIA (Equivalent UKAS, ENAC, DAKKS, SAS, COFRAC etc.) HARDNESS CERTIFICATE of upper and lower compression platens. Minimum hardness: 55 HRC. See p. 288

C097-01 DUAL LOW CAPACITY DIGITAL RANGE, complete with **appropriate pressure transducer**, only for digital machines. Recommended range 0-250kN. Technical details: see p. 288

C097-01

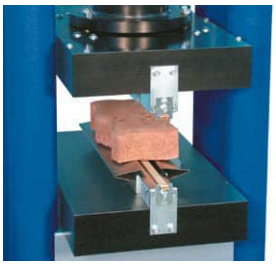
C100 SPLITTING TENSILE test device for cylinders. EN 12390-6 | ASTM C496
Technical details and other models: see p. 289

C100

C103 SPLITTING TENSILE test device for self blocking pavers and cubes. EN 1338, 12390-6.
Technical details: see p. 289

AS AN ALTERNATIVE:

C103-01 SPLITTING TENSILE test device for self blocking pavers and cubes having max. dimensions 300x500mm, directly fixed on the large compression platens.
EN 1338, 12390-6.
Technical details: see p. 289



C103-01

C106 FLEXURAL TEST DEVICE for concrete beams.
EN 12390-5 I ASTM C78, C293 I AASHTO T97
Technical details: see p. 290

C106

E170 COMPRESSION DEVICE to test cement specimens 40.1x40 mm EN 196-1 I ASTM C349
Technical details and other models: see p. 290

E170

Note: All the accessories from C100 to E170 need C097-01 and suitable distance pieces basing on their height.

C104-10N FIRMWARE AND SOFTWARE to allow displacement control and displacement measurement during a compression test. The final results obtained are maximum load, maximum strength and displacement. It is for Servo-plus machines only and it needs the addition of a displacement transducer.

C125M FIRMWARE, SOFTWARE AND HYDRAULIC UPGRADE to control the load both when increasing and decreasing. Allowing to apply load cycles on the sample.
See page 258

C126 BENCH to hold the compression machine. See p. 292

C104-04 CONSOLE HOUSING THE SERVO-PLUS PROGRESS
The pump assembly **lined** with sound proofing material for noise reduction and the digital system are encased to enhance the design and look of the machine.
Technical details: see p. 215

C089-19N **C104-04**

C099N INVERTER DEVICE
Applicable only on Servo-Plus Progress machine C104-04 is required.
Technical details: see p. 215

C099N

C099-01 BARCODE SCANNER This instrument allows specimen file and identification by barcodes reading.
Supplied complete with USB cable.
Technical details: see p. 215

SSW-LINK
FIRMWARE UPGRADE
To enable SmartLab software (pack of 3).
Only for touch screen models. Further details at page 20

Note: UTM2 software is also available on request.

COMPRESSION TESTING MACHINES 3000 KN AND 5000 KN CAPACITY TESTED FOR HIGH STABILITY

THIS OVERSIZED ISOSTATIC HIGH STABILITY STIFFNESS FRAME FOR CENTRAL AND RESEARCH LABORATORIES TO TEST HIGH STRENGTH SPECIMENS, EXPLOSIVE SAMPLES, ROCK AND CERAMIC

STANDARDS: EN 12390-4 | BS 1881:115 | DIN 51220 | NF P18-411 | GOST 10180

HIGH-END MODELS

3000/5000 KN CAPACITY

MAIN FEATURES FOR ALL MODELS

- Compression platens Ø 316x60 mm
- Hydraulic pressure: 360 bar max.
- Max. vertical daylight: 411 mm
- Horizontal daylight between columns: 321 - 345 mm
- Max. ram travel: 100 mm
- **High stiffness and heavy weight 4 columns frame: 0.3 mm at max. load (german-style).**
- Safety guards to CE Directive ▌ Class "1"
- Dimensions 3000 kN: 1030x760x1700 mm
- Dimensions 5000 kN: 1020x1180x1870 mm
- Power supply: 230V 1ph 50Hz 750W
- **Weight frame 3000 kN: 2500 kg / 5000 kN: 4500 kg**

itTECH

CYBER-PLUS OR **SERVO-PLUS PROGRESS** DIGITAL TOUCH-SCREEN DISPLAY

CYBER PLUS PROGRESS

Cyber-Plus Progress control unit 7" touch-screen display, up to 8 channels for pressure, load, displacement and other transducers, 2 USB and 1 ethernet ports.

C088-01N **C087N**

COMPRESSION 3000/5000 kN High Stability		LOAD MEASURING SYSTEM		
MODEL	Code	Motorized	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)
3000 kN	**C087N**	▼	▼	
3000 kN	**C087-01N**	▼		▼
5000 kN	**C088N**	▼	▼	
5000 kN	**C088-01N**	▼		▼

✱ Servo-Plus model feature fully automatic power pack - electrovalve operated test start (no manual lever).

ACCESSORIES FOR 3000 kN and 5000 kN MACHINES

C087-11 DISTANCE PIECE, 50 mm high

C087-12 DISTANCE PIECE, 25 mm high

C087-15 DISTANCE PIECE, 100 mm high

Note: Vertical daylight between the compression platens is 411 mm. The operator will have to buy the needed distance pieces to reduce the daylight between the compression platens to achieve the dimension of the specimen under test plus approx. 10 to 15 mm of free space.

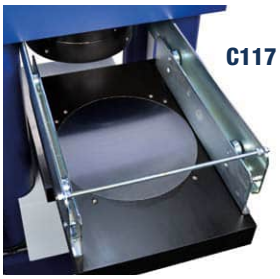
NEW

C087-16 CLAMPING DEVICE for distance pieces.
Strongly recommended for tests on high strength samples.

C112-11 UPPER+LOWER LARGE COMPRESSION PLATENS 320x510x55 mm to test **also** blocks. It is necessary to have also the sliding rail carriage mod. C117

C112-11

C117 SLIDING RAIL CARRIAGE, for an easy removal of the large block upper platen



C117

C127N GRAPHIC PRINTER on thermo-paper on board

C127-11 THERMO-PAPER roll for printer (pack of 10 rolls)

C104-10N FIRMWARE AND SOFTWARE to allow displacement control and displacement measurement during a compression test. The final results obtained are maximum load, maximum strength and displacement. It is for Servo-plus machines only and it needs the addition of a displacement transducer.

C125M FIRMWARE, SOFTWARE AND HYDRAULIC UPGRADE to control the load both when increasing and decreasing. Allowing to apply load cycles on the sample.
See page 258

C115-01 | -02 | -03
TWO WAY HYDRAULIC VALVE, connected to the motorized pumping unit of the machine to activate a second frame. **In order to choose the correct model** and for technical details see p. 293

C115-01

C097-01 DUAL LOW CAPACITY DIGITAL RANGE, complete with **appropriate pressure transducer**.
Recommended range 0-250kN. Technical details: see p. 288

C097-01

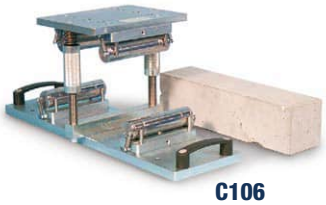
C097-05 CALIBRATION CLASS 1, starting from 1% of the full range. With a special calibration procedure it is possible to grant Class 1 practically on the full range of the compression machine.

C097-08 OFFICIAL ACCREDIA (Equivalent UKAS, ENAC, DAKKS, SAS, COFRAC etc.) HARDNESS CERTIFICATE of upper and lower compression platens. Minimum hardness: 55 HRC. See p. 288

C100
SPLITTING TENSILE test device for cylinders.EN 12390-6 | ASTM C496
Technical details and other models: see p. 289

C100

C106
FLEXURAL TEST DEVICE for concrete beams.
EN 12390-5 | ASTM C78, C293
AASHTO T97
Technical details: see p. 290



C106

E170
COMPRESSION DEVICE to test portion of cement specimens 40.1x40 mm EN 196-1 | ASTM C349
Technical details and other models: see p. 290

Note: All the accessories from C100 to E170 need C097-01 and suitable distance pieces basing on their height.

C099N
INVERTER DEVICE
Applicable only on Servo-Plus Progress machines. Technical details: see p. 215

C099N

C099-01
BAR CODE SCANNER allowing specimen file and identification. Supplied complete with USB cable. See p. 215

C121-51 STOP SWITCH on safety guard. See p. 292

SSW-LINK
FIRMWARE UPGRADE
To enable SmartLab software (pack of 3).
Only for touch screen models. Further details at page 20

Note: UTM2 software is also available on request.

C125M
DETERMINATION OF THE SECANT COMPRESSION ELASTIC MODULUS ON CONCRETE
AUTOMATIC WITH PACE RATE CONTROL ALSO WHEN RELEASING THE LOAD

STANDARDS: EN 12390-13, EN 13412, | ASTM C469 | ISO 1920-10 | BS 1881:121

C089-04N + C125M - C125-14 + C125-09

C125-13

C134N (x3)

It can be used with a MATEST high stability frame 2000, 3000, 4000 or 5000 kN capacity, coupled to the automatic servo-controlled system "Servo-Plus Progress" (mod. C104N) housed in a separate pyramidal frame.

The appliance includes:

HYDRAULIC SYSTEM
An additional hydraulic circuit with a high-performance valve directly controlled by the digital unit grants the automatic control of the pace rate increasing the load, keeps a certain load and then controls the pace rate decreasing the load. The setting of the pace rate is made by a very sensitive valve controlled by a stepper motor thus allowing a micrometric action on the pace rate grating excellent results. A laser sensor allows to automatically detect the approaching of the specimen, granting a high touching sensivity.

ELECTRONIC MEASURING SYSTEM
The high performance control and data processing unit Cyber-Plus Progress, can manage up to 16 high resolution channels for the control of load cells or transducers with strain gages bridge.
The unit contains two Analogical/Digital last generation converters with 24 bits resolution. The system processes the signals coming from the load cells and from the extensometers giving all the results required for further processing following the most updated International Standards for this application.

IN-BUILT FIRMWARE FOR ELASTIC MODULUS ON CONCRETE
The firmware allows to set the initial parameters and to obtain final results locally, according to the relevant Standards. The PC software can be purchased separately (see accessories).

The software allows to determine both the initial and stabilized **secant modulus of elasticity** as requested by **EN 12390-13** Standard.
The software gives the possibility to print on a standard printer a test certificate reporting all the data concerning the test and the specimen and the graph of the test. The extensometers (two models are proposed: **A** and **B**) are not included in the standard supply and must be ordered separately (see accessories).

NEEDED ACCESSORIES

A) Extensometers (strain gauges) single use, electric, for uniaxial and triaxial tests (pack of 10). Available in different sizes:

C125-10 Electric extensometer, base length 10 mm.
C125-11 Electric extensometer, base length 20 mm.
C125-12 Electric extensometer, base length 30 mm.
C125-13 Electric extensometer, base length 60 mm.
C125-14 Electric extensometer, base length 120 mm.

C125-10...C125-14

C125-15
KIT for the application of single use extensometers composed by: glue, welder, solder, cleaning liquid, accessories, the whole in carrying case

C125-09
INTERFACE MODULE, “needed accessory” to connect up to 4 electric single use extensometers . This module allows also the automatic calibration of the zero and of the measuring range after a special thermal compensation. This grants a five times better accuracy than the one requested by the Standards.

C125-09

ALTERNATIVE VERSION:

B) Extensometers/Compressometers, electronic, universal, mechanical frame, for uniaxial tests:

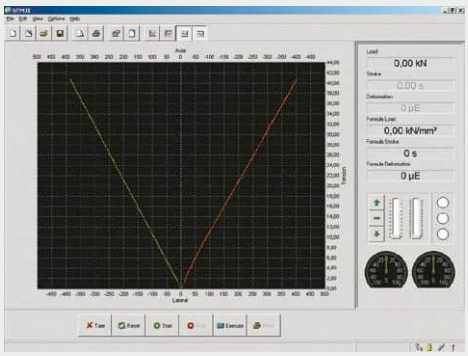
C134N
EXTENSOMETER / COMPRESSOMETER, electronic, universal, mechanical frame.
Technical details: see p. 260

C134N

AS ALTERNATIVE:

C134-01N
EXTENSOMETERS /COMPRESSOMETERS, electronic, universal, mechanical frame.
See p. 260

C134-10
TEMPLATE, to regulate and calibrate the base length of the C134N extensometer.



Typical screen representing the longitudinal and transversal deformations.

ACCESSORY

SSW-UTM2
PC SOFTWARE FOR REMOTE CONTROL

DETERMINATION OF THE ELASTIC MODULUS VALUE
ON CONCRETE AND MORTAR SPECIMENS

C134N
ELECTRONIC UNIVERSAL EXTENSOMETER/COMPRESSOMETER

STANDARDS: EN 12390-13, EN 13412 I ISO 1920-10 I BS 1881:121

Made of two anodized aluminium pieces, one fixed and the other sliding and housing an LVDT transducer that measures with high accuracy the movement of two conical points made of hardened steel and attached at the two ends of the electronic sensor. An aluminium template (mod C134-10) is used to regulate and to calibrate the base length. The two conical points are coupled to the surface of the sample with a rapid and simple attachment system by means of two adjustable elastic bands. The instrument is equipped with a mechanical knob to lock and unlock the displacement transducer, allowing to safeguard the selected base length while attaching of the device to the sample. Normally the test is performed on cylinders, cubes or prisms by using 3 extensometers/compressometers. The minimum height required for the sample is 130 mm. **It is also possible to test mortar prisms 40x40x160 mm by using a block for reducing length (included into C134N)**.
Gauge length adjustable from 50 to 160 mm.
Feeding up to 10 V
Travel: ± 1.5 mm (3 mm total)
Precision 0.1 micron.
Supplied complete with reducing block for mortar prisms, elastic straps, carrying case.

Weight: 1000 g approx.

Set of 3 units C134N fixed to a cylinder

C134-01N
ELECTRONIC EXTENSOMETER/COMPRESSOMETER
Similar to C134N but for samples with min. height of 60 mm and min. Ø 63 mm. Gauge length adjustable from 50 to 60 mm.
It includes a distance piece Ø 67x44 mm.

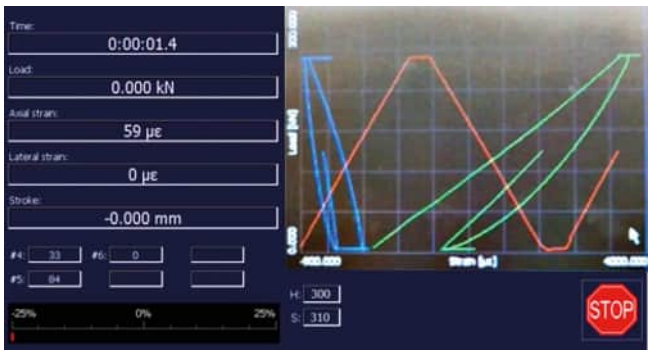
ACCESSORIES

C134-10 TEMPLATE, anodized aluminium made, used to regulate and calibrate the base length.

S337-51 CALIBRATION PROCESS for one Extensometer/Compressometer combined with digital unit.

Note:
C134N and C134-01N are suitable to measure only the axial deformation (for elastic modulus determination), they are not suitable to measure the lateral deformation (needed for the poisson ratio determination). To measure the lateral deformation, see the strain gauges option at page 259

C130-05
Firmware and software for the calculation of the elastic modulus but without the possibility to perform load/unload cycles.



C125M test execution

C134N with case

Note:
To grant fully compliance to the relevant EN, ASTM, ISO and BS standards, it is necessary to use extensometer/compressometer together with the upgrade C125M, which allow to perform load/unload cycles. See page 258

COMPRESSOMETERS

STANDARD: ASTM C469

Used to determine the strain deformation characteristics of concrete specimens. It comprises two steel rings for clamping to the specimen, two-gauge length bars and spherically-seated lever unit. Supplied **without** dial gauge or strain transducer to be ordered separately (see accessories). They can be suitable to measure both the axial and the lateral deformation, needed respectively to determine the elastic modulus and the poisson ratio.

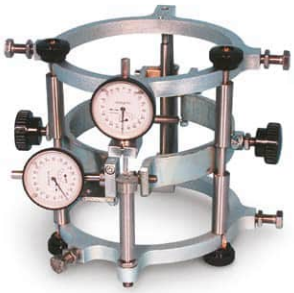
C132N + S375

C131N1 + S375

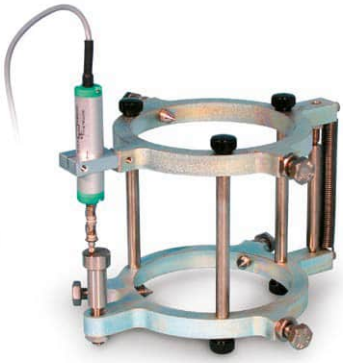
C130N + S375

AVAILABLE MODELS for Axial Deformation Measurement

C130N	COMPRESSOMETER for cylinders Ø 150x300 mm; Ø 160x320 mm; Ø 6”x12”
C131N1	COMPRESSOMETER for cylinders Ø 100x200 mm; Ø 112.8x220 mm; Ø 4”x8”
C132N	COMPRESSOMETER for cubes 150 mm side.
C132-01N	COMPRESSOMETER for cubes 200 mm side.



C130N + C133 + S375 (2)



C130N + C090-30

C133
COMPRESSOMETER-EXTENSOMETER Ø 150-160 mm

To measure the diametrical extension of cylinder specimens Ø 150x300 mm, 160x320 mm, 6”x 12” under compression stress, to determine the elastic modulus and the poisson ratio.
It consists of a central ring for the diametrical extension measure, **to be fixed on the C130N compressometer**.
Supplied **without** dial gauges or linear strain transducers (**two required**) to be ordered separately (see accessories).

C133-01
COMPRESSOMETER EXTENSOMETER Ø 100-112.8 mm

Same as mod. C133 but, connected to C131N1. It is suitable to test cylinders from Ø 100x200 to 112.8x220 mm.

C130N + C133 + C090-30 (x2)

NEEDED ACCESSORIES

S375	DIAL GAUGE, 5 mm travel by 0.001 mm subd.

AS AN ALTERNATIVE:

C090-30	LVDT DISPLACEMENT TRANSDUCER, 10 mm travel, complete with cable. Technical details: see p. 285
S337-51	CALIBRATION PROCESS of one displacement transducer C090-30
C130-05	Firmware and software for the calculation of the elastic modulus but without the possibility to perform load/unload cycles.

Note:
To grant fully compliance to the relevant EN, ASTM, ISO and BS standards, it is necessary to use extensometer/compressometer together with the upgrade C125M, which allow to perform load/unload cycles. See page 258

ADVANCED APPLICATIONS FOR COMPRESSION MACHINES

Compression machines are designed to work in load or pressure control up to the failure of the sample.
However, it is possible to allow also displacement control and/or different stop conditions such as up to a displacement or time threshold.

AGGREGATE CRUSHING VALUE

STANDARDS: BS 812-110 I AS 1141.21

This test requires to load the sample in a defined time and up to a precise value.
In order to allow this procedure, the following configuration is needed:

COMPRESSION MACHINES, Servo-Plus models and related distant pieces (see page 220...257)

C104-11N Built-in firmware for ACV testing that allows a compression test to be stopped at a specific load or time threshold. For Servo-Plus machines only

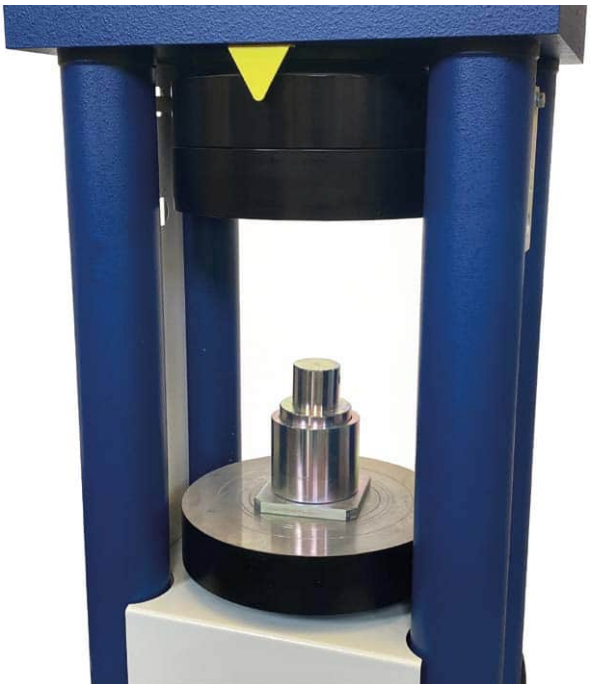
C097-01 DUAL LOW CAPACITY DIGITAL RANGE, complete with appropriate pressure transducer. Range 0-500 kN.

A082 and/or **A083** Complete assembly including cylinder and plunger for aggregate crushing value test. See p. 53

A082

A083

A082 on compression machine



A083 on compression machine

TEN PER CENT FINE VALUE (TFV)

STANDARD: BS 812-111

This test requires to load the sample within a defined time, going up to a preset load/displacement threshold and controlling in displacement. In order to allow this procedure, the following configuration is needed:

COMPRESSION MACHINES, Servo-Plus models and related distant pieces (see page 220...257)

C104-11N Built-in firmware for TFV testing that allows a compression test to be stopped at a specific load or time threshold. For Servo-Plus machines only

C097-01 DUAL LOW CAPACITY DIGITAL RANGE, complete with appropriate pressure transducer. Range 0-600 kN

A082 and/or **A083** Complete assembly including cylinder and plunger for aggregate testing. See p. 53

S336-14 LINEAR DISPLACEMENT TRANSDUCER, 50 mm travel, to measure the piston stroke. Other models at p. 503

S337-51 CALIBRATION PROCESS for the displacement transducer

C104-31 or **C104-31SP** Holder for the displacement transducer, respectively magnetic or screwed to the compression frame

C104-31 + S336-14

C104-31SP + S336-14

LIGHTWEIGHT AGGREGATES CRUSHING RESISTANCE

STANDARD: EN 13055

This test requires to load the sample until a defined displacement threshold is achieved. In order to allow this procedure, the following configuration is needed:

COMPRESSION MACHINES, Servo-Plus models and related distant pieces (see page 220...257)

C104-10N Built-in firmware for compression testing with displacement control, enabling the test to be stopped at a specific load, time or displacement threshold. For Servo-Plus machines only

C097-01 DUAL LOW CAPACITY DIGITAL RANGE, complete with appropriate pressure transducer

A081-01 and/or **A081-02** Complete assembly including cylinder and plunger for crushing resistance test. See p. 46

S336-14 LINEAR DISPLACEMENT TRANSDUCER, 50 mm travel, to measure the piston stroke. Other models at p. 503

S337-51 CALIBRATION PROCESS for the displacement transducer

C104-31 or **C104-31SP** holder for the displacement transducer, respectively magnetic or screwed to the compression frame

DISTANCE PIECES must be selected according to the dimensions of the following accessories:

Note: **A082** has a total max height of 247 mm and max stroke of 75 mm, the base is 200x200 mm.
A083 has a total max height of 162 mm and max stroke of 45 mm, the base is 110x110 mm.
A081-01 has a total max height of 260 mm and max stroke of 20 mm, the base is Ø180 mm.
A081-02 has a total max height of 200 mm and max stroke of 50 mm, the base is Ø100 mm.

A081-01 on compression machine

A081-01

FLEXURE TESTING MACHINES

MAIN FEATURES

- Motorized or hand operated models.
- Gauge load measuring system.
- **Digitec** or **Cyber-Plus Progress** graphic display unit.
- **Autotec** or **Servo-Plus Progress** servo-controlled automatic system.
- Stand-alone frame, or combined to another frame.
- Possibility of two-point loading or centre-point loading by simply removing one upper roller and placing the other in the centre.
- Graduated scales to get easy rollers adjustment.
- Rollers are hardened and rectified.

WE PROPOSE VARIOUS FLEXURAL FRAMES:

- **C090** Series with frame 150 kN capacity frame to perform flexural tests on concrete beam specimens having max. dimensions of 150x150x750 mm. See p. 266

C090 SERIES

- **C091** Series with **open sided frame** 150 kN capacity to perform flexural tests on concrete beam specimens having max. dimensions of 200x200x800 mm;
  - Flat blocks (max. width 600 mm);
  - Flagstones and Kerbs;
  - Any type of beam having max. size 600xh250 mm (lower rollers max. length 1325 mm). See p. 268

C091 SERIES

- **C090-06** Series with 200 kN capacity, high stiffness flexure frame to perform tests on concrete beams up to 200x200x800 mm;
  - Flat blocks, max. width 600 mm
  - Flagstones and Kerbs
  - Any type of beam having max. width 600 mm and max. height 200 mm
  - Energy absorption on sprayed concrete samples

  See p. 270

C090-06 SERIES

NEW

C095N
FLEXURAL AND TRANSVERSE MULTIPURPOSE TESTING MACHINE
320 KN CAPACITY, **C-SHAPED OPEN FRAME**

See p. 272

C096N
HIGH STIFFNESS FLEXURAL MACHINE
360 KN CAPACITY.

See p. 273

To perform a wide range of flexural/compression tests on concrete specimens, paving slabs, kerbs, mortar specimens, flexural toughness of FRC, energy absorption of sprayed concrete, beam deflection and toughness of FRC/Shotcrete, measurement of crack opening (CTOD-CMOD) etc. See p. 285...287

C095N

C096N

C109-09N + C093-05
CONCRETE PIPE TESTING MACHINE, 1000 kN capacity to test pipes Ø 450 to 2600 mm. See p. 277

C093 Series to perform flexural tests on concrete beam specimens having max. dimensions 200x200x800 mm and to perform tests on any kind of other product with max. dimensions 550x550 mm (adjustable distance between lower rollers up to 1325 mm). See p. 278

C093 SERIE

C093-05

FLEXURAL TESTING MACHINE 150 KN CAPACITY

FOR FLEXURAL TESTS ON CONCRETE BEAM SPECIMENS MAX. DIMENSIONS 150X150X600 (750) MM

STANDARDS: EN 12390-5 | ASTM C78, C293 | AASHTO T97 | BS 1881:118

150 KN CAPACITY

MAIN FEATURES

- Max. vertical daylight between upper/lower rollers: 160 mm
- Horizontal daylight of the testing chamber: 240 mm
- Rollers dimensions: Ø 40x160 mm
- Complete with 4 adjustable and articulated rollers.
- Distance of lower rollers adjustable from 100 to 455 mm
- Distance of upper rollers adjustable from 40 to 155 mm
- Gauge diameter 250 mm with 0.5 kN divisions.
- Max. ram travel 50 mm approx.
- Calibration accuracy: class 1
- Hydraulic device to stop the piston stroke at its max excursion, to avoid pumping the piston out of the cylinder.
- Power supply (motorized models): 230V 1ph 50Hz 750W
- Dimensions: 610x510x980 mm
- Weight: 180...240 kg approx.

Note: the rollers (two upper and two lower) are included.
Possibility to use only one upper roller for centre point tests.

C090-03N + C104-04 + C127N | C090-02D | C090-01 + C111-16

FLEXURAL 150 kN capacity			LOAD MEASURING SYSTEM				
MODEL	Hand Operated	Motorized	1 Gauge	Cyber-Plus Progress mod. C109M (p.215)	Servo-Plus Progress mod. C104N (p.215)	Digitec mod. C108N (p.212)	Autotec mod. C098N (p.212)
C090	▼		▼				
C090-01		▼	▼				
C090-02N		▼		▼			
C090-03N		▼			▼		
C090-02D		▼				▼	
C090-03A		▼					▼

ACCESSORIES FOR 150 kN FLEXURAL MACHINES

C111-16 DISTANCE PIECE, 50 mm high to test beams 100x100x400/500 mm

C127N GRAPHIC PRINTER on thermo-paper on board for digital models

C115-01 | -02 | -03
TWO WAY HYDRAULIC VALVE, connected to the motorized pumping unit of the machine to activate a second frame. **In order to choose the correct model** and for technical details see p. 293

C115-01

C104-04 CONSOLE HOUSING THE SERVO-PLUS PROGRESS, the pump assembly is lined with sound-proofing material for noise reduction and encased to enhance the design of the machine. See p. 215

C104-04

C097-01 DUAL LOW CAPACITY DIGITAL RANGE, complete with **appropriate pressure transducer**, only for digital machines. Range selectable from 10 kN to 100 kN.
Technical details: see p. 288

C097-01

C097-05 CALIBRATION CLASS 1, starting from 1% of the full range. With a special calibration procedure it is possible to grant Class 1 practically on the full range of the flexural machine. Applicable only on digital machines.

C100 SPLITTING TENSILE test device for cylinders.
EN 12390-6 | ASTM C496
Technical details and other models: see p. 289

C100

E170 COMPRESSION DEVICE to test mortar specimens 40.1x40 mm
EN 196-1 | ASTM C349
Technical details and other models: see p. 290

E170

E172-01 FLEXURE DEVICE for mortar prisms 40.1x40x160 mm.
EN 196-1 / EN ISO 679 (it can be used only with the dual low capacity digital range 0-15kN).
Technical details and other models: see p. 392

C126 BENCH to hold the flexure machine. See p. 292

E172-01

C126

C099N
INVERTER DEVICE
Applicable only on Servo-Plus Progress machines C104-04 is required.
Technical details: see p. 215

C099N

SSW-LINK
FIRMWARE UPGRADE
To enable SmartLab software (pack of 3).
Only for touch screen models. Further details at page 20

Note: UTM2 software is also available on request.

FLEXURAL TESTING MACHINE 150KN CAPACITY OPEN-SIDED FRAME

FOR FLEXURAL TESTS ON CONCRETE BEAM SPECIMENS MAX. DIMENSIONS 200X200X800 MM, FLAT BLOCKS, FLAGSTONES, KERBS, TILES, SLABS, MASONRY UNITS, AND ANY TYPE OF MATERIAL HAVING MAX. SIZE 600X250 MM
(LOWER ROLLERS MAX. DISTANCE 1325 MM)

STANDARDS: EN 12390-5 I EN 1340:4 I ASTM C78, C293 I AASHTO T97 I BS1881 :118, BS 6073-1, BS 7263

150 KN CAPACITY

MAIN FEATURES

- **Open-sided frame** for an easy and fast positioning of the specimen between the rollers
- Sturdy and durable frame
- Max. vertical daylight between upper/lower rollers: 260 mm, intermediate daylight positions: 210, 160, 110 and 60 mm
- Roller dimensions: Ø 40x613 mm
- Ram travel 110mm approx.
- Calibration accuracy: class 1.0
- Simple action piston with counterweights to minimize frictions
- Power supply: 230V 1ph 50Hz 750W
- Dimensions: 1400x1200x1430 mm
- Weight: 350 kg approx.

C091-03N + C091-11 + PC

FLEXURAL 150 kN capacity		LOAD MEASURING SYSTEM			
MODEL	Motorized	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)	Digitec mod. C108N (p. 212)	Autotec mod. C098N (p. 212)
C091-02N	▼	▼			
C091-03N	▼		▼		
C091-02D	▼			▼	
C091-03A	▼				▼

ACCESSORIES FOR FLEXURAL 150 kN "OPEN SIDED FRAME"

Rollers Ø40x613 mm

STANDARDS: EN 12390-5, EN 1339, EN 1340 I ASTM C78, ASTM C293

C091-10 ROLLERS GROUP: lower adjustable from 75 to 525 mm, and **only one** upper central roller for single point method.

C091-11 ROLLERS GROUP: lower adjustable from 75 to 525 mm, and upper adjustable from 75 to 180 mm for two points method.

C091-12 ROLLERS GROUP: lower adjustable from 75 to 1325 mm, and upper adjustable from 75 to 575 mm for two points method.

C091-14 ROLLERS GROUP: lower adjustable from 75 to 1325 mm, and **only one** upper central roller for single point method.

C091-13

C091-13 UPPER TAMPER (steel made), for concrete KERBS tests.
The tamper is mounted on a rotating coupling and fixed to the upper part of the machine to apply a flexural strength on three points on the kerb, without any torsional stress. One among C091-10, C091-11, C091-12, C091-14 is needed to perform the test.
STANDARD: EN 1340

C093-11 DEVICE for flexural tests on clay blocks for flooring.
STANDARDS: EN 15037-2, 15037-3 I UNI 9730-3

C093-11

C127N GRAPHIC PRINTER on thermo-paper on board for digital models

C127-11 THERMO-PAPER roll for printer (pack of 10 rolls)

C115-01 I -02 I -03
TWO WAY HYDRAULIC VALVE, connected to the motorized pumping unit of the machine to activate a second frame.
In order to choose the correct model and for technical details see p. 293

C115-01

C097-01 DUAL LOW CAPACITY DIGITAL RANGE, complete with **appropriate pressure transducer**, only for digital machines. Reccomended range 10-100 kN.
Technical details: see p. 288

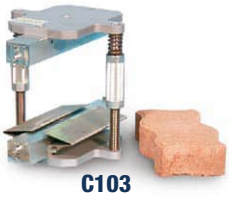
C097-01

C097-05 CALIBRATION CLASS 1, starting from 1% of the full range. With a special calibration procedure it is possible to grant Class 1 practically on the full range of the flexural machine. Applicable only on digital machines.

C100 SPLITTING TENSILE test device for cylinders.
EN 12390-6 I ASTM C496
Technical details and other models: see p. 289

C100

C103 SPLITTING TENSILE test device for self blocking pavers and cubes.
EN 1338, 12390-6.
Technical details: see p. 289



C103

AS AN ALTERNATIVE:

C103-02 SPLITTING TENSILE test device for self blocking pavers and cubes, max dimensions 300x500 mm.
EN 1338, 12390-6. Technical details: see p. 289

E170 COMPRESSION DEVICE to test mortar specimens 40.1x40 mm EN 196 I ASTM C349
Technical details and other models: see p. 290

E172-01 FLEXURE DEVICE for mortar prisms 40.1x40x160 mm EN 196 / EN 1015 (it can be used only with the dual low capacity digital range 0-15kN). Technical details and other models: see p. 392

C099N
INVERTER DEVICE
Applicable only on Servo-Plus Progress machines.
Technical details: see p. 215

C099N

SSW-LINK
FIRMWARE UPGRADE
To enable SmartLab software (pack of 3).
Only for touch screen models. Further details at page 20

Note: UTM2 software is also available on request.

FLEXURAL FRAME, 200 KN CAPACITY HIGH STIFFNESS AND STABILITY

FOR FLEXURAL TESTS ON CONCRETE BEAMS DIMENSIONS UP TO 200X200X800 MM, FLAT BLOCKS, FLAGSTONES, KERBS, TILES, SLABS, MASONRY UNITS, AND ANY TYPE OF MATERIAL HAVING MAX. WIDTH 600 MM AND MAX. HEIGHT 200 MM

STANDARDS: EN 12390-5, 12390-6, 1338, 1339, 1340, 14488-5, 196, 15037-2 | BS 1881:118 | ASTM C78, C293, C496, C349 AASHTO T97 | UNI 9730-3

200 KN CAPACITY

MAIN FEATURES

- High stiffness frame with minimum deflection at maximum load (0.9 mm)
- Max. vertical daylight between upper/lower rollers: 210 mm
- Ram travel: 155 mm, to get minimun daylight of 55 mm
- Horizontal daylight of the testing chamber: 720 mm
- Simple action piston with counterweights to maximize frictions
- Power supply: 230V 1ph 50Hz 750W
- Dimensions: 1270x1190x1350 mm
- Weight: 190...250 kg approx.

THE FRAME IS SUPPLIED **WITHOUT** UPPER/LOWER ROLLERS GROUP, TAMPER, BASE SUPPORT ETC. TO BE ORDERED SEPARATELY (see accessories).

C090-07N + C090-13

C090-07N + C127N + C104-04 + C090-13

FLEXURAL 200 kN capacity High Stiffness		LOAD MEASURING SYSTEM			
MODEL	Capacity kN	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)	Digitec mod. C108N (p. 212)	Autotec mod. C098N (p. 212)
C090-06N	200	▼			
C090-07N	200		▼		
C090-06D	200			▼	
C090-07A	200				▼

ACCESSORIES FOR FLEXURAL FRAME 200 kN HIGH STIFFNESS

Rollers To EN 12390-5, 1339, 1340, 14488-5
ASTM C78, C293 I AASHTO T97 I BS 1881:118
Lower rollers have adjustable distance from 210 to 900 mm, and upper rollers have adjustable distance from 75 to 180 mm for two points loading tests.
Possibility to easily place in the centre one upper roller for centre point loading tests.

Models:

C090-12 ROLLERS GROUP upper and lower, 160 mm long. Ø 40 mm

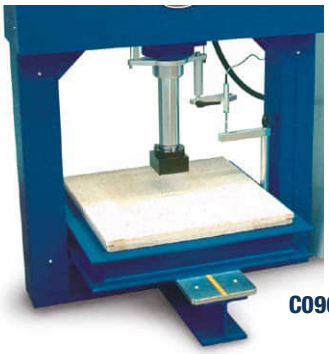
C090-13 ROLLERS GROUP upper and lower, 613 mm long. Ø 40 mm to EN 1339, 1340

C090-22 ROLLERS GROUP upper and lower, 160 mm long. Ø 30 mm (suitable to perform tests on FRC samples according to EN 14651 and ASTM C1609, see p.285...287 for further details)

C090-21 ROLLERS-HOLDERS (lowers only) 613 mm long, **to be installed on the C090-13** group in order to modify the max. vertical daylight at 110 mm and min. at -45 mm to test tiles, slabs etc. with max. thickness less than 100 mm and flexibility up to -45 mm

C090-14 ENERGY ABSORPTION TEST on sprayed concrete specimens. STANDARDS: EN 14488-5 I UNI 10834
The test is performed with the provided equipment (square base with useful internal size of 500x500 mm, for sample 600x600 mm and loading element) and **needed accessories:**

- **C090-19** TRANSDUCER HOLDER
- **S336-19** DISPLACEMENT TRANSDUCER, 50mm stroke with flat head.
- **S337-51** CALIBRATION PROCESS for S336-19
- **C109-16N** FIRMWARE AND SOFTWARE for energy absorption test. See page 21



C090-14+C090-19+S336-19

C111-17 DISTANCE PIECE 40 mm high, strongly suggested to test samples with thickness less than 150 mm.

C091-13 UPPER TAMPER (steel made), for concrete KERBS tests. The tamper is mounted on a rotating coupling and fixed to the upper part of the machine to apply a flexural strength on three points on the kerb, without any torsional stress.
To be used together with C090-13
STANDARD: EN 1340

C091-13

C093-11 DEVICE for flexural tests on clay blocks for flooring.
STANDARDS: EN 15037-2, 15037-3 I UNI 9730-3

C093-11

C127N GRAPHIC PRINTER on thermo-paper on board for digital models

C097-01 DUAL LOW CAPACITY DIGITAL RANGE, complete with **appropriate pressure transducer**.
Range selectable from 10 kN to 100 kN.
Technical details: see p. 288

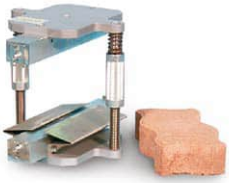
C097-01

C097-05 CALIBRATION CLASS 1, starting from 1% of the full range. With a special calibration procedure it is possible to grant Class 1 practically on the full range of the flexural machine.

C100 SPLITTING TENSILE test device for cylinders.
EN 12390-6 I ASTM C496
Technical details and other models: see p. 289

C100

C103 SPLITTING TENSILE test device for self blocking pavers and cubes.
EN 1338, 12390-6.
Technical details: see p. 289



C103

As alternative:

C103-02 SPLITTING TENSILE TEST DEVICE for self blocking pavers and cubes, max. dimensions 300x500 mm
EN 1338, 12390-6
Technical details: see p. 289

E170 COMPRESSION DEVICE to test mortar specimens 40.1x40 mm
EN 196-1 I ASTM C349
Technical details and other models: see p. 290

C103-02

SSW-LINK
FIRMWARE UPGRADE
To enable SmartLab software (pack of 3).
Only for touch screen models. Further details at page 20

Note: UTM2 software is also available on request.

C095N
FLEXURAL MULTIPURPOSE TESTING MACHINE, 320 KN CAPACITY
C-SHAPED OPEN FRAME

STANDARDS: EN 12390-5, 12390-6, 14488-5, 1338, 1339, 1340, 196
ASTM C78, C293, C1550, C496, C349 | UNI 9730-3

320 KN CAPACITY

MAIN FEATURES

- Servo-Plus Progress 8-channel servo controlled system for a fully automatic execution of the test (mod. C104N).
- Load is measured by a high accuracy electric strain cell, eliminating the piston's weight and friction.
- C-shaped open frame for an easy and fast positioning of the specimen between the rollers.
- Frame is closed by a hydraulic vertical rod, granting high rigidity.
- Graduated scales are foreseen for easy roller adjustment.
- Simple action piston with counterweights to minimize frictions.
- 1 mm deformation every 200 kN
- Calibration accuracy: class 1
- Power supply: 230V 1ph 50Hz 750W

itTECH

SERVO-PLUS PROGRESS
DIGITAL TOUCH-SCREEN DISPLAY

CYBER PLUS PROGRESS

Cyber-Plus Progress control unit 7" touch-screen display, 8 channels for pressure, load, displacement and other transducers, 2 USB and 1 ethernet ports.

C095N with accessories

Accessories at page 274...276

C096N
HIGH STIFFNESS FLEXURAL MACHINE, 360 KN CAPACITY

STANDARDS: EN 12390-5, 12390-6, 14488-5, 1338, 1339, 1340, 196 I ASTM C78, C293, C1550, C496, C349 I UNI 9730-3

360 KN CAPACITY

MAIN FEATURES

- Servo-Plus Progress 8-channel servo controlled system for a fully automatic execution of the test (mod. C104N).
- Load is measured by a high accuracy electric strain cell, eliminating the piston's weight and friction.
- Graduated scales are foreseen for easy roller adjustment.
- Simple action piston with counterweights to minimize frictions.
- 1 mm deformation every 200 kN
- Calibration accuracy: class 1
- Closed type frame for maximum rigidity.
- Reduced footprint for easy positioning.
- Power supply: 230V 1ph 50Hz 750W

itTECH

CYBER PLUS PROGRESS

SERVO-PLUS PROGRESS
DIGITAL TOUCH-SCREEN DISPLAY

Cyber-Plus Progress control unit 7" touch-screen display, up to 8 channels for pressure, load, displacement and other transducers, 2 USB and 1 ethernet ports.

C096N + C095N-12

Accessories at page 274...276

C095N AND C096N SPECIFIC APPLICATIONS

TECHNICAL SPECIFICATIONS

Model		C095N	C096N
Load capacity		320 kN	360 kN
Load reading		Load cell	Load cell
Horizontal daylight of the testing chamber		1040 mm	980 mm
Max. vertical daylight between upper/lower rollers	With C095N-11	263 mm	263 mm
	With C095N-12	263 mm	263 mm
	With C095N-13	221 mm	221 mm
	With C095N-19	263 mm	263 mm
	With C095N-14	350 mm	350 mm
Upper rollers adjustable distance		From 75 to 550	From 75 to 210 mm
Lower rollers adjustable distance		From 75 to 1550	From 75 to 850 mm
Ram travel		110 mm	140 mm
Dimensions		1815x1700x1590 mm	1500x600x1390 mm
Weight (approx.)		1000 kg	900 kg

C095N-11
FLEXURAL TESTS ON CONCRETE BEAMS

STANDARDS: EN 12390-5 I ASTM C78, C293

Upper and lower roller group for third point and centre tests on concrete beams up to 200x200x800 mm
Rollers size:
30 mm Ø by 312 mm long.

Weight: 65 kg approx.

Note: C095N-11 is also suitable to perform tests on FRC samples according to EN 14651 and ASTM C1609. See page 285...287 for further details.

NEEDED ACCESSORY

C095N-18 SET OF FOUR DISTANCE PIECES height 43 mm each, to adjust the vertical useful light of the frame. One set needed for 150x150 mm beams. Two sets needed for 100x100 mm beams.

C095N-12
FLEXURAL TESTS ON PAVING SLABS AND ANY TYPE OF MATERIAL HAVING MAX. WIDTH 600 MM

STANDARD: EN 1339

One upper centre loading roller and two lower roller assembly for tests on paving slabs.
Rollers size:
40 mm Ø by 620 mm long.

Weight: 76 kg approx.

NEEDED ACCESSORY

C095N-18 SET OF FOUR DISTANCE PIECES height 43 mm each, to adjust the vertical useful light of the frame. One set needed for 150x150 mm beams. Two sets needed for 100x100 mm beams.

C095N-19
FLEXURAL TESTS ON CONCRETE BEAMS

STANDARDS: EN 12390-5

Two upper loading rollers for third point and centre tests on concrete beams up to 200x200x800 mm
Rollers size: 40 mm Ø by 312 mm long, cadmium plated against corrosion, to be used with the rollers assembly C095N-12.

Weight: 65 kg approx.

NEEDED ACCESSORY

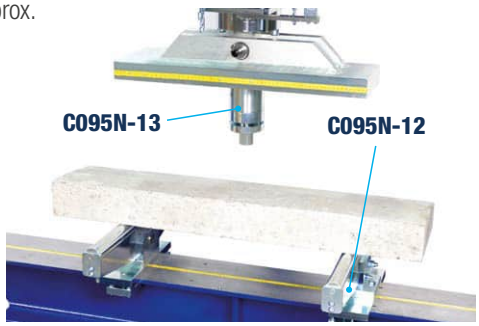
C095N-18 SET OF FOUR DISTANCE PIECES height 43 mm each, to adjust the vertical useful light of the frame. One set needed for 150x150 mm beams. Two sets needed for 100x100 mm beams.

C095N-13
UPPER TAMPER FOR TESTING KERBS

STANDARDS: EN 1340

The Tamper, steel made, is mounted on a rotating coupling and fixed to the upper part of the machine to apply a flexural load on the kerb, without any torsional stress.
To be used with the rollers assembly C095N-12.

Weight: 6 kg approx.



ACCESSORY

C095N-18 SET OF FOUR DISTANCE PIECES height 43 mm each, to adjust the vertical useful light from 221 to 135 mm

C095N AND C096N SPECIFIC APPLICATIONS

C095N-14
COMPRESSION TESTS UP TO 320KN CAPACITY

The multipurpose (flexural) frame can be equipped with lower platen and upper spherically seated platen, having Ø 165 mm by 30 mm thick, to perform compression tests on low strength and small size specimens. To be used with the four distance pieces C095N-18.
The device can be used also for compression tests on mortar specimens (by using suitable devices E170 etc. listed on page 290 and splitting tensile tests (by using suitable C100, C103 etc. devices listed on page 289).

Weight: 20 kg approx.

C095N-14 + C095N-18

NEEDED ACCESSORY

C095N-18 FOUR DISTANCE PIECES height 43 mm each, to adjust the vertical useful light of the frame.

C095N-17
FLEXURAL TOUGHNESS OF CONCRETE SLABS

STANDARD: ASTM C1550
BASE SUPPORT FRAME, holding the concrete slabs having 800 mm diameter by 75 mm thick, complete with upper loading element.
Weight: 60 kg approx.

C095N-17 + S336-19

NEEDED ACCESSORIES

S336-19 DISPLACEMENT TRANSDUCER, with flat head to measure the deflection of the centre of the slab.
Travel: 50 mm
Full bridge at 350 Ohm
Independent linearity: < 0.1%
Standard sensitivity: 2 mV/V

S337-51 CALIBRATION PROCESS for S336-19

C095N-15
DISPLACEMENT TRANSDUCER TO MEASURE THE PISTON TRAVEL

Supplied complete with holder to the test frame.
Travel: 100 mm
Full bridge at 350 Ohm
Indipendent linearity: < 0.1%
Standard sensitivity: 2 mV/V

C095N-16
ENERGY ABSORPTION TEST ON SPRAYED CONCRETE SLABS

STANDARD: EN 14488-5
SQUARE BASE SUPPORT FRAME useful inside dimensions 500x500 mm, holding the sprayed concrete slab 600x600 mm, complete with spherically upper loading element (for C095N only).

Weight: 125 kg approx.

NEEDED ACCESSORIES

S336-19 DISPLACEMENT TRANSDUCER, with flat head to measure the deflection of the centre of the slab.
Travel: 50 mm
Full bridge at 350 Ohm
Independent linearity: < 0.1%
Standard sensitivity: 2 mV/V

S337-51 CALIBRATION PROCESS for S336-19

C090-14SP
ENERGY ABSORPTION TEST ON SPRAYED CONCRETE SLABS

STANDARD: EN 14488-5
SQUARE BASE SUPPORT FRAME, holding the sprayed concrete slab with useful inside dimensions 500x500 mm, holding the sprayed concrete slab 600x600 mm complete with spherically upper loading element (for C096N only).

Weight: 125 kg approx.

C095N-16 / C090-14SP + S336-19 with sample

NEEDED ACCESSORIES

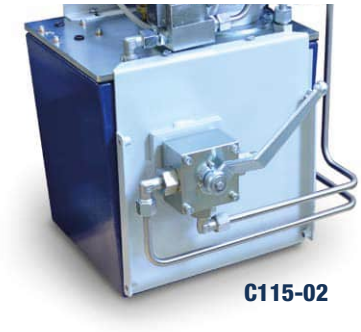
S336-19 DISPLACEMENT TRANSDUCER, with flat head to measure the deflection of the centre of the slab.
Travel: 50 mm
Full bridge at 350 Ohm
Independent linearity: < 0.1%
Standard sensitivity: 2 mV/V

S337-51 CALIBRATION PROCESS for S336-19

C095N AND C096N SPECIFIC APPLICATIONS

C127N GRAPHIC PRINTER on thermo-paper on board

C115-02 TWO-WAY HYDRAULIC VALVE, connected to the motorized pumping unit of the machine to activate a second frame. Technical details: see p. 293)



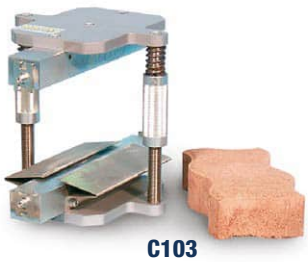
C115-02

C097-05 CALIBRATION CLASS 1, starting from 1% of the full range. With a special calibration procedure it is possible to grant Class 1 practically on the full range of the flexural machine.

C100 SPLITTING TENSILE test device for cylinders.
EN 12390-6 I ASTM C496
Technical details and other models: see p. 289)

C100

C103 SPLITTING TENSILE test device for self blocking pavers and cubes. EN 1338, 12390-6
Technical details: see p. 289)



C103

AS AN ALTERNATIVE:

C103-02 SPLITTING TENSILE test device for self blocking pavers and cubes, max dimensions 300x500 mm.
EN 1338, 12390-6. Technical details: see p. 289)

C103-02

C093-11 DEVICE for flexural tests on clay blocks for flooring.
STANDARD: EN 15037-2, 15037-3 I UNI 9730-3

C093-11

E170 COMPRESSION DEVICE to test mortar specimens 40.1 x 40 mm EN 196-1 I ASTM C349
Technical details and other models: see p. 290)

E170

SSW-LINK
FIRMWARE UPGRADE
To enable SmartLab software (pack of 3).
Only for touch screen models. Further details at page 20

Note:
Accessories for specific applications listed above are common for different tests. We recommend to check them when ordering, to avoid duplications.

CONCRETE PIPE TESTING MACHINE

Designed and manufactured to test concrete sewer and drain pipes used in drainage works, water and irrigation supply systems etc.
STANDARD: EN 1916 comparable to ASTM C301, C497 I BS 5911 I DIN 4035

The machine is composed of two parts:

- Electro-Hydraulic loading and control system
- Testing frame, steel made

C109-09N
ELECTRO-HYDRAULIC LOADING AND CONTROL SYSTEM, 1000 KN CAPACITY

- Double action alloy steel ram + cylinder.
- Ram travel: 400 mm
- The ram is ground.
- Upper attachment for steel frame cross-beam coupling.
- Spherical seat fixed to the ram for an uniform loading.
- Loading and control cabinet complete with hydraulic multipiston power pack group, maximum pressure safety valve, decompression valve, oil flow control valve granting smooth and accurate load pace.
- Touch-screen display **Cyber-Plus Progress** C109M (technical details: see p. 213) with software for the acquisition, visualization, processing, printing and saving of the test data and certificates.
- Electric load cell 1000 kN capacity, for accurate load measurement directly from the ram.
- Two flexible high pressure hoses, to connect the cylinder to the hydraulic power pack.

Power supply: 230V 1ph 50Hz 1000W
Dimensions: 500 x 530 xh 1300 mm
Weight: 150 kg approx.

C093-05
TESTING FRAME, STEEL MADE

- Pipe max. diameter (external): 2600 mm
- Pipe min. diameter (external): 450 mm
- Pipe max. length: 2500 mm
- Lower bearers: 2500 mm long
- Upper crossbeam: 2500 mm long
- Frame of structural steel, bolted together with high strength bolts, so it can be easily assembled/disassembled for delivery or for site displacements. The frame has to be locked to a concrete base to be prepared by the customer.
- Two upper crossbeams, raised and lowered by a motor two speed operated winch. The upper frame crossbeam is locked in position by pins inserted through the columns.
- Two lower bearers supporting the pipe to be tested.
  The bearers are supplied both flat and "V" shaped as requested by the EN 1916 Spec.
- Upper loading beam, floating on a seat.

Power supply of the winch: 230/400V 3ph 50Hz 2000W
Frame dimensions: 3700x2500x6900 mm approx.
Weight: 7000 kg approx.

Note:
The testing frame is delivered disassembled and has to be mounted on site following the instructions. The customer can also manufacture locally the testing frame, and purchase the loading/control system only.

Testing frames with different capacity and features can be manufactured as per customer's requirements.

Quoted testing frame cannot be sold in the CE markets.

C109-09N detail

UNIVERSAL FLEXURAL AND TRANSVERSE MACHINE 150 KN CAPACITY

FOR FLEXURAL TESTS ON CONCERTE BEAM SPECIMENS MAX. SIZE 200X200X800 MM, FLAT BLOCKS, FLAGSTONES, KERBS, TILES, SLABS, MASONRY UNITS, PIPES, AND ANY TYPE OF MATERIAL HAVING MAX. SIZE 550XH820 MM

STANDARDS: EN 12390-5 I EN 1340:4 I ASTM C78, C293 I AASHTO T97 I BS 1881:118, 6073-1, 7263

150 KN CAPACITY

MAIN FEATURES

- Vertical daylight between upper/lower rollers: max. 825 - min. 65 mm adjustable each 76 mm by hand winch with counterweights
- Rollers dimensions: Ø 40x613 mm
- Complete with 4 adjustable and articulated rollers for two point loading
- Distance between lower rollers from 75 to 1325 mm
- Distance between upper rollers from 75 to 575 mm
- Ram travel 110 mm approx.
- Simple action piston with counterweights to optimize frictions
- Power supply: 230V 1ph 50Hz 750W
- Dimensions: 970x1400x2000 mm
- Weight: 800...850 kg approx.

itTECH

CYBER PLUS PROGRESS

CYBER-PLUS OR **SERVO-PLUS PROGRESS**
DIGITAL TOUCH-SCREEN DISPLAY

Cyber-Plus Progress control unit 7" touch-screen display, up to 8 channels for pressure, load, displacement and other transducers, 2 USB and 1 ethernet ports.

C093-03N + PC

UNIVERSAL FLEXURAL 150 kN capacity		LOAD MEASURING SYSTEM			
MODEL	Motorized	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)	Digitec mod. C108N (p. 212)	Autotec mod. C098N (p. 212)
C093-02N	▼	▼			
C093-03N	▼		▼		
C093-02D	▼			▼	
C093-03A	▼				▼

ACCESSORIES FOR UNIVERSAL FLEXURAL 150 kN

C091-13 UPPER TAMPER (steel made), for concrete KERBS tests. The tamper is mounted on a rotating coupling and fixed to the upper part of the machine to apply a flexural strength on three points on the kerb, without any torsional stress.
STANDARD: EN 1340

C093-11 DEVICE for flexural tests on clay blocks for flooring.
STANDARD: EN 15037-2
EN 15037-3
UNI 9730-3

C091-13

C093-11

C127N GRAPHIC PRINTER on thermo-paper on board

C115-01 | -02 | -03
TWO WAY HYDRAULIC VALVE, connected to the motorized pumping unit of the machine to activate a second frame.
In order to choose the correct model and for technical details see p. 293

C115-01

C097-01 DUAL LOW CAPACITY DIGITAL RANGE, complete with **appropriate pressure transducer**.
Range selectable from 10 kN to 100 kN.
Technical details: see p. 288

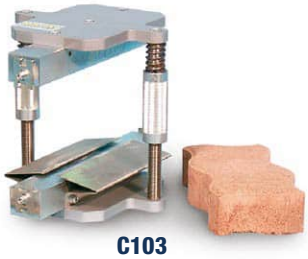
C097-01

C097-05 CALIBRATION CLASS 1, starting from 1% of the full range. With a special calibration procedure it is possible to grant Class 1 practically on the full range of the flexural machine.

C100 SPLITTING TENSILE test device for cylinders.
EN 12390-6 | ASTM C496
Technical details and other models: see p. 289

C100

C103 SPLITTING TENSILE test device for self blocking pavers and cubes. EN 1338, 12390-6
Technical details: see p. 289


C103

E170 COMPRESSION DEVICE to test mortar specimens 40.1x40 mm EN 196-1 | ASTM C349
Technical details and other models: see p. 290

E170

E172-01 FLEXURE DEVICE for mortar prisms 40.1x40x160 mm. EN 196-1 | EN ISO 679 (it can be used only with the dual low capacity digital range 0-15kN).
Technical details and other models: see p. 392

E172-01

C099N
INVERTER DEVICE
Applicable only on Servo-Plus Progress machines.
Technical details: see p. 215

C099N

SSW-LINK
FIRMWARE UPGRADE
To enable SmartLab software (pack of 3).
Only for touch screen models. Further details at page 20

UPGRADING OPTION: SECOND ADDITIONAL FRAME

All motorized compression testing machines listed in the previous pages can be upgraded with a hydraulic two ways distribution valve for connection and control (alternative and non-simultaneous) to a second frame, like for example flexural or cement compression frame, with obvious functional and economic advantages.

The additional combined frame is supplied complete with a hydraulic two ways distribution valve, specific pressure transducer connected to one channel of the digital readout unit, pipes, connectors and Matest calibration certificate.

The two frames group can be combined with many different solutions, according to the specific needs of the customer, with the possibility to perform both compression and flexural tests.

The composition of the combined group is obtained by:

C092-01
FLEXURAL FRAME 150 KN CAPACITY

Technical details and specific accessories at p. 266-267. Complete with pressure transducer, two way hydraulic valve, used in conjunction with a digital compression machine (Digitec, Autotec, Cyber-Plus / Servo-Plus Progress)
(see p. 220...256).

C055N **C092-01**

C092-11
FLEXURAL OPEN SIDED FRAME 150 KN CAPACITY

Technical details and specific accessories at p. 268-269. Complete with pressure transducer, two way hydraulic valve, used in conjunction with a digital compression machine (Digitec, Autotec, Cyber-Plus / Servo-Plus Progress)
(see p. 220...256).

C078N **C092-11 + C091-12**

C092-15
FLEXURAL HIGH STIFFNESS FRAME 200 KN CAPACITY

Technical details and specific accessories at p. 270-271. Complete with pressure transducer, two way hydraulic valve, used in conjunction with a a digital compression machine (Digitec, Autotec, Cyber-Plus, Servo-Plus Progress) (see p. 220...256)

C078N **C092-15** with accessories

C092-04
FLEXURAL HIGH STIFFNESS, HIGH-CAPACITY FRAME 360 KN CAPACITY

Technical details and specific accessories at p. 273...276. Complete with load cell, two-way hydraulic valve, used in conjunction with a Servo-Plus Progress compression machine (see p. 220...256).

C055N+C092-04 with accessories

C092-05
COMPRESSION FRAME ON MORTAR SPECIMENS
250 KN OR 500 KN CAPACITY

(mod. E159D, E159N, E159-01D, E159-01N, E161A, E161N, E161-02A, E161-02N technical details and specific accessories at p. 384-385).
Complete with pressure transducer, two way hydraulic valve, used in conjunction with a digital concrete compression machine (Digitec, Autotec, Cyber-Plus / Servo-Plus Progress)
(see p. 220...256).

C092-06
COMPRESSION/FLEXURAL FRAME ON MORTAR SPECIMENS

Dual range:
0-250 kN (or 500 kN) for compression tests
0-15 kN for flexure tests (mod. E160N, E160-01N, E161-01N, E161-03N technical details and specific accessories at p. 386-387) complete with two pressure transducers, two way hydraulic valve, used in conjunction with a digital concrete compression machine (only Cyber-Plus / Servo-Plus Progress) (see p. 220...256).

C055N

C092-05 / C092-06

C095N-05
FLEXURAL AND TRAVERSE MULTIPURPOSE FRAME 320 KN CAPACITY

Technical details and specific accessories at p. 272...276).
Complete with load cell, two-way hydraulic valve, used in conjunction with a Servo-Plus Progress compression machine (see p. 220...256).

C078N+C095N-05 with accessories

C092-07
COMPRESSION AND FLEXURAL FRAME, DOUBLE CHAMBER 300/15 KN CAPACITY

Double chamber frame 300/15 kN for compression and flexure tests on mortar. Technical details and specific accessories see p. 390-391.
Complete with two load cells, two-way hydraulic valve, used in conjuction with a Cyber/servo-Plus Progress machine.
See p. 220...256

C055N+C092-07

Note: In addition to the proposed groups, it is possible to compose many other alternative testing groups, with the digital display measuring system. Please contact Matest technicians for your needs and you will receive the most suitable solution.

itTECH
CYBER PLUS PROGRESS

NEW

C104-03N
SERVO RESEARCH

HIGH PERFORMANCE SERVO-PLUS SERVO STRAIN

STANDARDS: EN 14488-3, 14488-5, 14651 | ASTM C1609, C1018, C1550 | UNI 11039-2

Servo Research is the cutting-edge control unit designed by Matest for precise **testing in construction**. Built on Cyber-Plus Progress electronics and a specialized hydraulic system, it excels in high-performance testing, particularly on fiber-reinforced concrete. This capability allows engineers to **optimize structures for durability, reducing the need for frequent maintenance and replacements, thus lowering environmental impact**.

The unit's proportional valve ensures high reactivity while minimizing energy consumption, enhancing efficiency during testing processes. Its versatility extends beyond standard practices, enabling customization of test conditions for innovative solutions that prioritize sustainability without compromising performance.

Servo Research addresses environmental concerns by minimizing waste and resource consumption through efficient design and optimized testing protocols.

C104-03N

Fully customizable test ramps

In-built firmware for compression, flexure and indirect tensile tests already included

Performs tests in load, displacement and strain rate control

Completely automatic test control with no need of PID adjustments during the execution

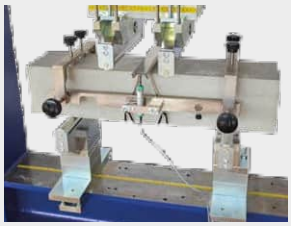
Proportional valve granting prompt reaction for FRC tests

Fully automatic frames control expandable to four with electrovalves

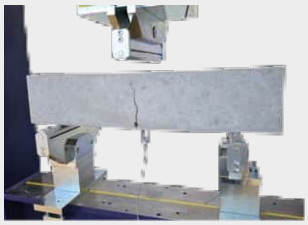
ADVANCED APPLICATIONS

In addition to the common and standard practices, **Servo Research runs high reactivity tests like those on fiber reinforced concrete** (Deflection, CMOD, CTOD, Energy Absorption, Post Faillure Behaviour etc.) and **modulus of elasticity** on several types of materials, allowing customization of ramps and cycles (upgrade kit C125-03N) and displaying load, stress, displacement and strain related graphs.

All tests can be run through its compact-PC touch interface, making personal computer not mandatory. An external PC can however be connected (H009-01EN / H009-01, order separately) to control all tests from remote.



Deflection (ASTM C1609)



CMOD (EN 14651)

Flexural toughness (ASTM C1550)

Elastic modulus

Triaxial tests

HYDRAULIC SYSTEM SPECIFICATIONS

- Max hydraulic pressure: 700 bar
- 4 pistons pump granting oil supply up to 1.35 l/min
- Servo controlled proportional valve with high control frequency
- Inverter device
- Possibility to connect up to 4 frames

HARDWARE AND FIRMWARE SPECIFICATIONS

- 16 channels, each one able to control the test and each one suitable to connect load sensors (load cells or pressure transducers), displacement transducers (potentiometric, full bridge, LVDT, magnetostrictive) and deformation transducers (extensometers, strain gauges)
- Each channel effective resolution 24-bit, 16'777'216 divisions
- Closed loop PID control
- Maximum reactivity which makes it unnecessary to control the PID in real time during the test execution.
- Control frequency up to 1 KHz
- Sampling frequency up to 2 kHz
- 7" LCD touch-screen

ANALOG INPUT CHANNELS

- Selectable power voltage for connection of load, displacement, deformation, LVDT, temperature (PT100, PT1000, NTC) transducers and strain gauges
- Data acquisition synchronized on all channels
- Calibration of the 16 channels in divisions (up to 40 steps), with polynomial function which allows the best approximation of readings accuracy over the whole test range

TEST EXECUTION

Compact PC for local control and software for remote control in order to perform the following tests:

- Compression, flexure and splitting
- Elastic modulus and Poisson's Ratio on rocks and concrete (add C125-03N)
- Triaxial test on rocks (add C125-03N and C104MLPP for lateral pressure)
- Toughness of FRC and energy absorption of sprayed concrete tests
- FRC tests: deflection, CMOD, CTOD and flexural test

C096F + C104-03N4 + C089F + E183F + accessories

MODELS

C104-03N
SERVO-RESEARCH CONTROL UNIT for the connection of one frame.

C104-03N2
SERVO-RESEARCH CONTROL UNIT for the connection of two frames.

C104-03N3
SERVO-RESEARCH CONTROL UNIT for the connection of three frames.

ACCESSORIES

C125-03N
UPGRADE KIT for elastic modulus and Poisson's Ratio tests allowing pace rate control also when releasing the load.

C127N
ON-BOARD GRAPHIC PRINTER

C128
BENCH LASER PRINTER, see page 288.

H009-01 | H009-01EN
PERSONAL COMPUTER, see page 288.

SSW-UTM2
PC SOFTWARE for remote control.

ORDERING INFO

	FRC TESTS		FRC TESTS ELASTIC MODULUS TESTS	FRC TESTS ELASTIC MODULUS TESTS TRIAXIAL TEST
	ASTM C1609	ASTM C1550	EN 12390-13, EN 13412,	EN 14580, EN 1926,
	EN 11039-2			EN 1926, EN 14580
	EN 14651		ASTM C469	ASTM D7012,
	EN 14488-3		ISO 6784	ASTM D2664,
	EN 14488-5		UNI 6556	ASTM D3148,
			DIN 1048	ASTM D5407
			BS 1881:121	ISRM
C104-03N	•	•		
C104-03N2			•	•
C125-03N			•	•
Flexural frames:				
C090-06CF 200 kN, basic model Check p. 270	• (choose a frame)	• (choose a frame)	• (choose a frame)	• (choose a frame)
C095F 320 kN, advanced model Check p. 272				
C096F 360 kN, advanced model Check p. 273				
Compression frames:				
C086, C087, C088, C089 series 2000 up to 5000 kN and E183F (300/15 kN) frames only (check p. 240 and p. 390)			•	•
C104MLPP (lateral pressure) see p. 70				•

Notes: All accessories for C104-03N must be installed in factory
Specific accessories must be added basing on each test
Other suitable compression frames can be connected on request

ACCESSORIES FOR FLEXURAL TESTS ON FIBER-REINFORCED CONCRETE

MEASUREMENT OF DEFLECTION

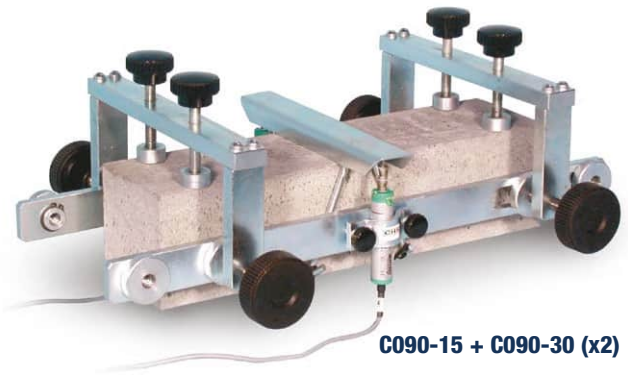
STANDARDS: EN 14488-3 I ASTM C1609, C1018

The test is performed by applying a flexural load to the concrete beam in displacement control and with automatic deflection measurement of the loaded specimen.

C090-15
DEFLECTION MEASUREMENT DEVICE

Suitable to measure the deflection on both size of fibre-reinforced concrete beams 100x100x400 mm (or longer) and 150x150x500 mm (or longer). **The device doesn't include the 2 needed displacement transducers C090-30**

Dimensions: 300x450x300 mm
Weight: 8 kg approx



C090-15 + C090-30 (x2)

NEEDED ACCESSORIES

C090-30
LVDT DISPLACEMENT TRANSDUCER

To be attached to the device C090-15 for the measurement of deflection and determination of toughness on fibre reinforced concrete beams. Two transducers are required.
Complete with cable and connector. Travel: 10 mm.

S337-51 CALIBRATION PROCESS for one C090-30

C109-15N

STANDARDS: EN 14651, 14488-3, 14488-5 I UNI 11039-2
ASTM C1609, C1018, C1550

In-built firmware for deflection FRC, flexural toughness and energy absorption test

Note: For further options about software for remote control ask Matest staff.

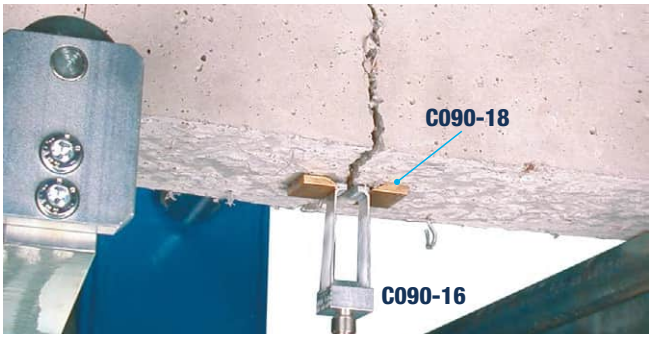
MEASUREMENT OF CRACK OPENING

STANDARDS: EN 14651 I UNI 11039-2

The test is performed using a crack opening transducer, fork shaped, to measure the enlargement of the crack while applying the load on the specimen.

C090-16
CRACK OPENING TRANSDUCER

For the measurement of the Crack Mouth Opening Displacement (CMOD) and the Crack Tip Opening Displacement (CTOD).
Complete with cable and connector.
Measuring range: 5 mm



S337-51 CALIBRATION PROCESS for one C090-16

C090-18

FIXING BLOCKS to place the C090-16 transducer under the concrete beam (CMOD method according to EN 14651). Pack of 24 pieces.

C090-20

FIXING BLOCKS to place the C090-16 transducer on the two sides of the concrete beam (CTOD method according to UNI 11039-2). Pack of 24 pieces.

C090-18 C090-20

Note:
- For CMOD test according to EN 14651 the equipment needed is: C090-16 + S337-51 + C090-18 + C109-15N
- For CTOD test according to UNI 11039-2 the equipment needed is: 3 x C090-16 + 3 x S337-51 + C090-18 + C090-20 + C109-15N

Note: The accessories listed in this page are to be used with the Servo-Research C104-03N, a suitable flexural frame and rollers. See p. 287

C104-03N
SERVO-RESEARCH APPLICATIONS

NEW

The main application that led to developing the Servo-Research is the use of fibres in concrete.

Fibres are mainly used to
- reduce the shrinkage effect during concrete hardening
- increase the tensile/flexural strength
- increase toughness and impact strength
- increase concrete durability

The behaviour of a generally uniform material (as standard concrete, without fibres) is constant and predictable during the whole duration of the test, and therefore relatively easy to be determined and measured.

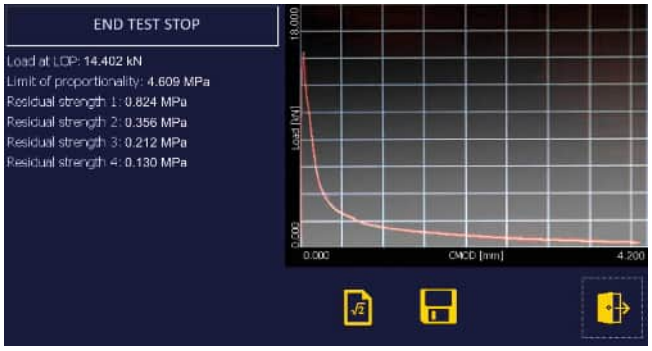
When fibres are added to the concrete mix, the same sample is characterized by two radically different behaviours: the typically fragile behaviour of the concrete matrix and the typical plastic behaviour of the fibres.

In general, but especially for plastic fibres, it is very difficult to control the applied load in a precise and smooth way, also considering that the execution of the test is not directly in load control but in displacement control (deflection in midspan for ASTM C1609 or opening of the crack for EN 14651).

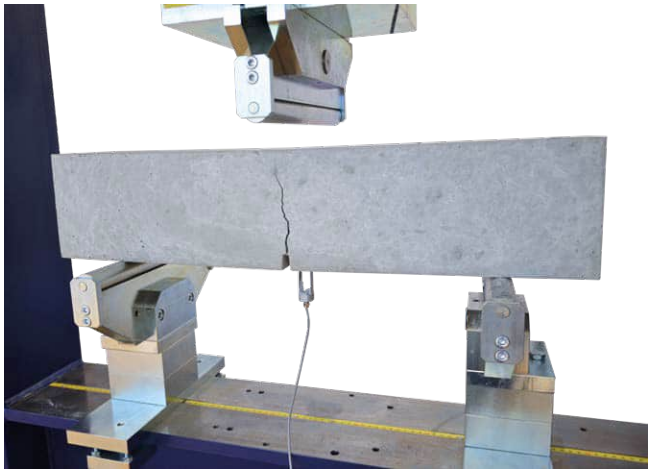
In the very moment when the concrete fails, the fibres start working and, if the control system is not reactive enough, the fibres may be broken in the same moment making it impossible to keep the correct pace rate and to evaluate the residual strength and the post-crack behaviour of the fibres.

With the Servo-Research it is possible to grant a completely automatic and precise control, which grant correctness and reliability of the results.

C104-03N

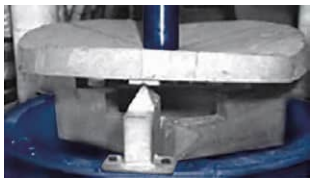


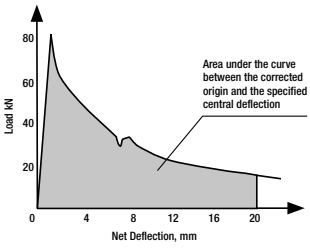
CMOD test results (EN 14651)



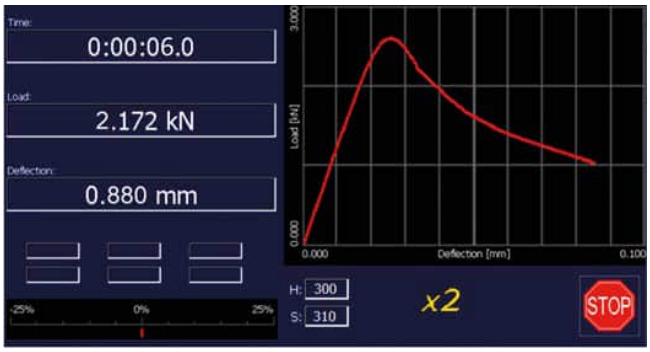
Sample broke after CMOD test

In the same way, tests on panels such as flexural toughness (ASTM C1550) and energy absorption (EN 14488-5) are performed on concrete with fibres and present the same criticalities.





Flexural toughness test on round slabs (ASMT C1550) at the end of the test the energy is calculated as the area subtended by the graph



Execution of a test according to ASTM C1550

CONFIGURATIONS FOR FIBRE-REINFORCED CONCRETE APPLICATIONS

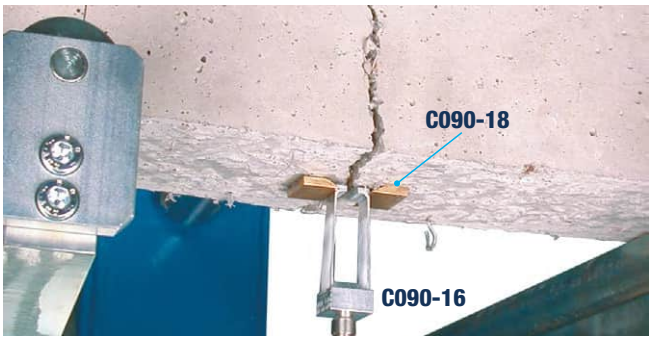
EXAMPLE OF CONFIGURATION ACCORDING TO EN 14651 (CMOD):

C104-03N Servo Research +

Option 1: **C090-06CF** Flexural frame 200 kN
C090-22 Two upper and two lower rollers Ø30x160 mm
C111-17 distance piece for beams 100x100 mm

Option 2: **C096F** Flexural frame 360 kN
C095N-11 Two upper and two lower rollers Ø30x312 mm
C095N-18 Distance pieces for beams 150x150 mm
(2 pieces required for beams 100x100 mm)

C090-23 Supports for the sample to prevent damages to C090-16
C090-16 Crack opening transducer (5 mm stroke)
S337-51 Calibration process for C090-16
C090-18 Fixing blocks for C090-16
C109-15N In-built firmware for deflection FRC, flexural toughness and energy absorption test



CMOD accessories

EXAMPLE OF CONFIGURATION ACCORDING TO ASTM C1609:

C104-03N Servo Research +

Option 1: **C090-06CF** Flexural frame 200 kN
C090-22 Two upper and two lower rollers Ø30x160 mm
C111-17 distance piece for beams 100x100 mm

Option 2: **C096F** Flexural frame 360 kN
C095N-11 Two upper and two lower rollers Ø30x312 mm
C095N-18 Distance pieces for beams 150x150 mm
(2 pieces required for beams 100x100 mm)

C090-15 Deflection device
2 x C090-30 LVDT Displacement transducers (10 mm stroke)
2 x S337-51 Calibration process for C090-30
C109-15N In-built firmware

Configuration according to ASTM C1609

EXAMPLE OF CONFIGURATION ACCORDING TO ASTM C1550:

C104-03N Servo Research +

Option 1: **C096F** Flexural frame 360 kN
Option 2: **C095F** Flexural frame 320 kN

C095N-17 Support frame for round panels
S336-19 Displacement transducer with flat head
S337-51 Calibration process for S336-19
C109-15N In-built firmware

C095N-17 mounted on C095F

EXAMPLE OF CONFIGURATION ACCORDING TO EN 14651 (CMOD) AND EN 12390-13 (ELASTIC MODULUS):

C104-03N2 Servo Research
C096F Flexural frame 360 kN
C095N-11 Two upper and two lower rollers Ø30x312 mm
2 x C095N-18 Distance pieces for beams 150x150 mm
C090-16 Crack opening transducer (5 mm stroke)
S337-51 Calibration process for C090-16
C090-18 Fixing blocks for C090-16
C109-15N In-built firmware
C125-03N Upgrade for elastic modulus test
C089F Compression frame 2000 kN
C111-14 + C111-32 Distance pieces
3 x C134N Extensometer for elastic modulus determination
3 x S337-51 Calibration process for C134N
C134-10 Template to regulate C134N base length

Configuration for CMOD and elastic modulus tests

Note: Other flexural and compression frames are available. It is possible to configure the system adding more features, more accessories and/or more frames. Ask Matest staff for further information.

ACCESSORIES FOR COMPRESSION AND FLEXURAL TESTING MACHINES

C097-01
DUAL LOW CAPACITY DIGITAL RANGE

(From 1/3 to 1/20 of the nominal range), complete with **Appropriate pressure transducer**, hydraulic installation and cock, fitted on testing machines equipped with digital display measuring unit.
This solution offers very high accuracy also for measurements of low strength, which is necessary to perform compression tests on mortar specimens, flexural tests on concrete beams, split cylinder test on cylinder and cube specimens, tests on kerbs, slabs etc., by utilizing a concrete compression machine.

C097-01

C097-02
DUAL LOW CAPACITY DIGITAL RANGE 0-300 KN

Complete with **strain gage load cell**, cables, fitted on concrete compression testing machines equipped with digital display measuring system.
This solution eliminates the weights of the piston and lower compression platen, paking set frictions etc., granting very high accuracy (Class 1; max. error within ± 1%) in the measuring range 30...300 kN.
To be placed under the lower compression platen.
Height: 70 mm.

C097-02

C105
DEVICE WITH CENTRAL SCREW

Very practical to adjust the light between the compression platens of a machine, according to the height of the specimen to be tested. Recommended solution for machines equipped with big sized platens. This device can be foreseen on all models of concrete compression machines, except High Stability models.

C105

C097-05
CLASS 1 STARTING FROM 1% OF THE FULL RANGE

Applicable only to digital machines. By following a special calibration procedure, Matest is capable to grant the Class 1 practically on the full range, upgrading the machine to be used for a considerable number of applications where low strength value are expected, including:
- Lightweight concrete, or early strength concrete
- Small size samples, soil cement mixtures
- Flexural and tensile tests, slabs, kerbs, etc.

C097-08
OFFICIAL ACCREDIA HARDNESS CERTIFICATE

(Equivalent UKAS, ENAC, DAKKS, SAS, COFRAC etc.) of upper and lower round compression platens. Minimum hardness: 55 HRC.

OMECO S.R.L.
Centro Ricerca - Prove Materiali - Taratura
Research Centre - Material Testing - Calibration

TEST REPORT

Number: SBO/0911/13 Date: 28/11/2013
OMECO Ref.: 3349 Page 1 of 1
CUSTOMER Ref.: ORD.89671 25/11/13

MATEST S.P.A.
VIA DELLE INDUSTRIE, 35
24028 TREVIOLO BG

Sample: N. 2 PLATES Ø 287mm thk 63 mm
Identification: A1– B1
Date of receipt: 27/11/2013
Test standards: UNI EN ISO 6508-1 2005
Equipments: Hardness test machine identified SBO-0060

Obtained results :

	ROCKWELL HARDNESS TEST
Identif. N.	HRC
A1	57.5 – 60.0 – 60.5
B1	58.5 – 59.0 – 61.0

This test report concerns only the sample submitted to the test. If not otherwise indicated, the sampling operation were performed by the Customer.

Date of execution: 28/11/2013 At: OMECO Lab. – Albano S. Alessandro – Bg –

Notes: Measurement uncertainty: we refer to table "Incertezze" of Omeco procedure PEM-010 Rev. 6 Ed. 11 (data available on request).

The samples have to be kept after the test execution: 30 days (in case of Lab 1246 and supervised tests) and 6 months (in case of other tests).

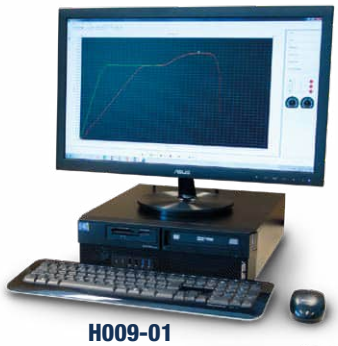
Operators	Technical Manager
A. BACCIGNI	ING. M. CASARI

Document end

C097-08

H009-01 | H009-01EN
PERSONAL COMPUTER

Complete with LCD monitor, keyboard, mouse, connection cables, it is applicable with all the Matest testing machines equipped with digital display measuring system. The PC supply includes the installation and the setting up of the purchased Software (see p. 18...21).
Available in italian or english.



H009-01

C128
BENCH LASER PRINTER

For the graphic and test certificate printing, applicable on all Matest testing machines with digital display measuring system.
The connection is direct by parallel interface also without PC.

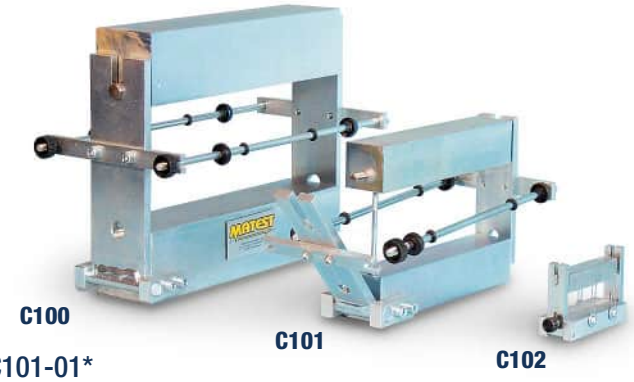
C128

ACCESSORIES FOR COMPRESSION AND FLEXURAL TESTING MACHINES

SPLITTING TENSILE TEST DEVICES

For cylindrical specimens.
STANDARDS: EN 12390-6, 13286-42

Model	Cylinders Ø x height mm	Weight kg	Height mm
C100*	150x300, 160x320, 6”x 12”	20	280
C101*	100x200, 110x220, 4”x 8”	12	220
C102*	40 x 80	1	90



C100 C101 C102

C101-01*
SPLITTING TENSILE TEST DEVICE

STANDARDS: EN 12390-6, 13286-42 | ASTM C496
For cylindrical specimens from Ø 100x200 mm (4”x8”) to Ø 160x320 mm (6”x12”) with maximum length of 330 mm and maximum width of 160 mm.
The base is equipped with flat springs centering and keeping in position the specimen.
Two columns with adjustable height sustain the upper plate by two springs.
This item is an alternative solution to mod. C100 + C101

Dimensions: 350x250xh264 mm
Weight: 17 kg approx.

C101-01

C103*
SPLITTING TENSILE TEST DEVICE

STANDARDS: EN 12390-6, EN 1338
Used to perform tests on concrete cube specimens 100 and 150 mm and on concrete block pavers. Maximum length of the samples 330 mm, maximum width 160 mm.
C103 includes a distance piece to allow testing of samples with minimum height of 60 mm.

Dimensions: 350x250x264 mm
Weight: 17 kg approx.

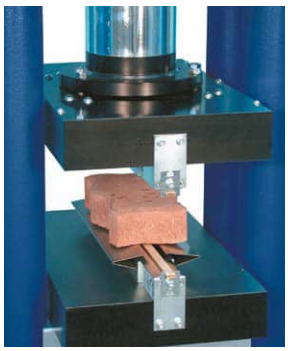
***Note:** To perform the test, these devices have to be used with a concrete compression machine equipped with a low capacity measuring range and suitable distance piece (see dual low range, p. 288), or with a flexural frame.

C103

C103-01*
SPLITTING TENSILE TEST DEVICE

Same as mod. C103 but to perform tests on concrete block pavers having max. dimensions 300 x 500 mm, and for tests on concrete cube specimens 100, 150, 200 mm, and any type of block and prismatic specimens. This splitting device is directly fixed on the compression platens of the block testers having 2000kN or 3000kN capacity.

Weight: 10 kg approx.



C103-01

C103-02

C103-02*
SPLITTING TENSILE DEVICE

Same to mod. C103-01, but to be fixed to the flexural frames serie C091-02 (p. 268), C090-07 (p. 270), C095N (p. 272) and C096N (p. 273).

ACCESSORIES

C100-01 STANDARD: EN 13286-42
PACKING STRIPS, dimensions 4x10x350 mm to be used for splitting tensile tests with mod. C100, C101, C101-01 C103. Pack of 100 pieces.

C100-02 STANDARDS: EN 1338, EN 12390-6, EN 13286-42
PACKING STRIPS, dimensions 4x15x350 mm to be used for splitting tensile tests with mod. C100, C101-01, C103. Pack of 100 pieces.

C100-03 STANDARDS: EN 1338, EN 12390-6, EN 13286-42
PACKING STRIPS, dimensions 4x15x540 mm, to be used for splitting tensile tests with the device mod. C100, C101-01, C103, C103-01, C103-02. Pack of 100 pieces.

C100-04 STANDARD: ASTM C496
PACKING STRIPS, dimensions 3x25x350 mm, to be used for splitting tensile tests with mod. C101-01.
Pack of 100 pieces.

ACCESSORIES FOR COMPRESSION AND FLEXURAL TESTING MACHINES

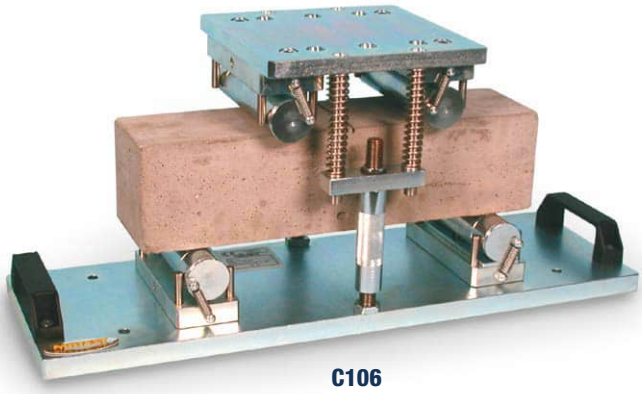
C106
FLEXURAL DEVICE FOR TWO POINTS AND CENTRE POINT TESTS ON CONCRETE BEAMS 100X100X400/500 AND 150X150X600/750 MM

STANDARDS: EN 12390-5 | ASTM C78, C293 | AASHTO T97
BS 1881:118

Equipped with two lower rollers, one of them articulated, and two upper rollers for third point tests. Rollers dimensions Ø 40x160 mm
- Two fix distances between lower rollers: 300 and 450 mm
- Two fix distances between upper rollers: 100 and 150 mm

It is possible to place in the centre only one upper roller for centre point tests.
To perform the flexural test, this device has to be used with a concrete compression machine foreseen of low capacity measuring range (mod. C097-01, C097-02) see p. 288

Dimension: 610x200x320 mm
Weight: 27 kg approx.


C106

E170
COMPRESSION DEVICE TO TEST PORTIONS OF MORTAR PRISMS 40.1X40X160 MM PREVIOUSLY BROKEN IN FLEXURE

STANDARDS: EN 196-1, 13892-2 | ASTM C349 | ISO 679

To be used with a concrete compression machine foreseen of low capacity measuring range and suitable distance pieces (mod. C097-01, C097-02) or with a flexural frame.

Dimensions: Ø 150xh182 mm.
Weight: 12 kg approx.

E170

E171
COMPRESSION DEVICE TO TEST MORTAR CUBE SPECIMENS 50 MM (2”)

STANDARD: ASTM C109, C1194

It is possible to test also cylindrical specimens Ø 50xh50 mm.
To be used with a concrete compression machine foreseen of low capacity measuring range and suitable distance pieces (mod. C097-01, C097-02) or with a flexural frame.

Dimensions: Ø 150xh182 mm
Weight: 12 kg approx.

E171

E171-01
COMPRESSION DEVICE TO TEST MORTAR CUBE SPECIMENS 70.7 MM

STANDARD: BS 4550

It is possible to test also cylindrical specimens Ø 70x70 mm.
To be used with a concrete compression machine foreseen of low capacity measuring range and suitable distance pieces (mod. C097-01, C097-02) or with a flexural frame.

Dimensions: 120x150xh175 mm
Weight: 9 kg approx.

E171-01

C091-13 / C095N-13
CONCRETE KERBS AND SLABS DEVICE
FLEXURAL STRENGTH MEASUREMENTS

STANDARD: EN 1340

The equipment consists of a steel tamper mounted on a rotating coupling which is fixed to the upper part of the flexural testing machine (to be selected from serie mod. C091-02/03, C090-06/07, C095N, C096N) to apply a flexural strength on three points on the concrete kerb, without any torsional stress. **Weight:** 7 kg approx.

C091-13

ACCESSORIES FOR COMPRESSION TESTING MACHINES

UNBONDED CAPPING PADS AND RETAINERS

STANDARDS: ASTM C1231 I AASHTO T22, T851

Used for compression tests on concrete cylinder specimens, as an alternative method to the sulphur capping and grinding machine.
Two steel capping retainers are applied on the two flat surfaces of the cylinder.
Two neoprene pads are put between them, for a better load distribution.

The neoprene pads are available in two models:

- 60 shore hardness pads for expected strength from 10 to 48 MPa
- 70 shore hardness pads for expected strength over 48 MPa

The system is not applicable for expected strength lower than 10 Mpa.
The thikness of each capping retainer and each pad is 13 mm approximately.

C107-29

MODELS

C107-09 CAPPING RETAINERS (couple) for Ø 100x200 mm and 4x8" cylinders.

C107-10 CAPPING RETAINERS (couple) for Ø 150x300 mm and 6x12" cylinders.

C107-12 CAPPING RETAINERS (couple) for Ø 160x320 mm cylinders.

C107-18 NEOPRENE PADS (couple) 60 shore A for Ø 100x200 mm and 4"x8" cylinders.

C107-19 NEOPRENE PADS (couple) 70 shore A for Ø 100x200 mm and 4"x8" cylinders.

C107-20 NEOPRENE PADS (couple) 60 shore A for Ø 150x300 mm and 6"x12" cylinders.

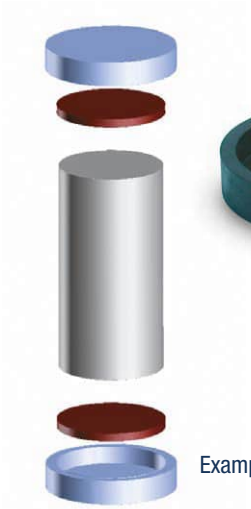
C107-21 NEOPRENE PADS (couple) 70 shore A for Ø 150x300 mm and 6"x12" cylinders.

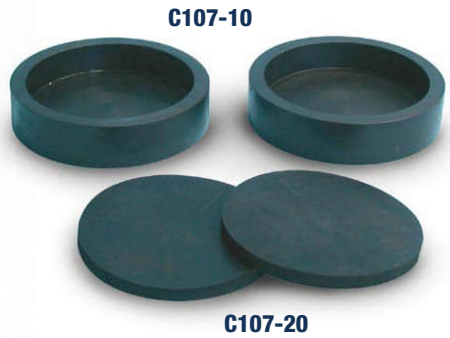
C107-25 NEOPRENE PADS (couple) 60 shore A for Ø 160x320 mm cylinders.

C107-26 NEOPRENE PADS (couple) 70 shore A for Ø 160x320 mm cylinders.

C107-29 NEOPRENE SHEET (couple) 60 shore A.
Dimension: 600x400x12 mm
For tests on blocks.

Note:
The capping retainers can be used only with compression testers having increased vertical clearance of the testing chamber, respectively to minimum 356 mm for the cylinders Ø 150x300 mm or 6"x 12"; and minimum 376 mm for the cylinders Ø 160x320 mm.





C107-10

C107-20

Example of utilization

AUTO-CENTERING DEVICE

For cubes 100 and 150 mm side and cylinders Ø 100 and 150 mm
The lower compression platen of the testing machine is marked with a serie of concentric circles to facilitate the correct centering of the specimens. However to grant a rapid and accurate centering of concrete cube and cylinder specimens, this "Auto-Centering" device is recommended.

MODELS

C107 Auto-Centering Device, to be used with compression machine having platen Ø 216 mm (1300, 1500 and 2000 kN)

C107-01 Auto-Centering Device, to be used with compression machine having platen Ø 287 mm (3000 kN and high stability machines)

C107

C110-30

UPPER COMPRESSION PLATEN + SPHERICAL SEAT

For tests on cylinder specimens diameters 100x200, 150x300, 160x320 mm and 4"x8", 6"x12"(to be fixed on the testing machine, in replacement of the standard one where requested), to meet the ASTM C39, AASHTO T22 Specifications.
Platen dimensions: Ø 165x30 mm

Weight: 10 kg approx.

C110-30

ACCESSORIES AND SPARES FOR COMPRESSION TESTING MACHINES

SAFETY GUARDS

Compliant with CE Safety Directive, manufactured of highly resistant transparent polycarbonate material and complete with hinges and lock. The guards are both on front and back sides.

Improved and made stronger

C121

MODELS

C121	For machines 1300kN and 1500kN (mod. C036 to C041N)
C121-05	For machines 2000kN (mod C053 to C058-05N)
C121-01	For machines with block platens 2000kN (C075 to C078N)
C121-06	For machines high stability 2000kN (C089 to C089-04N)
C121-10	For machines high stability with block platens 2000kN capacity (mod C089B to C089-22N)
C121-07	For machines 3000kN (mod C068 to C071N) and high stability 3000kN (mod C089-06 to C089-10N)
C121-08	For machines with block platens 3000kN (mod C079-03 to C079-06N) and high stability with block platens 3000kN (C089-15 to C089-19N)
C121-02	For machines 4000 kN (mod C088-10N and C088-11N)
C121-04	For machines 5000kN (mod C086-02N and C086-03N)
C121-11	For high stability 3000 kN with increased vertical clearance (with C089-12)
C121-12	For high stability 3000 kN blocks with increased vertical clearance (with C089-12)

C126
BENCH

Used to hold the compression testing frame, to set the machine at a proper height for its utilization.
Alternative solution to a concrete holding base.
Made from heavy welded steel, it can be moved in the laboratory both from front or lateral side by a forklift.
When ordering, please specify the model of testing machine the bench is to be designed for.

Weight:
60 kg approx.

C126

C121-51
DOOR STOP SAFETY SWITCH

This door locking electric switch if fixed on the front door of the compression machine as safety device. It cuts off mains and stops the machine when the door is open, according to CE Safety Directive. This locking switch can be installed only on digital compression machines equipped with safety guards.

C121-51

C121-52
ELECTRIC SWITCH FOR THE PISTON

This electric switch is fixed on the compression frame in order to cut off mains and to stop the machine when the maximum stroke of the piston is achieved. It can be installed only on digital compression machines.

GAUGE

Diameter 250 mm foreseen for max. load pointer, zero adjustment and mirror face. Spare part for compression and flexure machines. Supplied pre-calibrated.

C121-52

Models	Gauge
C118-14	Range 0 - 1300 kN
C118-03	Range 0 - 1500 kN
C118-04	Range 0 - 600 kN for 1300-1500kN machine
C118-05	Range 0 - 2000 kN
C118-06	Range 0 - 600 kN for 2000kN machine
C118-07	Range 0 - 3000 kN
C118-08	Range 0 - 600 kN for 3000kN machine
C118-09	Range 0 - 150 kN for flexure press C090 serie
C118-10	Range 0 - 150 kN for flexure press C091, C093 serie
C118-11	Range 0 - 1500 kN for tensile press H010
C118-12	Range 0 - 300 kN for cement machine
C118-13	Range 0 - 50 kN for cement machine

ACCESSORIES AND SPARES FOR COMPRESSION AND FLEXURAL TESTING MACHINES

C113
PUMPING UNIT, HAND OPERATED

Complete with tank, lever, manual valves and connectors. Spare part for compression and flexure machines. Supplied **without** hydraulic oil to be ordered separately (see mod. C114-10N). See p. 210

Weight: 10 kg approx.

C114
PUMPING UNIT SEMIAUTOMATIC, MOTORIZED

Complete with tank, speed selector, hydraulic cock, electric motor and connectors. Spare part for compression and flexure machines.
Hydraulic pressure: 0...700 Bar
Oil supply from 0.05 to 1,3 litre/min.
Supplied **without** hydraulic oil to be ordered separately (see mod. C114-10N). See p. 210

Power supply: 230V 1ph 50Hz 750W
Weight: 40 kg approx.

C114-01
PUMPING UNIT SEMIAUTOMATIC, MOTORIZED, TWO FRAMES

Identical to mod. C114, but equipped also with a two way hydraulic valve (C115-01) to activate, alternatively, two testing frames.

C114-10N
HYDRAULIC OIL

For compression/flexural testing machines. Can of 20 litres.

C115-01
TWO-WAY HYDRAULIC VALVE

Installed on machines with standard pumping unit to activate alternatively two testing frames. Not suitable either for pyramidal-shaped control units or for use with C104-04.

C115-02
TWO-WAY HYDRAULIC VALVE
FOR PYRAMIDAL SHAPED CONTROL UNITS

C115-03
TWO-WAY HYDRAULIC VALVE
FOR C104-04 HOUSING CARTER

C114AUTO
PUMPING UNIT AUTOMATIC, MOTORIZED

Complete with tank, discharge electro valve, stepper motor, electric motor and connectors. Spare part for compression and flexural machines.
Hydraulic pressure: 0…700 bar
Oil supply from 0.05 to 1.3 litres/min.
Supplied without hydraulic oil to be ordered separately (see mod. C114-10N). See p. 210

Power supply: 230V, 1ph, 50Hz, 750W
Weight: 50 kg approx.

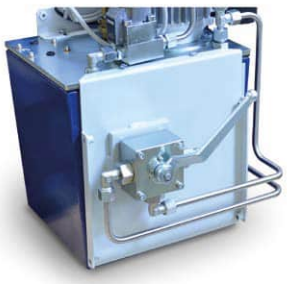
Note:
When ordering accessories and spare parts always specify the serial number of the machine they are meant for. See page 210 for further information.

PRESSURE TRANSDUCER

Used in conjunction with digital units Cyber-Plus C109M, Servo-Plus C104N, Digitec C108N, Autotec C098N.
Supplied complete with cable, connector and electric calibration.
Nominal sensitivity: 2 mV/V.

Models	Capacity
C116-01N	range: 0 - 10 bar
C116-02N	range: 0 - 20 bar
C116-03N	range: 0 - 35 bar
C116-04N	range: 0 - 50 bar
C116-05N	range: 0 - 100 bar
C116-06N	range: 0 - 200 bar
C116-07N	range: 0 - 350 bar
C116-08N	range: 0 - 500 bar
C116-09N	range: 0 - 700 bar
C116-10N	range: 0 - 400 bar
C116-11N	range: 0 - 600 bar
C116-12N	range: 0 - 160 bar
C116-13N	range: 0 - 60 bar

C116-01N...C116-13N


C115-01
Without case

C115-03

C114-01

C114

ACCESSORIES AND SPARES FOR COMPRESSION AND FLEXURAL TESTING MACHINES

PACKING SET

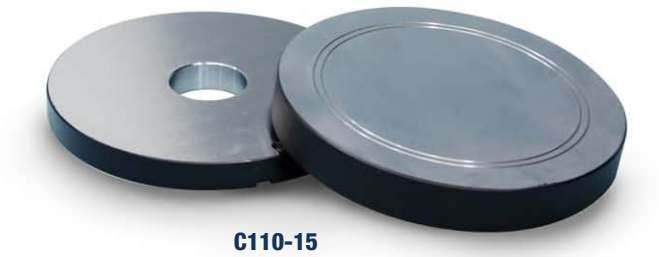
Comprising three elements, for piston/cylinder coupling

MODELS

C122-01 For compression machines 1300-1500 kN capacity
C122-02 For compression machine 2000 kN capacity
C122-03 For compression machine 3000 kN capacity
C122-04 For flexure machine 150 kN capacity, C090 series
C122-06 For flexure machine 150kN capacity, C091, C093 series
C122-07 For flexure machine 200 kN capacity, C090-06 and C090-07 series
C122-05 Packing set for the hand-operated pump of testing machines (mod. C113)
E161-15 For Cement testing machines mod. E151 to E161-03
E183-11 For Cement machines mod. E181, E183, piston 300kN
E183-12 For Cement machines mod. E181, E183, piston 15kN

C122...E183-12

C110-20 LOWER COMPRESSION PLATEN, hardened over 55 HRC, Ø 165x50 mm to test cubes 100 mm side (as an alternative to the distance piece 50 mm high).
For C058 series, 3000 kN ASTM, 2000 and 3000 kN EN high stability models.



C110-15

C110-15
LOWER COMPRESSION PLATEN

Hardened and rectified, Ø 216x40 mm, complete with distance piece 20 mm high.

Weight: kg 11.3 + kg 3

This simple and low cost solution is recommended for an easier use of the **High Stability** Compression Testing Machines and the compression machines equipped with lower platen Ø 287 mm to make lifting operations easier.

It consists of replacing the **heavy** lower compression platen having Ø 287 mm (weight 30.3 kg) with a smaller platen having only Ø 216 mm by 40 mm height (weight 11.3 kg), together with the 20 mm high distance piece (included).

This test solution allows a much easier removal and positioning of the lower compression platen when the distance pieces have to be fitted in and out, based on the specimen size the user needs to test (cube 100 or 150 mm or cylinder 150x300 mm or 160x320 mm diameter).

This solution is **not valid** only when a cube specimen 200 mm side has to be tested. In this case the lower compression platen 287 mm diameter must be foreseen to cover the full surface of the 200 mm cube specimen.

C110-20

C089-02N with **C110-15** light lower plate Ø 216 mm (weight 17 kg)

C089-02N with standard lower plate Ø 287 mm (weight 32 kg)

ACCESSORIES AND SPARES FOR COMPRESSION AND FLEXURAL TESTING MACHINES

COMPRESSION PLATENS

Surface hardened over 55 HRC and finish-grinding.

UPPER PLATEN

Model	Ø mm	Machine
C110	165x30	1200kN
C110-01	216x30	1300kN, 1500kN and 2000kN
C110-02	287x51	3000kN and 2000kN serie C058
C110-03	287x60	2000kN and 3000kN high stability complete with "ball seating"

LOWER PLATEN

Model	Ø mm	Machine
C110-11	165x30	1200kN
C110-12	216x30	1300kN, 1500kN and 2000kN
C110-13	287x51	3000kN and 2000kN serie C058
C110-14	287x60	2000kN and 3000kN high stability

C112-10
UPPER and LOWER COMPRESSION PLATENS, complete with "ball seating", dimensions 510x245x55 mm for tests on blocks.

C112-11
UPPER and LOWER COMPRESSION PLATENS, complete with "ball seating", dimensions 510x320x55 mm for tests on blocks.

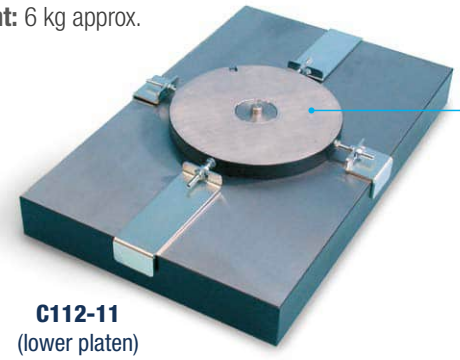
C112-05
Kit of 4 handles to lift the lower platen, making the positioning of distance pieces easier.

AS AN ALTERNATIVE:

C111-50
DISTANCE PIECE

To be used with compression testers equipped with rectangular platens 510x320 mm to test blocks.
This device eliminates the heavy procedure to lift the lower rectangular platen and to add distance pieces to perform compression tests also on cube specimens.
This distance pieces is fixed over the lower rectangular platen through 4 adjustable couplers allowing a quick, correct and stable fixing.
On the distance piece it is now possible to put the round compression platen Ø 216 or 287 mm foreseen by the specific machine.
This distance piece is finish-grinded (suitable also for high stability testers), has Ø 210 mm, height 20 mm.

Weight: 6 kg approx.



C111-50

C112-11
(lower platen)

C112-05

DISTANCE PIECES

Used to reduce the vertical clearance between the compression platens, according to the height of the specimen to be tested, to prevent piston overtravel. The distance pieces are placed between the ram and the lower compression platen.

MODELS

DISTANCE PIECES Ø 140 mm for machines: 1300kN, 1500kN, 2000kN (C053 to C056N)

C111-30 High 20 mm
C111-03 High 100 mm
C111-02 High 226 mm
C111-21 High 50 mm
C111 High 176 mm
C111-01 High 176+50 mm

DISTANCE PIECES Ø 200 mm for machines: 2000kN (C058-02 to C058-05N), 3000kN (C068 to C071N), 2000kN blocks (C075 to C078N), 3000kN blocks (C079-03 to C079-06N)

C111-31 High 20 mm
C111-26 High 76 mm
C111-22 High 50 mm
C111-04 High 126 mm
C111-05 High 126+50 mm
C111-06 High 126+50+50 mm
C111-07 High 50+50 mm

SLOTTED DISTANCE PIECES Ø 150 mm for central screw machines: 2000kN (C073 to C078N), 3000kN (C079-01 to C079-06N)

C111-27 High 20 mm
C111-28 High 76 mm
C111-23 High 50 mm
C111-08 High 126 mm

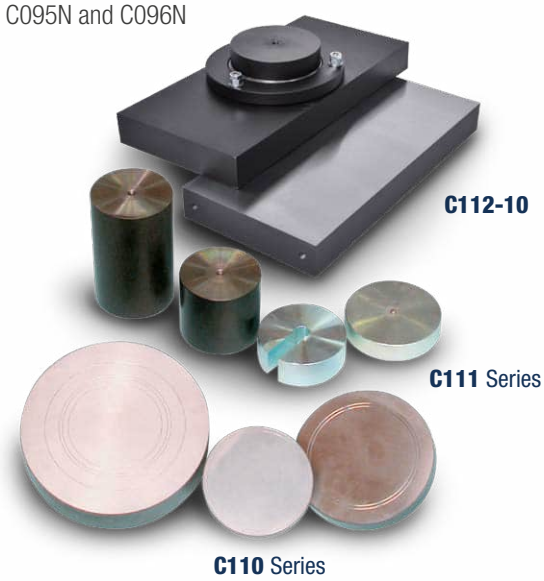
DISTANCE PIECES Ø 210 mm, finish-grinding, for **high stability** machines: 2000kN, 3000kN, 2000kN blocks and 3000kN blocks.

C111-32 High 20 mm
C111-25 High 73 mm
C111-24 High 50 mm
C111-12 High 73+50 mm
C111-13 High 73+50+50 mm
C111-14 High 73+50+50+50 mm
C111-15 High 50+50 mm

C111-16 DISTANCE PIECE, high 50 mm for flexure machines serie C090

C111-17 DISTANCE PIECE, high 40 mm for flexure machines serie C090-07N

C095N-18 DISTANCE PIECES, high 43 mm (x4) for flexure machines C095N and C096N



C112-10

C111 Series

C110 Series

S205M
UNITRONIC 50 KN
UNIVERSAL MULTIPURPOSE FRAME
FOR COMPRESSION / FLEXURAL TESTS, 50 KN MAX. CAPACITY LOAD
WITH AUTOMATIC LOAD OR DISPLACEMENT/DEFORMATION CONTROL, testing:

Concrete:
- FLEXURE ON BEAMS
- FLEXURE ON TILES

Clay Blocks, Tiles:
- PUNCHING
- TRANSVERSE/DEFORMATION on adhesives for tiles - EN 12002 (see p. 466)

Unitronic technical details and aditional specific tests are described at p. 462

S205M

SPECIFIC APPLICATIONS
FLEXURAL TEST WITH CENTRE POINT ON CONCRETE BEAMS AND CLAY TILES
STANDARDS: EN 12390-5, 538 I ASTM C78, C293
Test development with load control.

NEEDED ACCESSORIES

S337-34 STRAIN GAUGE LOAD CELL, 50 kN capacity

S337-51 CALIBRATION PROCESS for the load cell.

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 310 mm, and upper central articulated bearer fixed to the load cell.
Bearer dimensions: Ø 40 mm by 310 mm long.

Weight: 30 kg approx.

Or

S205-16 FLEXURE DEVICE similar to S205-18 but with two upper rollers adjustable from 45 to 120 mm.
Weight: 44 kg approx.

C109-11N In-built firmware for flexure tests on concrete beams.

S205-18

PUNCHING TEST ON CLAY BLOCKS
STANDARDS: EN 15037 I UNI 9730-3
Test development with load control.

NEEDED ACCESSORIES

S337-32 STRAIN GAUGE LOAD CELL 10 kN capacity.

S337-51 CALIBRATION PROCESS for the load cell.

C093-11 FLEXURAL PUNCHING DEVICE

S205-15 HOLDING BEAM for the punching device

C109-11N In-built firmware for punching on clay blocks.

C093-11

C095-05
FLEXURE TEST ON CLAY SLATS
STANDARD: UNI 9730-3
The apparatus consists of:
- digital loading balance 16 kg capacity x 0.1g sens, with software to display and hold the failure load
- flexure device fitted on the balance, with central rotating knob for load application. The load is obtained by simply rotating the knob that applies a flexural pressure on the strip sample up to the failure. The balance displays and holds the failure load.

Weight: 15 kg approx.

C095-05

S206M

UNITRONIC 200 KN
UNIVERSAL MULTIPURPOSE FRAME

FOR COMPRESSION / FLEXURAL TESTS, 200 KN MAX. CAPACITY LOAD
WITH AUTOMATIC LOAD OR DISPLACEMENT/DEFORMATION CONTROL, testing:

- FLEXURE ON CONCRETE BEAMS AND TILES
- COMPRESSION ON MORTAR CUBES 40, 50, 70 MM
- PUNCHING ON CLAY BLOCKS FOR FLOORING

Unitronic 200 kN technical details and aditional specific tests are described at p. 463

S206M

SPECIFIC APPLICATIONS

FLEXURAL TEST WITH CENTRE POINT
ON CONCRETE BEAMS AND CLAY TILES
STANDARDS: EN 12390-5, 538 | ASTM C293

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 310 mm, and upper central articulated bearer fixed to the load cell.
Bearer dimensions:
Ø 40 mm by 310 mm long.

Weight: 30 kg approx.

C109-11N
In-built firmware for flexural tests on concrete beams.

S205-18

TWO POINT FLEXURAL AND TRANSVERSE TESTS
ON CONCRETE BEAMS
STANDARDS: EN 12390-5 | ASTM C78

S205-16
FLEXURE DEVICE similar to S205-18 but with two upper rollers adjustable from 45 to 120 mm.

Weight: 44 kg approx.

C109-11N
In-built firmware for flexural tests on concrete beams.

S205-16

FLEXURAL TEST ON CONCRETE BEAMS
STANDARDS: EN 12390-5 | ASTM C78, C293 | AASHTO T97

C106 Flexure device (p. 290)

C109-11N In-built firmware for flexural tests on concrete beams.

C106

SPLITTING TENSILE TEST ON CONCRETE CYLINDERS
STANDARDS: EN 12390-6 | ASTM C496

C101-01
Splitting tensile test device (technical details p. 289)

C100-01
Packing strips (100 pieces)

C109-12N
In-built firmware for splitting tensile test

C101-01
C100-01

SPLITTING TENSILE TEST ON CONCRETE CUBES AND BLOCK PAVERS
STANDARDS: EN 1338 | EN 12390-6

C103
Splitting tensile test device (p. 289)

C100-02
Packing strips (100 pcs)

C109-12N
In-built firmware for splitting tensile test

C103
C100-02

PUNCHING TEST ON CLAY BLOCKS
STANDARD: EN 15037 | UNI 9730-3

C093-11
Punching device for clay block for flooring tests

S205-15
Holding beam for the device

C109-16N
In-built firmware for splitting tensile test

S337-32
C093-11
S205-11

H012
UNIMEC 300
ELECTROMECHANICAL UNIVERSAL TESTING MACHINE
300 KN CAPACITY BOTH FOR COMPRESSION AND TENSION

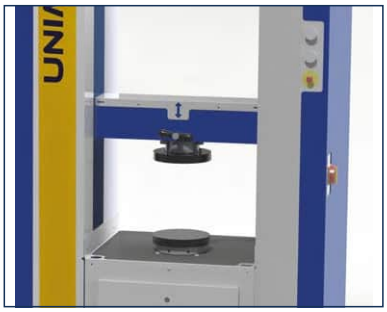
Unimec 300 is suitable for a wide range of tests on different kinds of construction materials such as concrete, mortar, steel, soil, asphalt, bitumen and also plastic, rubber, wood and others. It can work in two directions, allowing to perform tests both in tension and in compression, and it is equipped with a high precision load cell to grant accurate results and an integrated device to measure the crosshead displacement.
The movement system includes two linear actuators (of the ball-screw type) which provide two main effects: reduction of the friction at minimum, granting a smooth and precise positioning of the crosshead; elimination of manual operations to determine the position of the crosshead, the movement is completely automatized and controlled with an easy-access keyboard.

Note: further information see p. 409

H012

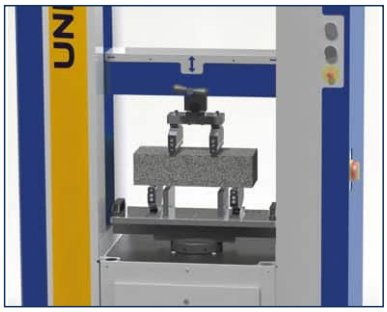
Main concrete applications

Compression test



C109-10N In-built firmware for energy absorption test
H012-20 Platens with Ø 216 mm (details at p. 411)
SSW-LINK or SSW-UTM2 Software for compression test (details at p. 20-21)

Flexural test



C109-11N In-built firmware for concrete flexure test
H012-21 Jig for flexural test (details at p. 411)
SSW-LINK or SSW-UTM2 Software for flexural test (see p. 20-21)

CMOD test

STANDARD:
EN 14651

H012-21 Jig for Flexural test
C090-16 Fork transducer
S337-51 Calibration of C090-16
C090-18 Datum blocks
SSW-UTM2 Software for flexural test on FRC
Details at p. 411
C109-14N In-built firmware for deflection FRC and flexural toughness test

Deflection test

STANDARDS:
EN 14488-3
ASTM C1609

H012-21 Jig for Flexural test
C090-15 Displacement transducer holder
2 x C090-30 LVDT transducer
2 x S337-51 Calibration of C090-30
SSW-UTM2 Software for flexural test on FRC
Details at p. 411
C109-14N In-built firmware for deflection FRC and flexural toughness test

Note: Unimec 300 can perform many other tests. See p. 410...413

C094N
PORTABLE DIGITAL PRESS, 56 KN CAPACITY

Used for compression tests on small cylinder specimens and core. The load is applied by a hand pump, and is measured by **a high precision electric load cell** with a digital display unit range 0-56 kN providing:
- 65,000 divisions
- 0.001 kN resolution
- Linearity: 0.05%
- Hysteresis: 0.03%
- Repeatability: 0.02%

The compression platens have Ø 80 mm, the upper one has a spherical seat and the vertical daylight is 110 mm
Piston stroke: 110 mm
Complete with wooden carrying case, accessories.

Dimensions: 370x320x710 mm
Weight: 30 kg approx.

C094N / C094N1

C094N1
PORTABLE DIGITAL PRESS, 100 KN CAPACITY

Same as C094N, but having load capacity up to 100 kN

ACCESSORY

A125-01 SET OF TWO HARDENED CONICAL POINTS, to modify the press mod. C094N into the **Point load tester** (see section aggregates mod. A125N and A126 p. 63), for the rock strength index test.

A125-01

C095
FLEXURAL TESTING MACHINE, 50 KN CAPACITY

DESIGNED TO TEST:
- CONCRETE TILES: EN 491
- FLAT BLOCKS: BS 6073:1 app. C.
- CLAY FLOORING BLOCKS: UNI 9730-3 (adding C093-11+S205-15)
- PAVING SLABS, ROOF TILES, FLOOR TILES, TERRAZZO TILES, CERAMICS, BRICKS, etc.

The machine consists of: steel frame, one upper bearer and two lower adjustable bearers, mechanical hand-operated screw jack and a 10 kN capacity proving ring to measure the applied load.

C095

TECHNICAL SPECIFICATIONS

- 10Kn load ring, complete with calibration certificate (on request rings with inferior or superior capacity up to 50kN)
- Horizontal span: 520 mm
- Maximal vertical span (accessories not included) 670 mm
- Distance between lower bearers adjustable from 50 to 500 mm
- Rollers dimensions: Ø25x500 mm
- Precision: 1% of applied load

Dimensions: 620x650x1500 mm
Weight: 120 kg approx.

C096
IMPACT FAILURE TEST ON TILES AND PAVING MATERIALS

STANDARD: Italian Royal Decree n° 2234 art. 3 (1939)

Utilized to verify the quality of paving materials like tiles, ceramics, bricks, floor tiles etc. by the impact method.
The specimen under test is placed on the base of the device which has been previously filled with sand. Then a spherical ball of approx. 1000 gr. is dropped on the tile from a known height, to measure the height under which the specimen will break.

Dimensions:
810x810x1300 mm
Weight: 75 kg approx.

C096

ABRASION MEASURING BASED ON BÖHME

C129
ABRASION TESTER BÖHME

STANDARDS: EN 1338, 1339, 1340 | EN 13748-2, 13892-3
EN 14157 | DIN 52108

C129

C129-02

The instrument measures a volume loss in a specimen under abrasion test and it's used in tests such as:

- paving stones
- concrete slabs
- slabs made of natural rocks
- natural stone slabs
- terrazzo tiles

The test is performed by positioning a specimen to be verified in a abrasion tester Böhme apparatus on the test track on which has been spread normalized abrasive; the grinding wheel it's made to rotate and the specimen submitted to the abrasive load of 294 N for a certain number of cycles.
Before doing a test, establish the specimen's bulk density by measuring weight and thickness.
Perform the test for 16 cycles composed of 22 turn each, calculating at the end a worn as a average loss in volume and weight.

The apparatus is basically composed of:

- Cast iron horizontal disc with a speed of 30 rpm and a diameter of 750mm furnished of a 200 mm wide test track to position a specimen.
- Separate control panel with digital revolutions counter with automatic stop after preset revolutions.
- Specimen's holder.
- Adjustable charger used to produce a force of 294 N ± 3 N on a specimen.

Power supply: 230V 50Hz 1PH 800W
Dimension: 1500x1000x850 mm
Weight: 320 kg approx.

ACCESSORIES

C129-01N ABRASIVE MATERIAL composed of fused alumina (artificial corundum). Pack of 25 kg

C129-02 MEASURER THICKER REDUCTION, composed of dial gauge with anular contact face with a diameter of 8-5 mm and measuring board.

A113
SKID RESISTANCE AND FRICTION TESTER

STANDARDS: EN 1338, 1340, 1341, 1342, 1339, 13412
Used for tests on concrete block pavers, natural stones, and skidding tests on wooden floor.
Technical details: see p. 54

A113

ACCESSORIES

A110-11 METAL BASE PLATE.

A110-13 CLAMPING DEVICE for tests on concrete block pavers (EN 1338); natural stones (EN 1341, 1342); skidding tests on wooden floor (EN 1339).

VERIFICATION OF FORCE TRANSFER

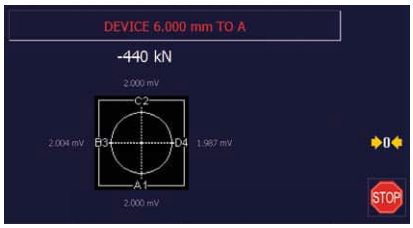
STANDARDS: EN 12390-4 I DIN 51302-2

The equipment to perform this test is composed of:

C155M
DIGITAL MEASURING TESTER
CYBER PLUS PROGRESS TOUCH-SCREEN

This unit reads simultaneously the four values supplied by the electric strain load cell. The values are memorized, automatically elaborated and visualized, to directly supply the various coefficients resulting by the calculations, and printed on laser printer (accessory C128) directly connected via USB to the tester.
The unit, through the wide display, shows to the utilizer the different test procedures, as requested by previously selected specification (EN, BS, DIN).
At the end of the test, the display automatically visualizes the test results, by informing also if the frame under test is conforming to the requirements of the selected specification regarding the stability (axial transmission of the loads, self-alignment of the seat ball etc.).
The digital readout unit is also foreseen of a fifth digital reading channel allowing to perform load calibration tests on compression machines up to 3000 kN capacity.
Supplied complete with kit of 5 cables and connectors for load cell coupling, accessories, carrying case.

Power supply: 110-230V 1ph 50-60Hz
Dimensions: 450x350x160 mm
Weight: 8 kg approx.



C154
ELECTRIC STRAIN LOAD CELL 3000 KN CAPACITY

Consisting of a strain steel cylinder where four balanced strain gauge bridges are centered to measure the deformation on 4 generatrix in relation with two diameters, orthogonal between them, so that both axial and circumferential deformations can be measured.
The cell incorporates a fifth strain gauge utilized for load measurement calibration tests.
Supplied complete with connectors, cables, calibration certificate.

Dimensions: Ø 130 by 200 mm high.
Weight: 18 kg approx.

C154-01
POSITIONING DEVICE

Necessary accessory to allow the correct positioning of the load cell on the lower platen of the compression frame, to carry out the footemeter test as described by the Standards.

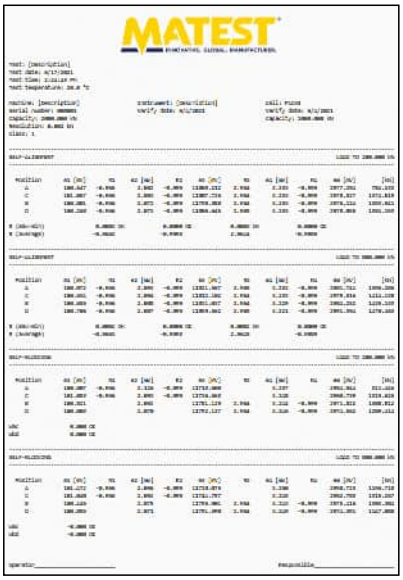
Dimensions: 150x150x50 mm

C155-05
VERIFICATION PROCESS of the load cell to the digital tester, complete with Matest verification certificate.

C155-15
OFFICIAL CALIBRATION CERTIFICATE class 1 issued by an official calibration centre for C154. This certificate includes the load calibration and the footmeter verification of the four strain readings.

ACCESSORY (recommended)

C155-10N SOFTWARE to download to PC the results with possibility of certificate printout.



Example of verification report C155-05

C138M
UNIVERSAL DIGITAL TESTER WITH MICROPROCESSOR FOR LOAD CELLS

CYBER-PLUS PROGRESS, 8 CHANNELS

STANDARDS: EN ISO 376, 7500-1
DIN 51220
ASTM E74

MAIN FEATURES

- Up to 5 decimal points visualization.
- LCD display 800x480 pixel.
- Large internal memory for load cell calibrations.
- USB and LAN ports.
- Language selection.

This user friendly menu driven digital display, connected to load cells (C140 and C142 series) allows to perform an accurate verification load readings from different machines and to produce the corresponding certificate.
The instrument foresees three memorized cycle verification program composed of ten measurements each.

At the end of the test the unit automatically elaborates the stored value and displays:

Effective applied load;
Measured load (over three verification cycles);
Average measured load;
Accuracy in %;
Repeatability;
Relative readability;
Max error.
The tester's accuracy is ± 0.5% of the indicated load.

TECHNICAL SPECIFICATIONS

HARDWARE:
- High resolution channel, 24 bit.
- Excitation at 5Vcc
- Standard signals: feed + feed – (0V) signal + signal – and shield
- Remote push button to facilitate the readings confirmation during the calibration and the execution of the verification cycles.

FIRMWARE:
- Software administration up to ten load cells. Possibility to use one cell at a time, selectable among with the ones correctly configured and installed
- Load measuring range: kN, kg, lb
- Date of test and/or calibration
- Steps linearization or polynomial curve.

FUNCTIONS:
- Unlimited execution of verification tests.
- Code of the device under verification.
- Execution of the verification cycles according to the relevant standards.
- Calculation of all the fundamental parameters required: repeatability and accuracy percentage error, residual error on the 0 point, maximum relative resolution and class of the device under verification.
- Sending all the data tests to PC, importable in excel.
- Direct USB printer connection (accessory C128).

MAIN PAGE:
- Visualization of all the device data of the selected cell
- Date and time
- Available languages: Italian, English, French, German and Spanish, Polish (other languages on request).

SOFTWARE:
To download to PC the results (accessory C155-10N).

Hardware technical details: see p. 213

The apparatus, and all the accessories, is contained in a strong and practical suitcase.

Power supply: 110-230V 1ph 50-60Hz
Dimensions: 360x300x200 mm
Weight: 5 kg approx.

ACCESSORY (recommended)

C155-10N SOFTWARE
To download to PC the results with possibility of certificate printout.

STANDARD LOAD CELLS

TO BE USED WITH THE C138M DIGITAL INDICATOR FOR CALIBRATION OF TESTING MACHINES

STANDARDS: EN ISO 376, Class 2 I ASTM E74 Class A

These load cells are suitable for the calibration of compression testing machines. While the load is applied, strains are transmitted to an amplifier (mod C138M) which gives a load digital reading. Further advantages is the possibility to equip different load cells on the same measuring tester and therefore to check all load capacities.

Model	Capacity kN	Dimensions Ø x height mm
C140	25	82x59
C140-01	50	82x59
C140-02	75	82x59
C140-03	100	82x59
C140-04	300	135x160
C140-05	600	135x160
C140-06	1000	135x200
C140-07	2000	135x200
C140-08	3000	135x200
C140-09	5000	180x200
C140-10*	500	100x35 (tension/compression)
C140-11	5	82x44

***Note:** Requires special fittins for tension calibration, code C140-12.

TECHNICAL SPECIFICATIONS

- Full Scale nominal output: 2 mV/V
- Linearity + Hysteresis: ± 0.3% of full scale
- Repeatability: ± 0.03% of full scale
- Class 2 / Class A

C140 and C142 series

C138-05
FORCE CALIBRATION PROCESS of one load cell to the calibrator C138M only in compression, complete with Matest calibration report. Suitable both for load cells C140 and C142 series.

Note: Possibility to supply the load cells in a carrying/protection case on request.

STRAIN LOAD CELLS HIGH PERFORMANCE

TO BE USED WITH THE C138M DIGITAL INDICATOR FOR CALIBRATION OF TESTING MACHINES

STANDARDS: EN ISO 376, Class 1 I ASTM E74 Class AA

These electrical strain gauge load cells with high accuracy and stability are proposed as alternative to the standard load cells for verification and calibrations of high precision, repeatability, and are recommended for a professional use, Metrologic Laboratories, SIT centres. To be used with the Digital Indicator mod. C138M.

Model	Capacity kN	Dimensions Ø x height mm
C142	30	100x127
C142-01	100	105x160
C142-02	300	140x160
C142-03	600	140x160
C142-04	1000	150x200
C142-05	2000	135x200
C142-06	3000	135x200
C142-07	5000	135x200
C142-08	600	235x80 (tension/compression)
C142-09	10	101x30
C142-10	5	101x30
C142-11	25	101x30
C142-12	75	150x40

TECHNICAL SPECIFICATIONS

- Full Scale nominal output: 2 mV/V
- Linearity + Hysteresis: ± 0.1% of full scale
- Repeatability: ± 0.03% of full scale
- Class 1 / Class AA

OFFICIAL CALIBRATION CERTIFICATE

Issued by an official calibration institute (Accredia) for one load cell connected to calibrator C138M.

C138-11 for load cells 600 kN or less, compression

C138-12 for load cells 1000 kN, compression

C138-13 for load cells 2000 or 3000 kN, compression

C138-14 for load cells 5000 kN, compression

C138-15 for load cells 500 or 600 kN, tension

TURBO FORCED MIXERS, PAN TYPE WITH VERTICAL AXIS

STANDARD: EN 12390-2

Used to prepare concrete specimens or mixtures, these mixers ensure an uniform, efficient and fast mixture action.
They are of easy and practical utilisation, absorb fewer air during mixing and are suitable for laboratory and field purposes.

TECHNICAL SPECIFICATIONS

- Parallel shaft gearbox (mod. C163, C164, C165)
- Oil bath epicycloidal gearbox (mod. C164-01)
- Wear-resistent steel pan (mod. C163, C164, C165)
- Pan and main parts in wearproof steel (mod. C164-01)
- Safety grid with bag breaker
- Adjustable mixing blades
- Manual discharge mouth on the bottom
- Wheels + tow bar (mod. C163, C164, C165)
- Axele with tire wheels and drive drawbar (mod. C164-01)
- Max. aggregates size: 25 mm
- Electric control with magnetothermal overload cutout
- Power supply: 230V 1ph 50Hz (mod C165, C163SP)
- Power supply: 400V 3ph 50Hz (mod C163, C164, C164-01)

C164-01

Models		C165	C163/C163SP	C164	C164-01
Pan capacity (volume)	Litres	100	150	200	300
Yield per mixture	Litres	55	80	135	220
Pan dimensions (Ø x h)	cm	70x30	70x43	80x40	110x40
Motor power	KW	1.1	1.8	4	5.5
Dimensions (Ø x h)	cm	71x115	71x150	110x137	130x135
Weight	kg	115	130	225	420

C164
C163
C165

C165N
PAN TYPE MIXER, HIGH QUALITY

STANDARD: EN 12390-2

This High quality mixer guarantees excellent mixing results even when using the smallest quantities of material.
High level mixing performances for both mortar and concrete (mixtures up to a grain size of 16mm).
Quick and practical drainage through a valve placed in the base of the drum.
Very long lifespan thanks to a solid and robust construction.
Pan capacity: 100 litres
Mixing amount: max. 60 litres
Pan dimension: Ø 642x310 mm

Power supply: 230V 50Hz 1ph
Dimensions: 675x825x1215 mm
Weight: 162 kg approx.

C165N

C165N Detail

C162
PAN TYPE MIXER 56 LITRES CAPACITY

STANDARD: EN 12390-2

This multiflow mixer absorbs fewer air during mixing, requires shorter mixing time and grants a perfect homogeneity in mixtures having a low water cement ratio.
The pan is easily removable by means of a trolley (accessory).
The blades are hardened against wear.
Mixing pan: Ø 640 mm x 330 mm deep
Not sellable in CE markets without security cabinet
(see mod. C162-02)

Power supply: 230V 1ph 50Hz 2 HP
Dimensions: 800x850x850 mm
Weight: 250 kg approx.

C162

C162-01

ACCESSORIES FOR MOD. C162

C162-01 TROLLEY for fast and easy removal of the mixing pan of the multi-flow mixer. Strongly suggested.
C162-02 SECURITY CABINET, manufactured from steel sheet, conforming to CE Safety Directive.

C161
DRUM TYPE MIXER

Suitable for field mixes of low/medium strength concrete.
Drum volume: 120 litres
Mixing amount: 90 litres

Power supply:
230V 1ph 50Hz - 0.85 HP
Dimensions:
720x1140x1340(h) mm
Weight: 55 kg approx.

C161

TESTING FRESH SELF COMPACTING CONCRETE (SCC)

ERMCO/EFNARC European Guidelines.

SLUMP-FLOW DETERMINATION

STANDARD: EN 12350-8

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

C181 SLUMP CONE, galvanized steel

C170-01 PLATE, galvanized steel made, dimensions 900x900 mm, with engraved two circles having 210 and 500 mm diameter and central X cross.

VISCOSITY DETERMINATION V-FUNNEL TEST

STANDARD: EN 12350-9

To evaluate the viscosity and filling ability of self-compacting freshly mixed concrete through the flowing speed from a funnel.
Applicable to concrete with aggregates of 25 mm max. size.

C171 V-FUNNEL, **stainless steel** made, stand mounted. The upper edge of the funnel is smooth and reinforced, and the outflow orifice is equipped of an openable seal valve.
Dimensions: 640x340x1050 mm
Weight : 20 kg approx.

C171-11 FILLING HOPPER stainless steel made, to pour the concrete into the funnel in one operation, as specified by the Standard.

V127 BOX, polythene made, to collect the concrete.

C262 STRAIGHT EDGE, 460 mm, to level the concrete.

CONFINED FLOWABILITY DETERMINATION

L BOX TEST

STANDARD: EN 12350-10

To determine the confined flowability of self-compacting freshly mixed concrete, and to evaluate the filling and passing ability and segregation resistance.
Applicable to concrete with aggregates of 25 mm max. size.

C172 L-BOX, **stainless steel** made, consisting of:
- container with inside rigid surfaces,
- Interchangeable sets of grids:
- one set of 3 vertical bars having Ø 12 mm and free light of 41 mm
- one set of 2 vertical bars having Ø 12 mm and free light of 59 mm
- gate in guillotine form

Dimensions: 712x280x682 mm
Weight: 20 kg approx.

S200-11 STRAIGHT EDGE, 300 mm long, galvanized steel, to level the concrete.

CONFINED FLOWABILITY DETERMINATION

U-SHAPE BOX

STANDARDS: UNI 11044 | RILEM report N. 23

To evaluate the filling speed and height of the concrete sample under its own self-weight, in the U-shape filling box, to determine the self-compactability. The test is performed with highly fluidised fresh concrete with superplasticiser.
Applicable to concrete with aggregates of 25 mm max. size.

C173 U-BOX, **stainless steel** made, with inside smooth walls, equipped of a flow obstacle formed by four vertical reinforcement bars. The bars have Ø 10 mm and the light between them is 35 mm.
A gate in guillotine form splits the vertical portion of the box from the horizontal one.
Picture in the next page.

Dimensions: 480x250x680 mm
Weight: 20 kg approx.

S200-11
STRAIGHT EDGE, 300 mm long, galvanized steel, to level the concrete.

CONFINED FLOWABILITY DETERMINATION

J-RING APPARATUS

STANDARD: EN 12350-12

To determine the flowability, i.e. the flow time and the capability of the self compacting concrete to pass through obstacles.

C174N

NARROW GAP J-RING, galvanized steel made, having rectangular section 30x15 mm and median diameter of 300 mm.
The median circumference of the ring is drilled, and n. 16 cylindrical bars Ø 18x140 mm are fixed into the holes.
The bars have a close distance of 41 mm between them, to simulate a condition of higher density of the reinforced bars.

C174-01N

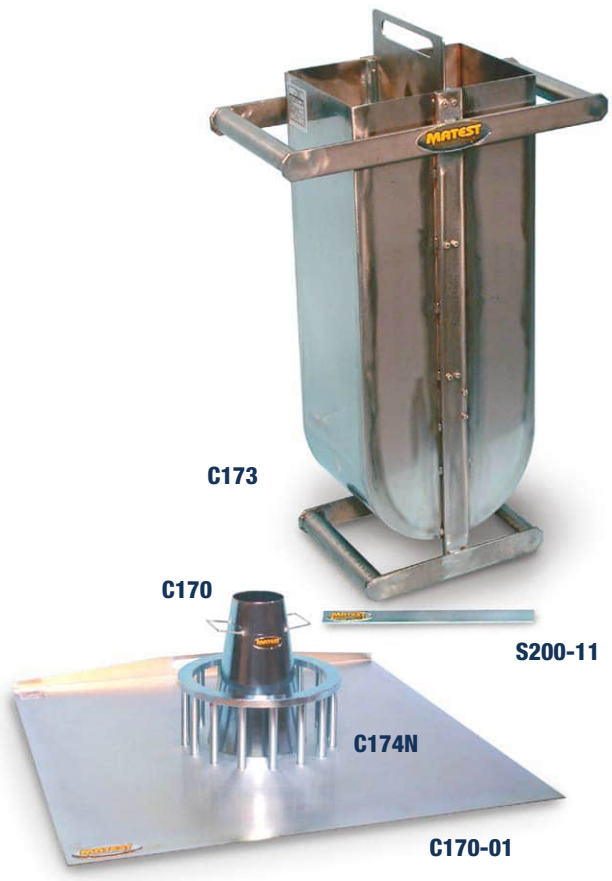
WIDE GAP J-RING, similar to C174N, but having n° 12 cylindrical bars and 59 mm distance between them, to simulate a condition of standard density of the reinforced bars.

C170

SLUMP CONE, galvanized steel.

C170-01

PLATE, galvanized steel made, dimensions 900x900 mm, with engraved two circles having 210 and 500 mm diameter and central X cross.



C183
VEBÉ TIME CONSISTOMETER

STANDARD: EN 12350-3

The Vebé consistometer determines the consistency and workability of concrete, based on the same principle of slump test, but with the advantage of a mechanical action. The concrete is subjected to vibration after the cone has been removed, until a transparent disk placed on the material makes complete contact with it. The time required to perform the operation indicates the workability or VEBE degree.
Supplied fully equipped.

Power supply: 230V 1ph 50Hz 250W
Dimensions: 400x250x690 mm
Weight: 100 kg approx.

C184N
VIBRATING TABLE (Vebé consistometer)

STANDARD: ASTM C1170

For determining the consistency and density of roller-compacted concrete. Similar to mod. C183, but conforming to ASTM C1170 Specifications (both for procedure A and B) with sliding weights of 50 lb and 27.5 lb.

*** Power Supply:** 230V 1ph 50Hz 180W
Dimensions: 280x400x900 mm
Weight: 110 kg approx.

***Note:** The vibrating table is available also at: 230V 60Hz and 110V 60Hz

ACCESSORY for the C184N table

C184-10N SLIDING WEIGHT 20 LBS (that replaces the standard 50 lbs one) + base to fix a cylinder mould Ø 6"x12" (optional mod. C258-03) to conform the Vibrating Table to the ASTM C1176 Specifications.

SLUMP CONE TEST KITS

STANDARDS: EN 12350-2 I ASTM C143 I AASHTO T119

SLUMP CONE COMPLETE TEST KITS. Matest proposes different versions:

C180-KIT SLUMP CONE, COMPLETE SET, ideal for laboratory tests including:

C180-01 Slump Cone, **stainless steel** made

C180-02 Tamping rod, galvanized steel, Ø 16x600 mm

C180-03 Slump Cone funnel, galvanized steel

C180-06 Graduated slump scale **engraved in 0.5 cm** increments with sliding measuring rod

C180-07 Base, galvanized steel, complete

V184 Aluminium scoop, 500 cc capacity

V178-01 Fine wire brush

Weight: 10 kg approx.

C182-KIT SLUMP CONE, COMPLETE SET, including:

C181 Slump Cone, **galvanized steel**

C180-02 Tamping rod, galvanized steel, Ø 16 x 600 mm

C180-04 Base plate, galvanized steel

V176-01 Stainless steel rule, 300 mm long

V184 Aluminium scoop, 500 cc capacity

V178-01 Fine wire brush

Weight: 5 kg approx.

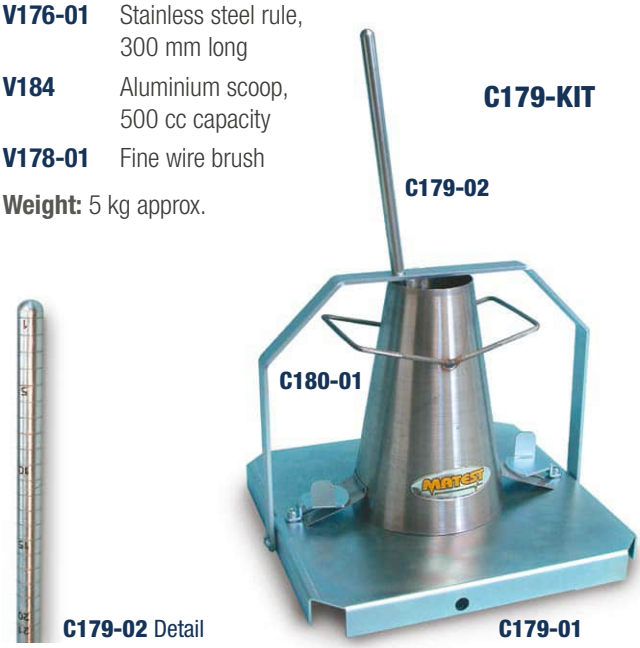
C178-KIT PORTABLE SLUMP CONE TEST SET, including:

C181 Slump Cone, **galvanized steel**

C179-02 **Graduated** steel tamping rod, galvanized, Ø 16x600 mm

C179-01 Base, manufactured from heavy duty galvanized steel, complete with clamps and measuring bridge which is also used as carrying handle.
The slump is measured using the tamping rod having a graduated scale engraved in 1 cm increments.
The components of the set are fitted together for easy carrying. Very practical, robust, ideal for site use.

Weight: 8 kg approx.



C179-KIT PORTABLE SLUMP CONE TEST SET, including:

C180-01 Slump Cone, **stainless steel** made

C179-02 **Graduated** steel tamping rod, galvanized, Ø 16x600 mm

C179-01 Base, galvanized steel, complete with clamps and measuring bridge, as described above.

Weight: 8 kg approx.

Note:
Each component of the kits can be ordered separately.
The user can personalize the kit composition for the Slump Cone test.

C182P-KIT
SLUMP CONE, PLASTIC, complete set including:

C181P Slump Cone, **plastic**. Max. temperature: 40 °C
Weight: 750 g
C180-02 Tamping rod, galvanized steel, Ø 16x600 mm
C180-04 Base plate, galvanized steel
V176-01 Stainless steel rule, 300 mm long
V184 Aluminium scoop, 500 cc capacity
V178-01 Fine wire brush

Weight: 5 kg approx.

ACCESSORY

C180-03P Cone Filling Funnel, **plastic**. Weight: 250 g

Note: Each component of this kit can be ordered separately.

C180-01
SLUMP CONE only, manufactured from **stainless steel**, diameter 100/200 mm, height 300 mm, thickness 1.5 mm

Weight: 2 kg approx.

C181
SLUMP CONE only, **galvanized steel**, Ø 100/200 mm, height 300 mm, thickness 1.5 mm

Weight: 2 kg approx.

V185-03
SCOOP, STAINLESS STEEL

STANDARD: EN 12350-1

Used to sample fresh concrete
Capacity: 5 kg of concrete
Dimensions: Ø 125x250 mm

C192-KIT
FLOW TABLE

STANDARDS: EN 12350-5 I DIN 1048

The apparatus comprises a galvanized steel conical mould, Ø 130/200x200 mm, double steel flow table with galvanized top plane, guide device, wooden tamper.
Used to determine the workability of concrete. The top table has a square surface of 700x700 mm, hinged on one side.

Weight: 30 kg approx.

SPARES

C192-01 Conical mould, galvanized steel made, Ø 130/200x200 mm
C192-02 Wooden tamper

C185
COMPACTING FACTOR APPARATUS

STANDARD: BS 1881:103

Designed to undertake a more precise and sensitive test procedure than the simple slump test.
The apparatus consists of two conical hoppers mounted on a cylinder.
Each hopper has a hinged flange with quick release mechanism and everything is mounted on a rigid steel stand.
The compacting factor is the ratio between the weight of the partially compacted concrete and the weight of the fully compacted concrete.
Supplied complete with tamping rod diameter mm 16x600 long.

Dimensions: 500x400x1510 mm
Weight: 55 kg approx.

C187
K-SLUMP TESTER

STANDARD: ASTM C1362

To determine the degree of compaction and the workability of fresh concrete. Used for in-situ measurements or inside test moulds. Test results can be correlated against the slump values.

Weight: 500 g

C188
WALZ CONSISTOMETER

STANDARDS: EN 12350-4 | DIN 1048

To measure the consistency of fresh concrete.
It consists of a metal box with handles 200x200 mm by height 400 mm, painted for rust protection.

Weight: 6 kg approx.

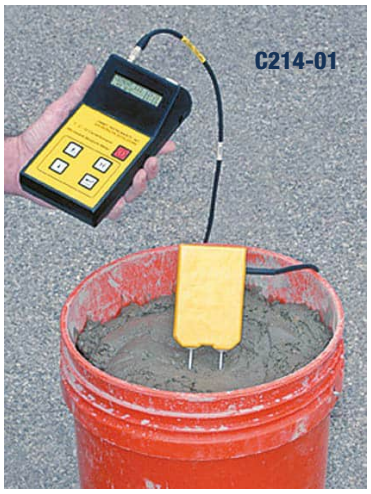
ACCESSORY

V189-01 TROWEL 90x115x165 mm conforming to EN 12350-4

C214-01
CEMENTOMETER

For the rapid determination of moisture content in wet cement and concrete. Fast and easy to use; simply insert the prongs into the material being tested,
Accurate and instantaneous readings, digital portable meter.
Ratio range: 0.35 to 0.70 water/cement.
The unit can store over 150 readings.
Data can be recalled via RS-232 interface to using WIN98 and above.

Power: 4AA Batteries
Weight: 2 kg approx.



C189
CONCRETE WORKABILITY METER

STANDARD: NF P18-452

The concrete workability meter (also known as plastometer) is designed to test concrete for dynamic workability.
It is suitable for field and laboratory tests to check:
- concrete mix for consistency, expecially water content
- optimum proportioning of concrete constituents (sand, gravel, water, cement)
- possible improvment when admixing a plastifier
- comparing two concrete types

The unit consists of a prismatic receiver divided into two unequal volumes by a removable partition, and an electric vibrator.
The fresh concrete is poured into the large volume space, the separating partition is removed, and the vibrator starts automatically.
The test consists in measuring the time required for the concrete to reach an uniform distribution in the receivers

Power supply: 230V 1ph 50Hz 300W
Dimensions: 820x420x410 mm
Weight: 80 kg approx.

C186
KELLY BALL APPARATUS

STANDARD: ASTM C360

Consisting of a hemispherically ended cylinder with guiding frame and a handle graduated in inch, it is used to determine the workability of fresh concrete. The ball is lowered into the concrete and the penetration measured.
It can be used on site or in laboratory.
Cadmium plated for rust protection.

Weight: 15 kg approx.

C190
PLASTICITY METER

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

Dimensions: Ø 130x180 mm
Weight: 2 kg

SETTING TIME OF CONCRETE BY PENETRATION

STANDARDS: ASTM C403 I AASHTO T197 I UNI 7123

C213
CONCRETE PENETROMETER

Used to determine the setting time of the mortar fraction in concrete mixes with slump greater than zero, by testing mortar sieved from mix. The apparatus consists of a spring penetrometer (capacity 100 kgf, precision 1 kgf) and six interchangeable stainless steel needle pointers of 16-32-65-160-325-650 mm2 area. A sliding ring indicates the reached load on the handle of the penetrometer. Supplied complete with carrying case.

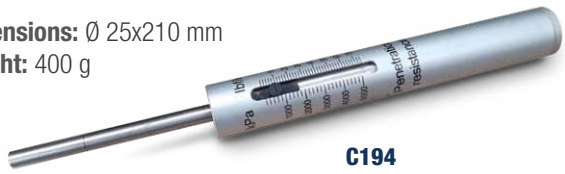
Dimensions: 450x160x70 mm
Weight: 5 kg approx.

C213

C194
CONCRETE POCKET PENETROMETER

Used for the evaluation of the initial set of the concrete mortar. The penetration plunger has a tip area of 32 sq/mm. It is plunged into the mortar to a depth of 25.4 mm. indicated on the plunger. The resistance expressed in Kpa and Lbf/sq.in. is shown on the marked direct-reading scale.

Dimensions: Ø 25x210 mm
Weight: 400 g



C194

C194-01
CONCRETE POCKET DIAL PENETROMETER

To evaluate the initial set of concrete and the effect of the retarders in the setting time.
The plunger has Ø ¼" (32.3 sq.mm.); the dial has dual scale: 0-700 p.s.i. and 0-50 kg/sq.cm.
Supplied complete with plastic case.

Weight: 300 g approx.

C194-01

C211
JOISEL APPARATUS Ø 140X220 MM HIGH

STANDARD: LCPC French Method
Used to separate the various elements of the fresh concrete such as cement, sand, aggregates. All made of stainless steel.

Weight: 2 kg

C211

C220
WATER TEST SET FOR CONCRETE MIXING WATER

STANDARDS: EN 1008 I EN 206 I DIN 4030

This kit, utilized to test the water mixing concrete, is composed by different dropping bottles, water-proof colors scales, test strips. It is suitable, to carry out more than 50 analysis of: total or momentaneous pH, magnesium, ammonium, chloride, sulphate, lime dissolving CO2, carbonate hardness, total hardness etc.
Contained in carryng cases.

Weight: 2 kg

C220

C221 NEW
LEACHING DEVICE FOR FIBER-REINFORCED CONCRETE

Thanks to high performance magnets, this device allows to separate the metallic fibres and determine their quantity in the concrete mix. Supplied without collecting basket.

Dimensions: 440x380x850 mm
Weight: 20 kg approx.

C221

C195
AIR ENTRAINMENT METER, WATER COLUMN TYPE
5 LITRES CAPACITY

STANDARDS: EN 12350-7 I ASTM C231 type A

Made from cast aluminium alloy. It records directly the percentage of air enclosed in freshly mixed concrete by operating according to the air pressure principle.
The instrument is supplied complete with pressure gauge tamping rod and hand pump.
Air content range 0...8% - div. 0.1%

Dimensions: Ø 250x700 mm
Weight: 13 kg approx.

ACCESSORY

C195-01
CALIBRATION CYLINDER to check and calibrate the air meter mod. C195

C195

C195-01

C196
AIR ENTRAINMENT METER, PRESSURE GAUGE TYPE
8 LITRES CAPACITY

STANDARDS: EN 12350-7 I DIN 1048 I ASTM C231 type B

It consists of an aluminium vessel with built in hand operated pressure pump, connected to the measuring gauge showing directly the air content in percentage.
Air content range: 0...10% div. 0.1% up to 8% and 0.5% over
Dimensions: Ø 250x450 mm
Weight: 12 kg approx.

C196

C197

C197
AIR ENTRAINMENT METER, PRESSURE GAUGE TYPE
8 LITRES, ELECTRIC

Identical to mod. C196 but with built in automatic electric air compressor giving air pressure, and keeping it constant all along the test.

Power supply: 110-230V 1ph 50-60Hz
Dimensions: Ø 250x450 mm
Weight: 14 kg approx.

ACCESSORY

C197-01
FILLING HOPPER for the air entrainment meters C196 and C197

C198

C198
AIR ENTRAINMENT METER, PRESSURE GAUGE TYPE
7 LITRES CAPACITY

STANDARDS: EN 12350-7 I ASTM C231 type B I AASHTO T152

It consists of an aluminium cylindrical vessel with airtight cover assembly incorporating an air pump, a precision pressure gauge 90 mm dia. and valves.
Capacity: 7 litres.
Air content range: 0 - 100%
Gauge graduations: 0.1% up to 6% of the scale; 0.2% from 6 to 8%; 0.5% from 8 to 15%; 1% from 15 to 30%; 5% from 30 to 50%; 10% from 50 to 100% of the scale. Lightweight, compact and durable, this meter allows quick clamping system and testing with few pump strokes.
It is not affected by change in atmospheric pressures. The container can be used also for unit weight measures of fresh concrete and aggregates. Supplied complete with calibration kit, accessories, robust plastic carrying case.

Dimensions: Ø 250 by 500 mm approx.
Weight: 10 kg approx.

C196M
AIR ENTRAINMENT METER NEW
MATEST MADE
8 LITRES CAPACITY

STANDARDS: EN 12350-7 I ASTM C231 type B

The air content in fresh concrete is a critical parameter for assessing concrete's behaviour when exposed to weathering and for monitoring changes in air content resulting from the application of chemical additives to enhance workability. This apparatus is designed by Matest to determine the percentage of air contained in a fresh concrete mixture, in accordance with a pressure-equalization process. The device features an aluminium pressure chamber where air pressure is manually generated using an integrated hand pump. Upon opening an overflow valve, the system achieves pressure balance with the test pot, filled with the fresh mortar or concrete. The resultant pressure reduction serves as an indicator of the material's air content and appears on the connected pressure gauge. The air entrainment meter can also be used for measuring the unit weight of fresh concrete and aggregates.

Dimensions: Ø 250x570 mm
Weight: 10 kg approx.

Air content ranges and resolution:

Entrained air volume (%)	Subdivisions
0 - 8	0.1
8 - 15	0.5
15 - 20	1.0
20 - 50	5.0
50 - 100	10.0

Note: More air entrainment meters are available at page 358.

C196M

C197M
AIR ENTRAINMENT METER, ELECTRIC NEW
MATEST MADE
8 LITRES CAPACITY

Same model as C196M but with built-in automatic electric air compressor. Air pumping is facilitated by the presence of the electric pump.

Power supply: 110-230V 1ph 50-60Hz

C196-01M
AIR ENTRAINMENT METER - MATEST MADE NEW
5 LITRES CAPACITY

Same as C196M but with a 5 litres capacity.

Dimensions:: Ø 245x530 mm
Weight:: 13 kg approx.

C197-01M
AIR ENTRAINMENT METER, ELECTRIC NEW
MATEST MADE
5 LITRES CAPACITY

Same as C197M but with a 5 litres capacity.

Power supply: 110-230V 1ph 50-60Hz

ACCESSORIES

V195 Rubber mallet
V098-05 Measuring cylinder, transparent plastic, 500 ml
V120-02 Wash bottles, 500 ml
C196M-11 Plexiglass disk Ø 230 mm, 5 mm thick

SPARE PART

C196M-10 Tubing kit for the Air Entrainment Meter calibration

C197-01M

DENSITY OF FRESH CONCRETE

C199
UNIT WEIGHT MEASURE, 10 LITRES CAPACITY

STANDARD: EN 12350-6

Used to determine the weight per cubic metre of freshly mixed and compacted concrete.
Made from steel, 4 mm thick, with inside radius between wall and base of 20 mm, with machined rim and base.
Inside diameter 200 by height 320 mm

Weight: 9 kg approx.

C199

UNIT WEIGHT MEASURES

STANDARDS: Comparable to ASTM C29, C138 I AASHTO T19

Made from heavy steel sheet, they are used to determine the weight per cubic metre of freshly mixed and compacted concrete, and as per ASTM Standards also the air content of fresh concrete.

C200...C205-01

V072-06N

V085

DENSITY OF HARDENED CONCRETE

STANDARDS: EN 12390-7, EN 1097-6
BS 812, 1881:114

Technical details: see p. 538

C199T
UNIT WEIGHT MEASURE, 9 LITRES CAPACITY

STANDARD: UNI 7122

Bucket for determining the weight per cubic meter of fresh concrete. Made of enamelled steel with handles.

Inside dimensions: Ø 240 x h200 mm

NEW

C199T

ADMIXTURES FOR CONCRETE, MORTAR AND GROUT.

DETERMINATION OF BLEEDING OF CONCRETE

STANDARD: EN 480-4

C199-10

CONTAINER, having Ø 250 mm by 280 mm height, complete with cover. **Stainless steel manufactured**, it is used for the determination of the relative bleeding of a fresh concrete sample, using aggregates having max. size of 50 mm.

Weight: 5 kg approx.

ACCESSORY

C199-11

TAMPER, **stainless steel** made, Ø 100 mm

C199-11 C199-10

Models	Capacity Litres	Inside diameter mm	Useful height mm	Sheet thick mm	Weight kg
C200	1	108.3	108.6	3	2
C201	2	108.3	217.1	3	3
C201-01	3	160	149.2	3	3.5
C202	5	187.7	180.7	3	4
C202-01	7	187.7	253	3	5
C203	10	265	181.3	4	7
C204	14	265	253.8	4	9
C204-01	15	265	272	4	12
C205	28	345.6	298.5	5	14
C205-01	30	345.6	319.8	5	15

C206
ADIABATIC CALORIMETER - MATEST MADE NEW

STANDARD: EN 12390-15

The measurement of the heat of hydration is essential for assessing the thermal reactivity of cement in a mixture, particularly for massive pours or structures at risk of thermal shrinkage cracking, special cements with rapid setting or high early strength, and for optimizing mix designs according to the expected thermal profile.

The system monitors the temperature rise over time of a fresh concrete specimen that is thermally insulated, using an active thermal conditioning system to maintain adiabatic conditions and minimize heat loss. This setup allows faithful reproduction of in-situ conditions (e.g., in a massive pour) and provides reliable data on the evolution of the cement hydration reaction.

The electronic system also includes a self-calibration function to check adiabatic error and calorimetric capacity.

The equipment includes: electronic control and measurement unit with integrated touchscreen display, adiabatic enclosure with lid, adiabatic cell with heating elements, 2 PT100 probes (one integrated in the calorimetric cell, the other for the specimen), 5 polystyrene moulds, 5 PT100 probe tubes, and one small tube of thermal paste.

TECHNICAL SPECIFICATIONS

- Adiabatic error: less than 0.05°C/h
- Temperature probes: PT100, resolution 0.01°C, accuracy 0.2°C
- Sample temperature range: ambient to 120°C
- Sample size: 150 mm cube
- Two USB ports
- 7” touchscreen display
- Real-time display of:
  - Sample temperature and corresponding graph
  - Cell temperature and corresponding graph
  - Power consumption (A)
- Final calculation outputs:
  - Intrinsic temperature rise
  - Adiabatic heat release

Power supply: 230V, 1ph, 50-60Hz, 160W
Dimensions: 800x580x520 mm approx. **Weight:** 100 kg approx.

C206

SPARES

C231N1 Polystyrene moulds, batch of 45 pieces (see p. 319)
C206-10 Set of 5 tubes for the PT100 probe
B250-12 Thermal conducting grease for PT100 probe, 56 g approx.

CONCRETE FLOW TABLE

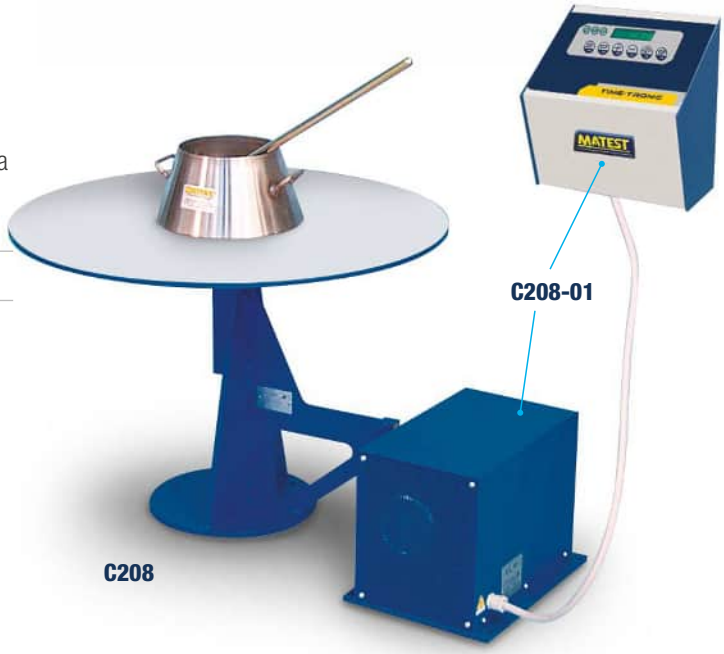
STANDARD: ASTM C124

Used to determine the flow of concrete. The apparatus consists of a flow table, stainless steel flow mould, tamping bar.

MODELS

C208 FLOW TABLE
Hand-operated by crack handle.
Table diameter 762 mm
Weight: 100 kg approx.

C208-01 MOTORIZATION KIT to be connected to the flow table mod. C208 and to get it automatic.
Complete with separate control panel and automatic digital drops counter.
Power Supply: 230V 1ph 50Hz 750W
Weight: 15 kg approx.



STEEL CUBE, CYLINDER AND BEAM MOULD

Moulds nominal dimensions meet the requirements of
STANDARDS: EN 12390-1 I BS 1881:108 I ASTM C192, C39
AASHTO T23, T126 I NF P18-400

STEEL CUBE AND BEAM MOULDS

These models of steel cube and beams moulds are extremely sturdy and the inside surfaces are accurately machined.

Cube Mould	Dimensions	Gang	Weight
C247	100 mm side	1 gang.	6 kg
C247-01	150 mm side	1 gang.	13 kg
C247-02	200 mm side	1 gang.	25 kg
C247-03	300 mm side	1 gang.	90 kg
C248	100 mm side	2 gangs.	11 kg
C248-01	150 mm side	2 gangs.	30 kg
C248-03	100 mm side	3 gangs.	17 kg
C248-05	150 mm side	3 gangs.	38 kg
C249	100 mm side	4 gangs.	20 kg
C249-01	150 mm side	4 gangs.	45 kg

C247...C249-01

Beam Mould	Dimensions	Weight
C254	100x100x400 mm	16 kg
C254-01	100x100x500 mm	18 kg
C254-02	150x150x600 mm	36 kg
C254-03	150x150x750 mm	46 kg

C254...C254-03

C230-01

FUNNEL (FILLING HOPPER) for an easier filling of fresh concrete into the cube moulds C247-01, C253-01, C253-03. Stainless steel sheet made.

C230-01

STEEL CYLINDER MOULDS

Internal surface, base, top and bottom ring are accurately machined.

Models	Dimensions Ø x height	Weight
C258	100x200 mm	8 kg
C258-01	112.8x220 mm	8 kg
C258-02	150x300 mm	15 kg
C258-03	6” x 12”	15 kg
C258-04	159.6x320 mm	17 kg
C258-04CO	159.6x320 mm fast clamping	18 kg
C258-05	250x500 mm	80 kg
C258-06	150x150 mm	10 kg

C258...C258-06

C258-04CO

CAST IRON CYLINDER AND CUBE MOULDS

Moulds nominal dimensions meet the requirements of

STANDARDS: EN 12390-1 I BS 1881:108 I ASTM C192, C39
AASHTO T23, T126 I NF P18-400

CAST IRON SPLIT CYLINDER MOULDS

Cast iron made, heavy duty, they are checked in the shape, dimensions and tolerance with instruments certified by an Official Institute. Foreseen with fast clamping system with inbuilt revolving screws. They are easy to use with practical and fast demoulding; recommended for field use. Complete with base, clamp type.

MODELS

C259-05
CAST IRON SPLIT MOULD, to produce a Cylinder Specimen
Ø 150x300 mm
STANDARDS: EN 12390-1 I ASTM C39 I AASHTO T23, T126
Weight: 10 kg approx.

C259-06
CAST IRON SPLIT MOULD, to produce a Cylinder Specimen
Ø 160x320 mm
STANDARD: NF P18-400
Weight: 11.2 kg approx.

C259-05 C259-06

C253 C253-01 C253-06

C180-02...V195

C302-02

CAST IRON CUBE MOULDS, ONE GANG

These moulds are checked in the shape, dimensions and tolerance with instruments certified and have a Serial Number marked on each side.
Complete with base plate, clamp type.

Two models are available:
- four part wall equal design
- two part wall "V" shaped

C253-01

C253

C253-03 Disassembled

C253 Disassembled

Models	Description	Weight kg
C253	Cube Mould 100 mm **four parts**	8.3
C253-01	Cube Mould 150 mm **four parts**	15.5
C253-02	Cube Mould 100 mm **two parts**	8.5
C253-03	Cube Mould 150 mm **two V shaped parts**	15.5
C253-06	Cube Mould 200 mm **four parts**	27.0

ACCESSORIES FOR MOULDS

C180-02 TAMPING ROD, Ø 16 mm x 610 mm long.
C261 TAMPING BAR, 25 mm square area x 380 mm long.
C262 STRAIGHT EDGE, 460 mm long.
V178-01 WIRE BRUSH, used to clean moulds.
C265 DEMOULDING OIL. Can of 25 litres
C302-02 GRASPING PLIER for cube specimens, side 15 cm NEW
V184-01 ROUND ALUMINIUM SCOOP 1000 ml capacity
V187 TROWEL STAINLESS STEEL 120x260 mm
V195 RUBBER MALLET, head Ø 55 mm
V182 MIXING TRAY, galvanized 600x600x80 mm

PLASTIC CUBE, CYLINDER AND BEAM MOULDS MADE IN MATEST

Moulds nominal dimensions meet the requirements of
STANDARDS: EN 12390-1 I BS 1881:108 I ASTM C192, C39 I AASHTO T23, T126 I NF P18-400

These one-piece moulds, very appreciated by the user, are made from hard plastic, strong, light, undeformable; resistant to vibrations shocks and wear. They do not require mounting and dismounting operations, thus saving time and labour. They just require a simple clean and demould oiling before being ready for use again for many times. The specimen is expelled from the mould by compressed air or water.

The moulds: C223, C224, C230L, C230N, C232N, C228, C229 are produced by Matest and have competitive manufacturer prices.

CUBE MOULDS 150 MM SIDE

The cube moulds 150 mm side can be supplied in three different models, each one with different characteristics and weight.
All the models have a reinforced band on the walls, and the inside surfaces are very smoothed getting easier the specimen's ejection.
Models C223 and C224, Matest made, have also **reinforced corners**, granting an additional resistance, and foresee a **X reinforced band on the base**, improving the strenght of the mould, and allowing the user to give small blows with a rubber heated hammer (mod. V195) by easing the specimen's ejection. All the moulds are supplied with engraved the logo Matest.

MODELS

C223

CUBE MOULD, 150 mm side, with X reinforced band on the base, and reinforced corners.
Weight: 1300 g approx.

C223R

CUBE MOULD, 150 mm side, reinforced. **Weight** 1200 g ca.

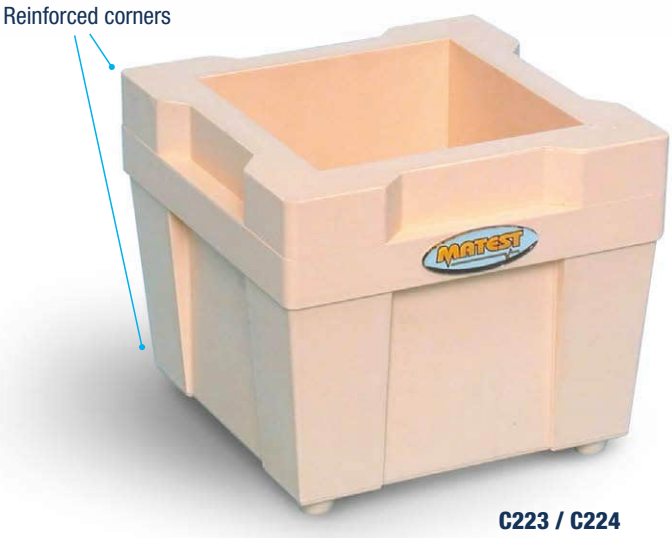
C223M NEW

CUBE MOULD, 150 mm, plastic, TWO GANGS, reinforced.

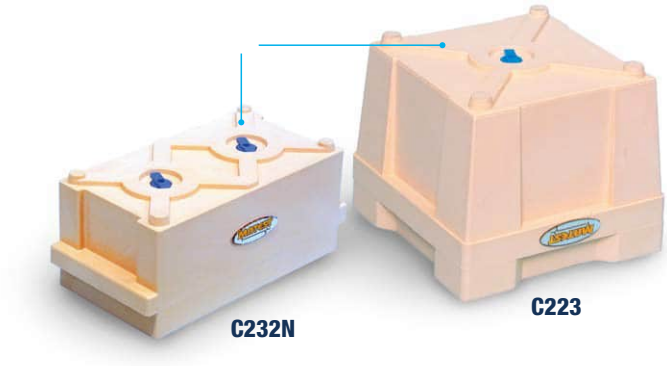
C224

CUBE MOULD, 150 mm side, **HIGH DENSITY**,
with X reinforced band on the base and reinforced corners.
The mould same to mod. C223 is manufactured from **high density mixture** with total weight 1600 g, by obtaining a higher hardness and strength of the plastic material.
- It increases the abrasion resistance, by reducing the wear action.
- It improves the pressure resistance during the specimen's ejection, by reducing mould breakages.
- It ensures a larger number of utilisations (with the same use care).

Weight: 1600 g approx.



Detail of the X reinforced band on the base of
C223, C224, C232N C235, C237, C238 models



C230N

CUBE MOULD, standard, reinforced band, 150 mm side.

Weight: 1250 g approx

C232N
CUBE MOULD, 100 mm side, TWO GANGS, with X reinforced band on the base. The inside surfaces are very smoothed getting easier the specimen's ejection. **Weight:** 1050 g approx.

C232
CUBE MOULD, 100 mm side, TWO GANGS, with reinforced corners and band on the walls. **Weight:** 1200 g approx.

C232M
CUBE MOULD, 100 mm, plastic, ONE GANG, reinforced.

C235
CUBE MOULD, 200 mm side, with X reinforced band on the base and upper double reinforced walls and corners. **Weight:** 2550 g approx.

C237
BEAM MOULD, 100x100x500 mm sides, with X reinforced bands on the base and upper double reinforced walls and corners. **Weight:** 2100 g approx.

C237-01 NEW
PLASTIC BEAM MOULD, same as C237 but dimensions 100x100x400 mm

C238
BEAM MOULD, 150x150x600 mm sides, with X reinforced bands on the base and upper double reinforced walls and corners. **Weight:** 4400 g approx.

C228
CYLINDER MOULD, Ø 150x300 mm with upper and lower reinforced bands. **Weight:** 2150 g approx.

C228-01
CYLINDER MOULD, Ø 100x200 mm with reinforced bands. **Weight:** 920 g approx.

C229
CYLINDER MOULD, Ø 160x320 mm with upper and lower reinforced bands. **Weight:** 2200 g approx.

C228-01 C228 C229

C230L
CUBE MOULD, 150 mm side, standard,**lighweight, entry level price**.

Weight: 850...950 g approx

C230L

C232 C232N C232M

C238 C237 C237-01

C231N1
POLYSTYRENE CUBE MOULD 150 MM, ONE GANG

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

Pack of 45 pieces.

ACCESSORIES

C223-01 COVER, plastic, for C223, C224, C230N, C230L moulds. Useful for transportations. Pack of 10 pcs.

C234-03 STOPPER, plastic, to plug the hole of the moulds C223, C224, C228, C230N, C230L, C229. Pack of 10 pcs.

C232-01 STOPPER, plastic, to plug the hole of the mould C232N Pack of 10 pcs.

C235-01 STOPPER, plastic, to plug the hole of the moulds C223R, C223M, C232, C232M, C235, C237, C237-01, C238, C228-01. Pack of 10 pcs.

C230-01 FILLING HOPPER, stainless steel made, for an easier filling of fresh concrete into the moulds: C223, C224, C230, C230N Supplied complete of clamping elastics.

C230-03 GRASPING PLIERS for C230 and C230N moulds, to get easier the carriage.

C230-05 GUN, to connect to a water or air pressure, to eject the specimen from the mould.

C222-10 COVER, plastic, for C223R.

C230-05

C234-03

C223-01

C223-05

C223-05
IDENTIFICATION LABEL Pack of 250 labels

VERIFICATION OF FLATNESS, PERPENDICULARITY, STRAIGHTNESS AND DIMENSIONS OF MOULDS AND SPECIMENS

STANDARD: EN 12390-1

The appendix of EN 12390-1 Standard calls for a set of instruments to be used for dimensional and tolerance verification of the mould and the specimens got from the same.

V175-03
VERNIER CALIPER, digital, 153x0.01 mm, for dimensional measurements.

V175-03CER
VERNIER CALIPER, digital, 153x0.01 mm, for dimensional measurements, complete with Calibration Certificate issued by an Accredited Laboratory (SIT).

in alternative:

V175-02
VERNIER CALIPER, digital, 200x0.01 mm, for dimensional measurements.

V175-02CER
VERNIER CALIPER, digital, 200x0.01 mm, for dimensional measurements, complete with Calibration Certificate issued by an Accredited Laboratory (SIT).

C250-10
RULE RIGHT ANGLE (square), steel made, 150x100 mm, rectangular section.

C250-12
FEELER GAUGE, comprising a set of strips from 0.05 to 1.00 mm with 0.05 pitch, with blade 100 mm long.

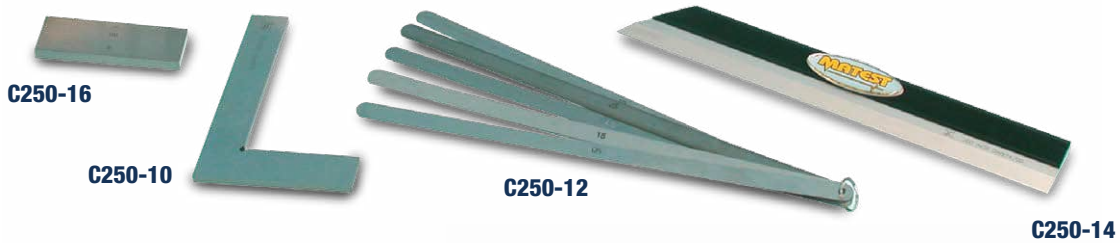
C250-14
RULE (straightedge), 300 mm long.

C250-16
GO-NOT GO GAUGE, for 100 mm cube moulds.

C250-16CER
GO-NOT GO GAUGE, for 100 mm cube moulds, complete with Calibration Certificate issued by an Accredited Laboratory (SIT).

C250-17
GO-NOT GO GAUGE, for 150 mm cube moulds.

C250-17CER
GO-NOT GO GAUGE, for 150 mm cube moulds, complete with Calibration Certificate issued by an Accredited Laboratory (SIT).



C216N
4 CHANNELS THERMOMETER
K-TYPE THERMOCOUPLE

Used to automatically measure and record the temperature of concrete during curing.

- 4 channels for K-type thermocouples, allowing simultaneous monitoring of multiple measurement points
- Internal memory for 32,000 values
- Measurement range: from -210 °C to 1370 °C
- Resolution: 0.1 °C at temperatures below 1000 °C; 1 °C at temperatures above 1000 °C
- Accuracy: ±0.5% of reading + 2 °C at temperatures below -100 °C; ±0.2% of reading + 1 °C at temperatures above -100 °C
- Selectable readings: °C, °F, K
- 2.8" LCD display with backlight and automatic shut-off
- Micro USB port to download data and read it with dedicated software; data saving formats *.pdf or *.csv
- Operating conditions: from -10 to 50 °C and less than 80% R.H.

Supplied complete with: 4 K-type thermocouples, 50 m cable coil for K-type thermocouple, micro USB cable, software and carrying case.

Power supply: Battery 3.7 V Li-Ion, rechargeable via micro USB
Dimensions (thermometer): 162x88x32 mm
Weight: 246 g approx

SPARE

C216-01 K-Type
Thermocouple coil (50 meters)

C158
GYROMEC NEW
GYRATORY COMPACTOR FOR NO-SLUMP CONCRETE

STANDARD: NT Build 427

Gyromec is an electromechanical gyratory compactor. The load is applied by an electro-mechanical cylinder with a load cell positioned directly on the vertical actuator for precise load measurement. To simulate and reproduce the kneading and compaction action of concrete mixes in precast production lines according to NT build 427. Useful for both quality control of concrete as well as in research and product development. The machine is provided with dedicated firmware according to NT Build 427, which can also be customized for specific requests.

MAIN FEATURES

- Rigid steel frame ensuring excellent angle control.
- Full color 7" touch screen control unit, running like a standard PC.
- Software for PC control data acquisition and processing.
- Electronic angle positioning.
- Collecting pan to prevent possible dispersions of slurry and water.

C158

TECHNICAL SPECIFICATIONS

- Compacted specimen size: Ø 100 and 150 mm; height from 0 to 200 mm for both sizes.
- Mould dimensions: internal Ø 100 mm and Ø 150 mm; height 250 mm for both moulds.
- Adjustable from 0 to 3° (preset in factory to 2° 17'' according to NT build 427).
- Number of cycles (gyratory): adjustable from 1 to 5000.
- Gyration rate: adjustable from 5 to 60 work cycles/min.
- The vertical pressure on the specimen is automatically controlled and adjusted by the electronic system.
- Applied pressure: up to 1000 kPa for Ø 150 mm specimen, up to 2300 kPa for Ø 100 mm specimen.

Power Supply: 230V 1ph 50-60Hz 1000W 12A
Dimensions: without worktop 640x505x1420 mm
with worktop 640x860x2140 mm
Weight: without worktop 280 kg, with worktop 370 kg

RECOMMENDED ACCESSORIES

B041-20 WORKTOP, it can also house the specimen extruder (B041-23 and B045-23) and the integrated balance (B041-26)

ACCESSORIES

B041-08 HARDENED SPECIMEN CYLINDER Ø 100 mm with holes, complete with bottom plate
B041-09 HARDENED SPECIMEN CYLINDER Ø 150 mm with holes, complete with bottom plate
B041-11 TOP PENETRATION PISTON Ø 100 mm
B041-12 TOP PENETRATION PISTON Ø 150 mm
B041-13 METALLIC DISC for Ø 100 mm moulds. Pack of 2
B041-14 METALLIC DISC for Ø 150 mm moulds. Pack of 2
B041-17 HOLLOW PUNCH to stabilize and to mature the sample Ø 100 mm
B041-18 HOLLOW PUNCH to stabilize and to mature the sample Ø 150 mm
B030-05 FILTER PAPER for Ø 100 mm moulds. Pack of 100
S200-14 FILTER PAPER for Ø 150 mm moulds. Pack of 100
B041-21 WHEELS (kit of 4) with brake, for an easy handling of the Compactor in the laboratory
B041-30 VERTICAL FORCE TESTING DEVICE with load ring
As alternative:
B041-31 VERTICAL FORCE TESTING DEVICE with digital dynamometer.
B041-33 KIT OF 2 DISTANCE PIECES of 105 and 115 mm height for the control of the height values measured by the linear transducer
S337-52 ACCREDIA official vertical load calibration certificate
B041-23 PNEUMATIC AUTOMATIC SPECIMEN EXTRUDER
Or
B045-23 ELECTROMECHANICAL AUTOMATIC SPECIMEN EXTRUDER
B041-26 BALANCE INTEGRATED into the worktop, to facilitate the sample and the mould weightings, by avoiding the stress of lifting them. The weighing reading values are directly and automatically displayed on the control panel of the compactor. Capacity: 30 kg, accuracy ± 6 g
Or
B041-27 BENCH for lateral bearing of a weighing balance

VIBRATING TABLES

STANDARD: EN 12390-2

Used for the compaction of concrete specimens in laboratory, they are manufactured from rugged steel sheet.
Equipped with motor-vibrator having 3000 vibrations-minute, it is possible to vary the vibration intensity by acting on the excentric masses.
The height of the table is 410 mm.
All the vibrating tables accept the clamping device, pedal switch or control panel (see accessories).

Power supply: 230V 1ph 50Hz

Models	Table dimensions mm	Power W	Weight kg	*Clamping device
C278	600x400	100	60	C281-01
C278-01	800x400	100	85	C281-02
C278-02	800x800	180	115	C281-03
C279	1100x550	180	145	C281-04

* The clamping device is used to fix the moulds to the table during the vibrating action.

C278 with moulds **C253-01**

C279

PORTABLE VIBRATING TABLES

Similar to the above Vibrating Tables, suitable for site and laboratory use, they accept ONE GANG cube moulds (max. 200 mm side) or cylinders max. 160x320 mm, both plastic and metal made.

Table dimensions: 400x300 mm, height 200 mm
Weight: 16 kg approx.

C281N

MODELS

C281N
VIBRATING TABLE, PORTABLE, 12V DC

Suitable for site use, where no electric supply is available.
Lightweight and small sized, it can be handled by one person and easily stored in the car trunk.
Supplied complete with On/Off switch and connector for the vehicle cigar lighter, and elastic bands to fix the mould to the table.

C282
VIBRATING TABLE

Similar to mod. C281N, but for laboratory use

Power supply:
230V 1ph 50Hz 110W

C282

C282

ACCESSORIES FOR VIBRATING TABLES

C279-04 PEDAL SWITCH, water tight. It can be fixed to the table **only as an alternative** to the Control Panel mod. C279-02

C279-02 CONTROL PANEL, separate, complete with On/Off switch and timer, getting also the tables to CE Safety Directive. It cannot be used with the table mod. C281N

C281-05 CLAMPING DEVICE, to fix the mould to the table, suitable **only** for tables mod. C281N and C282. Alternative solution to the elastic bands. Recommended for the laboratory table C282

C279-01 MOTOR-VIBRATOR, additional, (only for table mod. C279) to obtain an unidirectional vibration and a vibrating power of 300 kg of mass.

POKER VIBRATORS

STANDARDS: EN 12390-2 | ASTM C31, C192 | AASHTO T23, T126
Suitable for the internal compaction of concrete specimens both in laboratory and in site.

The diameter of the needle must not exceed the 25% of the smallest dimension of the specimen.

Different models available: electric, petrol, battery operated.

C271N

POKER VIBRATOR, portable, petrol operated.
Honda motor, 4-stroke, 1.6HP, 35,8cc
Tip dimensions: Ø 25 mm by 250 mm long.
Flexible shaft: 2 metres long.
Frequency: 10000 vibrations/min.
Supplied complete with knapsack.

Weight: 7 kg approx.

C271N

C272

POKER VIBRATOR, portable, electric.
Tip dimensions: Ø 25 mm by 290 mm long.
Flexible shaft 2 meters long.
Frequency: 12000 vibr./minute.
Amplitude: 0.65 mm
Centrifugal force: 0.8 kN (80 kg)

Power supply: 230V 1ph 50/60Hz 2300W
Dimensions: 180x350x220 mm approx.
Weight: 9 kg approx.

C272

SPARES

C272-10 TIP, Ø 25 mm by 290 mm long, complete with flexible shaft 2 metres long, for the vibrator mod. C272.

C271-10N TIP, Ø 25 mm by 250 mm long, complete with flexible shaft 2 metres long, for the vibrator C271N

C274M-KIT

C274M-KIT

POKER VIBRATOR, battery operated, **original Makita**,
Tip dimensions: Ø 25 mm by 250 mm long.
Flexible shaft: 800 mm long
Frequency: 13000 vibr./minute
Battery power: 18V 3.0Ah
Supplied complete with rechargeable battery and battery charger, original Makita.

Weight: 3 kg approx.

ACCESSORY

C274-03M CARRYNG CASE for Makita vibrator and accessories.

SPARES

C274M Poker Vibrator, **without** battery and charger.
C274-01M Battery Charger, original Makita.
C274-02M Rechargeable battery, original Makita.

CURING TANKS FOR CONCRETE SPECIMENS

STANDARDS: EN 12390-2 I ASTM C31, C192 I AASHTO T23

C302
CURING TANK, 650 LITRES CAPACITY

HEAVY PLASTIC

Made from extremely robust and stable polyethylene, complete with base rack.
Supplied **without** thermostat heating system, to be ordered separately (see accessories).
The tank can accomodate up to 36 cubes 150 mm side, or up to 25 cubes 200 mm side.

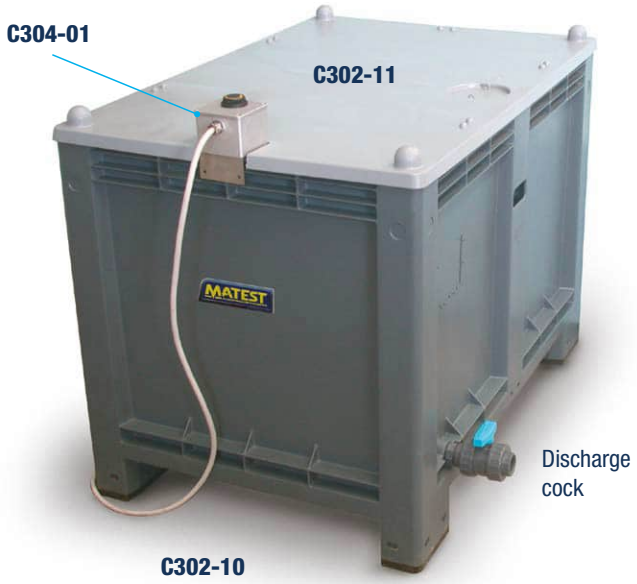
Inside dimensions: 1040x1040x605 mm
Weight: 60 kg approx.

C302-10
CURING TANK, 550 LITRES CAPACITY

HEAVY PLASTIC

Same to mod C302 but having:
Water discharge cock incorporated into the tank
The tank can accomodate up to 28 cubes 150 mm side, or up to 15 cubes 200 mm side.

Inside dimensions: 1100x710x690 mm
Overall dimensions: 1200x800x850 mm
Weight: 55 kg approx.



C304
CURING TANK, 1000 LITRES CAPACITY

Made from steel sheet, zinc coated to prevent it from corrosion.
Complete with base rack and stopper for an easy water discharge.
Supplied **without** thermostat heating system, to be ordered separately (see accessories).
The tank can accommodate up to 36 cubes 150mm side (up to 72 with 8xC306-01), or up to 21 cubes 200mm side (up to 42 with 8xC306-01).

Inside dimensions: 1500x750x750 mm
Weight: 120 kg approx.

NEEDED ACCESSORY

C304-01 THERMOSTAT ANALOGIC HEATING SYSTEM, for the tanks mod. C302, C302-10 and C304
230V 1ph 50-60Hz 2000W

AS AN ALTERNATIVE

C304-02 THERMOSTAT DIGITAL HEATING SYSTEM for the tanks mod. C304, C302-10 and C302,
ensuring better temperature accuracy
230V 1ph 50-60Hz 2000W

C304-02

C304-02 Detail

C304-01

ACCESSORIES FOR CURING TANKS

C305-01 PLASTIC COVER for the C302 tank
C302-11 PLASTIC COVER for the C302-10 tank
C306-04 STEEL ZINC COATED COVER for the C304 tank
C306-01 UPPER RACK for the C304 tank to store cubes
Max. 8 racks per tank

C306-02 SUBMERSIBLE WATER CIRCULATING PUMP, also used for an easy water discharge from the tank 230V 1ph 50/60Hz

C306-03 SEPARATE CONTROL PANEL, complete with switch and electric protections, to get the tanks to CE Safety Directive

C302-02 GRASPING PLIER for cube specimens, side 15 cm

C306-05
ANALOGIC THERMOSTAT

Complete with heating element. Used to thermostatise any type of tank from 300 to 1000 litres capacity.

Power supply:
230V 1ph 50-60Hz 2000W

E141

E141
WATER REFRIGERATOR

It cools the water from room temperature up to +10 °C. It is connected to the tank where a lower temperature than the room one is required. See Section "E" Cement, p. 381

C307
ACCELERATED CONCRETE CURING TANK

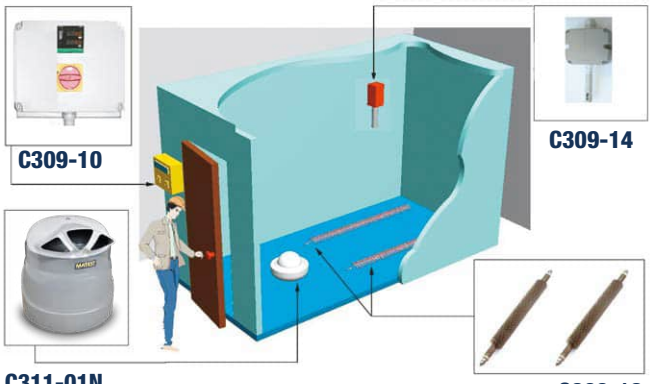
STANDARDS: ASTM C684

This tank has been designed for accelerated concrete strength curing. It comprises a fully insulated double wall tank with cover, inside all from stainless steel, outside from steel painted sheet with an intermediate layer of insulating mineral wool.
This tank can hold up to 16 cubic 150 mm side specimens; or 16 cylindrical Ø 150 mm specimens; or 8 cubic 200 mm side specimens.
The test consists essentially in curing the concrete specimens with water heated by 3 electric elements of 1500W each.
Temperature range: from ambient to 100 °C.
The separate control panel is provided with a thermoregulator, timer, pilot lights, main switch.

Inside dimensions: 910x660x680 mm
Overall dimensions: 970x720x900 mm
Power supply: 230V 1ph 50-60 Hz 4500W
Weight: 130 kg approx.

EQUIPMENT TO PREPARE A TEMPERATURE AND HUMIDITY CONTROLLED ROOM

The following equipment are suggested as alternative to the curing tanks and climatic chambers indicated in this catalogue or by necessity of a wide area for curing a big quantity of specimens. They are suitable to prepare an already existing room/box or one to be realized by the customer. The temperature of the room can be only increased compared to the external temperature but not decreased.



Example how to prepare a curing room

NEEDED DEVICES

C309-10 CONTROL PANEL of temperature and humidity.
It is usually placed on the outer side of the room, and allows to set, display and control the desired parameters of temperature and humidity.

Power supply: 230V 1F 50-60Hz
Dimensions: 240x130x310 mm **Weight:** 5 kg

C309-12 HEATING RESISTANCE in tubular frame, finned type.
Normally one heating resistance is enough for its purpose, provided that the range between the external and internal temperature set in the room (anyway well insulated) is kept within 15 °C.

Dimensions: Ø 40x1100 mm **Weight:** 2000 g approx.

C309-14 SENSOR PROBE to measure temperature and humidity.
Temperature measuring range from -10 to +90 °C and humidity up to 100%. It is fixed inside the room and connected to the control panel.

C311-01N VAPORISER
Used to humidify curing rooms up to 150 m^3.
Technical data: see p. 328

C307

CLIMATIC CABINETS

STANDARD: EN 1367-1

The climatic cabinet is available in two versions:

- **C313N** Temperature and humidity controlled from -30 to +70 °C and 20% to 95% respectively for testing concrete, cement, aggregates and many other applications.
- **C316N** Only temperature controlled from -30 to +70 °C for the determinations of the behavior and resultance to freezing and thawing of aggregates and different other applications on concrete and building materials.

MAIN FEATURES

- Real-Time display of temperature and humidity parameters.
- High quality thermal insulation material.
- Temperature control from -30 to +70 °C with high stability (± 0.15 °C).
- Humidity control from 20% to 95% with ± 5% stability and ± 1% accuracy.

C313N

C313N
TEMPERATURE AND HUMIDITY CONTROLLED CABINET 535 LITRES CAPACITY

Designed for all research and control laboratories to perform: cold and/or hot temperature measurement at controlled humidity conditions and any kind of freezing/thawing tests. Used to condition concrete and cement specimens and analyze the behavior to freezing and thawing of aggregates and concrete.
Internal and external frame is made of stainless steel AISI 304.
Polyurethane insulation: 60 mm thick.
Internal ventilation.
Door with 180° opening angle, equipped magnetic gasket and integrated heater against freezing.
Shelves can be taken off and adjusted in height; adjustable feet.
Temperature and humidity sensors wall mounted inside cabinet
The cabinet is supplied with a **two stage filter**; mechanic and mixed ionic/cationic resins. It works with demineralized, softened waters, or tap water with hardness rate up to 300 PPM assuring an excellent functioning along the time.
Equipped with microprocessor temperature/humidity controller with integrated cycles multiple segments programmer.

- panel mount 144×130 mm format
- 5" color graphic display
- 50 programs with 100 segments and real time clock
- Logging function with PC interface (optional)

Visual alarm for minimum and maximum temperature.
Supplied complete with 3 adjustable shelves suitable to withstand weights up to 40 kg.

Inside dimensions: 590x670x1360 mm
Overall dimensions: 710x820x2080 mm
Power supply: 230V 1ph 50-60Hz 2570W
Weight: 170 kg approx.

C313-01N
TEMPERATURE AND HUMIDITY CONTROLLED CABINET 1200 LITRES CAPACITY

Same as C313N model, but with an internal capacity of 1200 liters.
Internal ventilation, two doors opening.
Supplied complete with 6 adjustable shelves suitable to withstand weights up to 40 kg.

Inside dimensions: 1300x670x1360 mm
Overall dimensions: 1500x820x2080 mm
Power supply: 230V 1ph 50-60Hz 2900W
Weight: 230 kg approx.

Note:
as far the C313N and C313-01N performances, the humidity range indicated in the product description may be narrower vs. the given interval depending on the selected temperature. Please contact our sales team to investigate the suitability for your requirements.

C316N
TEMPERATURE CONTROLLED CABINET
535 LITRES CAPACITY

Same as mod. C313N, except for the humidity control that is not included.

ACCESSORIES

C313-11N ADDITIONAL BASKET SHELVE : Made of Stainless Steel grid, suitable for loads up to 40 Kg.

C313-12N MOBILE TEMPERATURE PROBE: Type PT100 in stainless steel bulb for free positioning in the chamber and on the specimen.

C313-13N LOGGING FUNCTION: Logging upgrade function for the on-board controller with enabling of "real time trend" and "Historical trend" of variables and predisposition of PC interface. To be purchased with C313-15N.

C313-15N PC INTERFACE: Consist of Cables, PC interface converter and software for editing and real-time view. To be purchased with C313-13N.

Note:
C313-12N, C313-13N and C313-15N must be included in factory and cannot be added afterwards.

C313N + C313-05N

ADHESIVES FOR TILES
DETERMINATION OF TENSILE ADHESION STRENGTH FOR CEMENTITIOUS ADHESIVES
STANDARDS: EN 1348 I EN 12004

C313-05N
INTERNAL FLOODING SYSTEM

Applicable only to temperature and humidity controlled cabinets C313N, C313-01N.
Used for the determination of tensile adhesion strength for cementitious adhesives.
It is composed of two stainless steel vessels and a discharging system for the water.
The system allows to empty and fill the inner vessel with water without opening the climatic cabinet.
Inner vessel water level is limited by a sensor.
Filling and drainage of water are regulated by a valve positioned on the bottom of both vessels.
Inner vessel volume is 150 l, while outer vessel volume is 170 l.
Water temperature range is from 10 °C to 40 °C, demineralized water must be used.
Temperature stability: ± 2 °C
Water pressure range is from 0.2 to 5 bar.
The system must not work with organic compounds.

Outer vessel dimensions: 816x588x600 mm
Weight: 50 kg approx.

Control panel

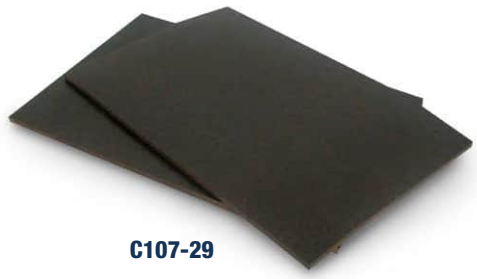
Two stage filter

UNBONDED CAPPING PADS AND RETAINERS

STANDARDS: ASTM C1231 I AASHTO T22, T851

Used for compression tests on concrete cylinder specimens, as an alternative method to the sulphur capping and grinding machine.
Two steel capping retainers are applied on the two flat surfaces of the cylinder.
Two neoprene pads are put between them, for a better load distribution.
The neoprene pads are available in two models:
- 60 shore hardness pads for expected strength from 10 to 48 MPa
- 70 shore hardness pads for expected strength over 48 MPa

The system is not applicable for expected strength lower than 10 Mpa
The couple of retainers + neoprene pads have a total thickness of 46 mm. Therefore the testing chamber of the press must have more vertical clearance than the height of the specimen + 46 mm.



C107-29

Pads + Retainers
+ Specimen configuration

C107-12

C107-10

C107-20

MODELS

C107-09 CAPPING RETAINERS (couple) for Ø 100x200 mm cylinders.

C107-10 CAPPING RETAINERS (couple) for Ø 150x300 mm and 6x12" cylinders.

C107-12 CAPPING RETAINERS (couple) for Ø 160x320 mm cylinders

C107-18 NEOPRENE PADS (couple) 60 shore A for Ø 100x200 mm cylinders

C107-19 NEOPRENE PADS (couple) 70 shore A for Ø 100x200 mm cylinders

C107-20 NEOPRENE PADS (couple) 60 shore for Ø 150x300 mm and 6"x12" cylinders

C107-21 NEOPRENE PADS (couple) 70 shore for Ø 150x300 mm and 6"x12" cylinders

C107-25 NEOPRENE PADS (couple) 60 shore for Ø 160x320 mm cylinders

C107-26 NEOPRENE PADS (couple) 70 shore for Ø 160x320 mm cylinders

C107-29 NEOPRENE SHEET (couple) 60 shore A dimensions: 600x400x12 mm for test on blocks.

C312-02N
CURING ROOM VAPORISER UP TO 600 M³

Same as mod. C311-01N, but more powerful for rooms up to 600 m³ capacity.
Supplied complete of **level regulator** with antioverflow, that allows the direct connection to the water net, for a continuous use of the vaporiser.

Power supply: 230V 1ph 50 Hz
Dimensions: Ø 610x565 mm
Weight: 18 kg approx.

C311-01N

C312-10

C311-01N
CURING ROOM VAPORISER UP TO 150 M³

Used to humidify curing rooms for concrete and mortar specimens.
Max. room capacity: diventa 150 m³.
Supplied complete of **level regulator** with antioverflow, that allows the direct connection to the water net, for a continuous use of the vaporiser.

Power supply: 230V 1ph 50-60 Hz
Dimensions: Ø 340x312 mm
Weight: 5 kg approx.

ACCESSORY FOR MOD. C311-01N, C312-02N

C312-10 HUMIDISTAT to automatically control the room humidity, range 30...100 %

SPARE

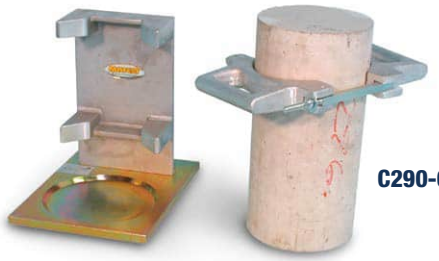
C312-11 Level regulator, complete of antioverflow.

CYLINDER CAPPING EQUIPMENT

SULPHUR METHOD

STANDARDS: EN 12390-3 I ASTM C617, C31, C192
AASHTO T231, T126

The above mentioned Specifications require that the two faces of the concrete core or cylinder specimen must be made perfectly flat and parallel, by using sulphur capping equipment.



C290-01N C290-02

CYLINDER CAPPERS

To obtain plane end surfaces perpendicular to the axis of the cylinder.

Model	Cylinder Ø x h	Weight kg
C290-01N	150x300 mm, 6”x12”	9.5
C291-01	160x320 mm	6
C292-01N	100x200 mm	6.3
C294-05	60x120 mm	1.5
C294-05SP	50x100 mm	3.5

C290-02
CYLINDER CARRIER, for Ø 150x300 mm, 160x320 mm and 6”x 12”. For an easier handling of the specimens.

Weight: 1.4 kg

C294-02
CYLINDER CARRIER for Ø 250x500 mm

MELTING POT FOR CAPPING COMPOUND

Used to melt the sulphur capping compound. Complete with thermoregulator. Suitable also for general laborataory purposes.

A106N
MELTING POT, capacity: 5 litres
Temperature range: +50 to +350 °C.
accuracy: ± 1.5 °C.
Complete with pilot lamp, fully isolated to CE Safety Directive. Internal dimensions: Ø 200x160 mm
230V 1ph 50-60Hz 800W.

Weight: 3 kg approx.

V186-01
LADLE, stainless steel made.

A106N

C290-06
SULPHUR MORTAR CAPPING COMPOUND, ultra-thin flakes.
The compressive strength after 2 hours is greater than 8000 psi.
Melting point is 115 to 143 °C (ideal 130 °C)
Bag of 22.5 kg (50 lbs)

As Alternative to C290-06:

C290-09
CAPPING SLAB COMPOUND to ASTM C617, sulfur-based compound formulated for capping concrete test cylinders.
Bag of 50 lbs (22.5 kg)

C290-06

C296
STEEL CAPPING PLATE, used for capping concrete blocks up to 500x300 mm.
The plate surface is accurately machined.

Dimensions: 500x300x20 mm
Weight: 30 kg approx.

C296

GYPSUM METHOD NEW

STANDARDS: ASTM C31, C39, C192, C617I AASHTO T231

As an alternative to the sulphur method, the above mentioned standards allow to use high strength gypsum paste. The application of this capping compound requires an easier and faster procedure which doesn’t develop any harmful substances.

C290-05
HIGH STRENGTH GYPSUM CAPPING COMPOUND
The compressive strength after 30 minutes is greater than 8000 psi.
Water/gypsum ratio: 17-18%
Bag of 25 kg (55 lbs)

C290-05

ACCESSORIES

C290-15 Glass plate 200x200x8 mm for levelling

C290-16 Bubble level

C290-15 I C290-16

C299
AUTOMATIC SPECIMEN GRINDING MACHINE

STANDARDS: EN 12390-2 I ASTM D4543 I UNI 6132

Designed to grind and polish concrete cube and cylinder specimens, blocks, natural stones, rocks, ceramic materials etc.
Specimens are easily fixed to the table by proper locking stirrups (see accessories) allowing to grind at a time:
- n° 3 cube specimens 100 mm side, or
- n° 3 cube specimens 150 mm side, or
- n° 2 cube specimens 200 mm side, or
- n° 2 cylinder specimens Ø 100x200, 110x220, 150x300, 160x320 mm, or
- n° 1 block with max. dimensions 390x250 mm

The radial movement of the head is equipped with end of stroke system, granting the fully automatic displacement in both directions.
The column is completely protected against the abrasive dust.
The vertical lowering of the grinding head is achieved with infinitesimal adjustments by operating on the top handwheel having 0.05 mm graduations.
The machine, made from rugged plate, is supplied complete with control panel, coolant/decantation tank (by water and emulsifying oil), motor pump, set of abrasive sectors, safety chip guard that when removed, stops automatically the machine.

The standard supply **does not include** the locking stirrups and the diamond sectors (8 pieces) that must be ordered separately (see accessories).

C299 with **C300-06N** holding one 150 mm cube

MAIN FEATURES

- Designed for grinding concrete cube and cylinder specimens, blocks, natural stones, rocks etc.
- Simultaneous grinding of many specimens.
- Motorized radial displacement of the revolving abrasive head in both directions.
- Automatic movements of the head in both directions and controlled by travel limit switches.

TECHNICAL SPECIFICATIONS

Table dimensions:	775x280 mm (usefull: 750x235 mm)
Grinding wheel Ø:	330 mm
Vertical span width:	min. 175 mm (95 mm with the distance piece) max. 380 mm
Grinding height range:	95...380 mm
Grinding head stroke:	215 mm
Grinding wheel speed:	revolving speed 1400 rpm translation speed **fixed 190 mm/min**
Power supply:	400V 3ph 50Hz 2700W
Dimensions:	1220x1080x1730 mm
Weight:	410 kg approx.

C299-01 NEW
AUTOMATIC SPECIMEN GRINDING MACHINE

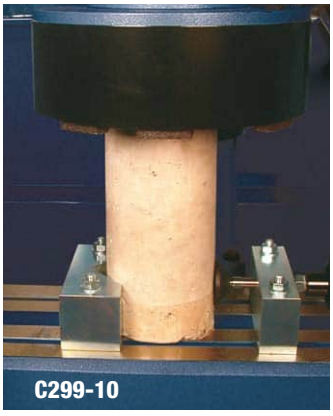
Same model as C299 but with an **adjustable** translation speed **from 100 to 380 mm/min**, to speed up the grinding operations.

NEEDED ACCESSORIES

C300-06N LOCKING STIRRUPS for cube specimens side 100, 150, 200 mm completewith distance piece 85 mm high.

AS AN ALTERNATIVE

C299-10
FAST LOCKING DEVICE, for:
cubes 150 and 200 mm;
cylinders Ø 100 to 160 mm
Each device accepts only one specimen.
It is possible to grind at a time:
1 cube 200 mm;
2 cubes 150 mm;
2 cubes 100 mm;
2 cylinders Ø 150 or 160 mm;
2 cylinders Ø 100.



C299-10

C300-02 DIAMOND GRINDING SECTOR (8 pieces required) **particularly recommended** because of their long duration and good grinding action.

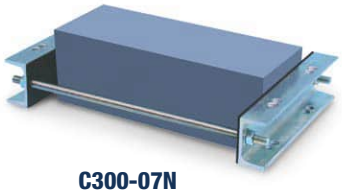
ACCESSORIES

C300-03 LOCKING STIRRUPS for cylinder specimens Ø 100, 110, 150, 160 mm. They can be used only in conjunction with the C300-06N stirrups.

C300-03SP LOCKING STIRRUPS for cylinder specimens Ø 50 to 100 mm, minimum height 95 mm.
They can be used only in conjunction with the C300-06N stirrups.

C300-05N LOCKING STIRRUPS for cube specimens side 50 mm to 70 mm. They must be used only in conjunction with the C300-06N stirrups.

C300-07N LOCKING STIRRUPS to grind blocks of different sizes, but with max. dimensions of 390x250 mm.



C300-07N

C300-08 CORE FACE PREPARATION DEVICE
It prepares parallel and flat core faces or rock samples.
The device accepts up to 4 core samples from Ø 20 to 55 mm and can be mounted on most grinding machines.

Weight: 7 kg approx

C300-08

C300-05N

C300-09N DEVICE to collect the produced powder during the drying grinding procedure.
The device must be connected to an aspirator (not included).*
The four collecting pipes have a max. extension of 3 meters (different extensions on request).
The terminal diameter of the device is: 160 mm

Weight: 15 kg approx.

C300-01 ABRASIVE GRINDING SECTORS, spare, set of 8 pieces.

C300-09N

C299 with **C300-06N** holding 3 cubes 150 mm

***Note:**
Minimum requirements for the aspiration system:
- Power: 1200W
- Air flow rate: 170 mc/h
- Capacity: 32 l

C377
MICRO-CORING EQUIPMENT

STANDARD: UNI 10766

The extraction of a micro-core sample from a concrete structure or masonry is an extremely valid non-destructive method, as it allows analysis and accurate evaluations of the manufacture (compression resistance, ecc.) without causing any damages to the structure.
Micro-coring system is additionally valid and reliable if combined with ultrasonic tester and concrete hammer.
The equipment comprises:
- Suitable electric drill. 230V 1F 50Hz
- Flanged guide assembly
- Drilling mask
- Impregnated diamond bit for cores with Ø 28x100 mm and for cores with Ø 28x200 mm
- 2 Self-blocking pincers to fit the flanged guide assembly to the surface

Set of accessories including: anchors, bits, wrenches, screws.
Carrying case.

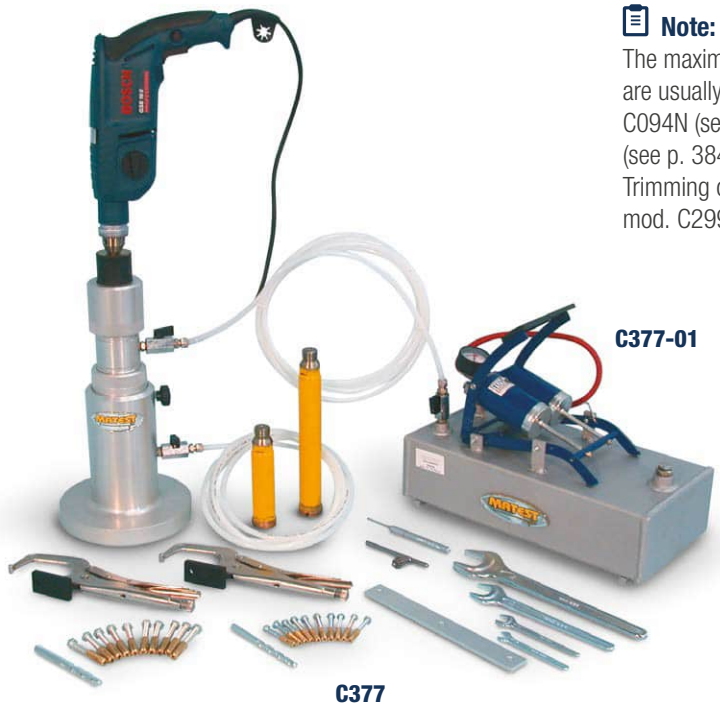
Dimensions: 550x400x200 mm approx.
Weight: 10 kg approx.

ACCESSORIES

C377-01 WATER TANK WITH FOOT PUMP, that leaves the hands of the operators free for coring

AS ALTERNATIVE:

C377-02 AIR-WATER PRESSURE TANK, 10 liters capacity



C377-01

C377

SPARES

C377-10 ELECTRIC DRILL, suitable for the microcoring purposes.

C377-15 DIAMOND BIT, Ø 28x100 mm

C377-16 DIAMOND BIT, Ø 28x200 mm

C377-05
TRIMMING/CUT-OFF MACHINE FOR CORES

Suitable to cut and trim cores to be prepared for compression tests, where the flatness of both surfaces is a basic condition to obtain correct results.
The equipment is made of stainless steel and aluminum and is supplied complete with diamond blade Ø 180 mm.
For this purpose it must be used the drill mod. C377-10 (enclosed into micro-coring equipment) and the water tank with foot pump mod. C377-01.

C377-05 + C377-10

ACCESSORY

C377-10 ELECTRIC DRILL, suitable for the microcoring purposes.

Note:
The maximum values foreseen for compression tests on micro-cores are usually lower than 60 kN. Portable compression machine mod. C094N (see p. 299), or a cement compression tester (see p. 384...387) may be conveniently used.
Trimming of cores may be even obtained with the grinding machine mod. C299 + device mod. C300-08 (see p. 330-331)

C377-02

CORE DRILLING MACHINES LIGHTWEIGHT, PORTABLE

These drilling machines are extremely practical, lightweight and easy to use.
The base is from aluminium alloy, the steel column can be tilted up to 45°, the motor support is fixed on a saddle sliding on teflon runner granting high performances. The motor incorporates a water swivel to cool the diamond bit.
The machine is supplied complete, **except** for: diamond bit, spanner, core extractor (see accessories p. 335) to be ordered separately.

C318N
CORE DRILLING MACHINE, ELECTRIC MOTOR

Electric motor at three speeds: 530, 1280, 1780 rpm, with speed reducer, provided of multifunction electronic friction device and switch to CE Safety Directive.
The machine accepts bits diameters from 50 to 150 mm

Power supply: 230V 1ph 50-60Hz 2200W
Dimensions: 600x320x1020 mm
Weight: 24 kg approx.

C318N tilted

C318N

C324N
ELECTRIC CORE DRILLING MACHINE WITH VACUUM FACILITY

The frame and the electric motor are the same as mod. C318N.
The machine is supplied complete with lubricated vacuum pump and pressure accumulation reservoir, which is very useful because it maintains for some times a valid vacuum level also with electric blackout, by avoiding the fall or disconnection of the unit from the wall.
The pump is connected to the utility by means of a ball tap to which a vacuum gage is fitted, that constantly indicates the pressure inside the tank.
Coring angle: 0 to 360° under the condition that the surface is sufficiently flat, and not too porous, to allow the vacuum attachment.

Power supply: 230V 1ph 50-60Hz 2200W
Dimensions: 600x320x1020 mm + pump
Weight: 24 kg + pump 15 kg approx.

C324N

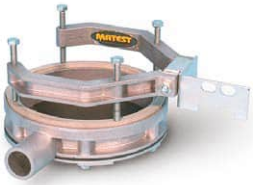
C332 PORTABLE ELECTRIC GENERATOR
To use with electrically driven machines where electrical power is not available. The generator is rated at 7KW and supplies: 230V 1ph 50Hz.
Complete with tank, accessories.

Weight: 60 kg approx.

C332

ACCESSORY

C318-10 WATER COLLECTING RING, confining waste water on the surface, for machine mod. C318N and C324N.
It has to be connected to a suitable electric pump and water supply.



C318-10

CORE DRILLING MACHINES HIGH PERFORMANCE

These drilling machines are extremely robust, heavy duty, compact and reliable.
The sliding group is rectified in order to assure a very soft and accurate drilling movement.
The drilling excursion is 550 mm and the machine can drill cores up to 200 mm of diameter.
Built in water swivel to cool the diamond bit.
The robust steel base is equipped with wheels for easy site displacements, together with four levelling and stabilizing feet.
All working and moving parts are cadmium plated for rust protection.
The machine is supplied complete **except** for: diamond bit, core extractor and spanner (see accessories) which have to be ordered separately.

MODELS

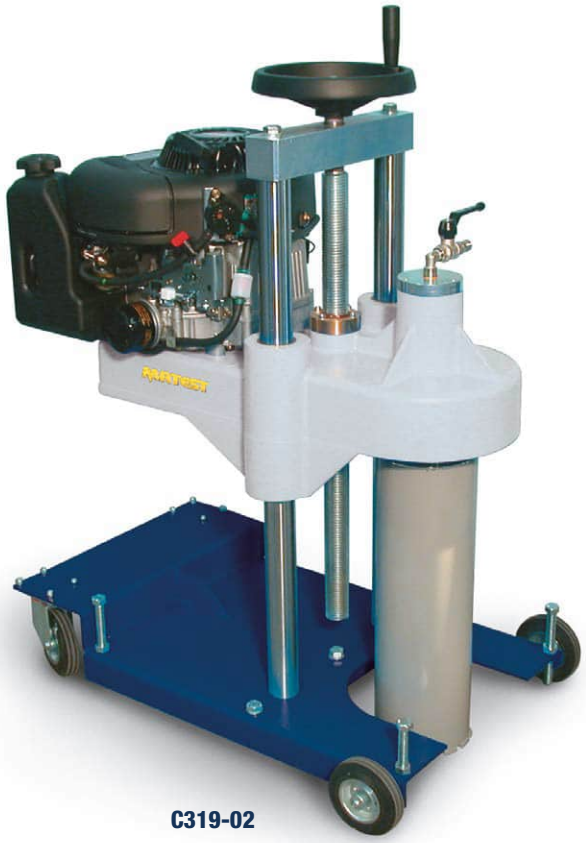
C319
PAVEMENT CORE DRILLING MACHINE 5HP
4-STROKE PETROL ENGINE

This rugged, compact and portable machine with vertical screw feed, is used for pavement core sampling where it is not easy to get electrical power.
Petrol engine 5 HP power, 4-stroke Briggs & Stratton model.

Dimensions: 850x580x1230 mm
Weight: 135 kg approx.

MAIN FEATURES

- Original Briggs & Stratton motor.
- It can drill cores up to Ø 200 mm.
- Vertical rectified screw feed.
- Built in water swivel to cool the bit.
- Rugged, compact, wheels mounted.



C319-02

C319-02
PAVEMENT CORE DRILLING MACHINE 12.5 HP
4-STROKE PETROL ENGINE

Same as mod. C319, but activated by a petrol engine 12.5 HP power 4-stroke Briggs & Stratton model.

Weight: 150 kg approx.

C319

SPARES

C331 Petrol engine, for C319 machine 5 HP power, 4-stroke Briggs & Stratton model. Supplied complete with tank, accessories Weight: 20 kg approx.

C331-02 Petrol engine for the C319-02 drilling machine. 12.5 HP power, 4-stroke Briggs & Stratton model. Supplied complete with tank, accessories. Weight: 25 kg approx.

C322
UNIVERSAL ELECTRIC CORE DRILLING MACHINE

Coring angle: 0 to 360°
The excursion group is rectified to assure a very soft and accurate drilling movement. The excursion is 550 mm.
Electric motor at three speeds: 670, 1140, 1580 rpm with speed reducer, provided of friction device and switch to CE Safety Directive.
The height of the vertical column is 1000 mm and is pre-built for extension column connection (accessory mod. C322-01).

Power supply: 230V 1ph 50-60Hz 2200W
Dimensions: 440x750x1300 mm
Weight: 85 kg approx.

C322

ACCESSORY

C322-01 EXTENSION COLUMN, 1000 mm long, to connect to mod. C322 for drillings over 1 metre from the ground.

SPARE

C330 Electric motor, for C318N, C322, C324N machines.

C344 Strap wrench useful for unblocking any type of bit.
C344-01 Strap wrench useful for unblocking only the bits with backend screwed connector.
C345 Extension rod 300 mm. long (used for deep holes).

DIAMOND CORE DRILL BITS
WITH BACKEND SCREWED CONNECTOR

Designed for making holes and getting cores from hard materials, like concrete, reinforced concrete, rocks, stones, bituminous materials.
The diamond utilized for these bits is quality impregnated sinterized type.
The diamond segment is **9 mm high**. The 9 mm high segment is important for the bit life, because the diamond is about 85% of the bit value.
The coupling between the bit and the motor shaft is direct through the backend screwed connector.
This diamond bit model is suitable to drill both reinforced concrete and also bituminous materials.

C339-01...C339-05

Model	Outside Ø mm	Inside Ø mm	Bit length mm	Expander Coupling	Core Extractor
C339-01	57	50	450	no	**C346**
C339-02	82	75	450	no	**C346-01**
C339-03	108	100	450	no	**C346-02**
C339-04	160	150	450	no	**C346-03**
C339-05	210	200	500	no	**C346-04**

Note: all drill bit models have thread 1" ¼ unc

C348T
SPECIMEN CUTTING MACHINE

with sliding supports.
The machine accepts blades up to Ø 400 mm
Useful cutting height: 130 mm
Dimensions of the sliding table: 460x400 mm
Blade rotation speed: 2800 rpm
Supplied **without** blade
(see accessories)

Power supply:
230V 1ph 50Hz 3Hp
Dimensions:
1185x660x1400 mm
Weight:
79 kg approx.

C348T

C350T
SPECIMEN CUTTING MACHINE

Used to cut concrete specimens and any type of construction material like blocks, tiles, pipes, rock cores etc. The machine is equipped of an electro-pump for water cooling, pedal guide for vertical cutting, safety device against breakage of blade.
The machine accepts blades up to Ø 450 mm
Useful cutting height: 165 mm
Supplied **without** blade (see accessories)

Power supply: 400V 3ph 50Hz 4Hp
Dimensions: 1330x600x1370 mm
Weight: 128 kg approx.

C350T

C350-01T
SPECIMEN CUTTING MACHINE

Identical to mod. C350T, but with:

Power supply: 230V 1ph 50Hz 3Hp

C349T
SPECIMEN CUTTING MACHINE

Basically similar to mod. C350T, but it can accept blade having max. Ø 600 mm
Useful cutting height:
230 mm with blade Ø 600 mm

Power supply: 400V 3ph 50Hz 5.5Hp

C351
SPECIMEN BENCH CUTTING MACHINE

The machine accepts blades up to Ø 350 mm
Useful cutting height: 120 mm
Blade rotation speed: 3900 rpm
Supplied complete with abrasive blade Ø 350 mm

Power supply: 230V 1ph 50Hz 2000W
Dimensions: 560x460x390 mm
Weight: 20 kg approx.

ACCESSORIES

C350-12 DIAMOND BLADE Ø 450 mm, having long life for a faster and more precise cutting operation. Suitable for models C350T and C350-01T.
C350-13 DIAMOND BLADE, Ø 350 mm for mod. C351
C350-14 DIAMOND BLADE, Ø 400 mm for mod. C348T
C350-15 DIAMOND BLADE, Ø 500 mm for mod. C349T
C350-17 DIAMOND BLADE, Ø 600 mm for mod. C349T
C350-10 ABRASIVE BLADE Ø 350 mm for mod. C351

Note:
It is recommended to use the blade having the max. diameter accepted by the cutting machine.

C351

C352
DEVICE FOR CYLINDERS AND CORES
To clamp and cut cylinders and cores diameter 100 to 160 mm.
The device is fixed to the table of the cutting machines mod. C348T, C350T, C350-01T, C349T. Weight 10 kg approx.

C352SP
DEVICE FOR CORES, as above, but Ø 55 to 160 mm.

C353
DEVICE FOR IRREGULAR SHAPES
To clamp and to cut irregular shaped specimens, like rocks, stones etc. The device is fixed to the table of the cutting machine mod. C348T, C350T, C350-01T, C349T.
Weight: 5 kg approx

MECHANICAL STRAIN GAUGES

STANDARDS: ASTM C426 I BS 1881:206 I EN 12390-16

Used to determine the strain (length changes) in concrete specimens and structures, rock strata, different parts of a structure, in remote areas and under adverse conditions, using a single instrument. Different models are available with analogic or digital gauge, 100, 200, 300 mm measuring length, depending on the standard length to be measured. The instrument can also be used for other structures like steel and wood.

The KIT comprises:
- Strain gauge (extensometer) complete with analogic or digital indicator 0.001 mm graduations (see available models)
- Calibration bar used also to fix the datum disc on the structure.
- 50 datum discs. To EN Spec. (C362-01)
- Adhesive compound for datum discs.

The whole contained in carrying case.

C361-KIT

MODELS with **analogic gauge** 0.001 mm graduations:

C360-KIT STRAIN GAUGE, **100** mm measuring length.

C360-01-KIT STRAIN GAUGE, **200** mm measuring length.

C361-KIT STRAIN GAUGE, **300** mm measuring length.

C361-01 STRAIN GAUGE, **600** mm measuring length.

C363-01-KIT

C363-KIT

MODELS with **digital gauge**, battery feeded, with reading values in mm (sens. 0.001 mm) and in inch (sens. 0.0001").
Complete with battery and RS232 connector to PC.

C363-KIT STRAIN GAUGE, **300** mm measuring length.

C363-01-KIT STRAIN GAUGE, **100** mm measuring length.

C363-02-KIT STRAIN GAUGE, **200** mm measuring length.

C363-03 STRAIN GAUGE, **600** mm measuring length.

ACCESSORIES for C363 serie models

S382-13 CABLE to connect S382-01 and S383 to PC through USB port for direct visualization and recording of the measurement.

C362-03 DATUM DISC to ASTM, EN Spec. (Pack of 50)

SPARES

C362-01 Datum disc to EN Spec.(pack of 50)
C362-02 Adhesive compound.

C399
CRACK DETECTION MICROSCOPE

Used to measure crack width in concrete structures, by operating via an adjustable light source.
High definition unit, provided by power batteries, carrying case.
The eyepiece scale can be turned through 360° to align with the direction of the crack under detection.
Measuring range:
4 mm and div. 0.02 mm.
Magnification: x40

Weight: 600 g

C399

FLAT JACKS - TESTS ON BRICKWORKS

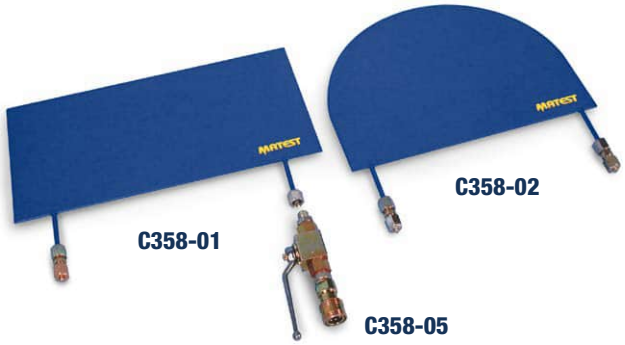
- DETERMINATION OF RESISTANCE AND DEFORMATION UNDER LOAD
  EVALUATION OF TENSILE STRESS
  MEASUREMENT OF ELASTIC MODULUS AND BREAKING LOAD

The complete test is developed in two steps:

- **DETERMINATION OF STATIC LOAD (TENSILE STATUS)**
  One flat jack is used.
  Two datum points are fixed across a mortar joint and the distance between the points is measured.
  Successively a horizontal cut is carried out with the suitable tool (drill, cutting saw) level with the mortar layer, and it is measured the variation of the two datum points.
  The flat jack must be introduced, it is pressurized in different growing phases and the variation between the datum points is measured, by determining the static load.

- **DETERMINATION OF DEFORMATION AND RESISTANCE (IN-SITU STRESS)**
  Two flat jacks are used.
  It must be done a second cut, parallel to the first one, level with the mortar layer, having a distance of approximately 50 cm from the first cut.
  Another flat jack must be introduced.
  Three couples of datum points are placed on the brickwork portion between the two cuts.
  Start to pressurize the two flat jacks at growing phases.
  The variation of distances of the datum points at different pressure steps allows to delineate a strength-deformation curve, obtaining elastic modulus, Poisson and breaking point values.

C358-01
RECTANGULAR FLAT JACK high deformability, max. pressure 50 bar, dimensions 400x200x4 mm. Steel sheet 0.8 mm thick
Complete with nuts and groins.



C358-11
N° 6 STEEL SHEETS, dimensions 400x200 mm, three pieces 1 mm thick, three pieces 1.5 mm thick. To be used with C358-01.

C358-02
SEMI-OVAL FLAT JACK ad high deformability, max. pressure 50 bar, dimensions 350x260x4 mm. Steel sheet 0.8 mm thick.
Complete with nuts and groins.

C358-03
SEMI-OVAL FLAT JACK, dimensions 325x125x3 mm.

C358-12
N° 6 STEEL SHEETS, dimensions 350x260 mm, three pieces 1 mm thick, three pieces 1.5 mm thick. To be used with C358-02 and C358-03.

C358-05
STOPCOCK (valve) high pressure complete with fittings, to close the oil flow in the jack and stop the pressure. One stopcock is needed for each flat jack.

LOAD APPLICATION

C358-06 HYDRAULIC HAND PUMP, complete with integral reservoir with oil, to apply pressure to the jacks.

C358-15 Flexible rubber TUBE, 3 meters length, for the connection to one jack.

or:

C358-16 Flexible rubber DOUBLE TUBE, 2 and 3 meters length, for the connection to two jacks.

C358-08 MANOMETER high precision 0 - 60 bar range, with fast jack, to be fixed on the pump to read the applied pressure.

STRAIN MEASUREMENT

C361-KIT STRAIN GAUGE-EXTENSOMETER with mechanical strain gauge, 300 mm length

or:

C363-KIT STRAIN GAUGE-EXTENSOMETER with digital strain gauge, 300 mm length

Other strain gauge models with accessories described in detail at p. 337

C361-KIT

As alternative to the strain gauge, the data acquisition and processing system can be used, with the following equipment:

C358-21
ELECTRONIC EXTENSOMETER, supplied with linear displacement transducer having 10 mm stroke and 0.1% linearity, fitted in a tubular anodized aluminum frame, complete with electrical cable and connector .
Span: 300 mm

Weight: 300 g approx.

C358-23N
PRESSURE TRANSDUCER, 50 bar capacity, to be fitted to the hand pump (as alternative to the manometer).
Complete with fast jack to the pump, electrical cable and connector.

C405-15M
CYBER-PLUS PROGRESS TOUCH SCREEN
8 Channels acquisition and processing data system, 24 bit resolution. Electronic advanced technology, **display** LCD, TFT, 800x480 pixels, 7", **touch screen**, high graphic performances. A certificate can be printed through an external USB printer (optional accessory C128).
The Cyber-Plus is equipped with LAN port for connection to PC and with USB port for an unlimited memory storage.
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 p. 213

S337-51
CALIBRATION process between the electronic extensometer or the pressure transducer to the data acquisition unit C405-15M

C405-15M

C358-21

Application examples

TESTING OF HARDENED CONCRETE

HYDRAULIC SHRINKAGE DETERMINATION

To measure the axial and/or superficial dimensional shrinkage of concrete specimens during hardening process in a curing room.
STANDARDS: UNI 11307 I UNI 6555 (comparable to ASTM C426)

The specimen is prepared by a mould having dimensions 100x100x500 mm, with aggregates up to 30 mm max. diameter, and after housed in the measuring apparatus that determines the axial shrinkage.
The two UNI Standards require two different systems to prepare the specimen:
- The UNI 11307 requires reference pins to be sticked on the specimen.
- The UNI 6555 requires inserts fixed into the mould and let into the specimen.

EQUIPMENT ACCORDING TO UNI 11307:

C254-01
BEAM MOULD, steel made, to prepare a concrete specimen 100x100x500 mm
Weight: 23 kg approx.

C366-12
REFERENCE PIN, to be sticked in the intersection of the longitudinal axis of the specimen with its bases.
Pack of 10

C366-12

EQUIPMENT ACCORDING TO UNI 6555 (comparable to ASTM C426):

C365
SHRINKAGE MOULD, steel made, complete with inserts, to prepare a concrete beam specimen 100x100x500 mm
Weight: 23 kg approx.

C366-11
INSERTS, stainless steel, spares to C365 mould. Pack of 10

NEEDED ACCESSORIES, ACCORDING TO: UNI 11307 AND UNI 6555

C364 MEASURING APPARATUS, for 100x100x500 specimens, complete with reference bar, but **without** dial gauge to be ordered separately. **Weight:** 23 kg approx.

S375 DIAL GAUGE, 5 mm stroke by 0.001 mm sens.

AS AN ALTERNATIVE:

S376 DIAL GAUGE, 10 mm stroke by 0.01 mm sens.

AS AN ALTERNATIVE:

S382-01 DIGITAL GAUGE indicator, with readings in mm (sens. 0.001 mm) and in inch (sens. 0.0001"), battery feeded. Complete with battery and RS232 connector to PC.

S382-13 CABLE to connect S382-01 and S383 to PC through USB port for direct visualization and recording of the measurement.

DETERMINATION OF RESTRAINED EXPANSION OF CONCRETE OR MORTAR SPECIMENS CONTAINING THE EXPANSIVE AGENT, AND THE EFFECT OF THE AGGREGATES ON THE DRYING SHRINKAGE OF CONCRETE

STANDARDS: UNI 8147 I UNI 8148

The mould, steel made, is supplied complete with 3 screwed rods and 6 restrained end plates.

MODELS

E114 THREE GANG PRISM MOULD, to produce 80x80x240 mm specimens. Weight: 15 kg approx.
STANDARD: UNI 8148

E114-02 Restrained end plate 80x80 mm; spare to E114 mould.

E115 THREE GANG PRISM MOULD, to produce 50x50x250 mm specimens. Weight: 10 kg approx.
STANDARD: UNI 8147

E115-02 Restrained end plate 50x50 mm; spare to E115 mould.

E115-01 Steel screwed rod 280 mm long; spare to E114 and E115 moulds.

ACCESSORIES

E078-KIT LENGTH COMPARATOR, with digital dial to measure linear variations.
Technical details and other models: see p. 368

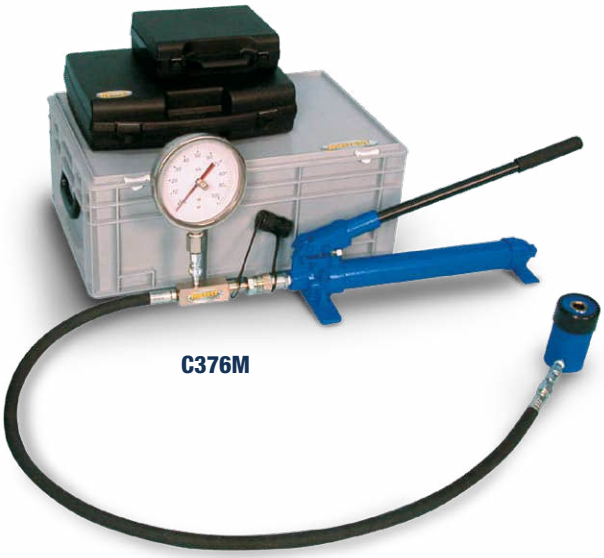
E078-05 REFERENCE ROD, 280 mm long

C376M
PULLOUT TEST APPARATUS

STANDARDS: EN 12504-3 I UNI 9536 I ASTM C900

Used to evaluate the concrete resistance as per the strength applied to extract a disc embedded or post-introduced into concrete. The standard equipment comprises hydraulic extraction unit 100 kN capacity with pump, precision manometer 0-100 kN and carrying case.

Weight: 18 kg approx.



NECESSARY ACCESSORIES FOR POST-INTRODUCED INSERTS METHOD

C376-10M Connecting extraction rod and bearing ring to be used with C376-11M inserts

C376-11M Geometric expansion inserts for post-introduced inserts method, pack of 25 pieces (EN 12504-3, ASTM C900)

C376-12 Hardened drill bit to perform the hole into the concrete for inserts location

C376-13 Drill with adapter

C376-15 Pump to clean the hole from dust

C376-16 Special router bit to enlarge the hole to place the inserts

C376-18 Straight grinder

NECESSARY ACCESSORIES FOR CAST-IN INSERTS METHOD

C376-17 Connecting extraction rod and bearing ring to be used with C376-01 and C376-03 inserts

C376-01 Inserts for cast-in inserts method, pack of 25 pieces (UNI 9536)

C376-03 Inserts for cast-in inserts method, pack of 25 pieces (EN 12504-3, ASTM C900)

E142
DIGITAL PULL-OFF (BOND) STRENGTH TESTER

CAPACITY: 16 KN

STANDARDS: EN 1542, EN 1015-12, EN 12004-2, EN 13687-2 EN 13963, 14496, EN 13892-8 I BS 1881:207 ISO 4624

This dynamometer measures the adhesive force and the tensile strength of two layers of materials (concrete, facing plasters, mortars, building plasters, lime etc.) and is particularly suitable for applications concerning testing repairs of any structure where the bond strength between two layers is an essential factor.
Technical details, more accurate description and accessories: see p. 373

E142-01
DIGITAL PULL-OFF (BOND) STRENGTH TESTER

CAPACITY: 0-5 KN

Identical to mod. E142 but with load cell and digital display range 0-5 kN for more accurate measurements on low strength values.
Technical details: see p. 373

C374
MOISTURE METER - SURVEYMASTER

Used to measure the damp conditions in concrete structures, masonry, gypsum, both on surface and at depth with non-destructive method.
Measuring range: from 7.9% up to the nominal value of the 99% with ± 0.1% accuracy.
Digital reading of values, audible alarm.
Battery operated.

Dimensions: 170x54x42 mm
Weight: 200 g approx.

C374

C375-01
CHLORIDE FIELD TEST SYSTEM

STANDARD: AASHTO T260, Comparable to ASTM C114

This equipment allows to determine the concentration of chloride ions in concrete structures to assess their need for maintenance or their state of preservation.
Working range: 0.002% to 2% chloride by weight.
The test system includes:
- Electronic meter, high impedance with temperature compensation and microprocessor for direct conversion to percentage of chloride. Battery powered.
- Chloride combination electrode with temperature sensor
- 12 jars, 20 ml of extraction liquid each
- 5 jars of coloured calibration liquid
- Scale for 3 g samples weighing
- All necessary accessories and carrying case.

Dimensions: 430x300x150 mm
Weight: 6 kg approx.

C375-01

SPARE

C375-03 Pack of 12 jars of 20 ml extraction liquid and 5 jars of colored calibration liquid.

CHLORIDE FIELD TEST SYSTEM NEW

STANDARDS: ASTM C1202, C1760 I AASHTO T277 I NT BUILD 492

This test method allows to evaluate the electrical conductance of concrete samples to provide a rapid indication of their resistance to chloride ion penetration, which is correlated to concrete durability.
The acquisition unit is available in two versions:

C378-01 acquisition digital unit with 4 independent channels to connect up to 4 test cells simultaneously

OR:

C378-02 acquisition digital unit with 8 independent channels to connect up to 8 test cells simultaneously

Technical specifications:
- Programmable test duration and adjustable measuring rate starting from 1 minute
- Continuously variable voltage difference from 5 to 70 VDC independent for each channel
- Voltage accuracy better than +/- 0.1V, resolution 0.01V
- Continuous current measurement with accuracy +/- 1 mA, resolution 0.1 mA
- Continuous temperature measurement with PT100 probe, accuracy +/- 1°C, resolution 0.1°C
- USB port for data export/storage on external memory
- RS 232 serial port for PC or serial printer connection
- Pre-set test routines to the main Standards plus custom procedures

Power supply: 110-230V, 50-60 Hz, 1 ph
Dimensions: 503x330x164 mm
Weight: 11.5 kg

NEEDED ACCESSORIES

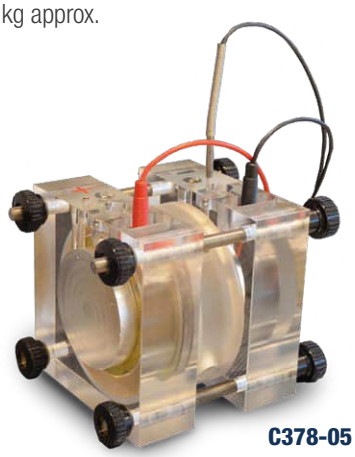
C378-05 Complete test cell to ASTM C1202 for samples Ø100x50 mm. It includes 2 heads and cables, 1 temperature probe, 4 tie rods for cells tightening, 2 gaskets, 1 rigid plastic sleeve for hydraulic seal.
Dimensions: 200x150x150 mm. Weight 3.5 kg.

C378-06 Complete test cell to ASTM C1760 for samples Ø100x200mm. It includes 2 heads and cables, 1 temperature probe, 4 tie rods for cells tightening, 2 gaskets, 2 rigid plastic sleeves with 4 internal tie rods for hydraulic seal. Dimensions: 350x150x150 mm. Weight 5 kg.

C378-10 Additional kit to NT BUILD 492 with 3-place rack suitable for simultaneous testing of up to 3 specimens dia.100x50mm. Dimensions: 380x270x280 mm. Weight: 10 kg.

C378-11 Vacuum system (for ASTM and NT BUILD) for specimen saturation with water. Power supply 230V, 50 Hz, 1 ph. Weight 40 kg approx.

C378-01


C378-05

C373-10N
CROSS HOLE ULTRASONIC SYSTEM FOR DEEP FOUNDATIONS

STANDARD: ASTM D6760

The Cross-hole Sonic method is used to perform high-resolution quality control on deep foundations. The system uses an ultrasonic wave sent from an emitter to a receiver while both are pulled through water-filled access tubes embedded in the concrete. The measured arrival time and energy are directly related to concrete quality.

The digital display included in the equipment allows to acquire, save and print the data. It is equipped with a wifi module so that no electric wires are needed and all the operations on site can be carried out in maximum safety.

The equipment includes one digital central unit, two ultrasonic transducers, two 60 m cables, two motorized reels and carrying case for everything listed.

HARDWARE SPECIFICATIONS

- Carrying case with wheels
- Operation temperature range: -20 to +80°C
- Ultrasonic probes frequency: 52 kHz
- Minimum measuring step: 10 mm
- Diameter of the probes: 35 mm
- Two motorized reels to roll and unroll the probes cables
- Cables length: 60 m

ACQUISITION SYSTEM SPECIFICATIONS

- Resolution: 12 bit
- 2048 samples per event
- Time base: 100/200/500 ns, 1/2/5/10/20 µs
- Differential error <0.03 %

Power supply: 12V DC, 1 battery Li-Ion, 10.5 Ah for each reel
Dimensions: 800x600x400 mm
Weight: 30 kg approx.

C373-10N

C393N NEW
RESONANCE FREQUENCY METER

STANDARDS: UNI EN ISO 14146 I ASTM C666, C215 I BS 1881:209 I NF P18-414 I UNI 9771

Digital equipment for the determination of longitudinal, transverse (flexural) and torsional resonance frequencies of samples made of concrete, cement or natural stone. The analysis of resonance frequency enables the determination of the dynamic modulus of elasticity and the attenuation coefficient, which is often used to analyse the degradation caused on materials by the action of freeze-thaw cycles. The equipment includes the digital unit (with case), an application for data managing and reports generation, holding bench for samples, accelerometer with cable (1 m long), set of 6 steel balls, set of 25 stronghold nuts carrying case for the accessories.

Specifications:

- Removable SD memory for easy data transfer to PC
- Internal memory 5 GB (up to 300.000 acquisitions) and external USB port
- Operating temperature: -20 to 80 °C; operating humidity: 0-90% RH
- Battery autonomy: 6 hours
- Acquisition medium power consumption: 350 mA
- Accelerometer sensitivity: 100 mV/g
- Frequency range: up to 10 kHz
- Sampling rate: 2 kHz to 100 kHz
- Measure frequency resolution: min. 12.2 Hz (0-50 kHz) max. 0.49 Hz (0-2 kHz)
- Samples per event: Up to 65536 samples (50 Hz)
- Minimum trigger level: 19 mV

Power supply: Li-ion 10,8V/12,4 Ah
Dimensions of the digital unit: 270x250x125 mm
Weight of the digital unit: 2.6 Kg

C393N

REBOUND CONCRETE TEST HAMMERS

STANDARDS: EN 12504- 2 I ASTM C805

Designed to perform non-destructive tests on concrete structures, it gives an immediate indication of the compressive strength of the concrete using the calibration curve supplied with.

MODELS

C380
CONCRETE TEST HAMMER MADE IN MATEST

Spring impact energy 0.225 mkg. (2.207 Joule or Nm)
Suitable for finished concrete structures and buildings having strength resistances from 10 to 70 N/sq.mm. **This concrete test hammer, entirely produced by Matest, has aluminium frame and thanks to its very accurate manufacture processing and selected components ensures high precision test results in the time.**
The top quality test hammer available on the market.
Supplied complete with calibration curve chart in N/mm² (Mpa) values, abrasive stone, carrying case.

Dimensions with the case: 330x100x100 mm
Weight: 2 kg

C380

C380 with case

C380-01
CONCRETE TEST HAMMER MADE IN MATEST

Exactly the same as mod. C380, but with calibration curve chart in Psl values as requested by ASTM Specifications.

C381
CONCRETE TEST HAMMER MADE IN MATEST

STANDARD: ASTM D5873
Similar to mod. C380, but with impact energy of 0.735 Joule (Nm).
Ideal to test small sized, sensitive and thin walled materials.
Suitable to test also rock core samples.

C381

NEW

C381-10
MORTAR TEST HAMMER MADE IN MATEST

Especially suitable for materials with low strength such as mortar, cement or finishing materials.
Spring impact energy 0.169 J.
Working range below 25 MPa.

Dimensions: 400x200x150 mm
Weight: 5 kg

C381-10

C390
ANVIL

STANDARD: EN 12504-2 I ASTM C805
Used for the verification of the calibration of the concrete test hammers. Special steel alloy made.

Dimensions: Ø 150 by 220 mm.
Weight: 16 kg approx.

C380

C390

Note:
The EN 12504-2 Specification requires obligatory the use of the anvil for the hammer tests.
The Standard specifies:
- Before a sequence of tests on a concrete surface, take and record readings using the steel reference anvil and check to ensure that they are within the range recommended by the manufacturer. If they are not, clean and/or adjust the hammer.
- After tests, take readings using the steel anvil, record them and compare them with those taken prior to the test. If the results differ, clean and/or adjust the hammer and repeat the test.

C386M
DIGITAL CONCRETE TEST HAMMER WITH MICROPROCESSOR MADE IN MATEST

STANDARDS: EN 12504-2 I ASTM C805

This digital concrete test hammer, **entirely designed and manufactured by Matest** with advanced technology, is capable of **assessing concrete strength and detecting potential structural issues** early on. This capability enables the planning of preventive maintenance interventions before more severe damage occurs. By identifying areas in need of maintenance, **it helps avoid the necessity of carrying out repairs across the entire structure**. Additionally, conducting targeted preventive maintenance interventions **reduces the amount of waste generated from demolitions and reconstructions**.

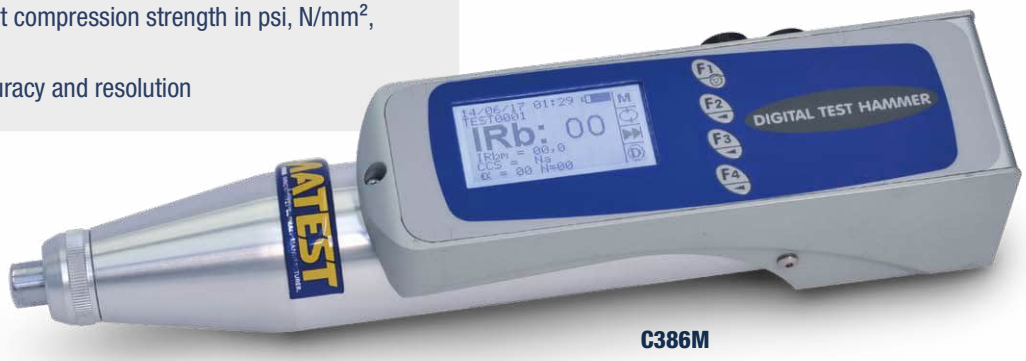
The unit comprises the standard mechanical model C380, enhanced with an electronic transducer that measures rebound values and automatically provides results on a graphic display.

During test performing:
- Shows index value
- Shows average index value
- Allows to select measuring system in N/mm² (MPa) or Psi
- Shows numbers of performed rebounds
- Shows date and time
- Identifies tested element
- Identifies automatically and shows rebound angle
- Shows battery life

C386M with case

MAIN FEATURES

- Possibility to store, display on graphic LCD 128x64 and download data to PC over 1500 tests
- Automatic statistical processing and readings
- Automatic conversion of rebound index to equivalent compression strength in psi, N/mm², kg/cm²
- High accuracy and resolution



C386M

TECHNICAL SPECIFICATIONS

- Impact energy: 2.207 Joule (Nm)
- Measuring range: 10 - 120 N/mm² (MPa)
- Interface: USB
- Power source: 6 rechargeable batteries AA NiMh 2400mA/hour
- Battery life: 60 hours with automatic shut down
- Operating temperature: -10°C +60°C

Supplied complete with data transfer software, data transfer USB cable, battery charger, abrasive stone, carrying case.

Dimensions with case: 330x180x120 mm
Weight: 3 kg

Note: The calibration anvil is the same (mod. C390) of the standard hammers.

The digital Matest test hammer is suitable to be connected to the Ultrasonic Tester high performance mod. C372M (see p. 347) for combined ultrasonic and rebound tests with automatic data acquisition, processing and store of the results.

C386M + C372M

C369N
ULTRASONIC PULSE VELOCITY TESTER HIGH TECHNOLOGY

STANDARDS: EN 12504-4 I ASTM C597

The instrument gives data concerning the homogeneity of the concrete, by generating pulses of sound into the concrete and measuring the time the sound to travel from the transmitter probe to the receiver probe through the material. Furthermore it is possible to have indicative data of the strength of the concrete.

MAIN FEATURES

- Non-destructive test to determine cracks, voids, faults presence in concrete structures.
- LCD display 128x60 pixel.
- Battery operated rechargeable.
- Portable with anti-shock case.
- Supplied complete with calibrating cylinder and contact paste.

- Measuring range: 0 - 3000 µs - resolution ± 0.1 µs
- Selection of the ultrasonic pulse amplitude adjustable from 250 to 1000 V
- Measurement of the time required by the ultrasonic pulse to go through the tested material.
- Single or continuous acquisition mode with automatic or manual saving.
- Zero calibration with depuration of the time for the pulse to go through the probes.
- Battery duration: 6 to 8 hours.
- Capacity of data acquisition, processing and filing of the test data up to 30.000 samples.
- Interface mini USB for PC connection.
- Two outlets for connection to the oscilloscope.
- Languages: English, French, German, Spanish, Italian.
- The use of the instrument is made easy because it is based on the user-friendly system.

The standard appliance includes:
- The instrument in basic configuration in a practical palmer container.
- Two 55kHz probes with connection cables.
- **Battery rechargeable pack** NiMh 4.8V > 2000mA/h with low battery condition alarm.
- External feeder 230V and battery charger 12V 500mA.

Case dimensions: 400x340x110mm
Weight: 2 kg approx.

C369N

C369N with case

ACCESSORIES

C370-08 EXPONENTIAL TRANSMITTING/RECEIVING PROBES (couple), 55 kHz Nominal Frequency.

C372-10 TRANSMITTING/RECEIVING PROBES (couple), 150 kHz Nominal Frequency, indicated for homogeneous, compact, high density concrete.

C372-11 TRANSMITTING/RECEIVING PROBES (couple), 24 kHz Nominal Frequency, indicated for heterogeneous, low density concrete.

C370-10 COUPLE OF CABLES (each 10 m long) to connect the probes to the tester. Used to test voluminous/large structures.

SPARES

C370-02 Transmitting/receiving probes (couple), 55 kHz

C370-06 Couple of cables (each 3.5 m long) to connect the probes to the tester.

C370-07 Tube of grease to better coupling the probes to the material under test.

C372M
ULTRASONIC PULSE VELOCITY TESTER, HIGH PERFORMANCE
WITH MICROPROCESSOR FOR COMBINED ULTRASONIC AND REBOUND HAMMER DATA ACQUISITION AND PROCESSING

STANDARDS: EN 12504-4 I ASTM C597

The device is suitable to execute various measurements regarding the mechanical properties and physical conditions of different materials. In particular, basing on the known data (for example the distance between the probes) it is possible to measure the ultrasonic impulse speed inside different materials. This information allows to suppose a possible status of conservation of the concrete (or other materials) and deduce the mechanical properties.

MAIN FEATURES

- Touch screen LCD display, 7”, 800x480 pixel.
- User-friendly interface.
- 16 Gb memory.
- Time measuring from 0 to 9999.9 µs.
- Resolution 0.1 µs.
- Possibility to combine the ultrasonic measurement with the rebound index (SonReb method).

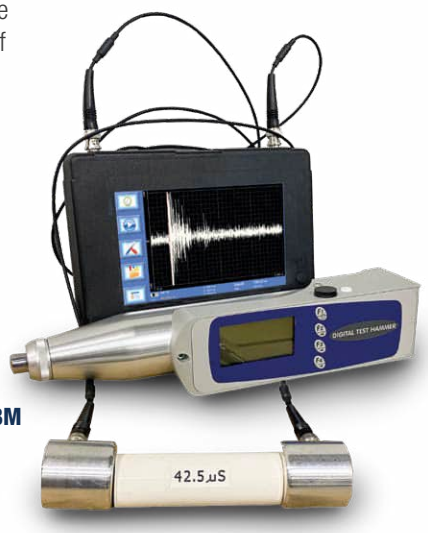
The device includes touch screen display with ports for the connection of two probes, two 55 kHz probes with connecting cables, calibration cylinder, tube of grease, carrying case with handle and shoulder strap.

ULTRASONIC TESTS

Some of the tests that can be performed with C372M are:
- Measuring of the flight time between the two probes.
- Measuring of the speed of the signal if the distance between the probes is known.
- Determination of the distance between the probes if the speed is known.
- Young modulus if the poisson ratio, the density and the distance between the probes are known.

SONREB TEST

It is possible to pair C372M with C386M (digital sclerometer) to directly import the rebound index measurement into the ultrasonic device and calculate the compressive strength of the concrete.



C372M with **C368M**

Power supply: battery pack Li-Ion 11.1V 3000mAh
External feeder: 230V/24V
Dimensions: 400x300x180 mm
Weight: 5 kg approximately

C372M

ACCESSORIES

C370-08 EXPONENTIAL TRANSMITTING/RECEIVING PROBES (couple), **55 kHz** Nominal Frequency.

C372-10 TRANSMITTING/RECEIVING PROBES (couple), **150 kHz** Nominal Frequency, indicated for homogeneous, compact, high density concrete.

C372-11 TRANSMITTING/RECEIVING PROBES (couple), **24 kHz** Nominal Frequency, indicated for heterogeneous, low density concrete.

C370-09M COUPLE OF CABLES (each 10 m long) to connect the probes to the tester.
Used to test voluminous/large structures.

SPARES

C370-02 Transmitting/receiving probes (couple), 55 kHz

C370-04M Couple of cables (each 3.5 m long) to connect the probes to the tester.

C370-07 Tube of grease to better coupling the probes to the material under test.

C370-02

C370-08

INVESTIGATIONS ON REINFORCEMENT BARS IN CONCRETE

C396N
PROFOMETER, REBAR DIAMETER AND COVER METER PM8000

STANDARDS: BS 1881:204 | DIN 1045 | Eurocode 2 | ACI 228.2R

This new generation profometer allows to quickly and precisely detect the position, diameter and depth of reinforcement bars. This device is especially suitable for non-destructive investigations on existing concrete structures. The compact, light-weight and wireless sensor is provided with a screen that indicates the location of the bars and the information about diameter and depth. But can also be connected to tablets (not included, ask our team for compatible models). The equipment includes sensor, cart for large areas scanning, batteries, charger, chalk and carrying case.
Cover measuring depth: up to 185 mm
Cover measuring accuracy: ±1 to ±4 mm depending on the depth
Rebar diameter measuring depth: up to 63 mm
Rebar diameter measuring accuracy: ± 1 rebar size

Dimensions: 400x300x100 mm
Weight: 2 kg approximately

C396N

C398
MINI R-METER NEW

STANDARD: BS 1881:204

This lightweight and hand-held field instrument allows to determine the location and the depth of rebars inside concrete structures, making it easy to define where it is possible to drill and extract concrete cores. It is not suitable to determine the diameter of the rebars.
Cover measuring depth: up to 250 mm (for 36 mm bars)
Bar size calibration: 10 to 28 mm
Battery life: 4 hours continuous operation
Possibility to store data for later upload via USB.

Dimensions: 250x162x62 mm
Weight: 1.6 kg

C398

C412-01
DIGITAL RESISTIVITY 2-PROBE ARRAY METER

Used for assessing the probable rate of corrosion in reinforcing bars with the electric resistivity measurement method.
A highly permeable concrete has a high conductivity with reduced electrical resistance. The knowledge of the electrical resistance of a concrete allows to measure the possible rate of corrosion of steel reinforced bars.
The test is simple to perform and requires only two 6.5 mm diameter holes drilled to a depth of 8 mm. Inject a small amount of conductive gel into each hole and insert the probes. The resistivity value is immediately displayed.
- Measuring range: 0.5 to 20 kΩ cm, with 0.1 kΩ resolution.
- 2-probe array spacing: 5 cm
- Display: LCD 4 ¼ digit
- Battery operated with 100 hours operating time

The instrument is supplied complete with drill bit, gel, template, accessories, carrying case.

Dimensions: 400x270x130 mm
Total weight: 4 kg

C412-01

C414
COR MAP-HALF CELL METHOD

STANDARDS: ASTM C876 | UNI 9535

A simple method for identifying areas of probable rebar corrosion in concrete structures.
Detachable electrode extension pieces (41 cm long), facilitate measurements in hard to reach locations.
High impedance digital meter is designed for tough field conditions.
Reference electrode, including copper sulphate reservoir.
Easy to use, supplied complete.

C414 complete set

C410
WINDSOR HP PROBE DIGITAL SYSTEM

STANDARDS: ASTM C803 I BS 1881:207 I ACI 347

To evaluate the compressive strength of concrete in place with the penetration method. Non destructive test. It is fast, accurate and simple to perform. The five-minute test does not weaken the structure. Comparison between test results using this method and destructive tests shows a variance normally within 3% from each other. The method requires a pistol-like device which is loaded with a small explosive charge and metal probe.The charge is precisely measured to give a consistent firing force. By pulling the trigger the probe is fired into the concrete.

C410

Standard equipment consist of:
- driven unit
- digital measuring unit with memory for data storage to PC unloading
- accessories and carrying case.

Probes and power charges **are not included** and must be ordered separately.

Dimensions:
500x400x200 mm
Weight:
16 kg approx.

C410 with case and accessories

ACCESSORIES

C410-01 SILVER PROBES used for high performance concrete with strength up to 17000 PSI (110 MPa). Complete with probes and power loads. Pack of 75 probe Kit.

C410-02 GOLDEN PROBES recommended for light weight concrete. Complete with probes and power loads. Pack of 75 probe kit.

C410-10N
PENETRATION PIN RESISTANCE DETECTOR

PENETRATION RESISTANCE

STANDARD: ASTM C803

This portable instrument is used to measure the resistance of materials in situ for new or existing constructions. The operating principle which the instrument is based is the capacity to nail a pin into the surface of the material, since the penetration depth is inversely proportional to compressive strength is easy to determine the material resistence. The unit measures compression strength of concrete and mortar in situ with accuracy and speed. It is a safe tool that uses a mechanism equipped with a calibrated spring to insert a steel nail into the material to be investigated. The depth of penetration of the nail is measured and correlated with specific curves to the compression strength of the test material. The removable small section nail facilitates the use of the instrument and the correct execution of the test.

Penetration resistance: 800 ± 8 N
Shot power: 20 ± 1 mm
Digital measuring gauge: 20 ± 0.01 mm
Nail dimensions: 3.5 mm diameter, 40 mm long

Supplied complete with 20 penetration nails, a little pump, a tightening key, a load lever, a carrying case.

Dimensions: 420x310x150 mm
Weight: 8 kg approx.

SPARE

C410-11 Penetration nails (pack of 20pcs).

C410-10N

C410-01 / C410-02

Example of use

C405-10N
DEFLECTOMETER WITH TELESCOPIC TUBULAR DISPLACEMENT TRANSDUCER

Used to determine the deflection under known loads of bridges, ceilings or any suspended structure.
This instrument grants very accurate and reliable test results with data acquisition through Cyber-Plus Progress mod. C405-15M.
One telescopic deflectometer consists of:
- Aluminium telescopic tubular anodized frame having 1700 mm mimimum height and 6000 mm maximum extension.
- Linear potentiometric displacement transducer with spring system, fixed on the base of the telescopic tubular frame, with measurements in compression 50 mm stroke and 0.01 mm resolution.
- Tripod supporting the telescopic tubular displacement transducer.
- 10 m extension cable.
- Carrying case.

Weight: 6 kg approx.

Note: Three deflectometers are recomended to correctly perform a test.

C405-15M
CYBER-PLUS PROGRESS

8 Channels acquisition and processing data system, 24 bit resolution.
Electronic advanced technology, **display** LCD, TFT, 800x480 pixels, 7", **touch screen**, high graphic performances, the unit automatically performs test and data processing. A certificate can be printed through an external USB printer (optional).
The Cyber-Plus is equipped with LAN port for connection to PC and with USB port for an unlimited memory storage.
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 p. 213

S337-51 CALIBRATION process of one deflectometer with the data acquisition unit C405-15M.

CISTERNS FOR LOAD TESTS

Made with flexible polystyrene covered in PVC, they are used to load the structure so to measure its deflection.
Supplied with connector, flexible pipe and spherical valve.

Available in different capacities:

Model	Capacity litres	Dimensions cm	Weight kg
C405-24	1000	240 x 145	10
C405-25	2500	280 x 240	16
C405-26	5000	400 x 240	25
C405-27	10000	490 x 340	40

C405-24

C405-30
LITRE-COUNTER, ELECTRONIC, FOR CISTERNS

It measures and displays the quantity of water.
Accuracy: ± 1%
Feeding. AAA standard batteries

Weight: 2 kg

C405-30

SPARE

C405-20 Chain, 10 m long, stainless steel, for measurements over 13 m.

DEFLECTOMETERS - SWING-ARM MODEL

Used to determine the deflection on bridges, ceilings or any suspended structure. Possibility to use the deflectometer in pressure or traction, and direct reading on the dial gauge.
Available in **one** or **three** sets, to be completed with dial gauges stroke from 10 to 50 mm.
One deflectometer set comprises:
Swing-arm with clamp for complete orientation in any position, inextensible wire coil 20 metres long, plumb weight, carrying case.
Supplied **without** dial gauge to be ordered separately (see accessories).

MODELS

C405N N° 1 SET OF DEFLECTOMETER (without dial gauge)
C406N N° 3 SETS OF DEFLECTOMETERS (without dial gauges)

ACCESSORIES

S376 DIAL GAUGE 10 mm stroke x 0.01 mm sens.
S377 DIAL GAUGE 25 mm stroke x 0.01 mm sens.
S378 DIAL GAUGE 30 mm stroke x 0.01 mm sens.
S379 DIAL GAUGE 50 mm stroke x 0.01 mm sens.
S383 DIGITAL GAUGE 25.4 mm x 0.001 mm sens.

ACCESSORY for S383

S382-13 CABLE to connect S382-01 and S383 to PC through USB port for direct visualization and recording of the measurement.

SPARE

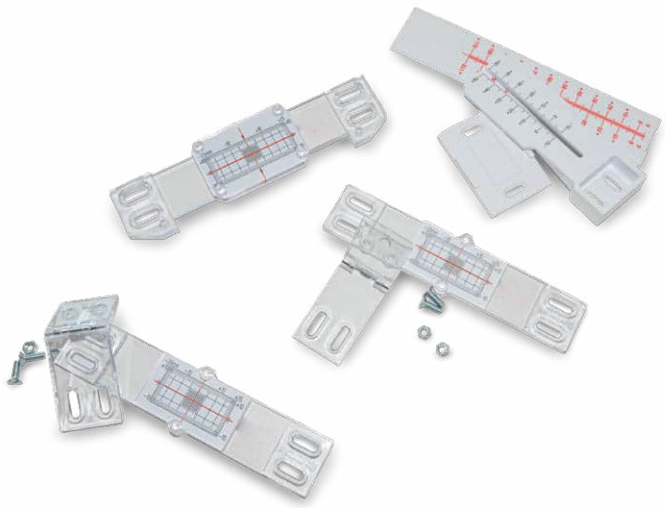
C407-02 Inextensible wire coil, 20 metres long

C405N + S377

C406N + S376

CRACK WIDTH GAUGES

Used for monitoring, measuring and recording the crack width of a building structure.
Internal or external use, manufactured in vandal resistant polycarbonate, complete with crack record card each gauge to semplify monitoring, they are suitable for vertical and horizontal movement measurements.



C408...C408-03

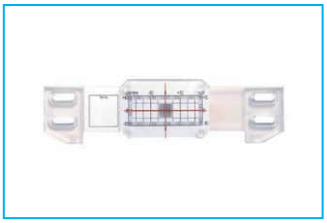
MODELS

C408 CRACK WIDTH GAUGE FOR WALLS, to monitor vertical and horizontal movements, also simultaneous, on a plane surface. Pack of 5 pieces.

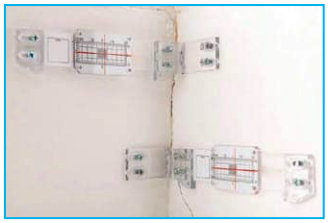
C408-01 CRACK WIDTH GAUGE FOR CORNERS, to monitor corner cracks with bidirectional movements, also simultaneous. Pack of 5 pieces.

C408-02 CRACK WIDTH GAUGE FOR FLOORS, to monitor floor settlements to a wall, column etc.
Pack of 5 pieces.

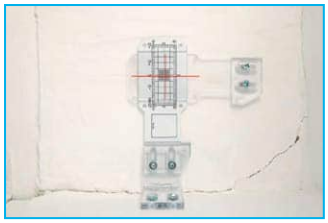
C408-03 CRACK WIDTH GAUGE FOR DIFFERENCE IN LEVELS, to monitor the loss of levelness of any cracked surface.
Pack of 5 pieces.



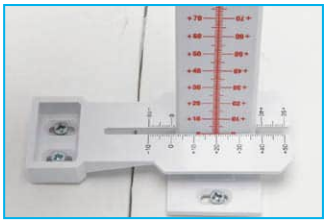
C408



C408-01



C408-02



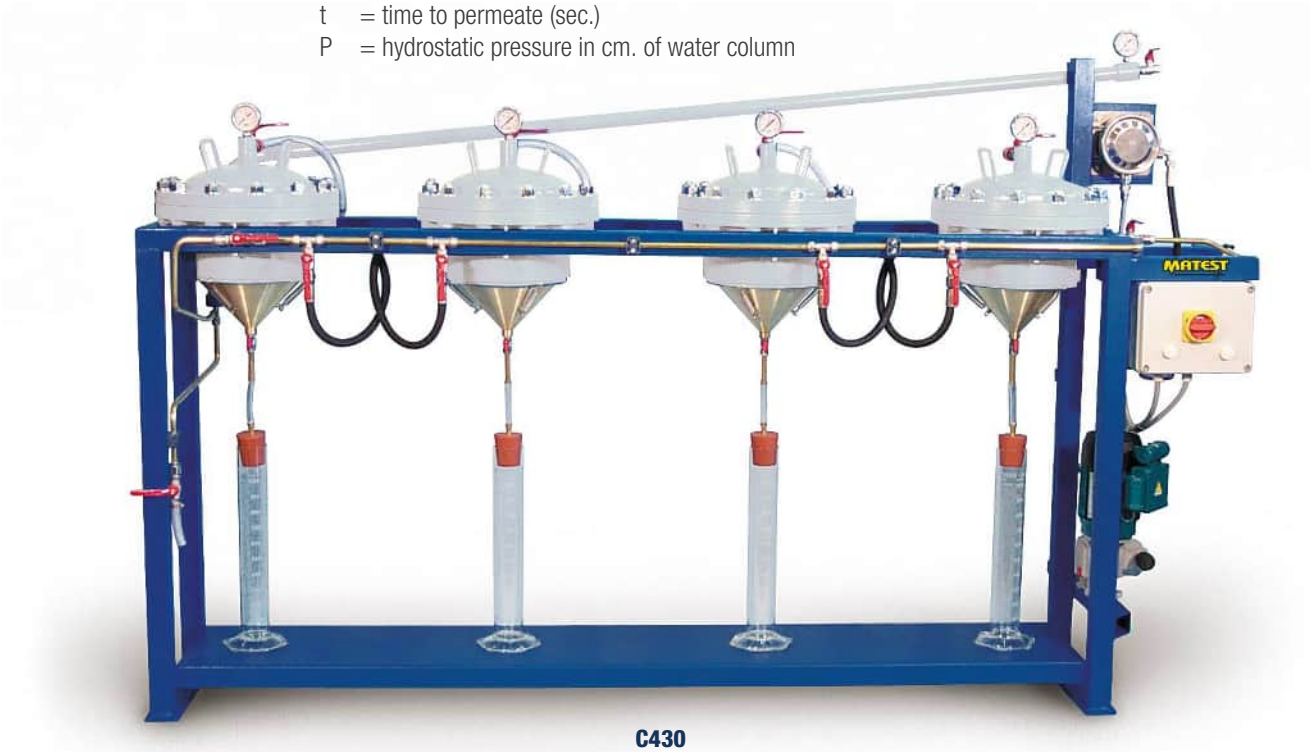
C408-03

C430
AUTOMATIC CONCRETE WATER PERMEABILITY APPARATUS AT FOUR CELLS

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

$$K = \frac{c \times h}{A \times t \times P}$$

where: cc = permeated water in cm^3
h = height of the specimen (cm)
A = surface area of the specimen (sq. cm.)
t = time to permeate (sec.)
P = hydrostatic pressure in cm. of water column



C430

The equipment consists of a strong metallic frame holding four cells which are hot-galvanized for anti-corrosion protection.
Each cell includes a pressure control manometer.
A re-chargeable compensation plenum chamber is included as part of the test.
The pressure is adjustable from 0 to 30 bar and it is supplied by an automatic pump of variable supply, to achieve the most suitable installation for the specimen under test.
Water feed is direct from water inlet.
Seal pressure obtained through special and practical seal devices which maintain and simplify the use of the machine.
It is possible to use one or more cells together, and specimens also of different size (cubes/cylinders).
The specimen's sealing system is achieved through a practical and speedy, user-friendly device.
Supplied complete with four cells, four graduated cylinders and accessories. The **sealing devices** must be ordered separately, while the epoxy resin must be ordered locally (when ordering we will supply technical specifications of the epoxy resin).

Power supply: 230V 1ph 50Hz
Dimensions: 2500x500x1300 mm
Weight: 240 kg approx.

NEEDED ACCESSORIES

SEALING DEVICE, complete with rubber latex packing which is between the two hot-galvanized steel collars. Complete with bolts.

MODELS

C432-01 SEALING DEVICE FOR CUBES 100 mm side
C432-02 SEALING DEVICE FOR CUBES 150 mm side
C432-04 SEALING DEVICE FOR CYLINDERS Ø 100 mm
C432-05 SEALING DEVICE FOR CYLINDERS Ø 150 mm
C432-06 SEALING DEVICE FOR CYLINDERS Ø 160 mm

C432-02

C432-05

WATER IMPERMEABILITY TESTER

DETERMINATION OF PENETRATION'S DEPTH OF WATER UNDER PRESSURE.

STANDARDS: EN 12390-8 | DIN 1048

This apparatus is used to determine the depth of penetration of the water into the concrete (impermeability) under known time and pressure.
The unit accepts concrete cubic, cylindrical or prismatic specimens having **max. dimensions** of 200x200x200 mm.
The specimen is put into the test chamber, clamped with **suitable flanges with central screw** and round gaskets.
A known water pressure is applied on the specimen's surface for a known time, as requested by Standard, using a suitable air compressor (see accessory) having at least 5 bar pressure.
A manometer checks constantly the applied water pressure.
The apparatus is supplied **complete with graduated burettes** fixed on the front panel.
The water penetrated is measured by breaking the specimen, or by reading the water permeated through the graduated burette.
Two models available: three place and six place version. The places can be used all-together at the same time, or one by one independently.

C435-01

C435

MODELS

C435
CONCRETE WATER IMPERMEABILITY APPARATUS, THREE PLACE, with water measurement burettes.
Dimensions: 1400x750x1700 mm
Weight: 280 kg approx.

C435SP
CONCRETE WATER IMPERMEABILITY APPARATUS, THREE PLACE, same as mod. C435, but having three separate pressure lines

C435-01
CONCRETE WATER IMPERMEABILITY APPARATUS, SIX PLACE, with water measurement burettes.
Dimensions: 1400x750x1850 mm
Weight: 430 kg approx.

C435-11
DUAL PRESSURE LINE to upgrade the apparatus mod. C435-01

ACCESSORIES

V206 AIR COMPRESSOR, 24 litres capacity. 230V 50Hz 1ph.

E138-11 TUBING and accessories to connect the impermeability apparatus to the air compressor.

MATEST
INNOVATIVE. GLOBAL. MANUFACTURER

SECTION E

CEMENT MORTAR

Raw materials like limestone, chalk, shale, and clay are mixed with water, crushed, ground, and blended, then chemically processed in a rotary kiln to form clinker. Clinker, mixed with gypsum, produces modern Portland cement, which can be further modified.

Matest offers a complete range of equipment for testing cement and mortars, covering aspects such as fineness, consistency, setting time, workability, and strength. This equipment ensures compliance with EN, ASTM, and international standards, supporting all necessary quality assessments for cement and mortar production.

DETERMINATION OF CEMENT FINENESS THROUGH BLAINE METHOD

STANDARDS: EN 196-6 I ASTM C204 I AASHTO T153 I BS 4359-2

E009-KIT
BLAINE AIR PERMEABILITY APPARATUS
MANUAL

Used to determine the fineness of Portland cement in terms of the specific surface expressed as total surface area in square centimeters per gram of cement.
The apparatus is supplied with glass U-tube manometer with valve, steel stand, test cell with disk and plunger all in stainless steel, rubber aspirator bulb, 1000 filter paper disks, manometric liquid, vaseline grease for better coupling tube/cell, funnel, brush.
The instrument conforms to EN 196-6 Standard and it is comparable to AASHTO, ASTM and BS

Dimensions: 220x180x470 mm
Weight: 12 kg approx.

E009 KIT + E055-08A

ACCESSORIES

E010-02 STANDARD REFERENCE CEMENT to calibrate the Blaine.

E055-08A GLASS ALCOHOL THERMOMETER 0 to +50 °C.

SPARES

E010-01 U-tube glass manometer complete
E010-03 Manometric liquid 250 ml bottle
E010-04 Filter paper discs, porosity: 2 micron (pack of 1000 pieces)
E010-08 Test cell, comprises cell body, plunger and perforated disk, stainless steel made
E010-07 Cell perforated disk, stainless steel made

E011
BLAINE AIR PERMEABILITY APPARATUS
SEMI-AUTOMATIC, ELECTRONIC

Electronic Blaine air permeability apparatus with semi-automatic test-cycle, electric suction pump, time registration and measuring section with photoelectric barrier. At the end of the test the time is displayed automatically. Precision of time displayed: 0.15.
The apparatus is delivered complete with filter papers (1000 pcs.), oil, light grease, plug, thermometer, brush and funnel.

Power supply: 110-230V 50-60Hz
Dimensions: 170x300x410 mm
Weight: 4.6 kg

E011

E011-01N
BLAINE AIR PERMEABILITY APPARATUS
AUTOMATIC, PC-CONTROLLED

This automatic electronic apparatus is designed for the fully automatic test procedure and evaluation; the software automatically acquires all test data and performs average calculations. Complete with filter papers (1000 pcs.), oil, light grease, plug, internal sensor, brush and funnel. Provided with software but without PC (which is required).

Power supply: 110-230V 50-60Hz
Dimensions: 170x280x410 mm
Weight: 4.7 kg

E011-01N

E014
LE CHATELIER FLASK

STANDARDS: EN 196-6 I ASTM C188
AASHTO T133

Used to determine the relative density (specific gravity) of hydraulic cement and lime. Capacity 250 ml. The neck is graduated from 0 to 1 ml and from 18 to 24 ml with divisions of 0.1 ml.

Weight: 500 g

V192-08

ACCESSORY

V192-08
CHATTAWAY SPATULA, 120 mm long.

E014

E017
FINENESS OF FLY ASH BY WET SIEVING

STANDARDS: EN 451-2 I ASTM C430

The set, brass made, consists of: sieve Ø 50 mm. with stainless steel mesh opening 0.045 mm, spray nozzle 17.5 mm ID with 17 holes Ø 0.5 mm, pressure gauge Ø 90 mm range 0-160 kPa, div. 5 kPa, fittings and connectors.

Weight: 3 kg

E017

E029
MEASURER 400 ML CAPACITY

STANDARDS: ASTM C185 I AASHTO T137

To determine the air content of freshly mixed mortars by the density method.
Steel made, internal diameter 76.2x88.1 mm height.

ACCESSORIES

E087-06
HARD WOOD TAMPER

E055-07
GLASS PLATE, nominally 120 mm diameter

V192-08
CHATTAWAY spatula

E020
BULK CEMENT SAMPLER

STANDARDS: EN 196-7 I ASTM C183
AASHTO T127

Used to sample cement in bulk storages or shipment.
Brass made, it consists of two concentric tubes with slots.
Inside tube volume is 3 litres approx.

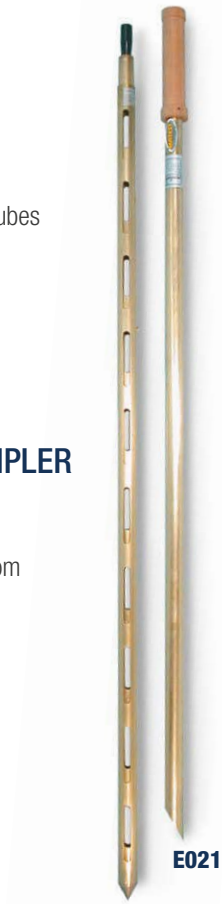
Dimensions: Ø 40x1500 mm.
Weight: 5 kg

E021
PACKAGED CEMENT TUBE SAMPLER

STANDARDS: EN 196-7 I ASTM C183
AASHTO T127

Used to sample cement homogeneously from cement bags.

Dimensions: Ø 32x1320 mm approx.
Weight: 3 kg



E021

E020

E035
SLAKING VESSEL
YIELD OF LIME-BUILDING LIME

STANDARD: EN 459-2

This insulated vessel is used to determine the yield of lime by leaving the lime sample to slake into.
Stainless steel made, double walled insulated with glass fibres, the cylinder has inside dimensions
Ø 113 by 140 mm deep. Supplied complete with cover.
Weight: 4 kg approx.

E035

E025
BULK DENSITY OF CEMENT

This apparatus is used for the measurement of the apparent density (bulk density) of powders and non-cohesive materials. It consists of sieve funnel with tripod, unit weight measure 1 litre capacity, spatula, straight edge, aluminium scoop.
The discharge hole of the funnel has 8 mm diameter.

Dimensions: Ø 350x520 mm
Weight: 6 kg approx.

E025

DETERMINATION OF AIR CONTENT IN FRESH MORTAR

STANDARDS: EN 459-2 I EN 1015-7 I EN 413-2

Determining the air content in fresh mortar is a fundamental test for quality control on construction sites and in laboratories. Trapped or incorporated air directly affects the mechanical strength, durability and workability of the material. An air content meter is an apparatus that allows the volume of air incorporated into the fresh mixture to be determined quickly and accurately. Various models are available with different operating modes and capacities:

E027M
AIR CONTENT METER MANUAL, 1 LITRE
MATEST MADE

Designed and manufactured by Matest, this air content meter consists of a sturdy and resistant cast aluminium container and lid. The container has a capacity of 1 litre; the lid includes:
- manual pump for generating pressure
- a valve for pressure correction
- a valve for pressure release and test execution
- a pressure gauge
- practical and sturdy hinges for attaching the lid to the container and ensuring a watertight seal

The manual pump generates pressure in the chamber and then, through an equalisation process, the pressure is released into the container, which has been previously filled with fresh mortar. Once the pressure has stabilised, the pressure gauge shows the amount of air incorporated into the mixture. The lower container can be used to determine the density of the fresh mortar.
Supplied complete with two tubes for calibration.

Dimensions: Ø 250x380 mm
Weight: 10 kg approx.

E028M
AIR CONTENT METER ELECTRIC, 1 LITRE
MATEST MADE

Identical to model E027M but with an electric pump operated by a button.

Power supply: 110-230V 1F 50-60Hz
Dimensions: Ø 250x380 mm
Weight: 10 kg approx.

E027M

E028M

E027
AIR CONTENT METER MANUAL, 1 LITRE

For determining the air content in fresh mortar, capacity 1 litre, manual pump.
Dimensions: Ø 235x340 mm

E027-01
AIR CONTENT METER MANUAL, 0.75 LITRE

Identical to model E027 but with a 0.75 l container.
Dimensions: Ø 235x320 mm

E028
AIR CONTENT METER ELECTRIC, 1 LITRE

Identical to model E027 but with electric pump.
Power supply: 110-230V 1F 50-60Hz
Dimensions: Ø 235x290 mm

E028-02
AIR CONTENT METER ELECTRIC, 0.75 LITRE

Identical to model E027-01 but with electric pump.
Power supply: 110-230V 1F 50-60Hz
Dimensions: Ø 235x270 mm

ACCESSORIES

E028-01	Filling HOPPER (ring) for models E027, E027-01, E028, E028-02
V195	Rubber mallet
V098-04	Transparent plastic measuring cylinder, 100 ml
V120-02	Plastic bottle, 500 ml
C196M-11	Plexiglass disc Ø230 mm, thickness 5 mm

Note: Standards EN 459-2 and EN 413-2 allow the use of 1-litre or 0.75-litre containers. Standard EN 1015-7 allows only the use of 1-litre containers.

E027

E028

E091
BULK DENSITY OF LIME

STANDARDS: EN 459-2

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

Weight: 5 kg approx.

E091

E031
DROPPING BALL APPARATUS

STANDARDS: BS 4551-1, 6463-4

Used to measure the consistency of cement mortars, this instrument allows a 25 mm diameter acrylic ball to fall freely from a standard height of 250 mm into a specimen of mortar contained into a brass ring mould, and the surface of which has been carefully prepared. The depth of the ball penetration into the mortar gives the specimen consistency. The instrument comprises a dropping device mounted on a stand, acrylic ball, mould Ø 100x25 mm
The base of the stand is machined. Chromed finishing.

Weight: 8 kg approx.

ACCESSORY

E031-01
BALL PENETRATION MEASURING DEVICE, formed by a tripod on which a dial gauge 25x0.01 mm is mounted. A device to adjust the height of the dial in relation to the tripod is also included. Chromed finishing.

Weight: 1 kg approx.

E031

E031-01

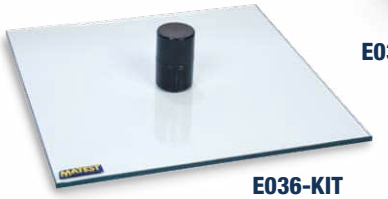
E036-KIT
FLUIDITY TEST OF GROUTS FOR PRE-STRESSING TENDONS: GROUT SPREAD METHOD

STANDARD: EN 445

The grout spread test measures the fluidity of thixotropic grouts. The fluidity is measured by the diameter of the circle of grout spread on a smooth plate after a fixed period.
The kit comprises:

E036-01 STIFF PLASTIC MOULD with internal diameter of 39 mm and a height of 60 mm
Weight: 70 g approx.

E036-02 GLASS PLATE, dimensions 305x305 mm



E036-KIT

E039-01
CEMENT WATER RETENTION APPARATUS

STANDARDS: ASTM C91, C110, C1506

Used to determine the water retention value of cement and lime putty. The unit comprises: water aspirator, vacuum regulator, vacuum gauge three-way stopcock, metal perforated dish, glass funnel, pack of filter paper, accessories; the whole assembled on stand. The vacuum pump with accessories are not included in the supply and have to be ordered separately.

Dimensions: 400x300x600 mm
Weight: 8 kg approx.

ACCESSORIES

V205 + V230-03
Vacuum pump and tube.
Power supply:
230V 1ph 50-60 Hz
See p. 553

E039-01

E034
LIME TESTING REACTIVITY APPARATUS

STANDARDS: EN 459-2

This apparatus is used for determining the reactivity on slaking of ground quicklime.
The equipment consists of a Dewar vessel 1000 ml capacity complete with cover, electric stirrer 300 rpm. complete with stirring paddle (propeller), base with stand, digital thermometer range -50 +200 °C subd. 0.1 °C, accessories.

Power Supply: 230V 1ph 50-60Hz
Dimensions: 400 x 250 x 750 mm
Weight: 10 kg approx.

ACCESSORY

E034-05
WEIGHTING AND FILLING CONTAINER

SPARES

E034-11
Dewar vessel

E034-12
Stirring paddle (propeller)

E034-12

E034-05

E034

E038
FLOW CONE APPARATUS

STANDARDS: EN 445 I NF P18-507

Used for viscosity and fluidity determinations of mortars, muds, grouts, pre-stressing tendons, fluid materials, etc.
The capacity of the cone is 1700 cc.
Entirely brass made, it is supplied complete with four interchangeable nozzles Ø 8 - 9 -10 -11 mm, stand adjustable in heigh, plastic graduated cup.

Weight: 10 kg approx.

ACCESSORIES

E038-01
INTERCHANGEABLE NOZZLE Ø 13 mm

E038-02
SIEVE, Ø 150 mm, 1.5 mm mesh opening that fits the upper cone.

E037
MARSH FUNNEL MUD VISCOMETER

STANDARDS: ISO 2431

Utilized for viscosity determination on drilling muds and fluid materials. Orifice opening 4.7 mm
Half part of the funnel mouth is foreseen of sieving cloth 2 mm mesh.
Made of break-resistance plastic.
Supplied complete with graduated cup.

Weight: 1 kg approx.

E037-01M
MUD DENSITY BALANCE
MADE IN MATEST

NEW

STANDARD: ASTM D4380 I EN 445

It provides a simple method for the accurate determination of mud density. The balance consists of a base and graduated arm with cup, lid, knife edge, rider, built-in spirit level and counter-weight. The constant volume cup is affixed to one end of the graduate arm and the counter-weight on the opposite end. Supplied with a carrying case.
Weight: 3 kg approx.

E037-05
FILTER PRESS FOR MUDS

STANDARDS: API (American Petroleum Institute), recommended practice 13B-1 and 2 I ISO 10414-1 I UNI 11152

This filter press is the most effective means for determining the filtration properties of drilling muds, fluids and cement slurries.The filter press consists of a mud reservoir mounted in a frame, a pressure source, a filtering medium, and a graduated cylinder for receiving the measuring filtrate, pack of 100 filter paper.

Dimensions:
210x240x500 mm approx.
Weight: 10 kg approx.

Note:
CO^2 pressurized cartridges are not included and must be purchased locally.

E037-10
SAND CONTENT OF DRILLING MUDS KIT

STANDARD: ISO 10414-1

The Sand Content Kit is a simple, accurate and inexpensive sieve analysis apparatus for determining the sand content of drilling muds. The kit consists of a special 200-mesh sieve 2.5" in diameter, fastened inside a collar upon which a small funnel is fitted on either end. This is used with a 10ml glass measuring tube, graduated to read from 0 to 20% the percentage sand by volume. The collar and funnel are made of polyethylene and the screen is made of brass. A 500 ml wash bottle and carrying case are included.

Weight: 1500 g

E055N
VICAT APPARATUS
SETTING TIME AND CONSISTENCY OF CEMENT

STANDARDS: EN 196-3 I EN 480-2 I EN 13279-2 (gypsum)
ASTM C187, C191 I AASHTO T131

The instrument consists of a metallic frame, graduated scale with index, sliding probe of 300 g, consistency plunger Ø 10 mm, glass base plate.
The needle and conical mould are not included and have to be ordered separately according to the selected Standard (see accessories).

Dimensions: 160x200x300 mm
Weight: 5 kg approx.

E055-06

E055N with accessories

NEEDED ACCESSORIES

E046N NEEDLE, hardened Ø 1.13 mm EN 196-3
E046-01N NEEDLE, hardened Ø 1 mm ASTM - AASHTO

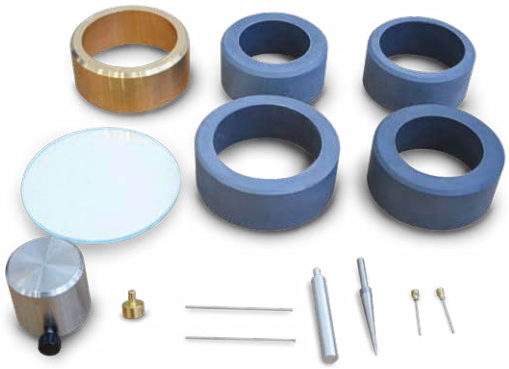
E055-10 CONICAL PLASTIC MOULD Ø 70/80 h 40 mm (EN - NF)
E055-05 CONICAL PLASTIC MOULD Ø 60/70 h 40 mm (ASTM - AASHTO)

CONICAL MOULDS TO BS, DIN, UNI SPECIFICATIONS:

E055-04 CONICAL PLASTIC MOULD Ø 80/90 h 40 mm (UNI)
E055-13 CONICAL PLASTIC MOULD Ø 65/75 h 40 mm (DIN)
E055-11 CONICAL BRASS MOULD Ø 80/90 h 40 mm (BS)

ACCESSORIES

E055-06 ADDITIONAL WEIGHT 700 g to the sliding probe (EN - NF)
E042N FINAL NEEDLE Ø 1.13 mm (EN - NF - BS)
E042-01N FINAL NEEDLE Ø 1 mm (Standards: ASTM - AASHTO)
E055-08A GLASS ALCOHOL THERMOMETER 0 to +50 °C.
E044-40N CONICAL PENETRATION NEEDLE Ø 8 mm by 50 mm long for gypsum tests. Standards: EN 13279-2
E055-15 PROBE, total weight of 100 g for tests on gypsum, EN 13279-2 I DIN 1168



Accessories and Spare Parts for **E055N**

SPARES

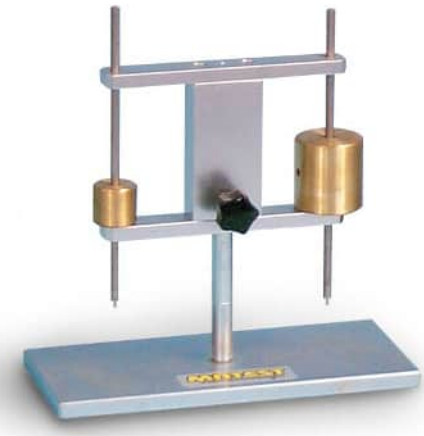
E055-07 Glass base plate Ø 120 mm
E044-48N Tang to fix the needle to the probe
E042-02N Consistency plunger Ø 10x50 mm

E058
GILLMORE APPARATUS

STANDARDS: ASTM C91, C141, C266, C1398 I AASHTO T154

Used to determine the setting time of cement. Vertical support shaft has a device to maintain the horizontal arms in alignment. Support assembly is adjustable in position. The two steel weights needles are calibrated to meet Specifications. Needle points are made of stainless steel.

Weight: 3 kg approx.



E058

E044A
VICATRONIC
AUTOMATIC TOUCH-SCREEN VICAT APPARATUS

NEW

STANDARDS: EN 196-3, 480-2, 13279-2 I ASTM C187, C191 I AASHTO T131

The new **Vicatronic** apparatus is designed and manufactured using the most recent and sophisticated technology to grant precise measurements of the setting time of cements, mortars, gypsum and other pastes.
The unit is manufactured with anticorrosion components perfect to work in environment with humidity and temperature requested by the relevant standards.

High precision sensor for the probe positioning

7'' touch-screen display with userfriendly interface

2 USB ports to save and transfer the data, 1 Ethernet port

Built-in printer to directly print the results

Automatic system for sample positioning

MAIN FEATURES

- Realtime graphic display of the test.
- Fully automatic execution of the tests.
- Pre-set penetration cycles according to the standards.
- Customizable programs for research tests.
- Easy data transfer simply using a USB stick.
- Free fall or guided fall option.

TECHNICAL SPECIFICATIONS

- LCD, TFT, 800x480 pixels, 7 inches, graphic touchscreen
- 2 USB ports, 1 Ethernet port
- Internal encoder with 0,1 mm resolution
- No external PC required
- Minimum time between penetrations time: 15 seconds
- Mobile probe (300 g) and glass plate included
- EN needle (Ø 1,13 mm) and ASTM needle (Ø 1 mm) included
- EN mould (Ø70/80) and ASTM mould (Ø60/70) included

Power supply: 230V 1ph 50-60Hz 50W
Dimensions: 190x330x470 mm
Weight: 13 kg approx.

PROBES

The mobile probe weighs 300 g (1000 g following the EN, NF Standards), the penetration needle has 1.13 mm diameter (1 mm following ASTM Standard) and its fall can be programmed in free fall or in guided fall. Totally flexible as far as the time is concerned, the penetrations time can be selected between 0.25 minutes and 900 minutes, the interval between two penetrations can be fixed or can change during the test basing on the penetration depth or on the number of penetrations. The options described here above can be combined together.

The penetration measure is read by a very accurate encoder having a resolution of 0.1 mm

The Vicatronic also calculates, visualises and prints:

- Date and time of the test.
- Time of each penetration.
- Depth of each penetration.

E044-11M SOFTWARE **VICATPRO** that allows by the Ethernet port downloading and managing all the data directly from the PC.
E044-12M needed for each Vicat to be connected to the software.

E044-12M Enabling of one Vicat for remote control through Vicat-Pro (E044-11M).

S334-11 Network connection RJ45 cable to connect one Vicat.

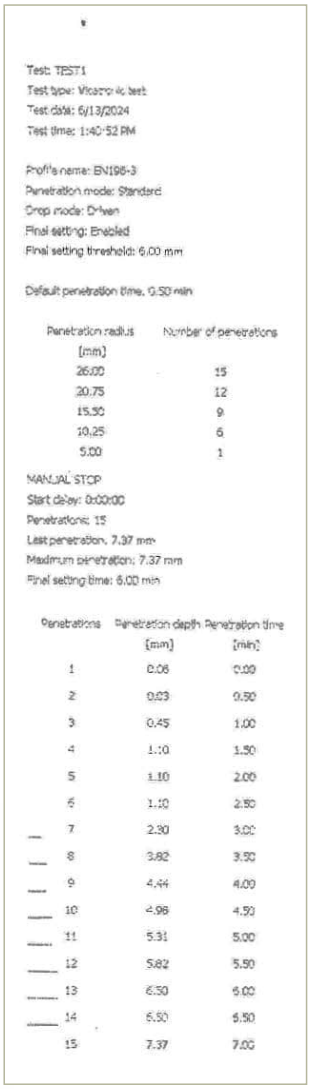
S334-12 Switch to connect from 2 to 7 Vicat to the ethernet network.

TIMER 0 – 900 MINUTES

The firmware allows activating a delay on the appliance to the beginning of the test. This program is particularly useful when the approximate setting time of the mortar is known and the operator wants to start the working of the Vicatronic after a certain time in order to concentrate the penetrations with a short interval of time between them and have better measuring values.

TEST RESULTS

The Vicatronic is equipped with two USB ports to allow the saving of the results on a USB stick. It is also possible to print data with the on-board printer.



Test: TEST1
Test type: Vicatronic test
Test date: 6/13/2024
Test time: 1:40:52 PM

Profile name: EN196-3
Penetration mode: Standard
Drop mode: Driven
Final setting: Enabled
Final setting threshold: 6.00 mm

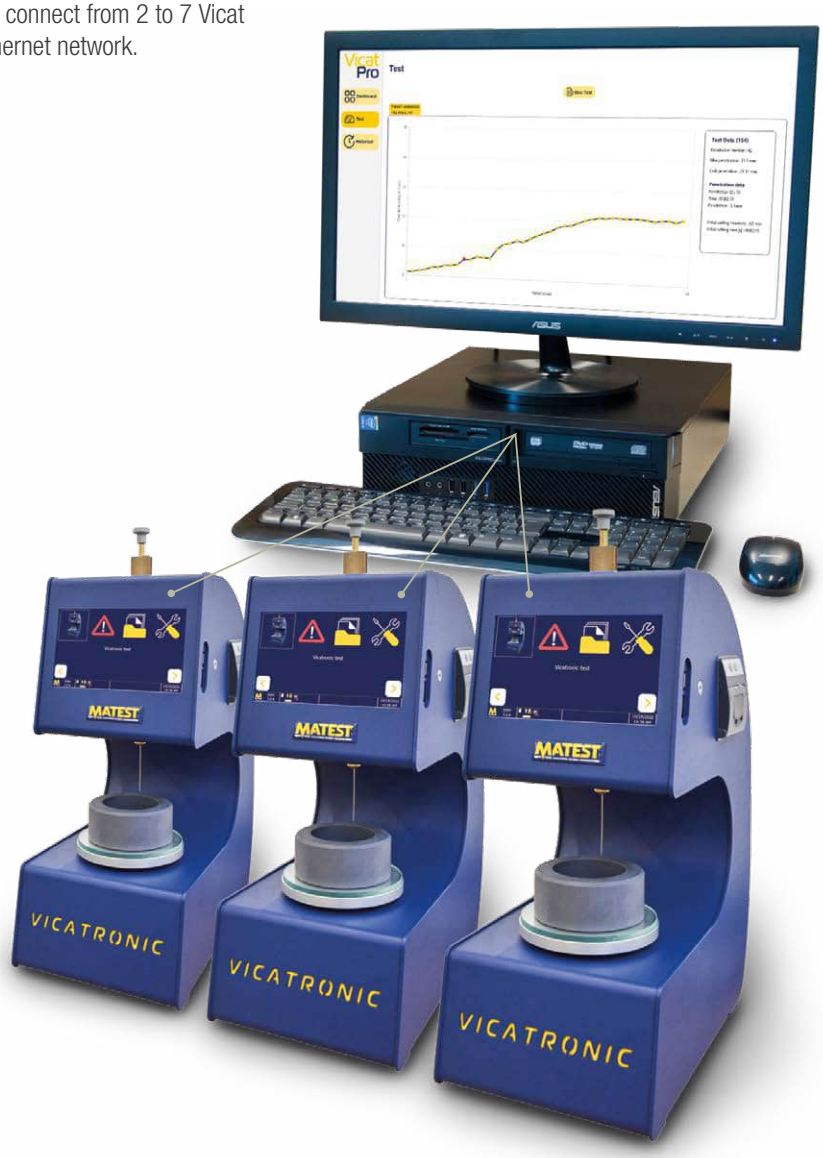
Default penetration time: 0.50 min

Penetration radius [mm]	Number of penetrations
26.00	15
20.75	12
15.50	9
10.25	6
5.00	1

MANUAL STOP
Start delay: 0:00:00
Penetrations: 15
Last penetration: 7.37 mm
Maximum penetration: 7.37 mm
Final setting time: 6.00 min

Penetrations	Penetration depth [mm]	Penetration time [min]
1	0.06	0.00
2	0.03	0.50
3	0.45	1.00
4	1.10	1.50
5	1.10	2.00
6	1.10	2.50
7	2.30	3.00
8	3.82	3.50
9	4.44	4.00
10	4.98	4.50
11	5.31	5.00
12	5.82	5.50
13	6.50	6.00
14	6.50	6.50
15	7.37	7.00

Printing Example



ACCESSORIES FOR E044A

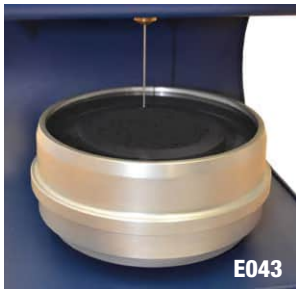
E044-07
THERMOSTATIC CONTROLLED HEATING/COOLING SYSTEM

The water thermostatic unit produces water at constant temperature of 20 °C ± 0.5 °C. The water is forced into the tank E043 (to be ordered separately) and then back to the bath allowing to perform the test at controlled temperature and humidity as requested by EN196-3 Standard. The system is supplied **without** taps and tubing (see E044-08) and accepts ONE or TWO Vicatronic.

E044A + E044-07 + E044-08

Specifications:

Water capacity: 7.5 litres approx.
Optimized temperature range: 15 to 25 °C
Accuracy: ± 0.5 °C
Power supply: 230V 1ph 50-60Hz 350W
Dimensions: 415x300x420 mm approx.
Weight: 20 kg approx.



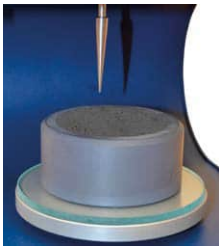
E043

E043
MOULD TANK to test the specimen immersed in water. To be used in conjunction with E044-07 and E044-08 for compliancy to EN 196-3, or at a room temperature of 20 °C

GYPSUM TEST

STANDARD: EN 13279-2

E044-40N
CONICAL PENETRATION NEEDLE, having 8 mm of diameter and 50 mm long, to make gypsum tests following EN Specification.



E044-40N

E044-41N
PROBE 100 g, to make test on gypsum following EN Specification.

E044-30
NEEDLE CLEANING DEVICE
It removes the residual cement particles from the needle keeping it constantly clean.

E044-30

NEEDED ACCESSORY FOR E044-07

E044-08
KIT OF TAPS AND TUBING
It consists of taps and tubing for the connection of the water thermostatic unit E044-07 to the water tank E043 (to be ordered separately). The kit is suitable for the connection of ONE Vicatronic. The kit is supplied calibrated for water inlet/outlet.

ACCESSORIES FOR E044A

E042-02N	CONSISTENCY PLUNGER Ø 10x50 mm (EN 196-3, ASTM C187)
E042N	NEEDLE for final setting Ø 1.13 mm (EN 196-3, EN 480-2)
E042-01N	NEEDLE for final setting ASTM 1 mm diameter (ASTM C187, C191)
E044-45	ADDITIONAL 700 g WEIGHT (EN, NF) (EN 480-2, ASTM C187)
E055-04	PLASTIC MOULD Ø 80/90x40 mm high following UNI
E055-11	BRASS MOULD Ø 80/90x40 mm high following BS
E055-13	PLASTIC MOULD Ø 65/75x40 mm high following DIN

SPARES

E046N	Ø 1.13 mm hardened needle (EN 196-3)
E046-01N	Ø 1 mm hardened needle (ASTM C191)
E055-05	Plastic mould Ø 60/70 x 40 mm high (ASTM C187, C191)
E055-07	Glass base plate
E055-10	Plastic mould Ø 70/80 x 40 mm high (EN 196, EN 480-2)
E042-06N	Probe 300 g (EN 196-3, ASTM C187, C191)
E044-48N	Tang to fix the needle to the probe
C127-11	Thermo-paper roll for printer (pack of 10 rolls)

E035-10
WATER PERMEABILITY DETERMINATION APPARATUS OF ONE-COAT RENDERING MORTARS

STANDARD: EN 1015-21

This apparatus is composed by a metallic cone having base diameter of 200 mm and a reference mark at 100 mm.
A glass burette 1000 ml capacity with 1 ml graduations is fixed on the cone through a suitable base with rod and clamps.

Dimensions: 1400x300x300 mm approx.
Weight: 10 kg approx.

E035-10

A024
LOSS-ON-IGNITION OF CEMENT AND BUILDING LIME

STANDARDS: EN 196-2 | EN 459-2

A muffle furnace is used to heat the sample in air at 950 °C (EN 196-2) or 1050 °C (EN 459-2)
Technical details:
see mod. A024, p. 27 section Aggregates.

A024

E059
FLOW CHANNEL FOR THE DETERMINATION OF WORKABILITY OF REPAIR MORTAR

STANDARD: EN 13395-2

Used to determine the consistency and flow of products and systems for the protection and repair of concrete structures.
The apparatus consists of a metal groove with a funnel fixed on one end. Supplied complete with gratuated rule, level and feet.

Dimensions: 960x210x400 mm
Weight: 10 kg approx.

E059

NEW

C381-10
MORTAR TEST HAMMER - MADE IN MATEST

Especially suitable for materials with low strength such as mortar, cement or finishing materials. Spring impact energy 0.169 J. Working range below 25 MPa.

Dimensions: 400x200x150 mm
Weight: 5 kg

C381-10

E060

E060-01

E060-03

DETERMINATION OF THE FREE EXPANSION IN PLASTIC PERIOD, and of the exudation quantity of the mixing water on expansion pre-mixed mortars for anchorages, mixed with water.
STANDARDS: UNI 8996, 8998

The equipment consists of:

E060 Bridge of dual measure, formed by a steel square straightedge with two adjustable measure screws.

E060-01 Fix caliper at two steps, having heights of 100 and 107 mm

E060-03 Metallic container Ø 99x120 mm with 3 hermetic covers.

E061N
CALORIMETER
HEAT OF HYDRATION OF CEMENT
STANDARDS: EN 196-8 I ASTM C186

Used to determine the heat of hydration of low heat Portland and hydraulic cement.
The apparatus consists of a Dewar flask contained in an insulated material and housed in a wooden box which is hinged so that the flask can be easily removed or replaced.
A **second hinged wooden box** contains the first one, granting a better insulation, as expressly requested by the Standards.
The Calorimeter is supplied complete with a constant speed electric stirrer, filler funnel to EN and ASTM standards.

The standard supply **does not include**: propeller and the thermometer (to be selected from digital models) which must be ordered separately, see accessories.

Power supply: 230V 1ph 50Hz 150W
Dimensions: 350x250x680 mm
Weight: 12 kg approx.

E061N Open **+ E062-04**

NEEDED ACCESSORIES

E062-04 DIGITAL THERMOMETER. Resolution: 0.01 °C. Complete with probe, or:

E062-04N DIGITAL THERMOMETER supplied with software. Resolution: 0.001 °C.
- Memory for 10000 readings
- Displays, stores and prints: min, max, mean values, delta T
- Alarm if limit values are exceeded
- Battery operated

E061-12 PROPELLER, conforming to EN 196-8 Specification.

E061-13 PROPELLER, conforming to EN and ASTM Standards.

E062-04N

E061-13

ACCESSORY

V300-19 PARAFFIN WAX with melting point 55 °C to coat the glass parts which are in contact with the hydrofluoric acid. Pack of 5000 g.

SPARES

E062-01 Dewar flask
E062-03 Filler glass funnel

E062-10
LANGAVANT CALORIMETER
STANDARD: EN 196-9

Used to determine the heat of hydration of cements by means of semi-adiabatic method.
The equipment consists of:
1 testing calorimeter and 1 reference calorimeter, each one with official calibration certificate; 2 Pt100 temperature probes;
1 electronic module with 6 channels and USB cable for PC connection; PC software; 50 mortar boxes; 20 sand bags (1080 g each); calibration cylinder.
To perform a test a PC is required (not included into E062-10).

E062-10

E070
AUTOCLAVE
EXPANSION OF PORTLAND CEMENT

STANDARDS: Comparable to ASTM C151 | AASHTO T107

It consists of a high pressure boiler made from special alloy steel, inside Ø 154x430 mm high, receiving a holding rack for 10 cement specimens. The heating system is achieved by electric resistances. The separate control panel encloses a **digital thermometer** to visualize the boiler temperature, pressure gauge scale 0 - 600 psi with built in pressure regulator and power switches.
Supplied complete with rack for holding the specimens and safety valve with PED Cat. certificate according to the 97/23/CE Standard. Not sellable on CE market.
To prepare the samples E072 mould is needed.

Power supply: 230V 1ph 50Hz 3500W 295psi
Dimensions: 490x490x980 mm
Weight: 150 kg approx.

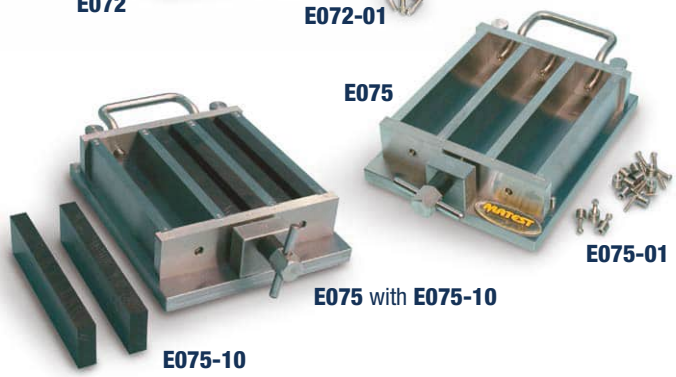
E070

Rack for specimens

E073

E072

E072-01



E075

E075-01

E075 with E075-10

E075-10

MOULDS FOR EXPANSION AND SHRINKAGE TESTS

These moulds are used to produce prismatic samples (fitted with specific inserts according to the relevant standard) for the determination of:
- Expansion, after immersion in water or after curing in autoclave
- Shrinkage, due to the hardening process which causes a loss of water and volume

The length variation of the samples is measured using a suitable length comparator and the relevant reference rod (see next page).

E072

STANDARDS: ASTM C151, C157, C227, C490, C596, C1260, C1567
TWO GANG PRISM MOULD to produce 25x25x285 mm prisms for expansion tests in autoclave, gauge length 250 mm
Complete with 4 steel inserts. **Weight:** 6 kg approx.

E073

STANDARDS: BS 1881-5, 6073
TWO GANG PRISM MOULD to produce 75x75x292 mm prisms, gauge length 254 mm. Complete with 4 steel inserts.
Weight: 9 kg approx.

E075

STANDARDS: EN 12617-4
Comparable to: NF P15-433

THREE GANG PRISM MOULD to produce 40.1x40x160 mm prisms, gauge length 160 mm. Manufactured from steel with hardness over 200 HV. All the parts of the mould are marked with an identification number. Supplied complete with 6 steel inserts, fixing screws and Certificate of Conformity.

Weight: 8.6 kg approx.

SPARES

E072-01 CONTACT POINTS stainless steel for E072 and E073 moulds. Pack of 10 pieces.

E075-01 CONTACT POINTS stainless steel for E075 mould, complete with fixing screws. Pack of 12 pieces.

ACCESSORIES

E075-10 SPACERS, teflon made, dimensions 15x40x160 mm to put into the chamber of the E075 mould, to produce 10x40x160 mm specimens for shrinkage tests as per EN 12808-4 and EN 13888-2 standards.
To be used with E075-11.
Pack of 6 spacers.

E075-11 INSERTS for the 10x40x160 mm specimens obtained with E075 + E075-10.
Standards: EN 12808-4 and EN 13888-2.
Pack of 12 inserts.

E107 STANDARDS: NF P15-434 I DIN 1164
THREE GANG PRISM MOULD to produce 40x40x160 mm specimens. Made from steel 55 HRB. Complete with 6 inserts. **Weight:** 8 kg approx.

E113 STANDARD: NF P18-427
THREE GANG PRISM MOULD to produce 70x70x280 mm specimens. Made from steel 55 HRB.
Complete with 6 inserts. **Weight:** 17 kg approx.

E107-01 CONTACT POINTS, spare for E107 and E113 moulds. Pack of 12 pieces.

LENGTH COMPARATORS

Used to measure the length variations of mortar specimens after **autoclave expansion tests or for shrinkage effect**. The top beam is adjustable to suit the specimen's length.
Dimensions: Ø 180x450 mm
Weight: 10 kg approx.

Available models:

E077-KIT LENGTH COMPARATOR with Analogic Dial Indicator, 5 mm travel by 0.001 mm divisions, mod. S375
as an alternative:

E078-KIT LENGTH COMPARATOR with Digital Gauge 12.7 mm travel by 0.001 mm divisions mod. S382-01, complete with battery.

ACCESSORY for mod. E078-KIT

S382-13 CABLE to connect S382-01 and S383 to PC through USB port for direct visualization and recording of the measurement.

ACCESSORIES FOR E077-KIT AND E078-KIT FOR EXPANSION AND SHRINKAGE TESTS

Standards	Mould code	Spare inserts code	Reference bar code and length (needed accessory)	Prismatic sample dimensions and gauge length
ASTM C151, C157, C227, C490, C596, C1260, C1567	**E072**	**E072-01**	**E078-01**, 295 mm	25x25x285 mm, 250 mm
BS 1881-5, 6073	**E073**	**E072-01**	**E078-01**, 295 mm	75x75x292 mm, 254 mm
EN 12617-4 NF P15-433 (comparable)	**E075**	**E075-01**	**E078-04**, 160 mm	40x40x160 mm
EN 12808-4 EN 13888-2	**E075 + E075-10**	**E075-11** (needed)	**E078-04**, 160 mm	10x40x160 mm
NF P15-434 DIN 1164	**E107**	**E107-01**	**E078-04**, 160 mm	40x40x160 mm
NF P18-427	**E113**	**E107-01**	**E078-03**, 280 mm	70x70x280 mm
UNI 8148	**E114** (see p. 340)	**E115-01** **E114-02** (end plates)	**E078-05**, 280 mm	80x80x240 mm
UNI 8147	**E115** (see p. 340)	**E115-01** **E115-02** (end plates)	**E078-05**, 280 mm	50x50x250 mm
EN 1367-4 BS 812-102	**A107** (see p. 61)	**A107-11**	**E078-06**, 205 mm	50x50x200 mm
UNI 11604	**A101M** or **A101-01M** (see p. 61)	**A101-11M**	**E078-01**, 295 mm	75x75x285, 250 mm
UNI 8520-22	**A101** (see p. 61)	**A101-11**	**E078-01**, 295 mm	25x25x280, 250 mm

Note: see p. 61 and 340 for other moulds and reference rods models.

SOUNDNESS OF CEMENT AND LIME

STANDARDS: EN 196-3 I EN ISO 9597 I BS 6463 I NF P15-432
UNE 80102

E064N
LE CHATELIER WATER BATH

Constructed with stainless steel inside chamber and exterior case in painted steel sheet, it can hold up to 12 Le Chatelier moulds (to be ordered separately) in the removable rack, supplied with the bath. The bath reaches the boiling point in approx. 30 minutes. Now an original device keeps the bath temperature at the boiling point, by avoiding the water evaporation and assuring that Le Chatelier moulds remain covered by the water during all the test execution.
The bath is equipped with security device which cuts the power out in case of low level of water.

Power supply: 230V 1ph 50-60Hz 1800W
Dimensions: 405x265x205 mm
Weight: 7 kg approx.

E064N

Rack detail with **E065**

E066
LE CHATELIER MOULD

Made from a brass spring tensioned split cylinder having internal diameter of 30 by 30 mm high, with two pointers 150 mm long.
Chromed finishing.
Used to determine the cement expansion (soundness) either in cold or in boiling water.

Weight: 30 g

E065

E066

E065
LE CHATELIER MOULD INDIVIDUALLY TESTED

Similar to mod. E066, but with pointers bigger sized, granting a higher number of test utilisations (about 10 times more) within the tolerances requested by EN Specifications.
Chromed finishing.
The moulds are checked one by one with engraved a serial number for an easier identification of each mould, they perfectly meet EN 196-3 Specification.

ACCESSORIES

E066-01 GLASS PLATE 50x50 mm to cover the mould. Pack of 2 pieces.

B057-05 100 g weight.

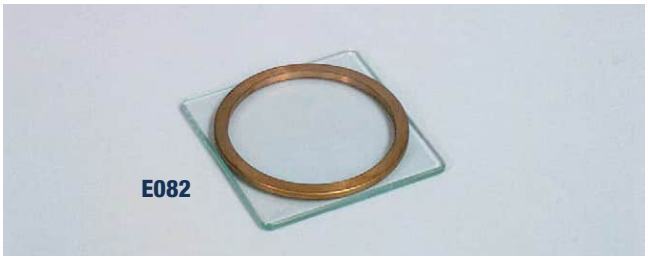
E066-03 Apparatus to check the elasticity of the split cylinder mould.
Complete with 300 g weight.

E066-04 TAMPING ROD 17 mm diameter.
Weight: 70 g

E082
PAT TEST
SOUNDNESS OF HYDRATED LIME AND GYPSUM PLASTERS

STANDARDS: EN 459-1 I BS 890, 1191

Utilized for the determination of the soundness of hydrated lime, gypsum and building plasters.
Consisting of a brass ring mould, 100 mm diameter by 5 mm deep.
The mould has an inside taper of 5°.
Supplied complete with glass base plate.
To perform one test, three moulds are required.



E081-10
STEAM BATH
SOUNDNESS OF BUILDING LIME DETERMINATION

STANDARD: EN 459-2

This bath is used for the determination of the soundness of building limes subjected to steam action at atmospheric pressure for 180 minutes time.
The steam bath, all stainless steel made, holds up to 12 Le Chatelier moulds, approx. 50 mm over the water level.
Two heating elements of 800W and 200W reach the water boiling point in 30 minutes; now a timer disconnects the 800W element, and the water temperature is maintained by the second element, as requested by the Standard.
The cover has a device avoiding the condensed water to drop on the specimens.

Power supply: 230V 1ph 50-60Hz 1000W
External dimensions: 455x215x350 mm
Inner dimensions: 300x150x260 mm
Weight: 9 kg approx.

ACCESSORIES

E066 LE CHATELIER MOULD Technical details : see p. 369
E066-01 GLASS PLATE, 50x50 mm. Pack of 2 pieces.
B057-05 100 g. weight.
E066-03 Apparatus to check the elasticity of Le Chatelier moulds.
E066-04 TAMPING ROD, Ø 17 mm x 70 g weight.

E081-10

E082-11N
WATER VAPOUR PERMEABILITY TEST CELL

STANDARD: EN 1015-19

Used to determine the water vapour permeability of hardened rendering and plastering mortars.
Manufactured from PVC material, resistant to corrosion, it has an opening of approx. 0.02 m² (internal diam. 160 mm), on which the test sample is sealed

Dimensions: Ø 190 mm by 55 mm
Weight: 600 g approx.

E082-11N

Disassembled Assembled

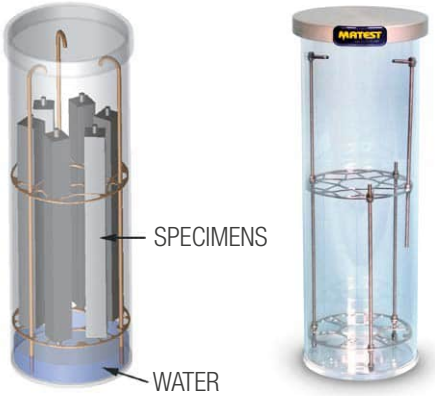
POTENTIAL ALKALI REACTIVITY OF CEMENT-AGGREGATE COMBINATIONS

E067-05
MORTAR BAR CONTAINER

STANDARDS: ASTM C227, C1567 I UNI 8520-22

This test method covers the determination of the potential alkali reactivity of cement-aggregate combinations (mortar bar method).
The device is composd by an acrilic cylinder container with a stainless steel rack.
Dimensions: Ø 170 mm x 450 mm
Weight: 3 kg approx.

Note: Prism moulds, length comparator and accessories: see p. 340



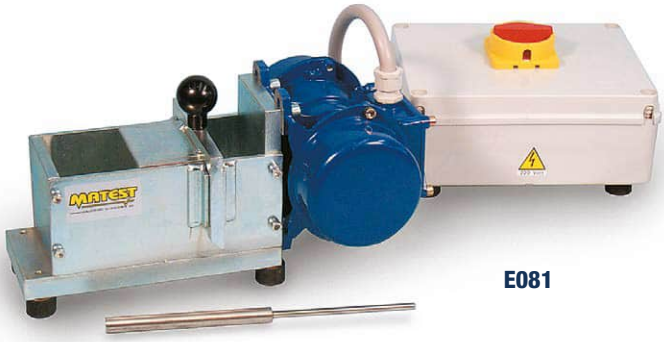
Example **E067-05**

E081
MORTAR WORKABILITY APPARATUS

STANDARDS: EN 413-2 I NF P18-452

Designed to test concrete mortar for dynamic workability and also to ensure optimum proportioning of mortar constituents (sand, water, cement, as well as cement/sand and water/cement ratios) compatible with given application. Suitable also for checking possible improvement when admixing a plastifier, or for comparing two mortar types. The unit consists of a prismatic receiver divided into two unequal volumes by a removable partition, and by an electric vibrator. The fresh mortar is poured in the large volume place, the separating partition is removed and the vibrator stats automatically. As a result of vibrations, mortar flows from the large volume to the small one, in a time which is a function of the workability of the mortar.

Power supply: 230V 1ph 50Hz 110W
Dimensions: 400x200x200 mm
Weight: 18 kg approx.



E081

WORKABLE LIFE AND CORRECTION TIME OF FRESH MORTAR

STANDARD: EN 1015-9 Method A

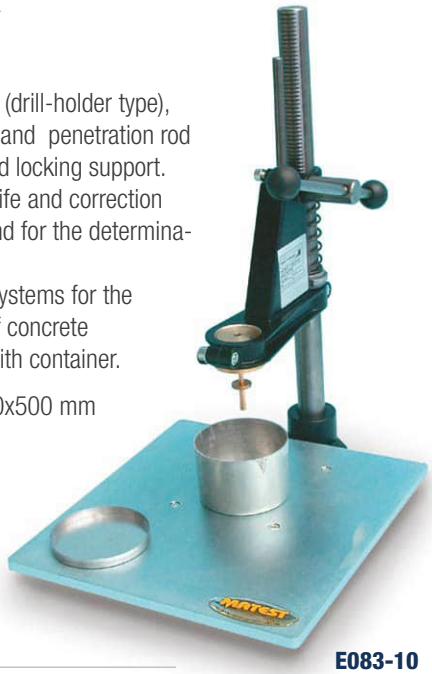
PROTECTION AND REPAIR OF CONCRETE STRUCTURES. DETERMINATION OF STIFFENING TIME

STANDARD: EN 13294

E083-10
LEVER SUPPORT (drill-holder type),

complete with washer and penetration rod brass made, clamp and locking support. Used for the workable life and correction time of fresh mortar, and for the determination of stiffening
time on products and systems for the protection and repair of concrete structures. Complete with container.

Dimensions: 380x300x500 mm
Weight: 12 kg approx.



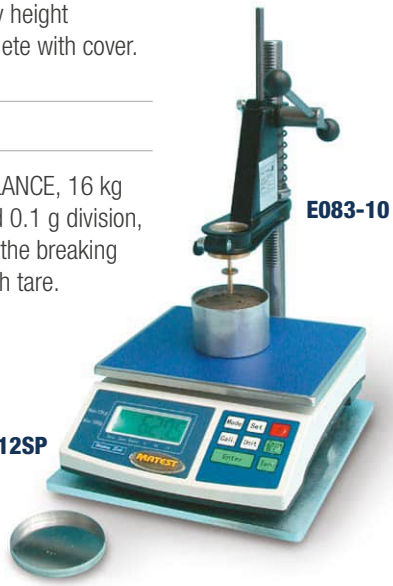
E083-10

SPARE

E083-11 CONTAINER, rigid aluminium made, Ø 90 by height 60 mm, complete with cover.

NEEDED ACCESSORY

V075-12SP DIGITAL BALANCE, 16 kg capacity and 0.1 g division, with hold of the breaking load and with tare.



E083-10

V075-12SP

E067
CRAKING TEST MOULD

STANDARD: NF P15-434

Used to produce ring-shaped specimens designed for cracking tests on hydraulic binders.
This test consists of measuring the formation time of a crack on the test specimen.

Weight: 8 kg

E067

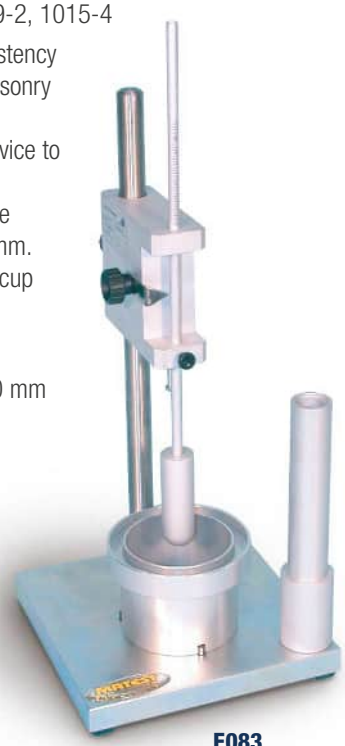
E083
PLUNGER PENETRATION APPARATUS

MASONRY CEMENT, BUILDING LIME CONSISTENCY

STANDARDS: EN 413-2, 459-2, 1015-4

Used to determine the consistency of fresh mortar, lime and masonry cement.
The base is foreseen of a device to locate the test cup.
The height of the drop can be accurately adjusted to 100 mm.
Supplied complete with test cup and tamper, both anodized aluminium made.

Dimensions: 200x200x700 mm
Weight: 8 kg approx.



E083

E080
PLASTER EXTENSOMETER

STANDARDS: BS 1191 I UNI 6782

Utilized to measure the linear expansion of a paste of standard consistence. The extensometer comprises an horizontal cradle 100 mm long x 60 mm wide x 25 mm deep closed at one end and open to the other.
The open end is in contact with a dial gauge spindle, so that the lateral expansion of the specimen is measured. The dial gauge has 10 mm travel and 0.01 mm. graduation.

Dimensions: 250x80x80 mm
Weight: 1 kg approx.

E080

A105
CALCIMETER CARBONATE CONTENT $CACO^3$ IN LIMESTONE AND LIME MARL

Specifications: see p. 59

E082-01N
WATER RETENTION

STANDARDS: EN 413-2

Used for determining the water retention of masonry cements.
Made from rigid plastic inside
Ø 100 ± 1 mm, inside height 25 ± 1 mm

Weight: 300 g approx.

E082-01N

A105

FLOW TABLES

FOR FLOW AND WORKABILITY TESTS OF MORTAR AND LIME

STANDARDS: EN 459-2, EN 1015-3, EN 13279-2 I ASTM C230, C1437 I *comparable to BS 4551-1

To perform this test, a specimen contained in a cone mould is placed on a metal surface which is then raised and dropped from a known height, after releasing the specimen from the mould.
The equipment consists of a circular top table with spindle, tripod, bronze flow mould and tamper for ASTM models and stainless-steel for EN models.
The apparatuses to EN Standards are equipped also of a filling hopper. Motorized models foresee an automatic digital drop counter.
The flow tables mod. E090N-KIT and E090-01N-KIT meet EN 459-2, EN 1015-3 and EN 13279-2 Specifications.

Power supply (motorized models): 230V 1ph 50Hz 150W **Weight:** 25...60 kg approx.

E090N-KIT

E090-01N-KIT

E086-KIT

E087-KIT

ACCESSORIES

E087-01 FLOW CALLIPER to ASTM and BS Standards, for measuring the diameter of the sample. Brass made. Weight: 450 g.

E090-08 FLOW CALLIPER to EN 459-2 and EN 1015-3 Specifications.

E087-01

E090-08

SPARE

E085-07N FILLING HOPPER to the mould. Standard: EN 459-2 **

Model	Standard	Operated Hand	Operated Motorized	Table Ø mm	Drop height mm	Spare mould	Spare tamper
E086-KIT	ASTM C230 *(BS 4551-1)	▼		254	12.7	**E087-05**	**E087-06**
E087-KIT	ASTM C230 *(BS 4551-1)		▼	254	12.7	**E087-05**	**E087-06**
E090N-KIT	EN 459-2 EN 1015-3 EN 13279-2	▼		300	10	**E085-05N ****	**E085-06**
E090-01N-KIT	EN 459-2 EN 1015-3 EN 13279-2		▼	300	10	**E085-05N ****	**E085-06**

**** Note:** As an alternative to E085-07N and E085-05N, bronze versions are also available respectively coded E085-07 and E085-05

E142
DIGITAL PULL-OFF (BOND) STRENGTH TESTER. CAPACITY: 16 KN

STANDARDS: EN 1542, EN 1348, EN 1015-12, 12004-2, EN 13687-2, EN 13892-8, EN 13963, EN 14496 | BS 1881-207 | ISO 4624

This dynamometer measures the adhesive force and the tensile strength of two layers of materials (concrete, facing plasters, mortars, building plasters, lime etc.) and is particularly suitable for applications concerning testing repairs of any structure where the bond strength between two layers is an essential factor.
Compact, light, for use in any location, this Pull-Off Tester is fitted with a load cell and high resolution large digital display unit; it is therefore suitable for measurements from low loads up to 16 kN, granting a wide working range and ideal for a large number of applications and materials. The direct tensile force is applied by rotating the hand wheel.
The three feet of the unit can be fixed in the **large** position (circunference with 176 mm diameter) with very stable bearing, or in the **compact** position (circunference with 92.5 mm diameter), to perform tests in narrow spaces or for specimens close one to the other.

Specifications:
- Resolution: 10 N
- Working range: 0.25 to 16 kN
- Accuracy and repeatability: better than ± 1%
- Complete with traceable calibration certificate
- Battery operated
- Serial port for PC connection
- Hand wheel rounds: 60 with mechanical round/counter
- Graphic indication of the applied load rate
- Seat ball assuring axial/central load application

Supplied complete with carrying case, but **without** accessories to perform the test, which have to be ordered separately.
To perform the test a common electric drill is required.

Dimensions: 460x280x370 mm
Weight: 10 kg approx.

E142
with feet
in large position

E142
in aluminium case

ACCESSORIES

E142-10 SOFTWARE to download test results.

E143 ADHESION TEST ALUMINIUM DISC 20 mm Ø by 21 mm thick (n° 10 pieces). Compliant to ISO 4624

E143-01 ADHESION TEST ALUMINIUM DISC 50 mm Ø by 31 mm thick (n° 10 pieces). Compliant to EN 1542, 1015-12, 13687-2

E143-10 ADHESION TEST STAINLESS STEEL DISC 50 mm Ø by 21 mm thick (n° 10 pieces). Compliant to EN 1542, 1015-12, 13687-2, 13892-8

E143-13 ADHESION TEST ALUMINIUM DISC, square, 50x50 mm, 21 mm thick (n° 10 pieces)
Compliant to EN 1348, EN 12004-2

E143-11 CYLINDRICAL RING, having truncated cone shape, inside Ø 50 mm
Standard: EN 1015-12

E143-02 DRILL BIT WITH CENTERING BIT, for the preparation of the test surface. Nominal diameter: external 25 mm, internal 20 mm

E143-03 DRILL BIT WITH CENTERING BIT, for the preparation of the test surface. Nominal diameter: external 57 mm, internal 50 mm

E142-01
DIGITAL PULL-OFF TESTER CAPACITY: 5 KN

Identical to mod. E142 but with load cell and digital display range 0-5 kN for more accurate measurements on low strength values

SPARE

E143-09 Tie rod with spheric head for Disc/Dynamometer coupling.

E092M

MIXMATIC

AUTOMATIC PROGRAMMABLE COMPUTERIZED MORTAR MIXER HIGH PERFORMANCE

STANDARDS: EN 196-1, EN 196-3, EN 413-2, EN 459-2, EN 480-1 I DIN 1164-5, DIN 1164-7 I ASTM C305, C359, C451 I AASHTO T162 I ISO 679

Mixmatic has an extremely sturdy fabricated frame for an intensive laboratory use. Complete with stainless steel polished beater, mixing bowl (5 litre capacity) and automatic sand dispensers having dimensions and geometry to grant the correct sand insertion, without residual and disaggregation between fine and coarse portions. Dispenser for additives (see accessory mod. E092-05). Dispenser for automatic water addition (see accessory mod. E092-06).

E092M

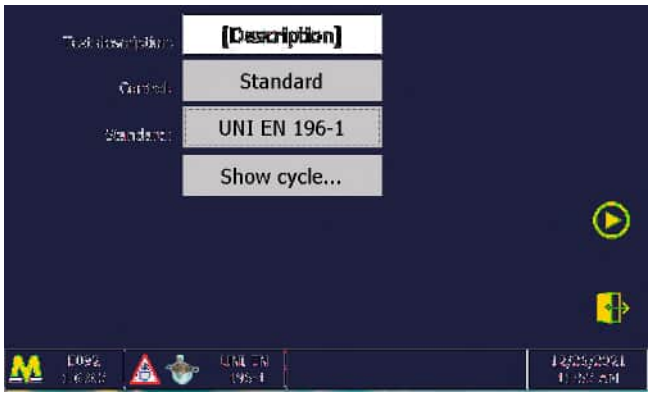
Firmware:

- Different automatic programmable mixing cycles conforming to the a.m. Standards.
- The operator can also program up to 30 automatic personalized mixing cycles, easy to set through Touch Screen.
- Acoustic signals synchronised with cycle steps.
- Electronic control unit, 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.
  Unlimited memory storage through the USB port.
- Rotational motor feeded through inverter to grant the max. precision of the rotational speed, adjustable by the operator on the display.
- Possibility of manual mixing cycle.
- Possibility to select different languages.
- Display of elapsed time from the start of the mixing, speed of the beater, introduction of sand/water, status of the safety switch.
- Graphic display TFT 7", 800x480 pixel, Touch Screen.

Power supply: 230V 50-60Hz 1ph
Dimensions: 580x570x830 mm
Weight: 85 kg approx.

MAIN FEATURES

- Rugged design.
- Planetary transmission for silent and low maintenance operation.
- Transparent CE-conform protection of the mixing area, to allow the mixture looking during the test.
- Digitally controlled rotation speed.
- Easy and fast bowl insertion and removal.
- Safety system of bowl presence and correct position to avoid dangerous working, with double sensor of removed bowl with load/unload sequential discrimination.
- Emergency stop button.



Selection of the Standard

E092M MIXMATIC

Test execution

Personalized cycle composition

E092-05

E092-06

SPARES

E092-10 Stainless steel bowl 5L cap.
E095-04 Stainless steel beater, accurately polished.

ACCESSORIES

E092-05 DISPENSER with hopper to ease the manual introduction of water or powders into the bowl, also during the mixing phase.

E092-06 DISPENSER with hopper for the automatic introduction (managed by the software) of additives into the bowl, also during the mixing phase.

E097-01N REFERENCE SAND, size from 0.08 to 2 mm to EN 196-1 Standard.
Bag of 1350 g. Pack of 16 bags for total of 21.6 kg

E097-02 GRADED STANDARD SAND, type Ottawa, to ASTM C109, C778 Standards. Bag of 50 lbs approx.

E097-02SP GRADED SAND, comparable to E097-02.
Bag of 25 kg approx.

E097-02SP

Use examples

MORTAR MIXERS

STANDARDS: EN 196-1, EN 196-3, EN 413-2, EN 459-2, EN 480-1 I DIN 1164-5 I ASTM C305, C359, C451 I AASHTO T162

E093N + E095-03

NEW

E094N + E095-03

MODELS

E093N
AUTOMATIC MORTAR MIXER

This very robust mixer is expressly designed for the efficient mixing of cement pastes and mortar, with **four** automatic sequences of mixing cycle, in compliance with:
EN 196-1, EN 196-3, EN 480-1, ASTM C305M Specifications.
Bowl capacity is 4.7 litres
Two speeds can be selected:
140 or 285 rpm for the revolving action
62 or 125 rpm for the planetary action
It is possible to select the manual working, or one of the two automatic programs.
By operating automatically on changes of speed, stops and mixing sequences, outlined by acoustic signal, the unit performs the mixing cycle.
The unit is equipped with an automatic sand dispenser which fills the sand into the mixing bowl for a period of 30 seconds (EN 196-1 program). Complete with safety grid conforming to CE Safety Directive; if opened it automatically stops the machine.
Supplied complete with stainless steel bowl, bajonet coupling between beater and shaft, but **without beater** which has to be ordered separately (see mod. E095-03 or E095-04).

Power supply: 230 V 1ph 50 Hz
Dimensions: 450x480x760 mm.
Weight: 55 kg approx.

E094N
MORTAR MIXER

Basically similar to mod. E093N, but not equipped of automatic program, sand dispenser and safety door.
Two speeds can be selected. Supplied complete with stainless steel bowl, but **without beater** which has to be ordered separately.
This mixer can be supplied only to extra CE markets.

Dimensions: 450x480x680 mm
Weight: 45 kg approx.

E094NSP
+ E095-03

E094NSP
MORTAR MIXER

Same as mod. E094N but equiped also with sand dispenser.

E095N
MORTAR MIXER

Basically similar to mod. E094N, but complete with sand dispenser and safety grid to CE Safety Directive.
Two speeds can be selected. Supplied complete with stainless steel bowl, but **without beater** which has to be ordered separately.

Dimensions: 450x480x760 mm
Weight: 45 kg approx.

E096-01

E095N + E095-03

ACCESSORIES FOR E093N, E094N, E095N MIXERS

E095-03 STAINLESS STEEL BEATER with bayonet fittings.

E095-04 STAINLESS STEEL BEATER with bayonet fittings. The beater is accurately polished to eliminate the porosities.

B028-03 WHISK BEATER, thin wire, stainless steel, for mixing admistured and other materials.

E096-01 DISPENSER WITH HOPPER, to ease the manual introduction of water, additives etc. into the bowl also during the mixing phase. Accessory to mod. E093N and E095N mixers.

E097-01N REFERENCE SAND, size from 0.08 to 2 mm to EN 196-1 Standard.
Bag of 1350 g. Pack of 16 bags for total of 21.6 kg

E097-02 GRADED NATURAL SILICA SAND, type Ottawa, to ASTM C109, C778 Standards. Bag of 50 lbs approx.

E097-02SP GRADED SAND, type Ottawa 25 kg, bag comparable to ASTM C109, C778 Standards.

B028-03

E097-02SP

SPARE PARTS FOR E093N, E094N, E095N MIXERS

E095-01 Stainless steel bowl.

E095-05 Bajonet coupling between beater and shaft

E102
THREE GANG MOULD
FOR 40.1x40x160 MM PRISMS
STANDARDS: EN 196-1 I EN ISO 679

Steel manufactured with **hardness of inside walls over HV 200**, it meets the dimensional tolerances to EN 196-1 Standard. All surfaces are grinded and all parts are marked with an identification number for a correct assembling.
Supplied with Certificate of Conformity. **Weight:** 8560 g.

E102P
THREE GANG PLASTIC MOULD
FOR 40x40x160 MM PRISMS
Made of light, durable and undeformable plastic. It does not need any mounting or demounting operations, the sample is expelled using compressed air or water. Complete with lid, handles and stoppers.

SPARE

E102P-01 SPARE STOPPERS (pack of 30 pcs)

E103
THREE GANG VERIFIED MOULD
FOR 40.1x40x160 MM PRISMS
STANDARDS: EN 196-1 I EN ISO 679

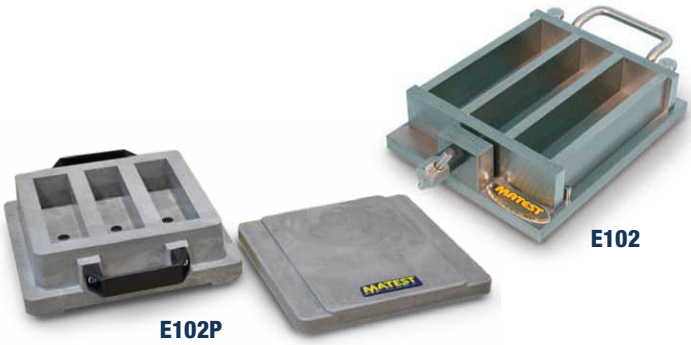
Identical in shape to mod. E102, but manufactured from heavy duty steel **with hardness of inside walls over HV 500** (EN196-1 Specifications recommend hardness HV 400). This high hardness value keeps the mould within the tolerances requested by Spec. for many tests, granting very long utilisation life. All parts are marked with an identification number for a correct assembling. Each mould is individually verified in the dimensional tolerances, hardness, squareness, flatness and roughness, with certified instruments.
Supplied with Certificate of Conformity. **Weight:** 8560 g.

E105
THREE GANG MOULD
FOR PRISMS 40x40x160 MM
STANDARDS: ASTM C348 I DIN 1164

Made from steel, hardness 55 HRB, it conforms to the above mentioned Specifications. **Weight:** 8 kg approx.

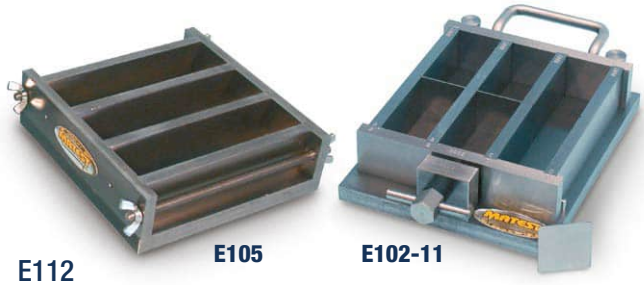
ACCESSORIES

E106 FEED HOPPER, used to fill the mould E102, E103, E105 when it is mounted on the Jolting machine E130, E131 Made from cast aluminium. Weight: 1 kg
E102-02 LARGE AND SMALL SCRAPER to EN 196-1
S200-11 STRAIGHT EDGE 300 mm long.
E102-03 GLASS PLATE 220x190x6 mm to cover the mould.
E102-04 PLUGS for thermal expansion to EN 1770, for prisms produced with E102 and E103 (pack of 12 pcs.)



E102-11
SIX GANG MOULD FOR 40.1x40x80 MM
STANDARD: EN 12808-5

DETERMINATION OF WATER ABSORPTION on grouts for floor or wall installation of ceramic tiles.
Identical to mod. E102, but equipped with three steel partitions, positioned in the middle of the gangs, to obtain six gangs having dimensions 40.1x40x80 mm approx. **Weight:** 8600 g



E112
THREE GANG MOULD FOR 70.7x70.7x282.8 MM
STANDARD: NF P18-401
Made from steel. **Weight:** 17 kg approx.

E111
BRIQUETTE MOULD
STANDARDS: ASTM C190, C307 I AASHTO T132
Accurately machined it conforms to the above Specifications and can be easily disassembled. Complete with base. **Weight:** 3 kg

E110-01
THREE-GANG MOULD FOR CUBE 40 MM NEW
Ground steel mould for three cubes 40mm sides.
Dimensions: 190x100x47 mm approx.
Weight: 2 kg approx.

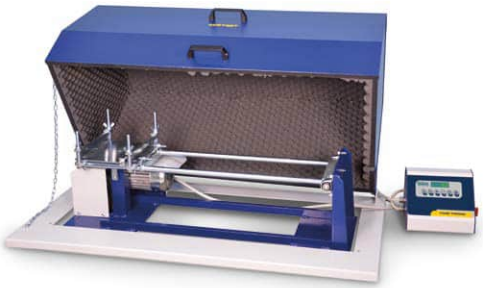
E110
50 MM THREE GANG CUBE MOULD
STANDARD : Comparable to ASTM C109
Made from steel, hardness 55 HRB, it can be also used for soil and other materials. **Weight:** 6 kg approx.

E130
JOLTING APPARATUS
STANDARDS: EN 196-1 I EN ISO 679

Used to compact cement mortar prisms 40x40x160 mm in the three gang mould, as requested by the above Specifications.
The apparatus, consists of a table holding the mould, seated on a rotating cam driven at 60 revolutions per minute. The jolting group is connected to the table by bayonet joints for quick checking of the weights.
The drop height (15 mm) is adjustable to keep it correct also after intensive uses. The apparatus is supplied with separate control panel including main switch, automatic digital drop counter, start/stop push button.
If used with Matest moulds, it grants compliancy to the Standards. However the apparatus accepts also other manufacturers moulds.

Power supply: 230V 1ph 50Hz 500W
Dimensions: 1000x380x420 mm
Weight: 65 kg approx.
Noise: 83 dB approx.

E130



E130-11 + E130

E130-11
CABINET
Manufactured from sheet steel, internally lined with sound-proofing material for noise reduction, to be used with the Jolting apparatus E130, E131N (it reduces the noise to 68 dB).
Front opening with rear hinges and jacks to facilitate the lifting.
Concrete base minimum 1350 x 670 mm is requested.

Dimensions: 1300x510x700 mm
Weight: 25 kg approx.

E131N
JOLTING APPARATUS HIGH PERFORMANCE
STANDARDS: EN 196-1 I EN ISO 679
Similar to model E130, but manufactured with oversized components, treatments and extremely accurate couplings for intensive use in heavy conditions.
Motor feeded by an inverter to grant the keeping of 60 revolutions per minute in any condition.

Power supply: 230V 1ph 50-60Hz 500W
Weight: 93 kg approx.
Noise: 83 dB approx.

E131N with mould and hopper

E132
VIBRATING MACHINE FOR 70.7 MM CUBE MOULDS
STANDARD: BS 4550
The mould is mounted on a vibration platform with excentric mechanism. The machine is supplied complete with separate control panel with timer, but **without cube moulds** to be ordered separately.

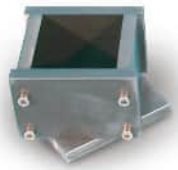
Power supply: 230V 1ph 50Hz 250W
Weight: 100 kg approx.

E132 with mould

E133
CUBE MOULD 70.7 MM
STANDARD: BS 4550

Made from steel with dimensions as specified by above Standard.
Complete with base plate
(three moulds required for each test).

Weight: 3 kg approx.



E133

WATER BATHS FOR CEMENT CURING
AND FOR GENERAL LABORATORY PURPOSE

STANDARDS: EN 196-1, 196-8 I ISO 679 I ASTM C109, C190, C191, C511

Double walled all stainless steel made, with wool insulation and water circulation electric stirrer, the bath ensures an uniform and constant temperature.
Temperature range: from ambient to +60 °C with accuracy of ± 0.4 °C at 20 °C.
The bath is equipped with digital thermostat and a dual safety thermostat with higher thermic threshold ensuring safe working conditions.
A cooling coil device to be connected to the water net is used when room temperature exceeds the requested one, with possibility to reduce the bath temperature within the room and water net conditions.
The specimens are held by a perforated shelf spaced from the bottom.

E136

E136-01

MODELS

E136
WATER BATH, 40 LITRES CAPACITY

It can hold over 60 specimens 40.1x40x160 mm

Internal dimensions: 510x350x230 mm
Overall dimensions: 680x420x420 mm
Power supply: 230V 1ph 50-60Hz 1200W
Weight: 28 kg approx.

E136-01
WATER BATH, 200 LITRES CAPACITY

Internal dimensions: 900x600x360 mm
Overall dimensions: 1050x680x430 mm
Power supply: 230V 1ph 50-60Hz 4000W
Weight: 55 kg approx.

B052-02
WATER BATH WITH COOLING DEVICE

Similar to mod. E136, but with temperature range: +3 to +95 °C.
Accuracy of ± 0.4 °C at 20 °C.
The cooling unit is housed under the water bath.

Inside dimensions: 635x360x205 mm
Outside dimensions: 800x430x1000 mm
Power supply: 230V 1ph 50Hz 1650W
Weight: 60 kg approx.

B052-02

E139
CURING CABINET

Both external and internal walls are stainless steel made, and insulated by a 50 mm thick glass wool.
The cabinet has an inner inspection glass door.
Temperature range: from ambient to 60 °C, with digital thermostat.
Humidification achieved through water heating.
A dual safety/thermostat with higher thermic threshold ensures safe working conditions.

Power supply: 230V 1ph 50-60 Hz 1000 W
Inside dimensions: 620x440x400 mm
Overall dimensions: 900x700x800 mm
Weight: 60 kg approx.

E139

ACCESSORY

S155-10A
CONTROL ALCOHL THERMOMETER range 0-50 °C div. 0.5 °C.

E138
LARGE CAPACITY CURING CABINET

STANDARDS: EN 196-1 I ISO 679

For curing large quantities of mortar, cement and concrete specimens, at controlled humidity and temperature.
Aluminium and policarbonate made, it is complete with precision digital thermostat and four robust shelves.
The humidity from 90% to saturation is maintained through water nebulizers activated by compressed air, and the temperature by an immersion heater and refrigerator unit (accessory mod. E141).
Temperature range: from ambient to +30 °C, accuracy ± 1 °C.
The cabinet requires a compressed air source. (see accessory).

Inside dimensions: 1090x470x1200 mm
Overall dimensions: 1350x570x1600 mm
Power supply: 230V 1ph 50-60Hz 2000W
Weight: 100 kg approx.

E138

ACCESSORIES for mod. E138

V206-01 AIR COMPRESSOR, air displacement: 250 litres/min. Tank capacity : 100 litres (see p. 554) Recommended for standard use.

V206-02 AIR COMPRESSOR, air displacement: 400 litres/min. Tank capacity : 200 litres (see p. 554) Recommended for intensive or continuous use .

E138-11 TUBING AND ACCESSORIES to connect the E138 cabinet to the air compressor

E134-11 PAN, 240x300x70 mm, polythene made, it accepts up to six 40.1x40x160 mm prisms for curing in water.

E134-11

ACCESSORY for mod. E136, E136-01, E138

E141
WATER REFRIGERATOR

It cools the water from room temperature up to +10 °C with supply capacity of 2 litre/minute.
Stainless steel made, complete with motor pump, digital thermostat sens. 0.1°C, it is connected to water baths and tanks where a lower temperature than the room one is required.
Complete with tubing and accessories for bath connection.

Power supply:
230V 1ph 50Hz 750W
Dimensions:
550x500x880 mm
Weight: 55 kg approx.

E141

E140
CURING BENCH WITH COOLING HEATING SYSTEM

STANDARDS: EN 196-1, 12390-2 I ISO 679 I ASTM C109, C190, C191, C511

Suitable for curing large quantities of cement, mortar and concrete specimens at controlled temperature and humidity.
Temperature range: +18 °C to +30 °C with accuracy ± 1 °C
Measurement, display, and control function for temperature only.
Humidity range: 95% to saturation
Useful capacity: 540 litres
Fully stainless steel made with insulation panels.
4 access doors and 4 grids, 530x310 mm each, adjustable in height. Thermostatic group including refrigerating unit, compressor, condenser, evaporator, control and safety devices are installed laterally for easy inspections.
The upper side can be used as working bench.

Power supply: 230V 1ph 50-60Hz
Dimensions: 2250x700x850 mm **Weight:** 460 kg approx.

E140

ACCESSORIES for E140

E140-10 ADDITIONAL SHELF, suitable for loads up to 40 kg. E140 can fit a maximum of 16 shelves.

E140-11 FILTRATION KIT, strongly suggested.

COMPRESSION AND FLEXURAL TESTING MACHINES FOR MORTAR STRENGTH DETERMINATION

In the cement and mortar section we are in the position to supply the widest and most complete range of compression/flexural testing machines today available in the worldwide market, making Matest the leader manufacturer of strength testing machines.
The versatility and flexibility of Matest production range allows the enduser to select a cement compression/flexural frame to be combined with another frame (like for example concrete compression frame) in order to satisfy and to personalize any specific requirement.

The next pages describe:

- Measuring and control systems (p. 383)
- Two columns machines with only one measuring range for **compression tests only**: 250kN to 500kN capacity load (p. 384-385)
- Two columns machines with **double measuring range** with the same testing chamber, for **compression and flexural tests**. Ranges: 250kN to 500kN for compression tests, and 15kN for flexural tests (p. 386-387)
- Machines with **double testing chamber** and **two independent measuring ranges**, for **compression** tests in the chamber 300kN capacity, and **flexural** test in the chamber 15kN capacity (p. 390)
- Combined groups for compression and flexural tests on mortars, compression/flexural tests on concrete, splitting, block tests; suitable to personalize and satisfy any specific requirement (p. 393)

C108N DIGITEC | C098N AUTOTEC

Two-channels computerised graphic display system to control and manage all sorts of automatic (Autotec C098N) and semi-automatic (Digitec C108N) testing machines, for acquisition, display, processing, printing and saving the test data and certificates, with software for remote control from PC.

Note: further details at p. 212

C108N

C109M CYBER-PLUS PROGRESS
C104N SERVO-PLUS PROGRESS

Designed with the latest technology, an innovative PC-like touch-screen system, employed to control and manage all sorts of automatic (Servo-Plus Progress C104N) and semi-automatic (Cyber-Plus Progress C109M) testing machines.

Note: further details at p. 213

C109M

SMARTLAB SOFTWARE

FOR COMPRESSION AND FLEXURAL TESTS ON CEMENT AND MORTAR

STANDARDS: EN 196-1 | ASTM C109, C348, C349

SmartLab for cement and mortar allows the management and control of multiple machines. In addition, the software offers the possibility to acquire and process data in accordance with international Standards. SmartLab is compatible only with Cyber-Plus/Servo-Plus Progress machines.

SSW-LINK

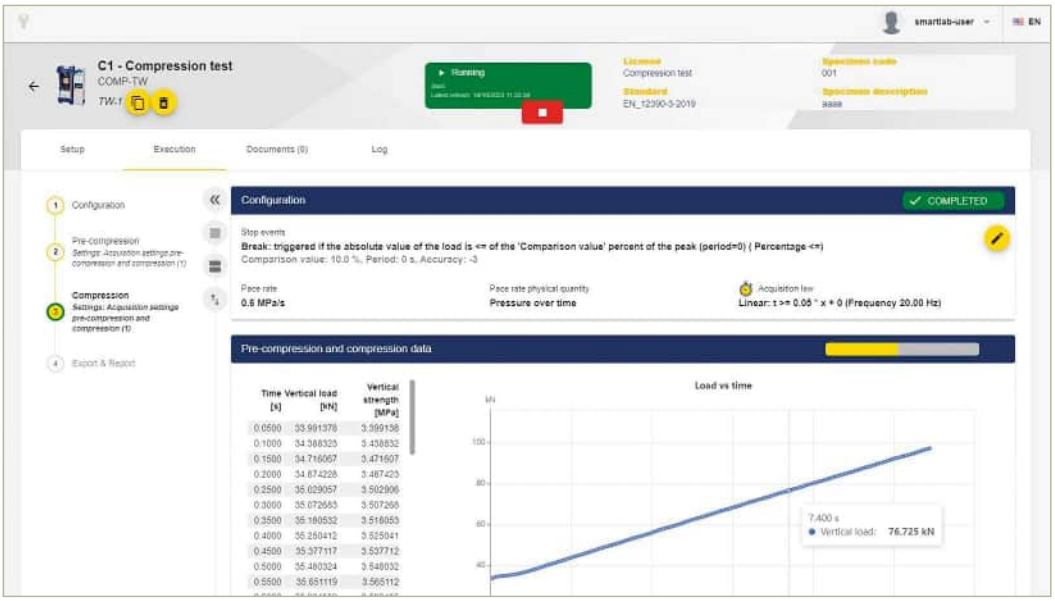
FIRMWARE UPGRADE

In order to use the SmartLab software, it is necessary to purchase the firmware license which unlocks up to three machines (e.g. 1 shear machine, 1 compression machine, 1 tensile machine).

Note: further details at p. 20

ACCESSORIES

SPC SmartLab PC (minimal requirements at p. 20)
S334-11 Network connection RJ45 cable
S334-12 Switch for Cyber-Plus Progress
SSW-GWAY SmartLab Gateway communication protocol (further details at p. 20)



Ongoing compression test

MACHINES FOR COMPRESSION TESTS ONLY

TO TEST CEMENT AND MORTAR SPECIMENS, BRICKS, ROCKS, REFRACTORIES PROPPANTS ETC.

STANDARDS: EN 196-1 I EN 1015-11, EN 13892-2 I ISO 679 I ASTM C109, C349, C1194 I DIN 1164 I BS 4550 I GOST 26798-1
EN ISO 13503-2 I API RP 19C

Designed to perform compression tests on portions of prism 40.1x40x160 mm, cubes side 40, 50, 70, 100 mm and 2"; cores with max. height of 180 mm or using the suitablecompression devices described in next pages (accessories mod. E170, E171-01 etc.)

Equipped with an electric microswitch to stop the piston after the specimen breakage, in order to avoid damages to the compression or flexure device.

DIAL GAUGES MODELS

- Gauge Ø 200 mm, range 0-300kN, subdiv. 2.5kN

MAIN FEATURES FOR ALL MODELS

- Two columns high stiffness frame.
- Max. vertical daylight between platens: 185 mm
- Horizontal daylight between columns: 175 mm
- Platens diameter: 153 mm
- Ram travel: 45 mm approx.
- Accuracy: Class 1 starting from 10% of the full scale
- Supplied complete with lower compression platen and coupling piece to easily fix the compression device.
- Power supply (motorized models): 230V 1ph 50Hz 750W
- Dimensions: 660x370x930 mm approx.
- Weight: 300 - 330 kg

E159D + C127N + E170

E161A + C127N + E170

COMPRESSION				LOAD MEASURING SYSTEM		
MODEL	Max load kN	Manual	Motorized	Gauge	Digitec mod. C108N (p. 212)	Autotec mod. C098N (p. 212)
E151	300	▼		▼		
E155	300		▼	▼		
E159D	500		▼		▼	
E159-01D	250		▼		▼	
E161A *	250		▼			▼
E161-02A *	500		▼			▼

Accessories at page 388-389

MACHINES FOR ONLY COMPRESSION TESTS

TO TEST CEMENT AND MORTAR SPECIMENS, BRICKS, ROCKS, REFRACTORIES ETC.

STANDARDS: EN 196-1 I EN 1015-11, EN 13892-2 I ISO 679 I ASTM C109, C349, C1194 I DIN 1164 I BS 4550 I GOST 26798-1
EN ISO 13503-2 I API RP 19C

CYBER-PLUS OR **SERVO-PLUS PROGRESS** DIGITAL TOUCH-SCREEN DISPLAY

Cyber-Plus Progress control unit 7" touch-screen display, up to 8 channels for pressure, load, displacement and other transducers, 2 USB and 1 ethernet ports.

E159N + C127N + E170 | E161N + C127 + E170

COMPRESSION			LOAD MEASURING SYSTEM	
MODEL	Max load kN	Motorized	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)
E159N	500	▼	▼	
E159-01N	250	▼	▼	
E161N *	250	▼		▼
E161-02N *	500	▼		▼

* Servo-Plus/Autotec models feature fully automatic power pack - electrovalve operated test start (no manual lever).

Accessories at page 388-389

COMPRESSION/FLEXURAL TESTING MACHINES WITH DUAL MEASURING RANGE

TO TEST CEMENT AND MORTAR SPECIMENS, BRICKS, ROCKS, REFRACTORIES ETC.

STANDARDS: EN 196-1, EN 13286-41, EN 933-5, EN 1015-11, EN 13892-2 I ISO 679 I ASTM C109, C348, C349, C1194 I DIN 1164 BS 4550 I GOST 26798-1 I EN ISO 13503-2 I API RP 19C

These testing machines foresee **a dual measuring range in the same testing chamber**. The two ranges can be used alternatively and are suitable to perform:

- Flexural tests on cement prisms 40.1x40x160 mm (selecting the low capacity range)
- Compression tests on portions of prism 40.1x40x160 mm broken in flexure, cubes side 40, 50, 70, 100 mm 2", cores with max. height of 180 mm (selecting the nominal range).

The measuring range 0 - 15kN can be also used for compression tests on specimens with expected low strength values.

Equipped with an electric microswitch to stop the piston after the specimen breakage, in order to avoid damages to the compression or flexure device.

MAIN FEATURES FOR ALL MODELS

- Two columns high stiffness frame.
- Max. vertical daylight between platens: 185 mm
- Horizontal daylight between columns: 175 mm
- Platens diameter: 153 mm
- Ram travel: 45 mm approx.
- Two pressure transducers granting the Class 1 starting from 10% of the scale for both the ranges.
- Supplied complete with lower compression platen and coupling piece to easily fix the compression devices.
- Power supply (motorized models): 230V 1ph 50Hz 750W
- Weight: 310 - 340 kg

E160D + E170

E161-01A + E172-01

COMPRESSION I FLEXURAL				LOAD MEASURING SYSTEM		
MODEL	Dual range kN	Manual	Motorized	Gauge	Digitec mod. C108N (p. 212)	Autotec mod. C098N (p. 212)
E152	300/50	▼		▼		
E156	300/50		▼	▼		
E160D	500/15		▼		▼	
E160-01D	250/15		▼		▼	
E161-01A *	250/15		▼			▼
E161-03A *	500/15		▼			▼

Accessories at page 388-389

COMPRESSION/FLEXURAL TESTING MACHINES WITH DUAL MEASURING RANGE

TO TEST CEMENT AND MORTAR SPECIMENS, BRICKS, ROCKS, REFRACTORIES PROPPANTS ETC.

STANDARDS: EN 196-1, EN 13286-41, EN 933-5, EN 1015-11, EN 13892-2 | ISO 679 | ASTM C109, C348, C349, C1194 | DIN 1164
BS 4550 | GOST 26798-1 | EN ISO 13503-2 | API RP 19C

itTECH
CYBER PLUS PROGRESS

CYBER-PLUS OR **SERVO-PLUS PROGRESS** DIGITAL TOUCH-SCREEN DISPLAY

Cyber-Plus Progress control unit 7" touch-screen display, up to 8 channels for pressure, load, displacement and other transducers, 2 USB and 1 ethernet ports.

E160N + E170

E161-01N + C104-04 + C127N + E172-01

COMPRESSION I FLEXURAL			LOAD MEASURING SYSTEM	
MODEL	Dual range kN	Motorized	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)
E160N	500/15	▼	▼	
E160-01N	250/15	▼	▼	
E161-01N *	250/15	▼		▼
E161-03N *	500/15	▼		▼

* Servo-Plus/Autotec models feature fully automatic power pack - electrovalve operated test start (no manual lever).

Accessories at page 388-389

ACCESSORIES FOR FLEXURE | COMPRESSION MACHINES

E172-01 FLEXURE DEVICE for 40.1x40x160 mm mortar specimens. EN 1015-11, EN 196-1, EN 13892-2, ISO 679 (for dual range machines only)

E172-02 FLEXURE DEVICE for 40x40x160 mm mortar specimens. ASTM C348 (for dual range machines only)

E172-01

E170 COMPRESSION DEVICE for portions of prism 40.1x40x160 mm broken in flexure. EN 196-1, EN 13892-2, ISO 679, ASTM C349

E170

E170-01

E170-01 COMPRESSION DEVICE for portions of 40.1x40x160mm prism broken in flexure. DIN 1164

E170-01GO COMPRESSION DEVICE for portions of 20x20x100 mm prism broken in flexure. GOST 26798.1

E170-01GO

E171

E171 COMPRESSION DEVICE for cubes 50 mm and 2" side. ASTM C109, C1194

E171-01 COMPRESSION DEVICE for cubes 70.7 mm side. BS 4550

E171-01

Note: For more details, other models of flexure and compression devices with accessories, see p. 392

E161-05 DISTANCE PIECE, 50 mm high

E161-06 DISTANCE PIECE, 25 mm high

Note: compression and flexure devices do not require any distance piece.
For 100 mm cubes 1 x E161-05 + 1 x E161-06 are needed.

C127N GRAPHIC PRINTER on thermo-paper on board

C127-11 THERMO-PAPER roll for printer (pack of 10 rolls)

E161-12 SAFETY GUARDS, polycarbonate made, to CE Safety Directive, complete with hinges and lock

C121-51 STOP SWITCH on safety guards. See p. 292

C097-05 CLASS 1, starting from 1% of the full range. With a special calibration procedure it is possible to grant Class 1 practically on the full range of the compression machine.

E161-11 BENCH, to hold the compression frame, 450 mm high.

E161-11

C115-01 TWO WAY HYDRAULIC VALVE, to activate a second frame. Technical details: see p. 293

C115-01

C106-10 FLEXURAL DEVICE FOR CONCRETE BEAMS 100x100x400 mm and 150x150x600 mm

C106-10

H009-01 PERSONAL COMPUTER, LCD 22” monitor, keyboard, mouse, cables. The supply of the PC includes the installation of UTM2 software

ACCESSORIES FOR DISPLACEMENT READING OPTION

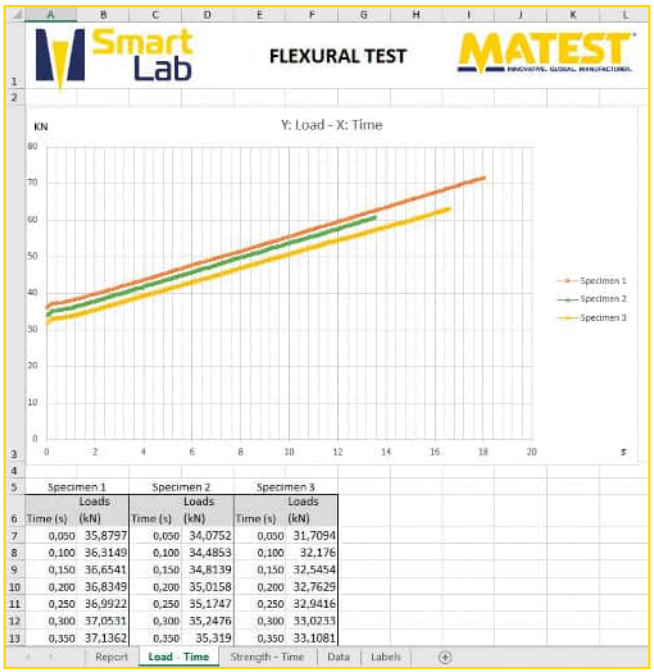
C104-10N In-built firmware for compression test with displacement control. For Servo-Plus machines only.

C109-14N In-built firmware for flexure test with displacement control. For Servo-Plus machines only.

S336-14 LINEAR DISPLACEMENT TRANSDUCER, 50 mm travel, to measure the piston stroke. Other models at p 503

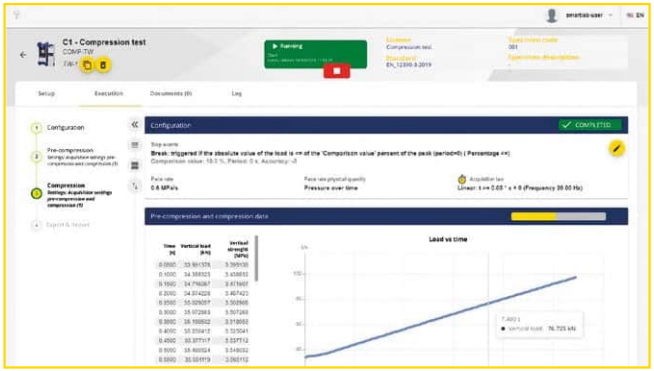
S337-51 CALIBRATION PROCESS for the displacement transducer.

C104-31 MAGNETIC HOLDER for the displacement transducer.



Specimen 1		Specimen 2		Specimen 3	
	Loads		Loads		Loads
Time (s)	(kN)	Time (s)	(kN)	Time (s)	(kN)
0,050	35,8797	0,050	34,0752	0,050	31,7094
0,100	36,3149	0,100	34,4853	0,100	32,176
0,150	36,6541	0,150	34,8139	0,150	32,5454
0,200	36,8349	0,200	35,0158	0,200	32,7629
0,250	36,9922	0,250	35,1747	0,250	32,9416
0,300	37,0531	0,300	35,2476	0,300	33,0233
0,350	37,1362	0,350	35,319	0,350	33,1081

Excel report of a flexural test performed with SmartLab



Ongoing compression test on SmartLab

C104-04 CONSOLE HOUSING THE SERVO-PLUS PROGRESS
The pump assembly “lined” with sound proofing material for noise reduction and the digital system are encased to enhance the design and look of the machine. Technical details: see p. 215

C104-04

C099N INVERTER DEVICE applicable only on Servo-Plus Progress machines. C104-04 is required.
Technical details: see p. 215

C099N

SSW-LINK
FIRMWARE UPGRADE
To enable SmartLab software (pack of 3).
Only for touch screen models. Further details at page 20

Note: UTM2 software is available for Digitec/Autotec machines. See p. 21

COMPRESSION AND FLEXURAL TESTING MACHINE HIGH PERFORMANCE WITH DUAL TESTING CHAMBER AND TWO INDEPENDENT MEASURING RANGES 300 KN AND 15 KN WITH LOAD CELLS

STANDARDS: EN 196-1, EN 13286-41, EN 933-5, EN 1015-11, EN 13892-2 I ISO 679 I ASTM C109, C348, C349, C1194 I DIN 1164 BS 4550 I GOST 26798-1 I EN ISO 13503-2 I API RP 19C

This testing machine of high performance, advanced solutions and top quality components is equipped with two load chambers with two independent measuring ranges. It is suitable to perform:

- Flexural tests on cement prisms 40.1x40x160 mm (with the range 0 - 15 kN)
- Compression tests on portions of prism 40.1x40x160 mm broken in flexure, cubes side 40, 50, 70, 100 mm 2", cores with max. height of 180 mm (with the range 0 - 300 kN) by using the suitable compression devices described in next pages (accessories E170 - E172-02)

The applied load is measured by two strain gage load cells (15kN and 300 kN) at high accuracy.
This solution eliminates the weights of the piston and lower compression platen, packing set frictions etc., granting very high accuracy (max. error within ± 0,5%). The load chamber 0 - 15 kN permits very accurate tests on specimens having low strength (both in compression and in flexure).

Equipped with an electric microswitch to stop the piston after the specimen breakage, in order to avoid damages to the compression or flexure device.

itTECH CYBER PLUS PROGRESS

CYBER-PLUS OR **SERVO-PLUS PROGRESS**
DIGITAL TOUCH-SCREEN DISPLAY

Cyber-Plus Progress control unit 7" touch-screen display, up to 8 channels for pressure, load, displacement and other transducers, 2 USB and 1 ethernet ports.

MAIN FEATURES FOR ALL MODELS

- Max. vertical daylight between platens: 189 mm
- Horizontal daylight between columns: 210 mm
- Platens diameter: 165 mm
- Ram travel: 35 mm approx.
- Accuracy: Class 1 starting from 10% of the scale for both the ranges.
- Safety guards to CE Directive, polycarbonate made, with hinges.
- Supplied complete with lower compression platens and coupling pieces to easily fix the compression devices (see accessories).
- Dimensions of the frame: 1300x400xh1500 mm approx.
- Power supply: 230V 1ph 50Hz 750W
- Weight: 400 kg

Note: range 0-15 kN can be increased on request up to 25 kN.

E183N + C127N with compression devices

COMPRESSION / FLEXURAL		LOAD MEASURING SYSTEM	
MODEL	Dual range kN	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)
E181N	300/15	▼	
E183N	300/15		▼

ACCESSORIES FOR DUAL CHAMBER MACHINES

E172-01 FLEXURE DEVICE for 40.1x40x160 mm mortar specimens. EN 1015-11, EN 196-1, EN 13892-2, ISO 679

E172-01

E172-02 FLEXURE DEVICE for 40x40x160 mm mortar specimens. ASTM C348.

E170 COMPRESSION DEVICE for portions of prism 40.1x 40x160 mm broken in flexure. EN 196-1, EN 13892-2, ISO 679, ASTM C349.

E170

E171 COMPRESSION DEVICE for cubes 50 mm and 2" side. ASTM C109, C1194.

E171

E171-01 COMPRESSION DEVICE for cubes 70.7 mm side. BS 4550.

E171-01

Note: For more details, other models of flexure and compression devices with accessories, see p. 392

E161-05 DISTANCE PIECE, 50 mm high

E161-06 DISTANCE PIECE, 25 mm high

Note: compression and flexure devices do not require any distance piece.
For 100 mm cubes 1 x E161-05 + 1 x E161-06 are needed.

C127N GRAPHIC PRINTER on thermo-paper on board.

C127-11 THERMO-PAPER roll for printer (pack of 10 rolls)

E183-10 SAFETY GUARDS complete with stop switch.

C097-05 CLASS 1, starting from 1% of the full range. With a special calibration procedure it is possible to grant Class 1 practically on the full range of the machine.

H009-01
H009-01EN PERSONAL COMPUTER, LCD 22" monitor, keyboard, mouse, cables. The supply of the PC includes the installation of UTM2 software, available in italian or english.

ACCESSORIES FOR DISPLACEMENT READING OPTION

C104-10N In-built firmware for compression test with displacement control. For Servo-Plus machines only.

C109-14N In-built firmware for flexure test with displacement control. For Servo-Plus machines only.

2 x S336-14 LINEAR DISPLACEMENT TRANSDUCER, 50 mm travel, to measure the piston stroke.
Other models at p 503

2 x S337-51 CALIBRATION PROCESS for the displacement transducers.

C104-31SP1 SCREWED HOLDER for the displacement transducers.

C099N INVERTER DEVICE granting a lot of improvements. Applicable only on Servo-Plus Progress machines.
Technical details: see p. 215

C099N

SSW-LINK
FIRMWARE UPGRADE
To enable SmartLab software (pack of 3).
Only for touch screen models. Further details at page 20

Note: UTM2 software is available for Digitec/Autotec machines.
See p. 21

COMPRESSION DEVICES

To be positioned between the compression platens of the machine; they fit perfectly without removing anything and without adding any distance piece.

Dimensions: 153x153x185 mm

MODELS

E170
COMPRESSION DEVICE FOR PORTIONS OF 40.1x40x160 MM PRISM BROKEN IN FLEXURE

STANDARDS: EN 196-1 I ASTM C349 I ISO 679 I EN 13892-2

The compression platens have hardness 60 HRC and upper platen is seat ball assembled. The centering plug is distant 10 mm from the compression platen, as requested by the EN 196-1 Specification.
Cadmium plated for rust protection.

Weight: 12 kg approx.

E170

ACCESSORY FOR MOD. E170

E170-11 CENTERING PLUG
STANDARD: EN 1015-11

Fixed on the E170 device in replacement of the standard centering plug, it modifies the distance from the compression platen to 16 mm, as requested by EN 1015-11 Specification.

E170-01
COMPRESSION DEVICE FOR PORTIONS OF 40.1x40x160 MM PRISM BROKEN IN FLEXURE

STANDARD: DIN 1164

Identical to mod. E170 but with compression platens having 40x62.5 mm size, as requested by DIN Standards.

Weight: 12 kg approx.

E170-01

E170-01GO
COMPRESSION DEVICE FOR PORTIONS OF 20x20x100 MM PRISM BROKEN IN FLEXURE

STANDARD: GOST 26798-1

Identical to mod. E170 but with compression platens as requested by Russian Standard.

E172-01GO E170-01GO

E171
COMPRESSION DEVICE FOR CUBE 50 MM AND 2” SIDE

STANDARD: ASTM C109, C1194

Platens diameter: 72 mm and upper platen is seat ball assembled. This device can be used also to test cores max. 50 mm height.

Weight: 12 kg approx.

E171

E171-01
COMPRESSION DEVICE FOR CUBE 70.7 MM SIDE

STANDARD: BS 4550

It can be used also to test cores max. 70 mm height

Dimensions: 150x130x185
Weight: 9 kg approx.

E171-01

E172-01
FLEXURE DEVICE FOR 40.1x40x160 MM PRISMS

STANDARDS: EN 196-1 I EN 1015-11 I DIN 1164 I ISO 679
EN 13892-2

Upper bearer is seat ball assembled.
The distance between lower bearers is 100 mm and one of them has a spherical seat. Cadmium plated for rust protection.

Weight: 11 kg approx.

E172-01

E172-01GO
FLEXURE DEVICE FOR 20x20x100 MM PRISMS

STANDARD: GOST 26798.1

Identical to mod. E172-01 but with bearers as requested by Russian Standard.

E172-02
FLEXURE DEVICE FOR 40x40x160 MM PRISMS

STANDARD: ASTM C348

Identical to mod. E172-01 but lower bearers have distance of 119 mm as requested by ASTM Standard.

Weight: 11 kg approx.

COMBINED TWO FRAMES GROUP
UPGRADING OPTION:

- COMPRESSION AND FLEXURAL TEST ON MORTAR SPECIMENS
- COMPRESSION AND FLEXURE TESTS ON CONCRETE SPECIMENS, BY CHOOSING THE STANDARD COMPRESSION MACHINE AMONG OUR DIFFERENT AVAILABLE MODELS FROM 1300 kN TO 5000 kN CAPACITY OR A FLEXURAL FRAME FROM 150 TO 360 kN (see section Concrete from p. 220...256)

The composition of the combined group is obtained by:

C092-05
COMPRESSION FRAME ON MORTAR SPECIMENS

250 kN or 500 kN capacity, (mod. E159D, E159-01D, E159N, E159-01N, E161A, E161-02A, E161N, E161-02N; technical details and specific accessories at p. 384-385) complete with pressure transducer used in conjunction with a concrete digital compression machine (Digitec, Autotec, Cyber-Plus / Servo-Plus Progress, see p. 220...256).

C055N example

C092-05

C092-06
COMPRESSION/FLEXURAL FRAME ON MORTAR SPECIMENS, DUAL RANGE:

0-250 kN (or 500 kN) for compression tests 0-15 kN for flexure tests (mod. E160N, E160-01N, E161-01N, E161-03N; technical details and specific accessories at p. 386-387) complete with two pressure transducers used in conjunction with a concrete digital compression machine (Cyber-Plus / Servo-Plus Progress model only, see p. 220...256).

C056N example

C092-06

C092-07
DUAL TESTING CHAMBER FRAME

(E181N, E183N technical details at p. 390) 300 kN and 15 kN, complete with load cells, used in conjunction with a concrete digital compression machine / Cyber and Servo-Plus Progress models only. See p. 220...256

C055N example

C092-07

In addition to the proposed groups, it is possible to compose many other alternative testing groups, with digital display measuring system; like for ex:

- Group formed by one concrete flexural frame and one mortar compression frame.

Group example

E190M
DETERMINATION OF MODULUS OF ELASTICITY IN COMPRESSION OF PRODUCTS AND SYSTEMS FOR THE PROTECTION AND REPAIR OF CONCRETE STRUCTURES (MORTARS).

AUTOMATIC WITH PACE RATE CONTROL ALSO WHEN RELEASING THE LOAD

STANDARD: EN 13412

E183N + E190M + Accessories

itTECH
CYBER PLUS PROGRESS

CYBER-PLUS OR **SERVO-PLUS PROGRESS**
DIGITAL TOUCH-SCREEN DISPLAY

Cyber-Plus Progress control unit 7" touch-screen display, up to 8 channels for pressure, load, displacement and other transducers, 2 USB and 1 ethernet ports.

It can be used only with the Servo-Plus Progress model E183N.

The appliance includes:

- **HYDRAULIC SYSTEM**
  It is an hydraulic installation and has a high performance valve directly controlled by the digital unit that grants the automatic control of the pace rate increasing the load, keeps a certain load and than controls the pace rate decreasing the load.
  The setting of the pace rate is made by a very sensitive valve controlled by a step by step motor and it allows a micrometric action on the pace rate granting excellent results.
  A laser position detector allows a touching sensitivity of test starting of about 0.1 per thousand of the maximum capacity.

- **ELECTRONIC MEASURING SYSTEM**
  The high performance control and data processing unit controlled by a 32 bit microprocessor, can manage up to 16 high resolution channels for the control of load cells or transducers with strain gages bridge.
  The system processes the signals coming from the load cells and from the extensometers giving all the results required for a further processing following the most updated International Standards for this application.

C125-13

C134N (X3)

- **IN-BUILT FIRMWARE FOR ELASTIC MODULUS ON CEMENT**
  The firmware allows to set the initial parameters and to obtain final results locally, according to the relevant Standards.The PC software can be purchased separately (see accessories).

The user can introduce a list of data concerning the specimen that will be tested and the kind of test that he wants to make: shape of the specimen, dimensions, age of the specimen, average expected breaking value, etc… The appliance allows verifying the proper reading of the extensometers and, if everything is within the expected tolerances, it manages the average deformation value read by the transducers and processed by the digital unit, than it transmits to a Personal Computer, through LAN communication. With code SSW-UTM2, all tests data are transmitted through a serial communication port RJ45 (Network Connection) to a Personal Computer, that can already belong to the end user or be supplied separately (not included with the Software).

The software gives the possibility to print on a standard printer a test certificae reporting all the data concerning the test the specimen and the graph of the test. The extensometers (two models are proposed: A and B) are not included in the standard supply, and must be ordered separately (see accessories).

NEEDED ACCESSORIES

A) EXTENSOMETERS (STRAIN GAGES), SINGLE USE, ELECTRIC
Pack of 10 pieces. Available in different sizes:

C125-10 Base length 10 mm
C125-11 Base length 20 mm
C125-12 Base length 30 mm
C125-13 Base length 60 mm
C125-14 Base length 120 mm

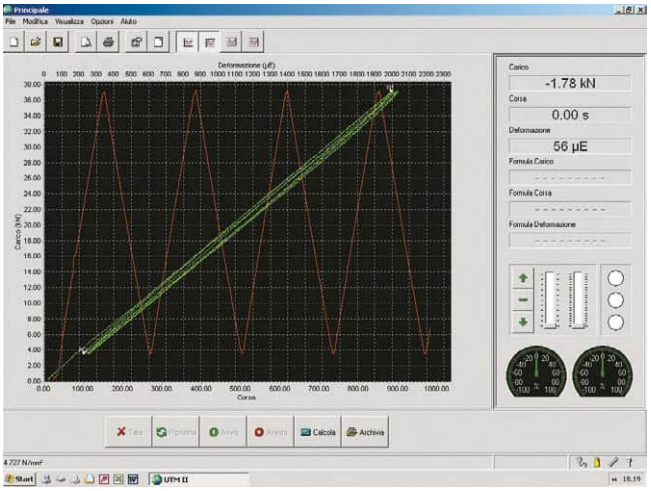
C125-15

KIT for the application of single use extensometers composed by: glue, welding apparatus, solder, cleaning liquid, accessories, the whole in carrying case.

C125-09

C125-09

INTERFACE MODULE, **needed accessory** to connect up to 4 electric single use extensometers. This module allows also the automatic calibration of the zero and of the measuring range after a special thermal compensation. This grants a five times better accuracy than the one requested by the Standards.



Screen during a test and marker indicating any change.

ALTERNATIVE VERSION:

B) EXTENSOMETER / COMPRESSOMETER, ELECTRONIC, UNIVERSAL, MECHANICAL FRAME.

C134N

EXTENSOMETER / COMPRESSOMETER, ELECTRONIC, UNIVERSAL, MECHANICAL FRAME.
It can be used only with samples having minimum height of 130 mm
Technical details: see p. 260

C134N (X3)

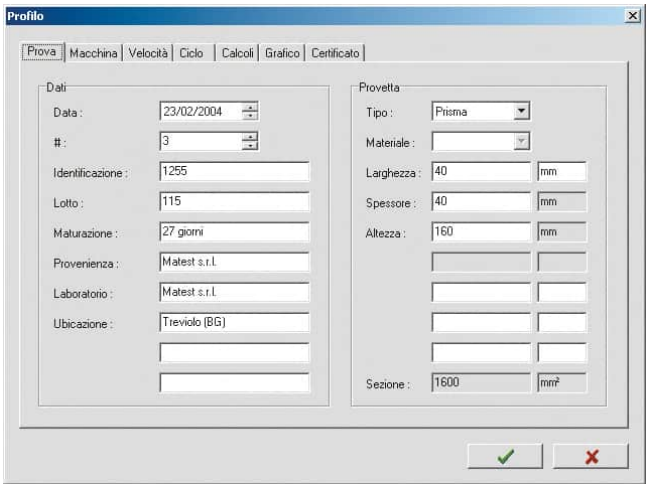
C134-01N

EXTENSOMETERS /COMPRESSOMETERS, electronic, universal, mechanical frame. It can be used with samples having min. height of 60 mm and min. Ø 63 mm.
Gauge length adjustable from 50 to 60 mm.
It includes a distance piece Ø 67x44 mm.
Technical details: see p. 260

C134-10

TEMPLATE, to regulate and calibrate the base length of the C134N extensometer.

SSW-UTM2 PC SOFTWARE for remote control.



Personalisation of the test certificate.

MATEST

SECTION H

STEEL

In this section Matest proposes a wide range of universal electromechanical and hydraulic machines to perform tensile, elongation, flexural, bending, resilience tests on metallic materials, with the possibility to extend these test applications on plastics, rubber, composed materials, wires, ropes, paper, textiles etc.

This range of machines satisfies both control tests on steel bars for reinforced concrete, and quality tests in the iron metallurgy, metals, plastics etc.

UNIVERSAL AUTOMATIC TENSILE TESTING MACHINES: 600 KN, 1000 KN, 1500 KN, 2000 KN CAPACITY

STANDARDS: UNI EN ISO 6892-1, 7500-1, 15630-1, 15630-2, 15630-3 I UNI EN 10080 I ASTM A370, ASTM E8 I UNI 7676 (Wire Strands)

The machine is designed to meet requirements of works, laboratories and universities for quality control and research purposes. This system is suitable to test metallic round and flat rebars, to determine tension, compression, bending shear strength and to determine compression and flexure strength on concrete.

LOAD FRAME FEATURES

- Models: **600 kN, 1000 kN, 1500 kN, 2000 kN Capacity. Other load capacities (1200 kN, 3000 kN) available on request.** (see next pages).
- Hydraulic servo-controlled system regulating the load rate
- Four thick columns and two lead screws grant high structural stiffness.
- Two different work spaces, the upper one for tension and the lower one for compression, bending and shearing, for a comfortable test execution.
- High precision load cell, class 1 according to ISO 376 standard, grants accurate force measurement.
- Hydraulic jaws, for stronger clamping of specimens.
- Integrated displacement transducer to measure the stroke of the piston.
- Movable lower crosshead with button panel for an easy machine operation and specimens positioning.
- Compression platens included for an easy machine calibration

A **second frame** (accessory) can be easily connected to perform a compression test on concrete specimens, including configurations for Elastic Modulus and Poisson ratio determination.
The most common combination is with C092-09, 2000 kN compression frame useful for testing cubes up to 150 mm side and cylinders up to 160x320 mm also with **capping retainers** (ASTM C1231).

HYDRAULIC JAWS CLOSURE NEEDED FOR STRONGER GRIPPING

Note:
a stiff concrete base is required in order to anchor the frame to the floor.

H001BS with accessories

FIRMWARE

- Fully automatic test execution with closed-loop digital feedback
- Electronic control unit “Servo-plus Progress” with touch-screen colour display for management and analysis of data, test results, graphs (see page 214).
- The Touch-Screen icon interface allows an easy set-up of parameters and an immediate test execution.
- The machine can also be connected to a PC for a remote test execution through suitable Software.
- LAN port for network connection.
- Unlimited memory storage with: 2 USB ports.
- Possibility to select different languages.

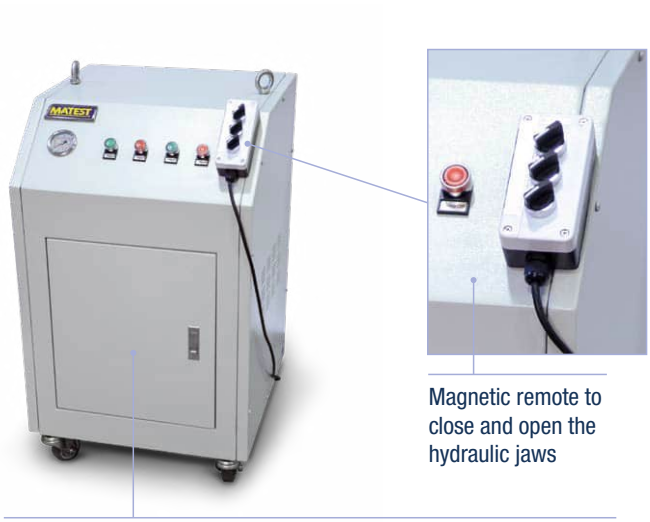
Each machine is supplied complete with loading frame, control unit, compression platens and hydraulic power pack for jaws closing, while PC, software, grips, printer and extensometers (see next pages) **are optional and must be ordered separately** according to the user needs.

DIFFERENT FRAMES, DIFFERENT NEEDS

H001BS H001B H001A

CONTROL SYSTEM

HYDRAULIC JAWS POWER PACKS



TECHNICAL SPECIFICATIONS

MODEL	H001A	H001B	H001BS*	H001CS*	H001DS*
Load capacity (kN) *** Both tension and compression	**600**	**1000**	**1000**	**1500**	**2000**
Load accuracy from 10% of the full scale (%)	± 1	± 1	± 1	± 1	± 1
Test speed (mm/min):					
Max	85	35	35	20	17
Min	0.5	0.5	0.5	0.5	0.5
Independent linearity of the piston stroke displacement (%)	± 0.05	± 0.05	± 0.05	± 0.05	± 0.05
Max crosshead moving speed (mm/min)	200	200	200	200	200
Piston stroke (mm)	250	250	250	250	250
Horizontal clearance (mm)	555	600	610	660	760
Net distance between grips (with 250 mm stroke available, mm)	550	550	750	750	750
Columns diameter	70	80	80	100	110
Dimensions of the grips for rounds and flats LxW (mm)	90x90	110x110	110x110	160x160	160x160
Length of the grips for strands			150 for 9.5 mm strands 225 for 12.7 and 15.2 mm strands		
Net distance between compression platens (with 250 mm stroke available, mm)	740	740	900	780	850
Dimensions of platens** (mm)	Ø 130x30	Ø 145x40	Ø 150x40	Ø 200x60	Ø 200x60
Load frame dimensions Height (including piston stroke, mm)	2600	2690	2860	3270	3640
Width (mm)	910	1000	920	1050	1210
Depth (mm)	640	700	620	910	1100
Frame weight (kg)	1840	2390	3000	5270	8560
Power supply			380V, 3ph, 50Hz		
Absorbed power (kW)	3.5	3.5	3.5	3.5	4.5

* Suitable also for wire strands. Other models for wire strands testing are available on request.
** Compression platens are already included in the supplied machine.
*** **Models with 1200 kN and 3000 kN capacities available on request.**

H002
OVERSIZED UNIVERSAL AUTOMATIC TENSILE TESTING MACHINE, 1000 KN CAPACITY

STANDARDS: UNI EN ISO 6892-1, 7500-1, 15630-1, 15630-2, 15630-3 | UNI EN 10080 | ASTM A370, ASTM E8 | UNI 7676 (Wire Strands)

This machine is suitable to test various high strength metallic materials for tension and other applications. Thanks to the ultra-large testing space and the dual-action actuator with long stroke, this machine is suitable for testing not only standard specimen but also longer specimen and specimen with grate elongation. Widely used in the fields of metallurgy industry to meet requirement for quality control and research purposes. Thanks to its exceptionally robust structure and oversized design, this frame model is perfect for intensive and prolonged use, keeping its functionalities and mechanical properties unchanged over time.

MAIN FEATURES

- High precision load cell class 1 (max error: ±1%)
- Completely automatic control system for the load application
- Double effect piston
- One chamber for tension and compression
- Jaws with hydraulic closure to grant strong clamping (two clamping pressures available)
- Integrated displacement transducer to read the stroke of the piston
- 4 thick columns and high-stiffness frame for intensive use
- Easy access to the working space

H002 frame only

TECHNICAL SPECIFICATIONS

Load capacity (kN)	1000 kN
Load accuracy	±1%
Piston stroke (mm)	800
Horizontal clearance (mm)	685
Max tensile space (with piston at the end of the stroke, mm)	825
Columns diameter (mm)	100
Dimensions of the grips for rounds and flats LxW (mm)	110x110
Length of the grips for strands (mm)	150 for 9.5 mm strands 225 for 12.7 and 15.2 mm strands
Max compression space (mm)	635
Dimensions of the platens (mm)	Ø160X40
Load frame dimensions (WxLxH, mm)	960x760x3415
Load frame weight (kg)	3800
Power supply	380 V, 3ph, 50 Hz, 3.5 kW

Note:
this model is available with other load capacities on request.

Note:
a stiff concrete base is required in order to anchor the frame to the floor.

ACCESSORIES FOR H001 AND H002 SERIES
GRIPS FOR TENSILE TESTS ON ROUND, FLAT AND WIRE STRANDS SPECIMENS
STANDARDS: ISO 6892-1, 15630-1, 15630-2, 15630-3 | UNI 7676 | ASTM A370, A1061, E8 | UNI EN 10080

MACHINE MODEL (load capacity*)	H001A 600 kN	H001B 1000 kN	H001BS** AND H002** 1000 kN	H001CS** 1500 kN	H001DS** 2000 kN
Grips for round specimens:					
Diameter 6 – 13 mm	**H001A-11**	**H001B-11**	**H001B-11**		
Diameter 13 – 26 mm	**H001A-12**				
Diameter 26 – 40 mm	**H001A-13**				
Diameter 9 – 20 mm		**H001B-12**	**H001B-12**		
Diameter 20 – 40 mm		**H001B-13**	**H001B-13**		
Diameter 40 – 60 mm		**H001B-14**	**H001B-14**		
Diameter 8 – 16 mm				**H001C-10**	**H001D-11**
Diameter 16 – 31 mm				**H001C-11**	**H001D-12**
Diameter 31 – 46 mm				**H001C-12**	**H001D-13**
Diameter 46 – 61 mm				**H001C-13**	**H001D-14**
Diameter 61 – 80 mm				**H001C-14**	**H001D-15**
Grips for flat specimens:					
Thickness 0 – 15 mm	**H001A-21**				
Thickness 15 – 30 mm	**H001A-22**				
Thickness 0 – 30 mm		**H001B-21**	**H001B-21**		
Thickness 10 – 40 mm		**H001B-22**	**H001B-22**	**H001C-21**	**H001D-21**
Thickness 40 – 70 mm				**H001C-22**	**H001D-22**
Grips for wire strands***:					
Diameter 9.5 mm			**H001BS-31**	**H001CS-31**	**H001DS-31**
Diameter 12.7 mm			**H001BS-32**	**H001CS-32**	**H001DS-32**
Diameter 15.2 mm			**H001BS-33**	**H001CS-33**	**H001DS-33**

* Models with 1200 kN and 3000 kN capacities available on request
** Models suitable also for wire strands testing
*** Grips for wire strands must be used with aluminium and carborundum inserts. See following accessories.

ALUMINIUM AND CARBORUNDUM INSERTS FOR WIRE STRANDS TESTING
These inserts are necessary to perform tensile tests on wire strands and must be used with the specific grips (H001XS-31/32/33).
The inserts are single-use and are supplied in packs of 100 pieces (one test requires 4 pieces).

H001-29N Inserts for strands Ø 9.5 mm, pack of 100 pieces
H001-30N Inserts for strands Ø 12.7 mm, pack of 100 pieces
H001-31N Inserts for strands Ø 15.2 mm, pack of 100 pieces

Couple of two carborundum inserts, type **H001-30N**

H001BS-32 **H001B-12**

H001B-22

SAFETY GUARDS

Plexiglass and aluminium doors around the testing space to grant operators safety.

Machine model (load capacity)	H001A 600 kN	H001B 1000 kN	H001BS 1000 kN	H001CS 1500 kN	H001DS 2000 kN	H002 1000 kN
Safety guards	**H001A-60**	**H001B-60**	**H001BS-60**	**H001CS-60**	**H001DS-60**	**H002-60**

Note: a different type of safety guards is available on request.

BENDING AND REBENDING ACCESSORIES

STANDARDS: ISO 5173, 15630-1, 15630-3, 7438, 8491 I ASTM A615, E290

The following accessories allow to perform:

- transverse root, face and side bend tests in order to reveal imperfections on or near the surface of the test specimen which is under tension during bend testing and/or assess ductility.
- bending and rebending test at different angles for the visual identification of cracks on the sample.

For the execution of the test, H009-11N In-built firmware for bending on steel test is necessary.

MACHINE MODEL (load capacity*)	H001A 600 kN	H001B 1000 kN	H001BS** 1000 kN	H001CS** 1500 kN	H001DS** 2000 kN	H002** 1000 kN
Bending accessory (ISO 5173)	**H001A-40**	**H001B-40**	**H001B-40**	**H001C-40**	**H001D-40**	**H002-40**
Span between the support rollers (mm)	30 – 500	50 – 500	50 – 410	50 – 520	50 – 720	60 - 700
Roller length (mm)	140	160	160	160	160	-
Roller diameter (mm)	30	50	50	50	50	-
Bending depth (mm)	100	180	180	180	180	-
Bend-rebend accessory (UNI EN ISO 15630-1, 15630-3, 7438, 8491, ASTM A615, E290)* ** The device is equipped with a digital display for the bending angle measurement. The device accepts samples up to 40 mm diameter.	**H001B-41**	**H001B-41**	**H001B-41**	**H001D-41**	**H001D-41**	**H002-41**

* Models with 1200 kN and 3000 kN capacities available on request

** Models suitable also for wire strands testing

*** The bend-rebend device must be used with the suitable mandrels as per following table

H001A-60

H001B-40

H001B-41 this jig is equipped with inclinometer

MANDRELS FOR BEND-REBEND TEST

Mandrels are necessary accessories for H001B-41 and H001D-41.
Other diameters available on request.

Mandrel diameter (mm)	Mandrel code for 600 and 1000 kN models	Mandrel code for 1500 and 2000 kN models
24	**H001B-42-24**	**H001D-42-24**
32	**H001B-42-32**	**H001D-42-32**
35	**H001B-42-35**	**H001D-42-35**
40	**H001B-42-40**	**H001D-42-40**
42	**H001B-42-42**	**H001D-42-42**
50	**H001B-42-50**	**H001D-42-50**
56	**H001B-42-56**	**H001D-42-56**
60	**H001B-42-60**	**H001D-42-60**
65	**H001B-42-65**	**H001D-42-65**
70	**H001B-42-70**	**H001D-42-70**
80	**H001B-42-80**	**H001D-42-80**
95	**H001B-42-95**	**H001D-42-95**
100	**H001B-42-100**	**H001D-42-100**
110	**H001B-42-110**	**H001D-42-110**
125	**H001B-42-125**	**H001D-42-125**
144	**H001B-42-144**	**H001D-42-144**

Mandrel diameter (mm)	Mandrel code for 600 and 1000 kN models	Mandrel code for 1500 and 2000 kN models
160	**H001B-42-160**	**H001D-42-160**
176	**H001B-42-176**	**H001D-42-176**
192	**H001B-42-192**	**H001D-42-192**
196	**H001B-42-196**	**H001D-42-196**
203	**H001B-42-203**	**H001D-42-203**
224	**H001B-42-224**	**H001D-42-224**
252	**H001B-42-252**	**H001D-42-252**
260	**H001B-42-260**	**H001D-42-260**
280	**H001B-42-280**	**H001D-42-280**
300	**H001B-42-300**	**H001D-42-300**
320	**H001B-42-320**	**H001D-42-320**
340	**H001B-42-340**	**H001D-42-340**
360	**H001B-42-360**	**H001D-42-360**
380	**H001B-42-380**	**H001D-42-380**
400	**H001B-42-400**	**H001D-42-400**

Note: for ASTM A615 the choice of the mandrel must be taken according to the following table:

Rebar diameter d in [mm]	Mandrel diameter	Mandrel diameter	Mandrel diameter	Mandrel diameter	Mandrel diameter
	Steel grade 40 [280 MPa]	**Steel grade 60 [420 MPa]**	**Steel grade 75 [520 MPa]**	**Steel grade 80 [550 MPa]**	**Steel grade 100 [690 MPa]**
3, 4, 5 [10, 13, 16]	3 ½ d	3 ½ d	5d	5d	5d
[12]	3 ½ d	3 ½ d	-	5d	5d
6 [19]	5d	5d	5d	5d	5d
[20]	5d	5d	-	5d	5d
7, 8 [22, 25]	-	5d	5d	5d	5d
[28]	-	7d	-	7d	7d
9, 10, 11 [29, 32, 36]	-	7d	7d	7d	7d
[40]	-	9d	-	9d	9d

For Italian standard DM 17-01-2018 the choice of the mandrel must be taken according to the following table:

Rebar diameter d in [mm]	Mandrel diameter	Mandrel diameter
	Steel B450A	**Steel B450C**
≤ 10	4d	-
< 12	-	4d
12 ≤ d ≤ 16	-	5d
16 < d ≤ 25	-	8d
25 < d ≤ 40	-	10d

ACCESSORIES FOR TENSILE TEST ON THREADED BARS, SCREWS AND BOLTS
STANDARDS: ISO 898-1, 898-2 I EN 15048-2 I ASTM E8
The equipment to perform tensile test on threaded samples is composed by the two cylindrical heads (one upper and one lower), which must be pulled using the suitable tensile grips. The cylindrical heads fit the bowl and ring which allow to fix the sample.

MACHINE MODEL (load capacity*)	H001A 600 kN	H001B 1000 kN	H001BS** AND H002** 1000 kN	H001CS** 1500 kN	H001DS** 2000 kN
Tensile cylindrical heads for threaded elements (to be used in conjunction with one or more of the following sets) (ISO 898-1, 898-2, EN 15048-2, ASTM E8)	**H001A-43** (needs grips H001A-13)	**H001B-43** (needs grips H001B-14)	**H001B-43** (needs grips H001B-14)	**H001D-43** (needs grips H001C-13)	**H001D-43** (needs grips H001D-14)
Complete set of bowls and rings with self-alignment for fine type thread from M3 to M39. (ISO 898-1, 898-2, EN 15048-2, ASTM E8)	**H001A-44F**	**H001B-44F**	**H001B-44F**	**H001D-44F**	**H001D-44F**
Complete set of bowls and rings with self-alignment for course type thread from M3 to M39. (ISO 898-1, 898-2, EN 15048-2, ASTM E8)	**H001A-44C**	**H001B-44C**	**H001B-44C**	**H001D-44C**	**H001D-44C**
Complete set of bowls and rings for fine type thread from M3 to M39. (ISO 898-1)	**H001A-46F**	**H001B-46F**	**H001B-46F**	**H001D-46F**	**H001D-46F**
Complete set of bowls and rings for course type thread from M3 to M39. (ISO 898-1)	**H001A-46C**	**H001B-46C**	**H001B-46C**	**H001D-46C**	**H001D-46C**
Complete set of sloped washers for threads from M3 to M39. (Needs either H001X-46F or H001X-46C) (ISO 898-1)	**H001A-47**	**H001B-47**	**H001B-47**	**H001D-47**	**H001D-47**

* Models with 1200 kN and 3000 kN capacities available on request
** Models suitable also for wire strands testing

H003-14
TEST ON ELECTRO WELDED WIRE NETS

STANDARDS: UNI EN ISO 15630-2
Device for the seizing of electro welded wire nets made of bars with maximum diameter of 15 mm; this accessory requires grips for flats 10 mm and grips for rounds according to the sample diameter.
Weight: 5 kg approx.

H001-45
DOUBLE SHEAR ACCESSORY

STANDARD: ISO 8749
For bars with diameter 10 mm. Compatible with all the frames from 600 to 2000 kN capacity. Other diameters up to 50 mm available on request. For the execution of the test, H009-12N In-built firmware for double shear on steel test is necessary.
Weight: 6 kg approx.

H001C-50

COMPRESSION PLATENS
These compression platens are an alternative to the ones included with the machines and are equipped with a spherical seat.

MACHINE MODEL	Model	Ø mm	Max specimen dimensions
H001A	**H001A-50**	165X30	Cubes up to 100 mm side and cylinders up to Ø 110x220 mm
H001B and **H001BS**	**H001B-50**	216X30	Cubes up to 150 mm side and cylinders up to Ø 160x320 mm
H001CS and **H001DS**	**H001C-50**	287x51	Cubes up to 200 mm side and cylinders up to Ø 160x320 mm

UNIVERSAL TENSILE/COMPRESSION MACHINE

TENSILE TESTS ON STEEL REINFORCEMENT BARS, UP TO 500 KN MAX. CAPACITY LOAD.
COMPRESSION TESTS ON CONCRETE CUBES / CYLINDERS 1500 KN MAX. CAPACITY LOAD.

STANDARDS: EN 10002 | UNI EN ISO 6892-1, 7500-1, 15630-1 | ASTM C39, E4 | BS 1610 | NF P18-411 | DIN 51220 | AASHTO T22

This machine of compact design, is utilized to carry out tensile tests on steel reinforcement bars from diameter 4 to 25 mm and flat max. 25x15 mm. It can also carry out compression tests on concrete cube specimens max. side 150 mm and cylinders max. diameter 160x320 mm.
The new and sturdier four columns loading frame is overdimensioned to assure high rigidity and stability. The loading piston, double action, is rectified and lapped. The piston is foreseen of an hydraulic maximum and minimum piston stroke's security device, by avoiding any damage risk due to wrong manipulations of the unit. An hydraulic selector allows to select the tensile or the compression test. The heads holding the jaws are obtained from only one block of high resistance steel. The "V" autoclamping shape allows a quick and practical grab on the specimen and the grips locking system ensures safe bar handling after failure. The machine is supplied complete with pair of jaw-holders, but **without** hardened jaws and accessories for tensile and compression tests , which must be ordered separately (see accessories). Hardware technical details see page 215.

TECHNICAL SPECIFICATIONS

- Maximum tensile load: 500 kN
- Maximum compression load: 1500 kN
- Min. distance between the jaws: 350 mm
- Max. distance between the compression platens: 331 mm
- Distance between the columns: 310 mm
- Piston's stroke: 120 mm
- Calibration accuracy: class 1 from 10% of the full scale
- Power supply: 230V 1ph 50Hz 750W
- Dimensions: 830x530x2000 mm
- Weight: 1150...1200 kg

H010-01N with accessories

H010-02N with accessories

MODEL	Motorized	Cyber-Plus Progress mod. C109M (p. 215)	Servo-Plus Progress mod. C104N (p. 215)
H010-01N	▼	▼	
H010-02N	▼		▼

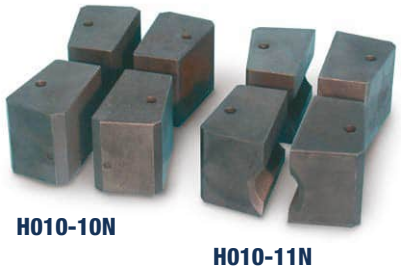
Accessories: see next page

ACCESSORIES FOR H010 SERIES

TENSILE TESTS

H010-10N
GRIPS FOR FLAT AND ROUND SAMPLES
SET OF 4 JAWS, upper and lower, for round steel specimens from Ø 4 to 15 mm, and flat specimens from 6 to 15 mm thickness (max. width 25 mm).

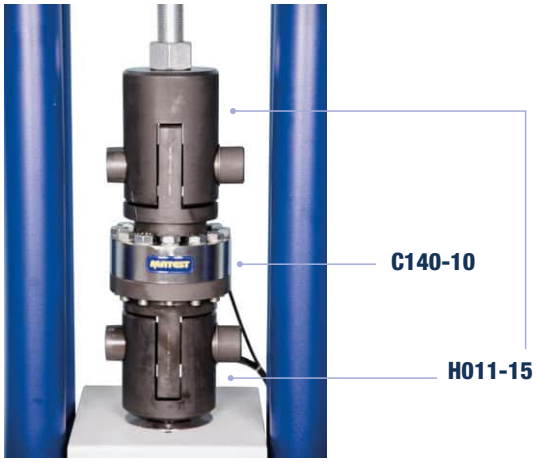
H010-11N
GRIPS FOR ROUND SAMPLES
SET OF 4 JAWS, upper and lower, for round steel specimens from Ø 15 to 25 mm.



CALIBRATION EQUIPMENT

C140-10
LOAD CELL
500 kN capacity, necessary for calibration in tension and compression. It must be connected to the digital calibrator C138M and the suitable calibration certificate/s must be added.
Technical details: see p. 302-303

H011-15
TENSILE DEVICE
Necessary to connect the load cell C140-10 to the tensile heads for calibration in tension.



COMPRESSION TESTS

H010-13N
COMPRESSION PLATENS
Upper compression platen, complete with seat ball and fixing device, and lower compression platen both hardened, rectified and with diameter 216 mm to test cylinders with max dimensions Ø 160x320 mm and cubes up to 150 mm. The max vertical daylight between the compression platens is 331 mm with the whole piston stroke (120 mm) available. A distance piece (176 mm high) is included.

OTHER ACCESSORIES

H010-15N
SAFETY GUARDS
Compliant to CE directive, polycarbonate made, complete with hinges and lock.

H010-31SP
DISPLACEMENT TRANSDUCER with supporting device to measure the piston stroke and allow displacement control.
Max. stroke: 150 mm
Independent linearity: ± 0.05%

H001BS with accessories

C092-09

OTHER ACCESSORIES FOR H001, H002 AND H010 SERIES

C092-09
COMPRESSION FRAME, 2000 kN capacity, connected to the same control unit of the tensile frame. Vertical daylight: 376 mm with a distance piece 40 mm high. Useful to test concrete cubes up to 150 mm side and cylinders up to 160x320 mm also with capping retainers.
Technical details: see p. 222-223
This code includes: deviator, oil hoses and pressure transducer.

Note:
It is possible to connect different types of compression frames and other frames (up to 2) for many other tests:
flexure, splitting, cement, etc.
Ask our technicians for more details.

SSW-UTM2
PC SOFTWARE for tensile tests on steel

H010-40
GREASE for all tensile machines jaws.
Can of 1 kg.

C128
LASER PRINTER, bench model, for graphics and certificates with direct connection via USB.

H009-01 | H009-01EN
PERSONAL COMPUTER for remote test execution with a pre-installed software. Complete with LCD, monitor 22", keyboard, mouse, connection cable, available in italian or english.

C127N
GRAPHIC PRINTER on thermal paper.

C128

S205-05M
UNITRONIC 50/25 KN

UNIVERSAL MULTIPURPOSE TOUCH-SCREEN FRAME FOR:

- **TENSILE TESTS, 25 kN MAX. CAPACITY LOAD**
- **COMPRESSION/FLEXURAL TESTS, 50 kN MAX. CAPACITY LOAD**

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 wide touchscreen display (7''), 2 USB ports for data saving and LAN port for connection to PC.

Unitronic technical details and additional specific tests and other models: see p. 462...470

S205-05M + accessories for tensile test

S205-05M

NEEDED ACCESSORIES for tensile test on metal flat and round specimens

H009N	In-built firmware for tensile test
S337-36	TENSILE STRAIN load cell 25kN capacity
H005-11	TENSILE HEADS (upper and lower)
S205-09	DEVICES to fix the tensile heads to the frame
H005-21	FLAT SEIZING GRIPS for flat specimens 1 - 10 mm thickness by 25 mm max. width and round specimens Ø 1 - 5 mm
H005-31	"V" SHAPE SEIZING GRIPS for round specimens Ø 5 - 12 mm

OPTIONAL ACCESSORIES

ELECTRONIC EXTENSOMETERS, all models available at p. 414 strongly suggested

SSW-LINK or SSW-UTM2 PC SOFTWARE for remote control

S206M
UNITRONIC 200/50 KN

UNIVERSAL MULTIPURPOSE TOUCH-SCREEN FRAME FOR:

- **TENSILE TESTS, 50 kN MAX. CAPACITY LOAD**
- **COMPRESSION/FLEXURAL TESTS, 200 kN MAX. CAPACITY LOAD**

WITH AUTOMATIC LOAD OR DISPLACEMENT/DEFORMATION CONTROL.

Unitronic technical details and additional specific tests and other models: see p. 463...470

S206M

Various materials:
By using suitable devices, Unitronic testers, within the limits of their capacities can performs compression, flexural, splitting tensile and direct tensile tests on: concrete, cement, rocks, bituminous materials, soil, composites etc., with automatic load or displacement/deformation control.

H012
UNIMEC 300
ELECTROMECHANICAL UNIVERSAL TESTING MACHINE
300 KN CAPACITY BOTH FOR COMPRESSION AND TENSION

NEW

MAIN FEATURES

- Solid base containing transmission components and hardware control instruments
- High rigidity granted by two high resistance steel columns with ground hard chrome surfacing
- Two ball-screw type actuators with preloaded lead screws that grant high precision for the crosshead positioning
- Sintered bushes with low friction coefficient for a smooth movement
- Automatized positioning of the upper crosshead with incrementally increasing speed through an easily accessible keyboard
- Possibility to execute tests in both directions

H012 with **H012-10**

Unimec 300 is suitable for a wide range of tests on different kinds of construction materials such as concrete, mortar, steel, soil, asphalt, bitumen and also plastic, rubber, wood and others. It can work in two directions, allowing to perform **tests both in tension and in compression**, and it is equipped with a high precision load cell to grant accurate results and an integrated device to measure the crosshead displacement. The movement system includes **two linear actuators** (of the ball-screw type) which provide two main effects: reduction of the friction at minimum, granting a smooth and precise positioning of the crosshead; elimination of manual operations to determine the position of the crosshead, the movement is completely automatized and controlled with an easy-access keyboard.

Thanks to its versatility, Unimec 300 is the best choice for advanced research and evaluation of mechanical properties of different materials in accordance with the latest relevant standards or following procedures not yet described by any standard. The crosshead is provided with a quick coupling in order to make the accessories installation easy and fast. The display position can be regulated according to the user's needs.

The external carter protecting the guide columns and the screws is made of painted steel sheets, the internal sides are closed with anti-dust accordions and all the outside and internal parts are properly treated against corrosion.

Accessories: see next page

TECHNICAL SPECIFICATIONS

- Display LCD, TFT, 800x480 pixels, 7 inches, graphic touchscreen
- 8 channels (24 bit) suitable for connection of load, displacement, deformation, LVDT, temperature transducers and strain gauges (by using an external adapter).
- Control/sampling frequency Up to 1 kHz / 2 kHz
- Ports: 1 ethernet, 2 USB
- Max load in compression: 300 kN
- Max load in tension: 300 kN
- Max crosshead stroke: 900 mm
- Max vertical daylight without accessories: 1032 mm
- Max distance between compression platens: 60÷900 mm
- Horizontal daylight between columns: 650 mm
- Stiffness: better than 300 kN/mm
- Crosshead speed range: 0.0001 ÷ 200 mm/min
- Crosshead displacement resolution: 0.0001 mm
- Load rate range: 1 ÷ 9999 N/s

Power supply: 230V 1ph 50-60Hz 1500W
Dimensions: 1400x710x1950 mm
Weight: 1000 kg (without accessories)

Note:
Unimec 300 is provided with a 300 kN load cell, 300 kN compression calibration, 300 kN tension calibration, and an integrated device to measure the crosshead movement. Any accessories and software to perform specific tests are not included and must be ordered separately.

ACCESSORIES for H012 machine

Steel applications

Tensile test (up to 250 kN)

STANDARDS:
ISO 6892-1
ASTM A370

H012-10 Tensile heads and grips for round bars with diameter 3÷24 mm and flat bars with thickness 0÷22 mm and width max 50 mm
Vertical distance between the grips: 0÷420 mm
Length of the grips: 70 mm
Suitable extensometer H014, H014-..... (see page 414)

SSW-LINK or SSW-UTM2 Software for tensile tests
H009N In-built firmware for tensile tests

Tensile test (up to 50 kN)

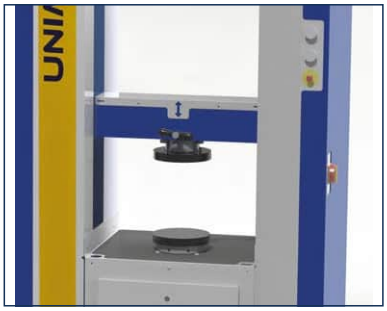
STANDARDS:
ISO 6892-1
ASTM A370

H012-11 Tensile heads and grips for round bars with diameter 3÷12 mm and flat bars with thickness 0÷10 mm and width max 30 mm
Vertical distance between the grips: 0÷480 mm
Length of the grips: 50 mm
Suitable extensometer H014, H014-..... (see page 414)

SSW-LINK or SSW-UTM2 Software for tensile tests
H009N In-built firmware for tensile tests

Concrete and cement applications

Compression test



H012-20 Platens with diameter 216 mm, complete with seatball
Vertical distance between the platens: 60 ÷ 900 mm
SSW-LINK or SSW-UTM2 Software for compression test
C109-10N In-built firmware for compression test

CMOD test

STANDARD:
EN 14651

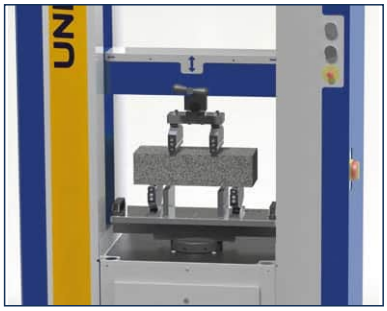
H012-21 Jig for flexural test in 3 or 4 points, rollers Ø30x160 mm
Upper rollers distance: 100/150 mm
Lower rollers distance: 300/350/400/450/500 mm
Vertical daylight between rollers: 0 ÷ 350 mm
C090-16 Fork transducer, 5 mm stroke
S337-51 Calibration process of the fork transducer
C090-18 Datum blocks, to be glued on the lower side of the con - crete beam to hold the fork transducer. Pack of 24 pieces
SSW-UTM2 Software for flexural tests on fiber-reinforced concrete
C109-14N In-built firmware for deflection FRC and flexural toughness test

Compression test on mortar

STANDARDS:
EN 196-1
ASTM C109

H012-20 Platens with diameter 216 mm, complete with seatball
Vertical distance between the platens: 60 ÷ 900 mm
E170 COMPRESSION DEVICE to test mortar specimens 40.1x40 mm or other models: see p. 392
SSW-LINK or SSW-UTM2 Software for compression test on mortar
E163N In-built firmware for compression test on mortar

Flexural test



H012-21 Jig for flexural test in 3 or 4 points, rollers Ø30x160 mm
Upper rollers distance: 100/150 mm
Lower rollers distance: 300/350/400/450/500 mm
Vertical daylight between rollers: 0 ÷ 350 mm
SSW-LINK or SSW-UTM2 Software for flexure test
C109-11N In-built firmware for flexure test

Deflection test

STANDARDS:
EN 14488-3
ASTM C1609

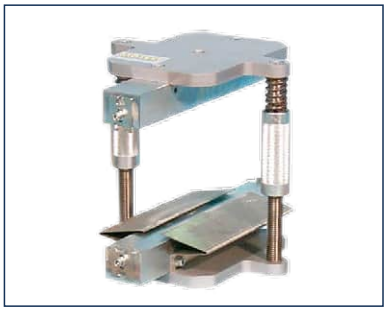
H012-21 Jig for flexural test in 3 or 4 points, rollers Ø30x160 mm
Upper rollers distance: 100/150 mm
Lower rollers distance: 300/350/400/450/500 mm
Vertical daylight between rollers: 0 ÷ 350 mm
C090-15 Displacement transducers holder
2 x C090-30 LVDT displacement transducer, 10 mm
2 x S337-51 Calibration process of the displacement transducer
SSW-UTM2 Software for flexural tests on fiber-reinforced concrete
C109-14N In-built firmware for deflection FRC and flexural toughness test

Flexure test on mortar

STANDARDS:
EN 196-1
ASTM C348

H012-20 Platens with diameter 216 mm, complete with seatball
Vertical distance between the platens: 60 ÷ 900 mm
S337-32 Strain gauge load cell 10 kN capacity
S337-51 Calibration process of load cell
E172-01 FLEXURE DEVICE for mortar prisms 40.1x40x160 mm
Other models: see p. 392
SSW-LINK or SSW-UTM2 Software for flexure test on mortar
E164N In-built firmware for flexure test on mortar

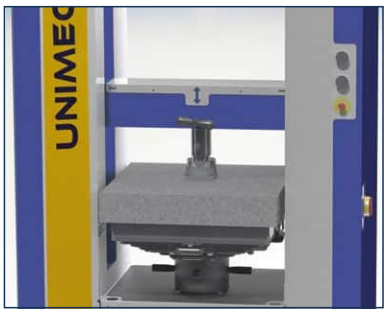
Indirect tensile test



STANDARDS:
EN 12390-6
EN 1338
EN 13286-42
ASTM C496
NF P18-408
BS 1881:117

H012-20 Platens with diameter 216 mm, complete with seatball
Vertical distance between the platens: 60 ÷ 900 mm
C101-01 Splitting tensile test device for cylinders
C100-01 Packing strips for the device C101-01
C103 Splitting tensile test device for prisms and block pavers
C100-02 Packing strips for the device C103
SSW-LINK or SSW-UTM2 Software for splitting tensile test
C109-12N In-built firmware for splitting tensile test

Energy absorption test



STANDARD:
EN 14488-5

H012-22 Square base, loading piston and transducer holder for energy absorption test
SSW-UTM2 Software for Energy absorption test
S336-19 Displacement transducer 50 mm stroke with flat head
S337-51 Calibration process
C109-16N In-built firmware for Energy absorption test

Elastic modulus determination in indirect tensile test on unbound and hydraulically bound mixtures

STANDARD:
EN 13286-43

H012-23 Splitting tensile test jig according to EN 13286-43
C135 Jig for determination of elastic modulus in indirect tensile test, complete with 4 LVDT displacement transducers
4 x S337-51 Calibration process for C135 transducers
C130-06 In-built firmware for elastic modulus on unbound mixtures (EN 13286-43)

Punching test on clay blocks

STANDARDS:
EN 15037-2, 15037-3
UNI 9730-3

H012-24 Punching device for clay blocks
S205-15 Holding beam for the punching device
S337-32 Strain gauge load cell 10 kN capacity
S337-51 Calibration process of load cell
SSW-UTM2 Software for the punching test
C109-16N In-built firmware for the punching test

Elastic modulus test on mortar and on unbound and hydraulically bound mixtures

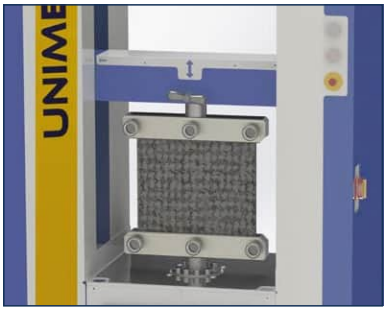
STANDARDS:
EN 13412
EN 13286-43

H012-20 Platens with diameter 216 mm, complete with seatball
Vertical distance between the platens: 60 ÷ 900 mm
3 x C134N Electronic universal extensometer/compressometer (see page 260)
3 x S337-51 Calibration process for the extensometers
C134-10 Template to regulate the base length of C134N
C130-05 In-built firmware for elastic modulus test (EN 13412)
C130-06 In-built firmware for elastic modulus on unbound mixtures (EN 13286-43)

Note: Strain gauges can be used as alternative to C134N (see p. 259)

Composite materials applications

Tensile test on composite materials (up to 100 kN)



STANDARD:
EN 10319

H012-30 Tensile heads and grips for tensile tests on FRP, FRCM, geotextiles, geogrids and geonets.
Suitable extensometer H014-... (see page 414)

H009N In-built firmware for tensile tests

Other tests

Other accessories are available on request for more applications:

- Peeling on geotextiles
- Punching test on geotextiles
- Tensile tests on FRCM and other composite materials
- CBR test
- Unconfined compression test
- Quick triaxial test
- Modulus of rupture of building stones
- Indirect tensile test on rocks
- Auto SCB semi-circular bend
- Duriez test
- Indirect tensile test on bitumen
- Direct shear (Leutner) between bituminous mixture layers
- Marshall stability test

AVAILABLE LOAD CELLS

ELECTRIC STRAIN GAUGE LOAD CELLS

Complete with cable, connector and device to fix the load cell to the frame.
Rated output: 2 mV/V nominal
Accuracy: 0.1%

Models	Capacity
S337-31	2.5 kN
S337-35	5 kN
S337-32	10 kN
S337-33	25 kN
S337-34	50 kN

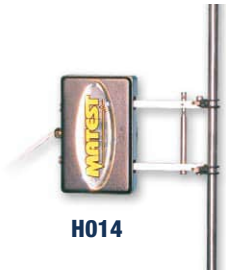
S337-34 S337-32

EXTENSOMETERS FOR H001, H002, H010 SERIES AND H012

H014
ELECTRONIC EXTENSOMETER

It allows to measure the elongation of the sample during the elastic phase of the test. It means that a load/deformation graph can be plotted and the elastic properties of the material can be determined and evaluated. O-rings are included to allow to fix the device on the sample.

This extensometer must be removed before the yielding phase.
Gauge length: 50 mm
Stroke: +1 mm/-0,2 mm
Precision: 0,001 mm
Specimen dimensions:
up to Ø 30 mm with the o-rings included
(up to Ø 60 mm in general).



H014

ELECTRONIC EXTENSOMETERS FOR TENSILE TESTS UNTIL BREAKAGE

Thanks to their design, these coaxial extensometers can be left on the sample for the whole duration of the test until the specimen failure.
They are equipped with a potentiometric transducer and they include different base lengths.

MODELS

H014-06 Extensometer for round specimens from 4.5 to 11 mm diameter. Transducer stroke: 25 mm

H014-07 Extensometer for round specimens from 10 to 19 mm diameter. Transducer stroke: 50 mm

H014-08 Extensometer for round specimens from 18 to 25 mm diameter. Transducer stroke: 50 mm

H014-09 Extensometer for round specimens from 26 to 36 mm diameter. Transducer stroke: 50 mm

H014-10 Extensometer for flat specimens, width max. 25 mm; thickness max. 10 mm. Transducer stroke: 50 mm

H014-11 Extensometer for round specimens from 35 to 49 mm diameter. Transducer stroke: 50 mm

H014-12 Extensometer for round specimens from 48 to 61 mm diameter. Transducer stroke: 50 mm

H014-07

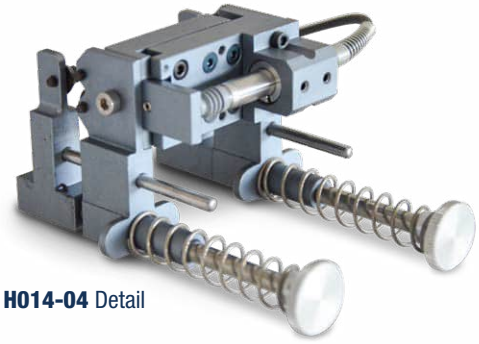
H003-18
EXTENSOMETERS FOR WIRE STRANDS

STANDARDS: UNI 7676 | ASTM A1061
The instrument is directly applied on the sample through two coaxial telescopic hardened tubes to measure the elongation of the strand up to failure.
The H003-18 extensometer can be utilized only with the machine mod. H001BS, H001CS, H001DS and H002.
Gauge length: 600 mm
Stroke: 50 mm
Precision: 0,001 mm
Specimen dimensions: strands 9,5; 12,7 and 15,2 mm
Dimensions: 105x630 mm
Weight: 1000 g

H003-18 Detail of the wire strands extensometer

H014-04
ELECTRONIC EXTENSOMETER

It comprises a mechanical slide and a transducer (LVDT type) which can be easily fixed on the sample with spring closures.
Thanks to two extension rods it is possible to adjust the gauge length.
As H014, this extensometer is suitable to measure the elastic elongation and **must be removed before breakage**.
The code comprises: extensometer (slide + LVDT), 2 extensions rods, spare fixing knives and carrying case.
Gauge length: 50/100/200 mm
Stroke: 10 mm
Precision: 0,001 mm
Specimen dimensions: rounds from 3 to 32 mm diameter, flats from 1 to 32 mm thickness and minimum width of 15 mm.
Minimum distance between the grips: 120 mm.


H014-04 Detail

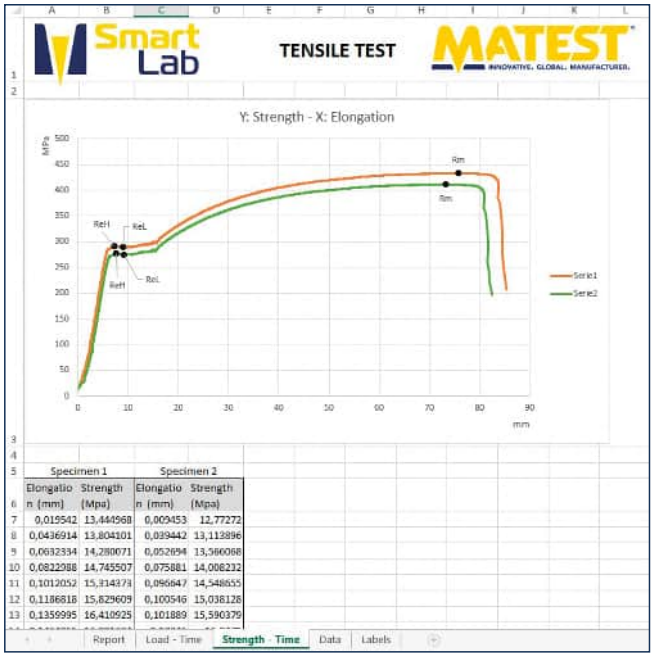
SMARTLAB SOFTWARE
FOR TENSILE TEST

SmartLab allows to perform tensile tests on **different types of specimens and materials according to the relevant standard** such as ISO 6892, ISO 15630, UNI 7676, ASTM A370, ASTM E8.

This module is compatible with **all Matest tensile machines**: both hydraulic and electromechanical and is designed to be as open and adaptable as possible. Before starting the test, the user chooses among a **list of different shapes of samples** (round, rectangular, strand, etc.) and the area is automatically calculated. It is also possible to select a "generic" shape so that the user can adapt the final calculations event to non-standard samples. While the test is running, SmartLab shows **multiple graphs built in real-time**: load vs elongation, strength vs elongation, load vs crosshead displacement, strength vs crosshead displacement, load vs time and strength vs time. The user decides what graphs to visualize or not, with the possibility to keep acquiring all of them, even the ones that are not being visualized. It is possible to select **0 to 3 extensometers measuring the elongation** and SmartLab shows simultaneously each single channel reading and the average. In the meantime, it is possible to acquire also the crosshead displacement. At the end of the test, the **software calculates all the values requested by the selected standard**, for example the maximum strength, the upper yield point and the lower yield point and many others. It is possible **to act on the graphic representation of the test** in order to define very precisely the position of some specific points: a sort of "guided" procedure allows to reduce at minimum the risks of human errors.

SmartLab is suitable also to **perform tests on composite materials** (such as FRP and GFRP) **and geosynthetics** or others that are not described in any standard yet.

Note: Further information see page 18...20



Excel report of a combined tensile test.

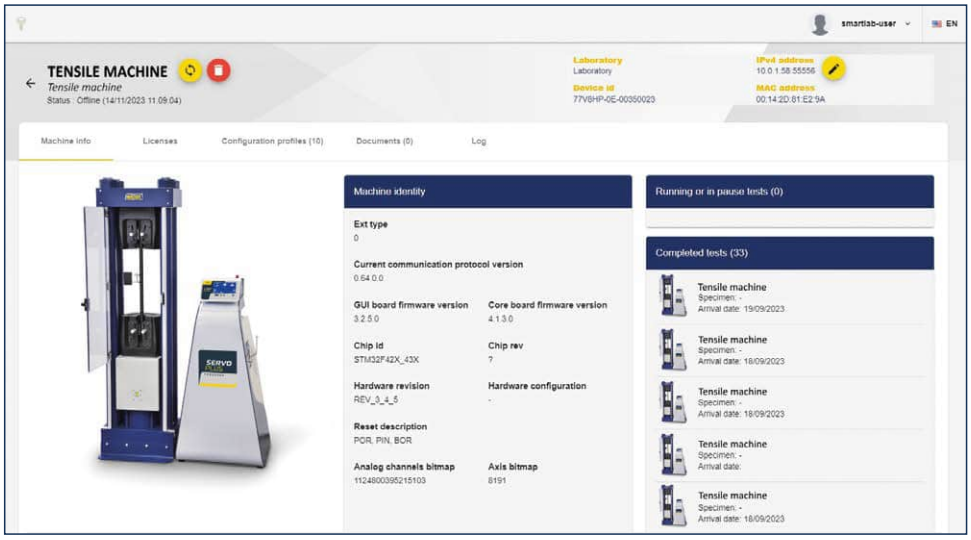
SSW-LINK
FIRMWARE UPGRADE

In order to use the SmartLab software, it is necessary to purchase the firmware license which unlocks up to 3 different types of machines (e.g. 1 Tensile Machine, 1 Shear Machine, 1 Compression machine).

PC specifications on which SmartLab acts as a server:
CPU Intel Core i5 or AMD Ryzen 5, 16GB RAM memory, 100GB mass memory dedicated to SmartLab, Windows 11 or 10 64-bit.
On request, it is possible to order the PC that fulfills all requirements (SPC).

ACCESSORIES

SPC PC for SmartLab software
SSW-GWAY SmartLab Gateway



Machine overview on SmartLab

H017
UNIVERSAL EDUCATIONAL TESTING MACHINE CAPACITY 20 KN

The machine has been designed to measure the strength of metallic materials and study the various reactions they undergo when subject to different stresses, verifying the same with the following tests:
- Tensile test
- Shear test
- Compression test
- Bending test
- Brinell hardness test

This machine is primarily for educational purposes and intended for the use in higher educational institutes or universities and allows students of material science to have a hands-on approach to applications so far studied at a theoretic level only.

Components of the machine:
- 30 kN (160 bar) manometer
- 50 mm travel analog dial gauge
- 250 bar pressure transducer
- 50 mm travel digital transducer
- 50 mm travel ram
- 8-channel digital indicator (Cyber-Plus Progress)

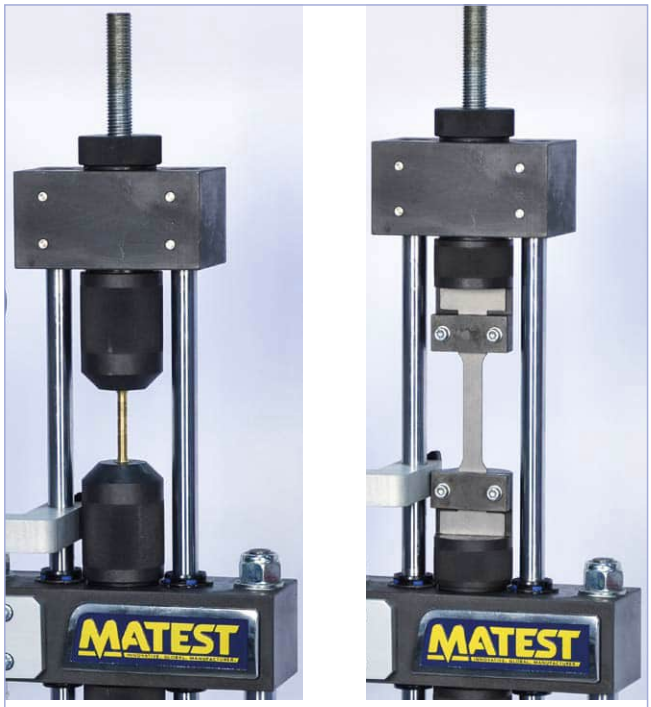
Power supply: 230V 1ph 50-60Hz 70W
Dimensions: 600x600x850 mm
Weight: 60 kg approx.

H017

ACCESSORIES THAT CAN BE USED IN THE UPPER CHAMBER OF THE MACHINE

H017-05
TENSILE TEST
The equipment allows to perform tensile tests on steel samples up to failure and allows to evaluate stress-strain diagrams of the material comprising the sample and mainly to evaluate the following parameters:
- Yield strength
- Proportionality limit
- Failure strength
- Elastic modulus
- Ultimate strength

The accessory includes: tensile heads for round samples and tensile heads for flat samples.



H017-05

H017-10
SHEAR TEST
The equipment allows to perform double shear tests on 6 mm diameter samples so as to determine the shear strength:
T=F/2S
F= value of maximum load applied
S= value of sectional area of the sample
The accessory includes: upper and lower shear heads and connecting rod.

H017-10

ACCESSORIES THAT CAN BE USED IN THE LOWER CHAMBER OF THE MACHINE

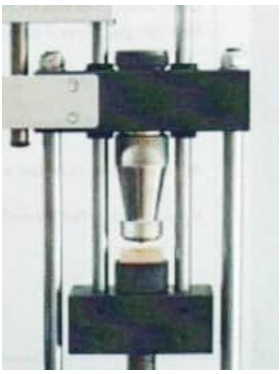
H017-15
COMPRESSION TEST
The equipment allows to determine the mechanical properties of different metals using, for example, spring type samples. Measuring the maximum load applied and the corresponding displacement, it is possible to determine the elastic constant K of the tested metallic spring.
The accessory includes: two compression platens and one distance piece.

H017-15

H017-20
BENDING TEST
The equipment is used to evaluate the flexional properties of metals. After the samples is subject to flexional stresses, a visual check is carried out to verify the formation of cracks or defects in general.
The equipment includes: a support beam, two lower rollers and one upper roller.

H017-20

H017-25
HARDNESS TEST
The equipment is used to determine the capacity of a material to resist when engraved, indented or impressed, according to the Brinell method, and is useful for studying materials subject to wear.
The accessory includes: upper hardness head (with 10 mm sphere) and the lower compression platen.


H017-25

SAMPLE SPECIMENS FOR THE DIFFERENT TESTS

CODE	DESCRIPTION
	TENSILE TEST
H017-30	Round bar test specimens ø 6 mm made in stainless steel AISI 303, set of 14 pieces.
H017-31	Round bar test specimens ø 6 mm made in brass, set of 14 pieces.
H017-32	Round bar test specimens ø 6 mm made in bronze, set of 14 pieces.
H017-33	Round bar test specimens ø 6 mm made in copper, set of 14 pieces.
H017-34	Round bar test specimens ø 6 mm made in aluminium, set of 14 pieces.
H017-40	Flat bar test specimens, different materials, set of 14 pieces.
	SHEAR TEST
H017-50	Round copper bar specimens ø 6 mm, set of 14 pieces.
	FLEXURAL TEST
H017-60	Flat bar specimen, set of 14 pieces.

The machine is manually controlled, while readings are both analog, through the manometer and the dial indicator, and digital, through the pressure transducer and the displacement transducer connected to the digital indicator.

SSW-UTM2
UTM2 SOFTWARE
The software allows to see graphs created in real time during the test, and to elaborate a test report.
For further details refer to p. 21

H018
BOND FACTOR DETERMINATION

STANDARDS: UNI EN ISO 15630-1 | D.M. 17/01/2018 | UNI EN 10080
Manual equipment for the determination of the bond factor of deformed rebars. The supply includes:

- Laser indicator and electronic scale for measuring the pitch and the shape of the ribs.
- Digital comparator
- Positioning and fixing support for specimens with a maximum diameter of 32 mm and 300 mm in length
- Excel sheet for calculation and printing of the results.

Dimensions: 370x200x300 mm
Weight: 6 kg approx.

H018

H020N
MARKING-OFF MACHINE
AUTOMATIC MOTORISED

STANDARDS: UNI EN ISO 15630-1, 6892-1
Used to mark off specimens with round and rectangular shape for the manual measurement of the elongation at breaking. Supplied complete with safety guard, electric micro switch and safety button; compliant with CE directive.
Technical specifications:

- Marking length: 400 mm
- Marking steps: every 5 or 10 mm
- Sample dimensions: rounds Ø5 to Ø50 mm, flats with thickness 1 to 40 mm
- Marking tip: HRC 70 (one tip is included)

Power supply: 220V 1ph 50Hz
Dimensions: 830 x 250 x 300 mm
Weight: 45 kg approx.

H020N

SPARE

H020N-10 Spare marking tip

C351
SPECIMEN CUTTING MACHINE

It accepts blades up to Ø350 mm.
Useful cutting height: 120 mm

Power supply: 230V 1F 50 Hz 2000W
Dimensions: 560x460x390 mm
Weight: 20 kg

C351

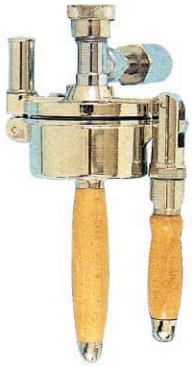
NEEDED ACCESSORY

C350-13 DIAMOND BLADE, Ø350 mm

H050
DRY-ICE MAKER

This device instantaneously produces the quantity of dry ice (solid CO2) required to reach temperatures down to -80 °C.
The dry-ice maker must be connected to a liquid CO2 bottle with connecting pipe and it produces 100 g dry-ice tablets having 75 mm diameter and 30 mm thickness.

Weight: 3 kg



H050

H052
COOLING BATH FOR RESILIENCE TESTS

This apparatus is meant for Charpy tests to be carried out at low temperatures.
It is made from double chambered stainless steel with isolating cavity wall from foamed polyurethan, 65 mm thick.
Complete with double chambered cover and specimen rack.

Internal dimensions:
125x125x180 mm
Weight: 12 kg

H054
PLIERS

Special-shaped, to take cooled specimens from the bath and place them directly into the Charpy Pendulum.

H052

H054

CHARPY PENDULUM TESTERS FOR RESILIENCE TESTS

STANDARDS: UNI EN ISO 148-1, 9016 I ASTM E23, A370

These machines allow to evaluate the resilience of metals, which means measuring the energy absorbed during the fracture of standardized specimens for quality control, certification, and R&D purposes.
The arm movement is motorized, with automatic positioning and release to ensure maximum operator safety and reduced testing times. A ground plate allows for proper machine levelling. Protective guards, compliant with the CE Safety Directive, are included and equipped with a safety microswitch.
The machines feature a 7" touch screen display, PLC module with serial communication, and software (PC not included). Both models are supplied with a striking edge conforming to EN standards, while the ASTM model is available as an accessory.

Note: a concrete base must be prepared in advance for the installation of the Charpy pendulum.

H062M

H062M
DIGITAL CHARPY PENDULUM TESTER

Impact energy: 300J and 150J
Other capacities are available on request.

Power supply: 380V 3ph 50Hz 550W
Dimensions: 2280x830x2060 mm
Weight: 1040 kg

H062-01M
DIGITAL CHARPY PENDULUM TESTER WITH OVERSIZED BASEMENT

This model has a heavier and more robust base and structure, making it particularly suitable for intensive use. It includes a conveyor belt that automatically removes broken specimens at the end of the test to reduce operating time.
Impact energy: 300 J (other capacities available on request).

Power supply: 380V 3ph 50Hz 1.5kW
Dimensions: 2220x900x2220 mm
Weight: 1200 kg approx.

ACCESSORIES FOR H062M AND H062-01M

H062-03M STRIKING EDGE according to ASTM standards for H062M.

H062-04 CERTIFIED SAMPLES low energy for Charpy pendulum verification, certificate included, pack of 5 pieces.

H062-05 CERTIFIED SAMPLES medium energy for Charpy pendulum verification, certificate included, pack of 5 pieces

H062-06 CERTIFIED SAMPLES high energy for Charpy pendulum verification, certificate included, pack of 5 pieces.

H062-07 CERTIFIED SAMPLES ultra-high energy for Charpy pendulum verification, certificate included, pack of 5 pieces.

H057N1
AUTOMATIC BROACHING MACHINE

STANDARDS:ASTM A370, E23 I UNI EN ISO 148-1

Used to mark notches on impact test bars with dimensions 55x10x10 mm for resilience tests with Charpy pendulum.
Notching speed: adjustable from 0,35 to 2,5 mm/min
Drive: hydraulic, automatic
It includes a V-type and a U-type broach.

Power supply: 380V 3ph 50 Hz 0.4 kW
Dimensions: 660x500x1240 mm
Weight: 200 kg approx.

H057N1

H062-01M

H065N
COLD BEND TESTING MACHINE

STANDARDS: UNI EN ISO 7438, 15630-1 | ASTM A615 | D.M. 17/01/2018

This equipment has been studied and designed to perform bending tests on steel bars for reinforced concrete.

SPECIFICATIONS:

- Max. piston load: 160 kN
- Max. piston stroke: 550 mm
- Piston speed adjustable from 0 to 6 mm/s
- Power supply: 230V 1ph 50 Hz 1500W
- Dimensions: 1540x800x1300 mm
- Weight: 350 kg approx.

H065-01

H065N

The machine can perform two types of test:
- bending the specimen through 180° only with mandrels up to max. 96 mm included.
- bending the specimen through 90° and then straightening it again up to a minimum of 20° only with mandrels over 96 mm diameter.

This bending machine is composed of a rugged frame supporting a beam having a cylinder with relevant load piston fixed on it, being activated by an hydraulic cell complete with speed adjuster for the piston, direction control valve, max. pressure valve, control gauge. The whole is cased to protect every single component from the dust, and the operator from any possible danger. A small bowl has been fitted under the beam, where the steel bar is bent.
Two contrasting rollers are fitted on the beam. They may easily be adjusted in distance to be in accordance with the Standards concerning bars having diameter between 5 and 32 mm.
Fixing and changing the mandrels on top of the thrust cylinder is easy and practical and grants the operator a perfect interchangeability of the same. A device prevents the unlocking of the bar under test from the relevant rollers and the contrasting mandrel both during the bending and the straightening operation.
The machine accepts bars up to Ø 32 mm and is supplied complete with two series of rollers, having respectively Ø mm 50 and 100.
The mandrels, the mandrel-holders and the brackets are not included in the standard supply and have to be ordered separately. (see table).

ACCESSORY

H065-01 SAFETY GUARDS to CE Safety Directives.

H065N detail

AVAILABLE MANDRELS AND BRACKETS FOR H065N

The following table allows to choose the suitable accessories (mandrel, mandrel holder and bracket) for H065N machine according to the rebar diameter and the standard of reference.

Starting from the rebar diameter, follow the line to find the mandrel, the mandrel holder and the brackets to fix the correct distance between the support rollers (either using the rollers with 50 or 100 mm diameter).

Rebar Ø mm DM 17-01-2018, ISO 15630-1 (recalls ISO 7438)	Rebar Ø mm ASTM A615/A615M (recalls ASTM E290)		Mandrel Model	Mandrel Ø mm	Mandrel-Holder Model	Bracket model according to ISO 7438		Bracket model according to ASTM E290	
Steel B450C and B450A	Steel grade 40 and 60 [280 and 420 MPa]	Steel grade 75, 80 and 100 [520, 550 and 690 MPa]				Use with rollers Ø50	Use with rollers Ø100	Use with rollers Ø50	Use with rollers Ø100
4	-	-	H066-04	16	H067-02	H068-12	-	-	-
6	-	-	H066-07	24	H067-03	H068-16	-	-	-
7	-	-	H066-08	28	H067-03	H068-17	-	-	-
8	-	-	H066-10	32	H067-03	H068-19	H068-11	-	-
-	10	-	H066-64	35	H067-03	-	-	H068-20	H068-11
10	-	-	H066-12	40	H067-03	H068-21	H068-12	-	-
-	12	-	H066-13	42	H067-03	-	-	H068-22	H068-14
-	-	10	H066-16	50	H067-03	-	-	H068-23	H068-14
-	16	-	H066-18	56	H067-04	-	-	H068-11	H068-01
12	-	12	H066-19	60	H067-04	-	H068-17	-	H068-17
-	-	13	H066-65	65	H067-04	-	-	H068-11	H068-01
14	-	-	H066-61	70	H067-04	H068-11	H068-02	-	-
16	-	16	H066-62	80	H067-04	H068-14	H068-12	H068-14	H068-12
-	19	19	H066-66	95	H067-04	-	-	H068-01	H068-08
-	20	20	H066-67	100	-	-	-	H068-02	H068-01
-	22	22	H066-72	110	-	-	-	H068-03	H068-03
-	25	25	H066-69	125	-	-	-	H068-08	H068-13
18	-	-	H066-33	144	-	H068-20	H068-13	-	-
20	-	-	H066-35	160	-	H068-02	H068-09	-	-
22	-	-	H066-36	176	-	H068-04	H068-05	-	-
24	-	-	H066-49	192	-	H068-09	H068-07	-	-
-	28	28	H066-70	196	-	-	-	H068-09	H068-08
25	-	-	H066-38	200	-	H068-09	H068-07	-	-
-	29	29	H066-71	203	-	-	-	H068-05	H068-10
-	32	32	H066-40	224	-	-	-	H068-08	H068-02
26	-	-	H066-53	260	-	H068-10	H068-03	-	-
28	-	-	H066-43	280	-	H068-01	H068-04	-	-
30	-	-	H066-56	300	-	H068-03	H068-09	-	-
32	-	-	H066-45	320	-	H068-04	H068-05	-	-

TABLE OF OTHER AVAILABLE MANDRELS

Mandrel Model	Mandrel Ø mm	Mandrel holder model
H066-01	10	H067-01
H066-02	12	H067-01
H066-03	15	H067-02
H066-05	18	H067-02
H066-06	20	H067-02
H066-09	30	H067-03
H066-11	36	H067-03
H066-14	44	H067-03
H066-15	48	H067-03
H066-51	52	H067-04
H066-17	54	H067-04
H066-20	64	H067-04
H066-21	66	H067-04
H066-48	72	H067-04
H066-22	75	H067-04
H066-52	78	H067-04
H066-23	84	H067-04
H066-55	90	H067-04
H066-24	96	H067-04
H066-26	108	-
H066-28	112	-
H066-63	114	-
H066-30	128	-
H066-31	132	-
H066-32	140	-
H066-68	150	-
H066-37	180	-
H066-39	220	-
H066-50	240	-
H066-41	250	-
H066-54	312	-
H066-46	336	-
H066-58	340	-
H066-57	360	-
H066-59	380	-
H066-47	384	-
H066-60	400	-

COMPLETE TABLE OF AVAILABLE BRACKETS WITH THEIR DISTANCES

Bracket model	Distances between the axis of the holes mm
H068-01	200, 260, 412
H068-02	210, 268, 425
H068-03	220, 280, 438
H068-04	225, 292, 464
H068-05	232, 342, 516
H068-06	240, 360, 520
H068-07	244, 364, 550
H068-08	250, 375, 580
H068-09	230, 320, 490
H068-10	256, 386
H068-11	75, 160, 262
H068-12	80, 170, 226
H068-13	85, 172, 298
H068-14	86, 180
H068-15	90, 184
H068-16	92, 190
H068-17	98, 196
H068-18	100, 208
H068-19	106, 226
H068-20	110, 224
H068-21	120, 254
H068-22	122, 542, 594
H068-23	134, 568, 620

Note: From Ø 100 to 400 mm the mandrel is directly fitted to the piston without using a mandrel-holder.

All mandrels have been produced from quality steel and cadmium plated for rust protection, and from Ø 10 mm up to Ø 96 mm included have been hardened to make them wearproof.

Pannello di controllo
5261
2.0.0
11/12/2020
1:25 PM
EMERGENCY
STOP
MATEST
EDOMEC

SECTION S

SOIL

For the implementation of civil engineering structures, the engineers must base their calculations according to the soil properties. This section analyses a soil sample to evaluate its characteristics, by providing 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.

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, huosed in carrying case, consists of:
10 kg drop rammer, 500 mm fall and anvil,
11 sounding rod Ø 22 mm x 1 m lenght complete with threaded collar and guiding rod. Grooved rod to extract samples
2 drive point 90°, 5 cm^2 and 10 cm^2 surface
Lifting device for sounding rod, accessories

Dimensions: 1080x360x220 mm **Weight:** 72 kg approx

SPARE

S050-01 Sounding rod Ø 22x1000 mm

S050

S051N
DYNAMIC CONE PENETROMETER (DCP)

TRL = TRANSPORT RESEARCH LABORATORY, UK.
STANDARD: ASTM D6951

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 Ø 20 mm
- Bar wrench, spanners, accessories.

Dimensions: 1210x340x190 mm
Weight: 29 kg approx

ACCESSORIES | SPARE

S051-10 Drop Sliding Hammer 4.6 kg weight.
S051-12N Extension rod, 400 mm long
S051-11 Spare Penetration conical point 60°

S057
FIELD INSPECTION POCKET VANE TESTER

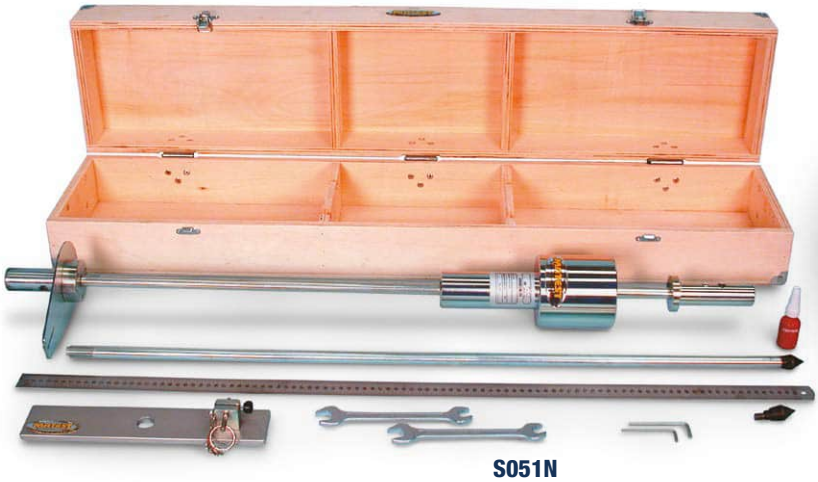
STANDARD: ASTM D2573

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 (diameter x height) 16x32, 20x40, 25.4x50.8 mm, extension rod 500 mm long, tools, carrying case.

Dimensions: 500x300x100 mm
Weight: 4 kg approx.

SPARE

S057-01 Extension rod, 500 mm long



S051N

S057

S051-01

S052-KIT
SOIL PROSPECTING KIT

STANDARDS: ASTM D420, D1452 I AASHTO T86

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 Ø 80 mm
S093-01	Auger head Ø 100 mm
S094-01	Auger head Ø 150 mm
S052-01	Dutch soil auger head, Edelman type, Ø 70 mm
S052-02	Gravel auger head Ø 150 mm
S092ASTA	Extension rod 1 m long with "T" handle
5xS095	Extension rod, 1 m long
S053	Soil sampler Ø 38 mm complete with stainless steel sample tube Ø 38x230 mm, jarring link, "T" handle.
5xS053-04	Stainless steel sample tube Ø 38x230mm
S052-03	Plastic cap ends for sample tubes Ø 38x230mm (12 pieces)
S054	Hand extruder for sample tube Ø 38x230 mm
S052-04	Stillson wrenches (2 pieces)
S052-05	Wooden carrying case.

Dimensions: 1140x490x360 mm
Total weight: 50 kg approx.

S051-01
MACKINTOSH PROSPECTING KIT

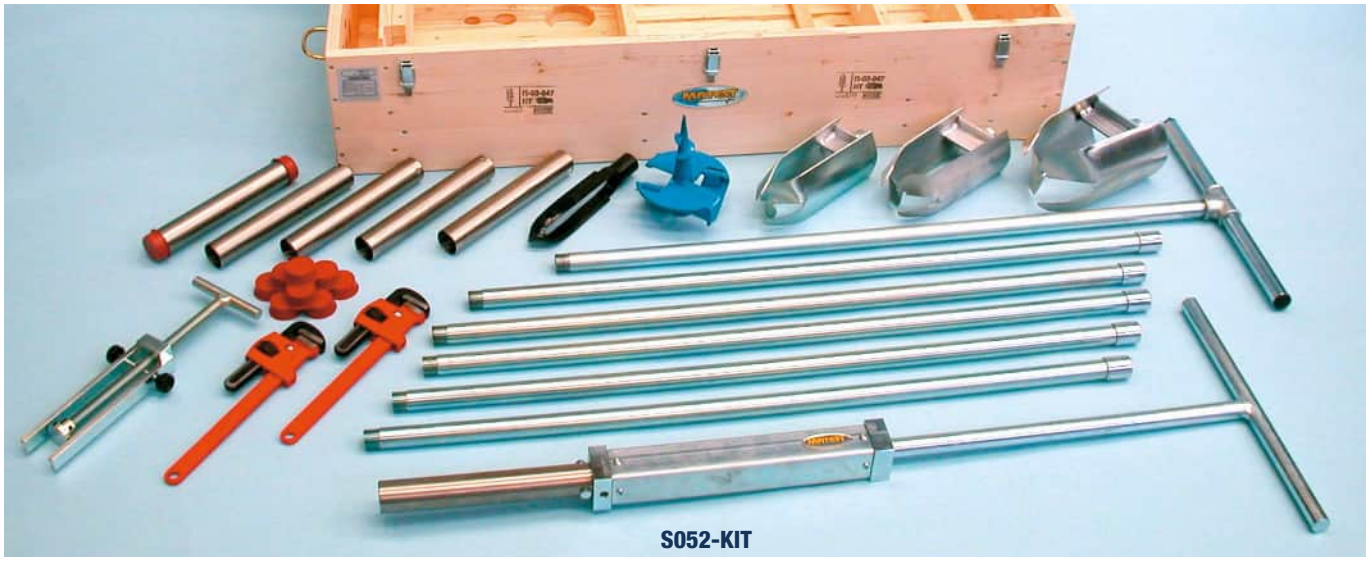
This equipment, manufactured by Matest, is particularly useful for initial site investigation work in remote areas. The kit is capable boring to a depth 10 - 12 mtrs depending on ground conditions. The use of specially designed extension rod couplers reduces bore-hole friction to a minimum, permitting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

Dimensions: 1050x260x120 mm
Weight: 35 kg approx.



S052-KIT

HAND AUGERS

STANDARDS: ASTM D420, D1452 I AASHTO T86

Designed for soil investigations and explorations, and to obtain representative samples.
Complete with "T" handle, and rod 1 m long.
Made of special galvanized steel.

S095

S094-KIT

S093-KIT

S092-KIT

Models	Description	Weight kg
S092-KIT	Hand Auger, Ø 80 mm x 1 m long	4
S093-KIT	Hand Auger, Ø 100 mm x 1 m long	5
S094-KIT	Hand Auger, Ø 150 mm x 1 m long	6
S095	Extension rod for above 1 m long	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 3 HP, two strokes, without speed inverter.
Fitted with two handwheels, to be used just by one operator.
Drilling holes up to Ø 200 mm and max. depth of 1000 mm
It only accepts extension rods mod. S096-06.
Supplied without augers (see accessories)

Weight: 10 kg approx.

ACCESSORIES

S096-03 AUGER Ø 100 mm x 1 m long
S096-04 AUGER Ø 150 mm x 1 m long
S096-05 AUGER Ø 200 mm x 1 m long
S096-06 EXTENSION ROD 1 m long

S096

S097

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.
Supplied without augers (see accessories)

Weight: 30 kg approx.

ACCESSORIES

S097-03 AUGER Ø 100 mm x 1 m long
S097-04 AUGER Ø 150 mm x 1 m long
S097-05 AUGER Ø 200 mm x 1 m long
S097-06 EXTENSION ROD 1 m long

SURFACE SOIL SAMPLERS

Used to take field standard core 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

S084N-KIT
SURFACE SOIL SAMPLER Ø 73 MM
STANDARDS: ASTM D2937 I CNR no. 22

Sampling tube is 73 mm inside diameter by 66 mm high.
Drop hammer is 5 kg

Total weight: 10 kg approx.

SPARE

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

SURFACE SOIL SAMPLER Ø 100 AND 150 MM
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.

Models	S083-KIT Ø 100x130 mm	S082-KIT Ø 150x130 mm
Driving rammer for core cutter	S083-01	S082-01
Driving dolly for core cutter	S083-02	S082-02
Core cutter	S083-03	S082-03
Total weight	9 kg approx.	15 kg approx.

Note: all items may be purchased separately.

WATER LEVEL INDICATORS

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

Weight: 6 kg approx.

Models	Cable length
S061	50 m
S061-01	100 m
S061-02	200 m

S061

S053-04 S053 S054 S084N-KIT S083-KIT

S053
SOIL SAMPLER Ø 38 MM
Used to obtain undisturbed soil samples of Ø 1½" (38 mm)
The sampler is formed by:
T handle with extension rod, 900 mm long
Jarring link ¾"
Stainless sample tube Ø 1½" x 9" (38x230 mm).

Weight: 7 kg

ACCESSORY

S054 HAND EXTRUDER used to extrude the soil specimens Ø 1½" from the sample tube.

SPARE

S053-04 Stainless sample tube Ø 1½" x 9"

POCKET PENETROMETERS AND SHEAR VANE DEVICES

STANDARDS: ASTM D2573

MODELS

S065
DIAL POCKET PENETROMETER
For the classification of cohesive soft soils in terms of consistency, shear strength and approximate unconfined compression strength. Direct value read in kgf/cm² on the graduated dial.
Range 0 - 6 kgf/cm² (0-588 kPa). Peak hold feature; zero setting by push button. Plunger Ø 6.35 mm

Weight: 300 g

S066
DIAL POCKET PENETROMETER
Identical to mod. S065 but with dial range 1-14 kg f/cm² (0-1373 kPa), suitable for medium and hard soil. Plunger Ø 6.35 mm

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.
Dual scale: 0-6 kgf/cm² (0-588 kPa)
0-11 kgf/cm² (0-1079 kPa)
Complete with 5 plungers Ø 6.4 - 10 - 15 - 20 - 25 mm

Weight: 400 g

S070
STANDARD POCKET PENETROMETER
Designed for the rapid determination of soil consistency, shear strength and approximate Unconfined Compression Strength. Scale range 0-4.5 kgf/cm² with direct reading strength values.
Plunger Ø 6.35 mm

Weight: 300 g

S071
POCKET PENETROMETER
Identical to mod. S070, but having a range of 0 - 16 kgf/cm².
Suitable for very compacted soils.

Weight: 800 g.

S075
POCKET SHEAR VANE DEVICE RANGE: 0-1 KG/CM²
Designed for the rapid determination in the field or in the laboratory of shear strength of cohesive soils. The dial indicates directly the shearing strength in kg/cm².
Complete with interchangeable stainless steel vane, 9x18 mm (Ø x height)

Weight: 300 g.

S076
POCKET SHEAR VANE DEVICE RANGE: 0-2 KG/CM²
Identical to mod. S075 but dial range 0-2 kg/cm².

SPARE

S076-01 Stainless steel vane 9x18 mm (Ø by height) for S075 and S076 devices.

A106N
MELTING POT, to melt wax and to cover soil samples keeping them to the original humidity. See section "A" p. 29

A106N

S086
LOAD 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 approx.

S086

S088
PROCTOR PENETROMETER

STANDARD: ASTM D1558

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 diameter: 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: 5 kg approx.

S088

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

E095N+B028-03 MIXER, 5 LITRE CAPACITY, complete with whisk beater

B025-01N+B025-13N MIXER, 20 LITRE CAPACITY, complete with whisk beater

Technical details:
see p. 94-95

E095N + E095-03

S074N
LABORATORY VANE APPARATUS

NEW

STANDARDS: BS 1377:7 | ASTM D4648

The Matest Laboratory Vane apparatus offers a swift method for estimating the **undrained shear strength** of soil specimens, serving as an alternative to standard triaxial equipment. This apparatus, based on the original **UK Transport Research Laboratory** design, applies stress to the soil sample based on the calibration spring and vane chosen. The selection of the spring and vane depends on the anticipated soil strength, with larger vanes suitable for soils with low-strength values. The apparatus operates by rotating the vane into the soil sample, and the calibrated spring measures the applied torque. The instrument features **two graduated scales** for applied torque (inner scale) and vane rotation (outer scale).
After the test, the **Undrained Shear Strength (cu)** is calculated by dividing the applied **Torque (T)** by a **constant (K)** determined by the dimensions and shape of the chosen vane.
The vane apparatus comes complete with four calibrated springs and a vane Ø 12.7 x 12.7 mm.

Dimensions: 250x300x600 mm
Weight: 11 kg approx.

ACCESSORIES

S074-06N VANE, Ø 12.7 x 25.4 mm
S074-07N VANE, Ø 12.7 x 19 mm
S074-09N VANE, Ø 25.4 x 25.4 mm
S074-10N UNIVERSAL ATTACHMENT to hold sample tubes from Ø 38 to 100 mm
S074-01N MOTORIZING ATTACHMENT with selectable speeds 6 to 12°/min or 60 to 90°/min, conforming to ASTM and BS standards. Power supply: 220V 1ph 50-60Hz 20W

SPARES

S074-08N Vane, Ø 12.7 x 12.7 mm
S074-12N Set of 4 calibrated springs

S058
NUCLEAR MOISTURE DENSITY GAUGE

STANDARDS: ASTM D6938, D2950, D7013, D7759, C1040
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/m^3
- Moisture measurement range: 0 to 640 kg/m^3
- Precision at 2000 kg/m^3, 150 mm - Depth: ± 3.5 kg/m^3
- Moisture precision at 240 kg/m^3: ± 4.42 kg/m^3

Gauge dimensions:
580x310x220 mm
Weight: 14 kg approx.

S058

S058-01
NUCLEAR MOISTURE DENSITY GAUGE HIGH-END

Same as model S058, but with additional Bluetooth, GPS, and Project storage capabilities.

ACCESSORIES for S058

S058-11
NUCLEAR GAUGE VALIDATOR AND CALIBRATION DEVICE
STANDARDS: ASTM D6938, D2950 | 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 the determination of the calibration constant is user friendly and communicates directly with the gauge to 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 approx.

S058-12 SOFTWARE to be used with the validator for calibrations.

S058-11

S059-10
ELECTRICAL DENSITY GAUGE

STANDARD: ASTM D7698, D1557, D698 | AASHTO T399

The Electrical Density Gauge is a nuclear-free field density measurement tool based on In-Lab test data. It determines moisture content and density for various materials like aggregate, compacted type I and II bases, or native soil suitable for shallow foundations. The lab unit allows direct readings from Proctor moulds during Proctor tests, supporting multiple Field Units. The field unit, in a rugged case, is easily portable. Expand capabilities by adding more field units. No highly trained or licensed technicians are needed, and there's no special handling for shipping or hazardous materials compliance. It's lightweight and eliminates costs associated with nuclear gauges.

S059-10

S059
NON NUCLEAR GAUGE FOR SITE SOIL COMPACTION CONTROL

YOUNG MODULUS
STANDARD: ASTM D6758

S059

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

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).

S077N
EARTH RESISTIVITY METER

STANDARDS: ASTM G57 I 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:

1 earth resistivity meter with software (requires external pc, not included)
2 cable reels with 300 m cable
2 cable reels with 100 m cable
2 stainless steel electrodes
2 copper electrodes
2 1.25 kg mallet

Dimensions: 270x246x123 mm
Weight: 2.9 kg approx.

S078-01N

S077N

ACCESSORY

S078-01N ENERGIZER, TWO PIECES
Energy source for geoelectrical surveys (in alternative to dry batteries or generators).

Dimensions: 27x24x10.5 cm (each piece)
Weight: 2.7 kg approx. (each piece)

MAIN FEATURES

- 24 channels + trigger (AUX) – 2 units can be serialized for a total of 48 chs.
- 24 real bits, Sigma-Delta ADC
- To be connected to any portable PC/tablet PC/ Toughbook (not included)
- Power supply from USB (no external battery!)
- Standard NK2721C seismic cable connectors
- Compatible with analog geophones of any resonance frequency
- Free upgrades of data acquisition software
- PELI Case (IP67 when closed)

S079N
SEISMOGRAPH, 24 CHANNELS

This new type of seismograph is a compact-sized and it has 24 channels, with a 24 bit data acquisition board and USB interface for external PC. Suitable for so many applications, this system is a really affordable solution for all professional uses.
Applications:
- Refraction
- Shallow reflection
- Surface waves (MASW, Re.Mi., Vs30, MAAM, ESAC, etc.)
- HVSR / Vibrations (on request)
- Downhole (with 3D borehole geophone) (on request)
- Crosshole (with 3D borehole geophone and cross-hole energizer for P/S waves Mod.CHE) (on request)

The system consist of:
1x measuring instrument
2x seismic cable, 12-CH 65 m length
24x geophone 10 Hz, vertical with single clip
1x piezoeletric starter, with cable (hammer switch) 100 m length
1x striking plate
1x software

Dimensions: 3 boxes 51x42x48 cm each
Weight: 45 kg approx.

S079N

S132N
COLOR STANDARD GLASS SCALE
ORGANIC IMPURITIES IN SOILS

STANDARDS: ASTM C40-11 method D I AASHTO T21

For the determination of the Organic impurities in soils and fine aggregates.
The chart has 5 glass reference scales.

S132-01 GRADUATED IMPURITIES TEST BOTTLE, stoppered, pyrex glass, 500 ml - ASTM C40

S132-02 GRADUATED IMPURITIES TEST BOTTLE, stoppered, pyrex glass, 500 ml, marked at 130 and 200 ml - UNI 8020-14

S132-03 GRADUATED IMPURITIES TEST BOTTLE, stoppered, pyrex glass, 1000 ml - ASTM C40

S133N
MUNSELL 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.

S133N

S137 HARDNESS TEST KIT OF WATER, for calcium and magnesium percentage determination.
The set comprises different reagents and graduated containers, syringe, pipette, instructions.

S137-01 ALKALINITY TEST KIT to determine the total alkalinity of water.

S138 COMPACT LABORATORY FOR SOIL ANALYSIS
Compact laboratory for the determination of nitrate-, nitrite-, and ammonium-nitrogen as well as pH in soils.
Formed by different bottles, reagents and accessories to perform about 50 tests for each soil factor.

S137

S137-01

S138

UNIVERSAL SAMPLE EXTRUDERS

STANDARDS: EN 13286-2, 13286-47 I ASTM D698, D1587, D1883 I BS 598, 1377:4, 1924:2

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 Ø 35 up to 150 mm (external diameter 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 diameter 38.1 (1½"), 83, 100 mm.

Power supply: 230V 1ph 50Hz 1300W
Dimensions (working position): 2741x635x1200 mm
Weight: 160 kg approx.

S111

S114
UNIVERSAL EXTRUDER

Used to extrude samples having diameter 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: Ø 300x500 mm
Weight: 32 kg approx.

S114

S110
VERTICAL SOIL EXTRUDER, HAND OPERATED

The extruder is actuated by a 60kN hydraulic jack, ram travel 480 mm. It accepts standard U4 tubes and samples from 35 to 152 mm diameter.
Dimensions: 350x320x1150 mm
Weight: 50 kg

ACCESSORIES

S110-01 ADAPTOR for extruding 38, 100, 150 mm, 4", 6" samples
S110-02 ADAPTOR for extruding 38 mm diameter samples only
S110-03 SAMPLE TUBE U100 (U4), Ø 106x457.2 mm
S110-04 TAMPER to extrude the sample from S110-03 tube

S110
with accessories

S112
SCREW EXTRUDER - HAND OPERATED

The unit extrudes samples from Ø 35 to 101.6 mm with max. stroke of 650 mm. Supplied complete with adaptors to extrude samples having diameter 38.1 (1½"), 83, 100 mm, supporting bench, sample receiving table both adjustable in height and lowerable.

Dimensions: 1700x700x1200 mm
Weight: 90 kg approx.

S112

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

Code	Diameter
S113-10	38.1 mm (1 ½") (spare)
S113-11	50.8 mm (2")
S113-12	76.2 mm (3")
S113-13	101.6 mm (4")
S113-14	83 mm (spare)
S113-15	100 mm (spare)
S113-16	35 mm
S113-17	150 mm (only for mod. S111)

S118
SOIL DIE CUTTER | 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 S122-08 to S122-27 and tampers S123 to S123-17
Upper plate diameter is 120 mm and max. vertical daylight is 470 mm

Dimensions: 500x300x900 mm
Weight: 30 kg approx.

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	Height	Hollow Punch	Tamper
Consolidation	Ø 50.47	20 mm	**S122-22**	**S123**
Consolidation	Ø 63.50	20 mm	**S122-23**	**S123-05**
Consolidation	Ø 71.40	20 mm	**S122-24**	**S123-01**
Consolidation	Ø 75.00	20 mm	**S122-25**	**S123-04**
Consolidation	Ø 79.80	20 mm	**S122-26**	**S123-02**
Consolidation	Ø 112.80	25 mm	**S122-27**	**S123-03**
Shear	Ø 50	23 mm	**S122-08**	**S123-08**
Shear	Ø 60	23 mm	**S122-09**	**S123-09**
Shear	Ø 63.5	23 mm	**S122-21**	**S123-17**
Shear	Ø 100	23 mm	**S122-10**	**S123-10**
Shear	⧄ 60x60	23 mm	**S122-11**	**S123-11**
Shear	⧄ 100x100	23 mm	**S122-12**	**S123-12**
Triaxial + Unconf.	Ø 38	76 mm	**S122-13**	**S123-13**
Triaxial	Ø 50	100 mm	**S122-14**	**S123-14**
Triaxial	Ø 70	140 mm	**S122-15**	**S123-15**
Triaxial	Ø 100	200 mm	**S122-16**	**S123-16**

S118 with punches and tampers

S120
SOIL LATHE

Designed to reduce by trimming the diameter of a soil sample unitil 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 Ø 38 to 110 mm.
Supplied complete with three sets of platens for samples Ø 38-50,47-60 mm, wire saw and 6 blades.
Dimensions: Ø 460x720 mm
Weight: 20 kg approx.

S120

V112-01

V113

S124

S125

V112-01 PORCELAIN MORTAR Ø 125 by 65 mm complete with porcelain pestle.
V113 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 Ø 38 to 110 mm When ordering please specify required diameter.

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 approx.

ACCESSORY

V300-30N Ion exchange resin, 1 litre

V300-30
S140

CHLORIDE CONTENT, RAPID METHOD
STANDARDS: BS 812:117 I 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.

A019-01 A019-02 A019-03

B073-01
MAGNETIC STIRRER/HEATER
For titration and stirring of liquid and semi-solid materials.
Square plate 160 mm.
Variable speed and temperature by electronic regulators.
Supplied complete with magnetic teflon coated follower.

Power supply: 230V 1ph 50Hz 750W

B073-01

pH METERS, DIGITAL
STANDARDS: ASTM D1067 I 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 p. 555

S155-KIT
PARTICLE SIZE ANALYSIS OF SOILS
HYDROMETER METHOD
STANDARDS: ASTM D422 / AASHTO T88

This complete set 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 provided with the kit)

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, water circulating unit.
230V 1ph 50-60Hz 700W

S155-10A Thermometer, range 0 - 50 °C, subdiv. 0.5 °C.

V104-03 Beaker, pyrex, 250 ml capacity

V300-23 Sodium Hexametaphosphate, 1000 g

S156-01 High speed stirrer, 15.000 rpm, complete with cup, paddle, anti-splash baffle, for dispersing soil particles in water. 230V 1ph 50Hz

Total weight: 60 kg approx.

ALTERNATIVE:

S155S-KIT
PARTICLE SIZE ANALYSIS OF SOIL

Same as S155-KIT but:

S155-09S HEATER **simple type**, complete with thermostat but without cooling coil.
Suitable for ambient temperatures of 20 °C maximum.
230V 1ph 50-60Hz

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

S155-11 NOMOGRAPHIC CHART, for stoke's law determination.

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.

C306-03

ACCESSORIES according 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.

V172-03N SOIL HYDROMETER 0.995 to 1030 g/ml.

SPARES for S156-01 Stirrer

S156-11 Anti-splash baffle

S156-12 Paddle

S156-13 Cup (beaker)

S156-13
S156-12
S156-11

S155-09S

S155-KIT

S156-01

S156-03

S156

S143-KIT
PARTICLE SIZE DISTRIBUTION PIPETTE METHOD

STANDARD: ISO 17892-4

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

The complete set comprises:

S144 Andreasen pipette, 25 ml capacity, for an accurate extraction of the quantities of soil in suspension for analysis.

S144-01 Pipette stand, to accurately raise and lower the pipette with no transmission of vibration to not disturb the sample suspension. Weight: 10 kg

S144-02 Sedimentation cylinder, 500 ml capacity

S144-03 Rubber bung for cylinder

S144-04 Evaporating dish, glass, Ø 90 by 50 mm height.

V172-03N Soil hydrometer, long stem, 0.995 to 1030 g/ml.

S155-04 Glass tank, dimensions: 600x300x380 mm.

S155-09 Heater, **professional type**, complete with thermostat, cooling coil, circulation unit.
Alternative: S155-09S simple type, see p. 474

S155-10A Thermometer, range 0 - 50 °C, subd. 0.5 °C.

Total weight: 40 kg approx.

Note: each item can be ordered separately.

ACCESSORIES

S144-10 ANDREASEN PIPETTE, capacity: 10 ml

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

A117 END-OVER-END SHAKER. Technical details: see p. 59

S157-KIT
METHYLENE BLUE 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 aggregates. The set comprises:

S157-01 Electric stirrer adjustable from 400 to 700 rpm, complete with Ø 70 mm propeller. 230V 1ph 50-60Hz

S157-06 Support base for stirrer

S157-02 Burette 50 x 0.1 ml with stopcock

S157-07 Support base for burette

S157-08 Pan 200x150x80 mm

S157-03 Filter paper Ø 90 mm (pack of 100)

S157-04 Glass rod Ø 8x300 mm

S157-05 2000 ml capacity plastic beaker

V300-28 Methylene blue, 100 g

V300-29 Kaolinite, 500 g

Total Weight: 10 kg approx.

Note: each item can be ordered separately.

S157-10 AUTOMATIC DISPENSER, 0-10 ml x 0.1 ml grad. Capacity 1000 ml (alternative to S157-02+S157-07)

S158-KIT
SAND EQUIVALENT TEST SET

STANDARDS: ASTM D2419 I AASHTO T176

This complete set comprises:

S158-01N Plexiglass measuring cylinder with transparent adhesive label, graduated in mm and inch (5 pieces)

S158-02 Rubber stopper for cylinder (2 pieces)

V176-02 Graduated rule 500 mm, stainless steel

V136-01 Funnel, wide mouth

S158-04N Measuring can 85 ml capacity

V121 Plastic bottle, 5 litre capacity

S158-06 Irrigator tube with stopcock and syphon assembly

S158-07N Weighted foot assembly for sand level

A052-44 Sieve, Ø 200 mm, opening 4.75 mm

S158-09 Concentrated stock solution, 1000 ml

V170 Stop watch, digital

S158-11 Clamp stand set to hold the syphon assembly with bottle

S158-12 Portable carrying case, dimensions: 550x250x400 mm

Total Weight: 18 kg approx.

S158-20-KIT
SAND EQUIVALENT TEST SET

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

This complete set comprises:

S158-03N 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

S158-13 Weighted foot assembly for sand level

A052-37 Sieve, Ø 200 mm, opening 2 mm

S158-09 Concentrated stock solution, 1000 ml

V170 Stop watch, digital

S158-11 Clamp stand set to hold the syphon assembly with bottle

S158-12 Portable carrying case, dimensions: 550x250x400 mm

Total Weight: 18 kg approx.

S158-KIT

S158-20-KIT

ACCESSORY

S158-08 METALLIC FUNNEL, conforming to EN 933-8 / NF XP18-598 UNI 8520/15 Specifications.

S158-08

Note: each item can be ordered separately.

S159-KIT
SAND EQUIVALENT TEST SET (SIMPLE)
STANDARDS: ASTM D2419 I AASHTO T176

The set comprises:

S158-01N Plexiglass measuring cylinder with transparent adhsive label, graduated in mm and inch (4 pieces)

S158-02 Rubber stopper for cylinder (2 pieces)

V176-02 Graduated rule 500 mm, stainless steel

V136-01 Funnel, wide mouth

S158-04N Measuring can 85 ml capacity

V121 Plastic bottle 5 litre capacity

S158-06 Irrigator tube with stopcock and syphon assembly

S158-07N Weighted foot assembly for sand level

S158-09 Concentrated stock solution, 1000 ml

Total Weight: 5 kg approx.

S159-11

S159-KIT

ACCESSORY

S159-11 CARRING CASE, PLASTIC, housing the sand equivalent set mod. S159-KIT or S159-01-KIT except the bottle V121

S159-01-KIT
SAND EQUIVALENT TEST SET (SIMPLE)
STANDARDS: EN 933-8 I NF XP18-598 I UNI 8520
CNR N.27 I UNE 83131

The set comprises:

S158-03N 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

S158-13 Weighted foot assembly for sand level

S158-09 Concentrated stock solution, 1000 ml

Total Weight: 5 kg approx.

S159-11

S159-01-KIT

ACCESSORY

S158-08 METALLIC FUNNEL, conforming to EN 933-8 I NF XP18-598 I UNI 8520 Specifications.

MEASURING CYLINDERS
Available Models :

S158-01N
STANDARDS: ASTM D2419 I AASHTO T176
PLEXIGLASS MEASURING CYLINDER, with transparent adhesive label graduated in mm and inches.

AS ALTERNATIVE:

S158-01GN
STANDARDS: ASTM D2419 I AASHTO T176
PLEXIGLASS MEASURING CYLINDER, engraved scale from 11“ to 15“

S158-03N
STANDARDS: EN 933-8 I NF XP18-598
PLEXIGLASS MEASURING CYLINDER, engraved at 100 and 380 mm

S158-03N S158-01GN S158-01N

S158-08

Note: each item can be ordered separately.

S160N
MOTORIZED SAND EQUIVALENT SHAKER

STANDARDS: EN 933-8 I ASTM D2419 I AASHTO T176
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 S160-01N)

Power supply: 230V 1ph 50Hz 250W
Dimensions: 700x360x350 mm
Weight: 30 kg approx.

S160N + S158-03N + S158-02

S160-01N
MOTORIZED SAND EQUIVALENT SHAKER

Same as S160N, 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.

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

S161
SAND EQUIVALENT SHAKER HAND OPERATED

STANDARDS: EN 933-8 I ASTM D2419 I NF XP18-598
AASHTO T176 I UNI 8520 I UNE 83131
Hand operated working through handwheel.
Complete with mechanical strokes counter.

Dimensions: 700x350x420 mm approx.
Weight: 20 kg approx.

S161

ASSESSMENT OF FINES: GRADING OF FILLERS

STANDARD: EN 933-10

A058-05N
AIR JET SIEVE SHAKER

Suitable for sieving powder and dry grain products up to 5 microns.
Technical details: see p. 38

A058-05N

A028N
UNIVERSAL CARBIDE METER

STANDARDS: BS 6576 I AASHTO T217 I ASTM D4944

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 20g to 100g achieving a moisture range 12.5% (20g) – 4.2% (50g) – 2.3% (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, accessories, case but **without ampoules** that have to be ordered separately.

Dimensions: 520x340x140 mm
Weight: 6 kg approx.

A028N

Note: Other carbide meter models: see p. 30

NEEDED ACCESSORY

A028-11 Carbide Ampoules (pack of 100)

A028-11

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 50-60Hz

V023-01

A117 + A116-11 + A116-12 + C279-02

A117
END-OVER-END SHAKER

PARTICLE DENSITY OF SOILS

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 50Hz 1ph 150W
Dimensions: 550x430x500 mm
Weight: 20 kg approx.

A116-12
A116-11

ACCESSORIES

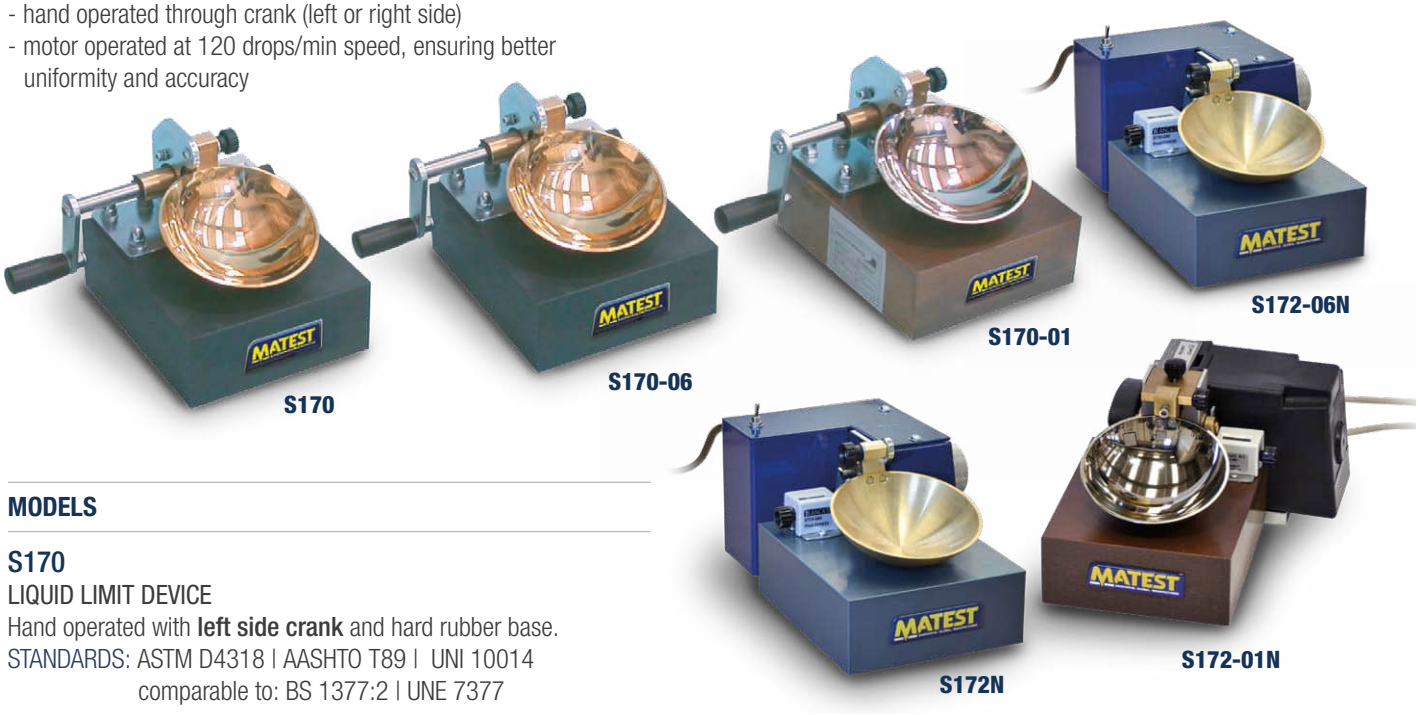
A116-11 GAS JAR to determine the specific gravity of soils. Complete with glass cover.
Diameter 75 mm by 300 mm height
Weight: 1.3 kg

A116-12 RUBBER BUNG for the gas jar A116-11

C279-02 SEPARATE CONTROL PANEL, complete with ON/OFF switch, timer, fuse, electric protections.

LIQUID LIMIT CASAGRANDE METHOD

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



S170
S170-06
S170-01
S172-06N
S172N
S172-01N

MODELS

S170
LIQUID LIMIT DEVICE
Hand operated with **left side crank** and hard rubber base.
STANDARDS: ASTM D4318 I AASHTO T89 I UNI 10014
comparable to: BS 1377:2 I UNE 7377

Weight: 3 kg approx.

S170-05
LIQUID LIMIT DEVICE
Same as mod. S170, but with **right side crank**.

S170-06
LIQUID LIMIT DEVICE
STANDARD: EN 17892-12
Hand operated with left side crank and cup conforming to EN.

S170-01
LIQUID LIMIT DEVICE
Hand operated with bakelite base and chromed cup.
STANDARD: NF P94-051-1

S172N
LIQUID LIMIT DEVICE
Motor operated with hard rubber base.
STANDARDS: ASTM D4318 I AASHTO T89 I UNI 10014
comparable to: BS 1377:2 I UNE 7377

Power supply: 230V 1ph 50Hz (also available: 110V 60Hz)
Weight: 3.5 kg approx.

S172-01N
LIQUID LIMIT DEVICE
STANDARD: NF P94-051
Motor operated with bakelite base, chromed cup.

Power supply: 230V 1ph 50Hz

S172-06N
LIQUID LIMIT DEVICE
STANDARD: EN 17892-12
Motor operated. Hard rubber and base and cup conforming to EN.
Power supply: 230V 1F 50Hz **Weight**: 3.5 kg approx.

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 T89 Spec.
S173-04 GROOVING TOOL, to ASTM D 4318-EN 17892-12 Spec.
S173-05 GROOVING TOOL, to NF P94-051-1 Specifications
S173-06 GROOVING TOOL, to BS 1377:2 Specification

S173-01...S173-11

SPARES

S173-01 Brass cup. (ASTM, BS, UNI, UNE, AASHTO)
S173-07 Chromed cup (NF P94-051-1)
S173-10 Cup conforming to EN 17892-12
S173-08 Coupling piece between cup and device, hand operated models.

S175
SHRINKAGE LIMIT

STANDARDS: ASTM D427 I AASHTO T92 I UNI 10014
UNE 103-108 I NF XP94-060-1 I 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, Ø 45x12,7 mm (2 pieces)
V122-03 Crystallizing dish, Ø 57x32 mm
S175-03 Shrinkage prong plate, made from plexiglass material with three metal prongs
S175-04 Glass evaporating dish, Ø 120 mm flat bottom
V100-01 Graduated cylinder 25 ml capacity
V192 Flexible spatula, 100 mm blade

Case dimensions: 390x300x100 mm
Weight: 2 kg approx.

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 I AASHTO T90 I BS 1377:2
UNI 10014 I UNE 103-104 I NF P94-051

The plastic limit determines the lowest moisture content of a soil, by wich a sample can be rolled into threads Ø 3 mm 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 Ø 3 mm
V114-03 Mixing porcelain dish Ø 120 mm
V192 Flexible spatula, 100 mm blade
V122 Aluminium moisture tins Ø 55x35 mm (Q.ty 6)

Case dimensions: 400x340x100 mm
Weight: 5 kg approx.

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 ± 0.5 according to NF P94-051

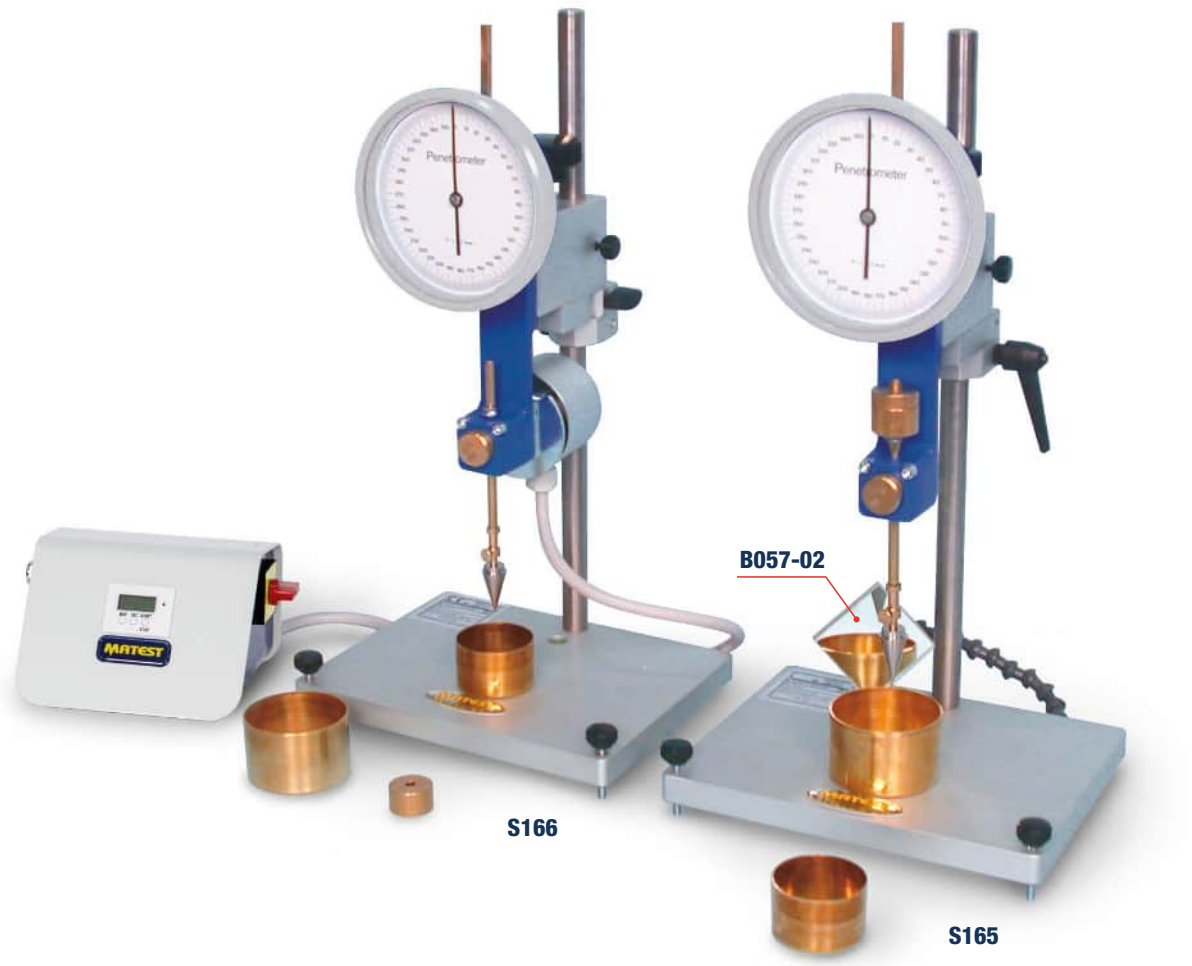
S179 GLASS PLATE 500x500x10 mm

S179 S178-06

CONE PENETROMETER METHOD FOR:

LIQUID LIMIT DETERMINATION
STANDARDS: UNI EN ISO 17892-12 I BS 1377:2 I NF P94-052-1
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 DETERMINATION
STANDARD: UNI EN ISO 17892-06
The cone penetrometer is also suitable to measure the shear undrained strength of undisturbed and reconstituted soil samples as per UNI EN ISO 17892-06 Standard.



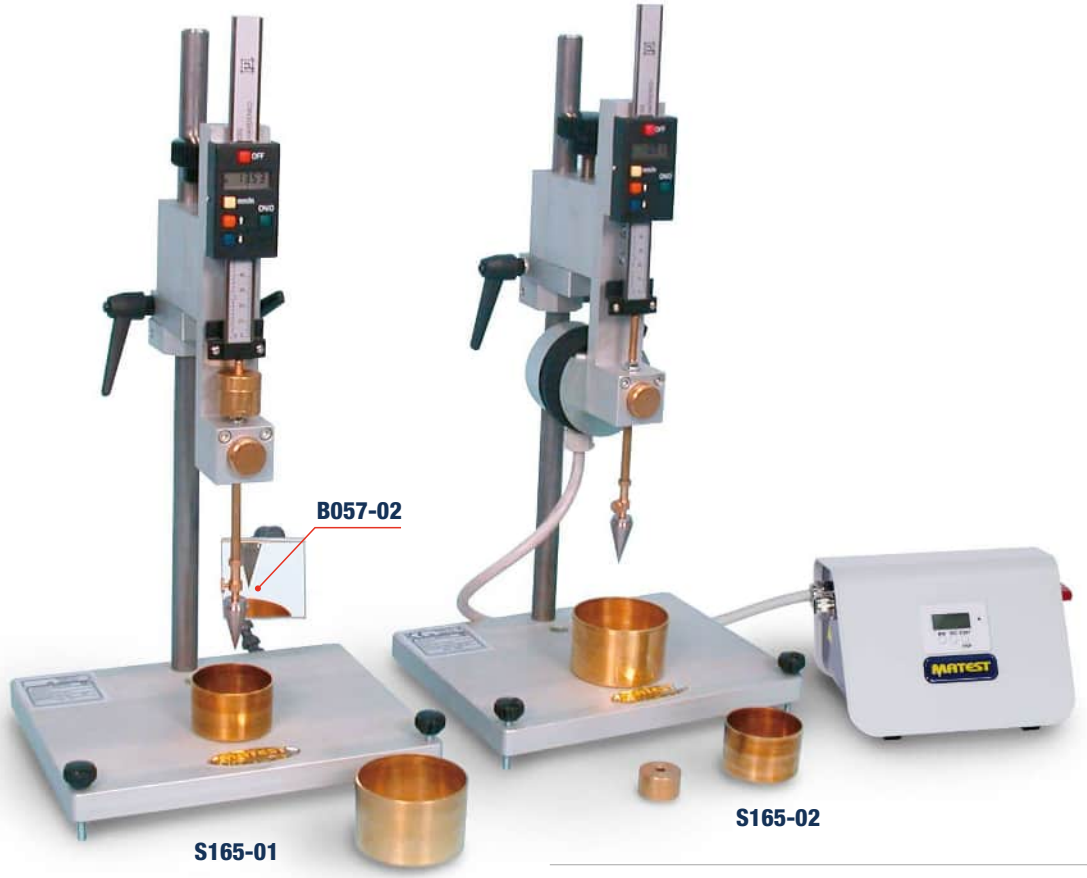
MODELS

S165
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 Ø 55x35 mm and 70x45 mm

Dimensions: 220x170x(h)490 mm
Weight: 13 kg approx.

S166
SEMIAUTOMATIC CONE DIAL PENETROMETER
Basically structured as mod. S165, 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 50-60Hz 200W
Dimensions: 220x280x(h)490 mm
Weight: 15 kg approx.



S165-01
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 Ø 55x35 mm and 70x45 mm

Dimensions: 220x280x490 mm
Weight: 13 kg approx.

S165-02
SEMIAUTOMATIC CONE DIGITAL PENETROMETER

Basically structured as mod. S165-01, 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 50-60Hz 200W
Dimensions: 220x280x490 mm
Weight: 15 kg approx.

ACCESSORIES for S165, S166, S165-01, S165-02

S166-03 TEST GAUGE, to check the condition of the cone point 30° angle. According to UNI EN ISO

S166-03N TEST GAUGE, to check the condition of the cone point 30° angle. According to BS

B057-02 MIRROR, to facilitate the height adjustment of the cone.

S166-04 TEST CONE 60° angle and 60 g 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 400 g (shear strength test).

V122-08 SAMPLE CUP, aluminum, Ø 55 mm by 40 mm deep, to meet BS 1377:2 Specification

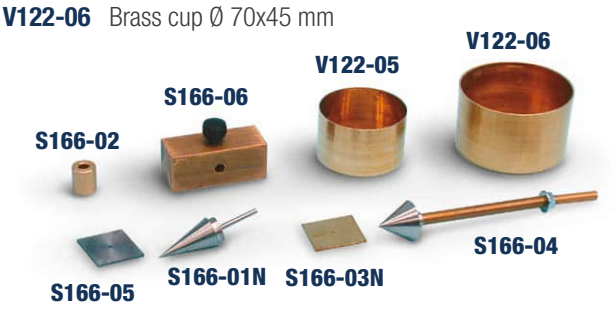
SPARES for S165, S166, S165-01, S165-02

S166-01N Test cone 35 mm long and 30° angle.

S166-02 Weight 20 g to be added to the cone 30° angle, to get a total weight of 100 g

V122-05 Brass cup Ø 55x35 mm

V122-06 Brass cup Ø 70x45 mm



PROCTOR TEST MOISTURE-DENSITY RELATIONSHIP

STANDARDS: EN 13286-2 I ASTM D558, D698, D1557 I AASHTO T99, T134, T180 I BS 1924:2
CNR N° 69 I NF P94-078, P94-093, P98-231-1 I DIN 18127

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	Description Proctor Mould	Standards	Int. diameter mm	Body height mm	Volume ml	Weight kg
S185	Standard	ASTM I AASHTO I NF I CNR	101.6	116.4	944	4.5
S186	Modified	ASTM I AASHTO I CNR	152.4	116.4	2124	10
S189	Split Standard	ASTM I AASHTO I NF I CNR	101.6	116.4	944	5
S190	Split Modified	ASTM I AASHTO I CNR	152.4	116.4	2124	10
S190-01	Modified	NF	152	152	2758	10
S191	Standard	BS 1377:2	105	115.5	1000	5
S194	Standard	EN 13286:2 comparable to DIN	100 ± 1	120 ± 1	942	9
S194-01	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	Split Modified	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, S190-01, S191, 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 p. 450) can be used.

Models	Description	Standards	Diameter mm	Fall height mm	Rammer weight kg	Total weight kg
S187	Standard Proctor rammer	ASTM I AASHTO CNR I NF	50.8	304.8	2.495	5
S187-01	Standard Proctor rammer	EN 13286:2 BS 1377:2	50 ± 0.5	305 ± 3	2.5 ± 0.02	5
S188	Modified Proctor rammer	ASTM I AASHTO CNR I 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 I DIN 18127

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

MODELS

S194-09
PLATE, Ø 99.5 mm thickness 10 mm

S194-10
PLATE, Ø 149.5 mm thickness 10 mm

S194-11
PLATE, Ø 249.5 mm thickness 20 mm

S194-11
S194-10
S194-09

S188-02
S188-01
S187

S114

CUTTING COLLAR

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

MODELS

S185-01 Diameter 4”
S200-09 Diameter 6”

S200-09

S114
UNIVERSAL EXTRUDER for moulds Ø 100, 150 mm; 4”, 6”
Technical details at p. 435

S199
AUTOMATIC, PROGRAMMABLE PROCTOR | CBR COMPACTOR WITH MICROPROCESSOR HIGH PERFORMANCE

STANDARDS: EN 13286-47, EN 13286-2 | ASTM D698, D1557, D1883
AASHTO T99, T180, T193 | BS 1990, 1994, 1377:2
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 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, versatile, 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.

The compactor accepts moulds having Ø 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: 610x470xh1710 mm
Weight: 200 kg approx.

S199-07
S199-06

S199+S199-11
with mould
and rammer

NEEDED ACCESSORIES

S199-06 STANDARD RAMMER Ø 50 ± 0.2 mm
and 2500 ± 10 g weight
S199-07* MODIFIED RAMMER Ø 50 ± 0.2 mm
and 4535 ± 5 g weight
Modified rammer are hardened for wear resistance.
Conforming to: EN 13286-47 | DIN 18127 | BS 1377:2
UNE 7255, 7365, 103-501-94 Standards.

OR:

S199-08 STANDARD RAMMER Ø 50.8 ± 0.13 mm
and 2491,25 ± 1.25 g weight
S199-09* MODIFIED RAMMER Ø 50.8 ± 0.13 mm
and 4537 ± 3 g weight
Modified rammer are hardened for wear resistance.
Conforming to: ASTM D558, D559, D698, D1557, D1883
NF P94-066 | CNR UNI 10009
CNR N. 69 | AASHTO T99, T180, T193

OR:

S199-13 STANDARD RAMMER, Ø 50 ± 0.4 mm
and 2700 ± 10 g weight
S199-14* MODIFIED RAMMER, Ø 50 ± 0.4 mm
and 4900 ± 10 g weight.
Conforming to: AS 1289 (Australian) Standard.

Note*: modified rammers are hardened for wear resistance.

Test screen

ACCESSORIES

S199-11 SAFETY GUARDS to CE Directive.
If the door is opened when the Compactor is working, it stops automatically.

As alternative:

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.
Outer Dimensions: 740x730x1900 mm
Weight: 80 kg approx.

SPARES

S198-22 Calibrated rod holding the rammer.
S198-23 Kit of two devices fixing the mould to the table.

S199 + S199-12 with accessories

S199TS

AUTOMATIC PROCTOR | CBR COMPACTOR

TECNOTEST MODEL

STANDARDS: EN 13286-2 | ASTM D698, D1557, D1883 | CNR N. 69, CNR UNI 10009 | AASHTO T99, T180, T193

A selector switch enables the operator to choose type of compaction required (circular blow pattern for 4" or 100mm specimen moulds and double concentric circles for 6" or 150 mm specimen moulds).
Height of rammer drop adjustable to 305 mm or 457 mm.
The number of blows is preset on the electronic microprocessor-based control panel. The machine is designed for long-term operation and has built-in safety features (to CE Standards) to prevent it from being operated without the unbreakable safety guard.
Thanks to its compact height design, the compactor is recommended for mobile laboratories. Complete **without rammer**, to be ordered separately according to the selected standard.

Power supply: 230V 1ph 50Hz
Dimensions: 1760x660x470 mm
Weight: 220 kg approx.

NEEDED ACCESSORY

S199T-03 RAMMER Ø 50 mm with interchangeable weight from 2500 ± 20g to 4500 ± 40g.
STANDARD: EN 13286-2

Or:

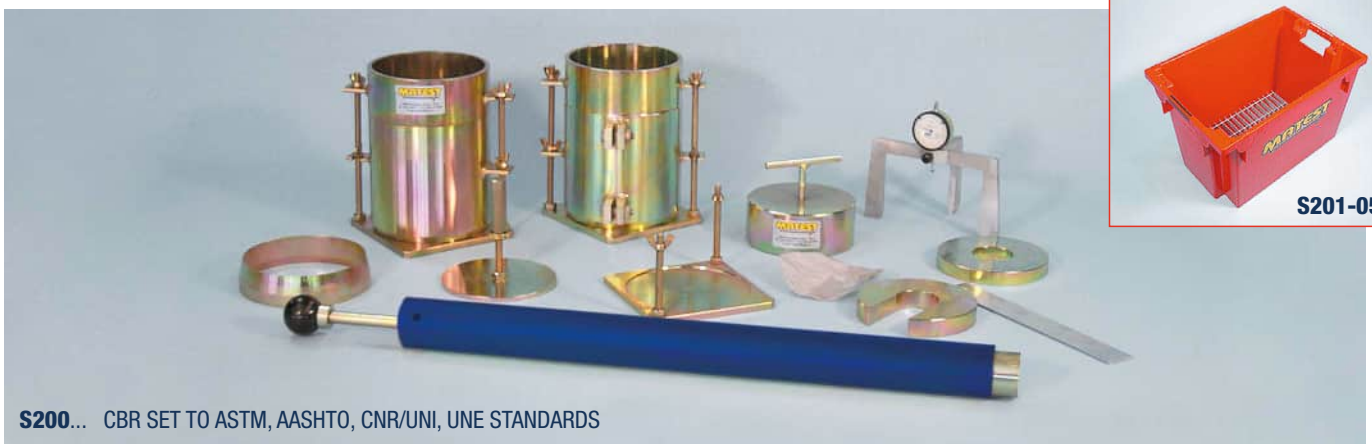
S199T-04 RAMMER Ø 50.8 mm with interchangeable weight from 2495 ± 3g to 4539 ± 5g.
STANDARDS: ASTM D698, D1557, D1883 | CNR N. 69, CNR UNI 10009 | AASHTO T99, T180, T193

S199TS + S199T-03

CALIFORNIA BEARING RATIO - CBR

STANDARDS: EN 13286-47 I EN 13286-4 I ASTM D1883 I AASHTO T193 I CNR UNI 10009 I UNE 103-502
NF P94-078, P94-093, P98-231-1 I BS 1924:2, 1377:2

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.

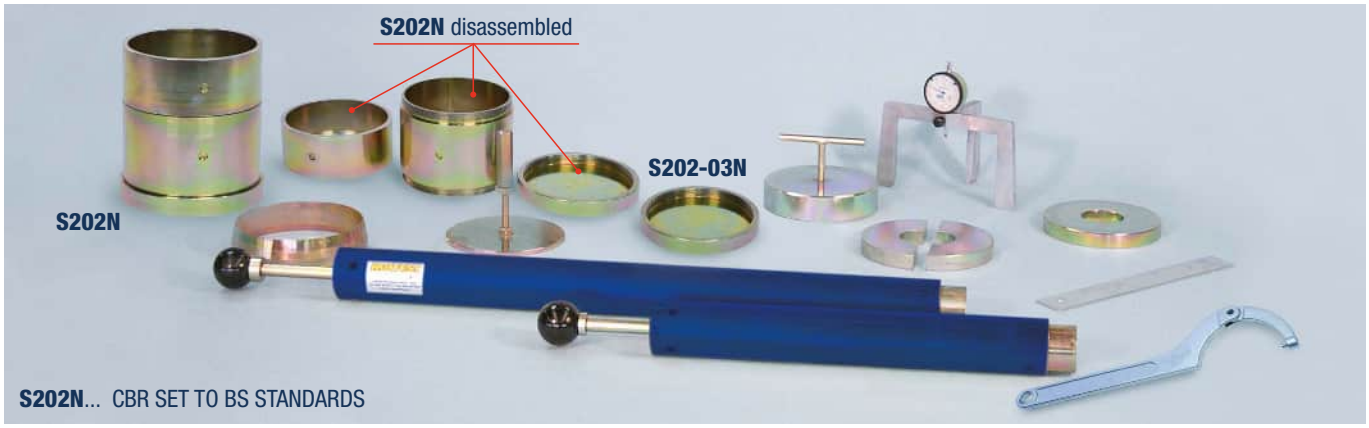


S201-05

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

S200-04F

S201... CBR SET TO NF STANDARDS



S202N... CBR SET TO BS STANDARDS

S203... 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

Description	Standards			
CALIFORNIA BEARING RATIO Ordering info	ASTM D1883 CNR UNI 10009 UNE 103-502 AASHTO T193	EN 13286-47	NF P94-078 NF P94-093 NFP98-231-1	BS 1924:2 BS 1377:2
CBR mould complete with collar and perforated base: Ø 6” (152.4 mm) x 7” (177.8 mm) height	S200-01N			
Ø. 150 mm x 120 mm height		S203		
Ø 152 mm x 152 mm height			S201	
Ø 152 mm x 127 mm height, threaded ends				S202N
Split CBR mould with collar and perforated base: Ø 6” (152.4 mm) x 7” (177.8 mm) height	S200-13N			
Ø 150 mm x 120 mm height		S203-01		
Ø 152 mm x 152 mm height			S201-01	
Solid base plate for CBR mould	S200-12N	S194-15	S201-12	S202-03N
Perforated base plate for CBR mould	S200-10N	S194-14	S201-10	S202-10N
“C” Spanner, to tighten/loosen the collar, body and base. Two required				S202-04
Filter screen, stainless steel Ø 149 mm mesh 0.150 mm (ASTM n° 100)	S200-02	S200-02	S200-02	S200-02
Spacer disc with “T” handle: Ø 5 15/16” (150.8 mm) x 2.416” (61.4 mm) height	S200-03			
Ø 149.5 mm x 36 mm height		S194-21		
Ø 151 mm x 25.4 mm height			S201-02	
Ø 151 mm x 36 mm height			S201-06	
Ø 150 mm x 50 mm height				S202-07
Perforated (sweel) plate with adjustable stem	S200-04	S194-23	S200-04F	S200-04
Plein swell plate		S194-24		
Tripod (dial gauge support)	S200-05	S194-26	S200-05	S200-05 BS
Dial gauge10 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	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 Ø 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 p. 435)	S114	S114	S114	S114

S196N
CLEGG HAMMER - IMPACT SOIL TEST

STANDARD: ASTM D5874

High quality genuine Clegg Impact Soil Tester manufactured under license to Dr. Clegg Pty Ltd (the original inventors).
This apparatus is used to obtain an indication of the degree of compaction of soil. Recorded valves can be directly correlated to the CBR test method. User can quickly enable/disable the readout unit to calculate the 4th drop %CBR following Dr. Clegg's revised and updated equation with inter-drop CIV check TREND algorithm.

MAIN FEATURES

- Well-proven and stable components.
- Easy to use, no set-up is required.
- Back lit highly readable alpha numeric display.
- Optionally fitted Bluetooth with PC Software to allow data transfer of CIV, %CBR, time and data of up to 10000 drop tests.

Lightweight and sturdy aluminum framed transit and storage case is provided.

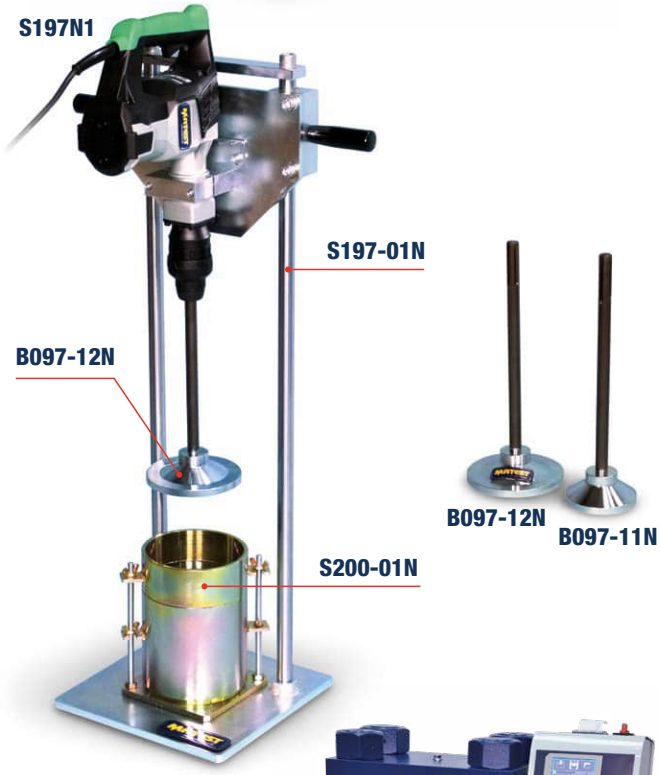
Dimensions: 710x130x130 mm
Weight: 6.2 kg approx.

S197N1
VIBRATING COMPACTION HAMMER

STANDARDS: EN 12697-9, 12697-10, 12697-32, 13286-4
BS 1924:2, BS 1377:2

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 p. 101) and for compacting concrete cube or beam samples.
Supplied without tampers and support frame which must be ordered separately.

Power supply: 230V 1ph 50-60Hz 720W
Dimensions: 105x430x270 mm
Weight: 6 kg approx.



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.
Dimensions: 500x320x1100 mm
Weight: 75 kg approx.

B097-11N SMALL TAMPING FOOT, 102 mm diameter.
Complete with shank.

B097-12N CBR AND PROCTOR LARGE TAMPING FOOT,
146 mm diameter. Complete with shank.

COMPRESSIVE STRENGTH OF UNBOUND, HYDRAULICALLY BOUND AND SOIL-CEMENT MIXTURES
STANDARDS: EN 13286-41, EN 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 p. 384...387) or concrete (see p. 220...256) machines are suitable to perform this test.

SPECIFIC GRAVITY OF SOILS

E136
WATER BATH, DIGITAL

STANDARD: BS 1377:2

For the determination of particle density, pyknometer 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 60 °C, accuracy ± 0.5 °C

Internal dimensions: 510x350x230 mm
Overall dimensions: 680x420x420 mm
Power supply: 230V 1ph 50Hz 1200W
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	Capacity
V108	25 ml
V108-01	50 ml
V108-02	100 ml
V108-03	250 ml

V108-01 V108-02

DESICCATORS BOROSILICATE GLASS

Complete with perforated porcelain plate.

Without vacuum		With vacuum	
A035	Ø 200 mm	A039	Ø 200 mm
A036	Ø 250 mm	A040	Ø 250 mm
A036-01	Ø 300 mm	A040-01	Ø 300 mm

ACCESSORY

V300-15 DESICCATORS SALTS Silica gel box 1000 g

A039 A035

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

S147
CONE PYKNOMETER

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
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.

S148

STRENGTH OF STABILIZED SOIL DETERMINATION

STANDARDS: EN 13286-53 I NF P94-100 I NF P98-230-2 I 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 Ø 50 by 122 mm to obtain specimen dia. 50x50 mm high of fine and medium grained soil (NF)

S195-02 Mould Ø 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 Ø 100 by 242 mm to obtain specimen dia. 100x100 mm high of coarse grained soil (EN, BS)

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

S195-03 Base and upper piston Ø 50 by 36 mm

S195-16 Base and upper piston Ø 100 by 71 mm

S195-04 Penetration and demoulding piston Ø 50 by 125 mm

S195-05 Penetration and demoulding piston Ø 50 by 175 mm

S195-17 Penetration and demoulding piston Ø 100 by 245 mm

S195-21 Penetration and demoulding piston Ø 100 by 345 mm

S195-09 Collecting cylinder Ø 56 by 60 mm

S195-10 Collecting cylinder Ø 56 by 110 mm

S195-18 Collecting cylinder Ø 106 by 110 mm

S195-22 Collecting cylinder Ø 106 by 210 mm

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

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

S195-12 Set of 2 displacing collars Ø 50 by 8.33 mm

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

S195-07 Set of 2 displacing collars Ø 50 by 12.5 mm

S195-24 Set of 2 displacing collars Ø 50 by 16.66 mm

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

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

S195-14 Set of 2 displacing collars Ø 100 by 16.66 mm

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

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

S195-27 Set of 2 displacing collars Ø 100 by 33.33 mm

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

S195-01...S195-28

S131-KIT
UNCONFINED COMPRESSION TESTER

STANDARDS: ASTM D2166 I AASHTO T208

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 Ø 80 mm x 200 mm height .

The S131-KIT tester comprises:

S221 Conversion frame
S221-01 Mechanical jack 50 kN capacity (provided with its support)
S370-02 Load ring 2 kN capacity
S131-11 Upper+lower compression platens with accessories
S376 Dial gauge 10x0.01 mm
S212-03 Dial gauge holder

Dimensions: 380x460x1380 mm
Weight: 68 kg approx.

S131-KIT

S220-KIT
FIELD CBR TEST SET

STANDARDS: BS 1377:9 , 1924:2 I ASTM D4429
CNR UNI 10009

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

The S220-KIT tester comprises:

S221-01 Mechanical jack 50 kN capacity (provided with its support)
S370-09 Load ring 40 kN capacity
S212-01 CBR penetration piston
S377 Dial gauge 25x0.01 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.

S210-KIT
CBR LOADING MACHINE
HAND OPERATED, FIELD MODEL

STANDARDS: EN 13286-47 I ASTM D1883 I AASHTO T193
NF P94-078 I CNR UNI 10009 I BS 1377:2

The load is applied through a mechanical jack with handwheel. The upper beam can be adjusted in height.

The S210-KIT machine comprises:

S221 Conversion frame
S221-01 Mechanical jack 50 kN capacity (provided with its support)
S370-10 Load ring 50 kN capacity
S212-01 CBR penetration piston
S376 Dial gauge 10x0.01 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

CALIFORNIA BEARING RATIO TESTING MACHINES - CBR

STANDARDS: EN 13286-47 | ASTM D1883 | AASHTO T193 | CNR UNI 10009 | NF P94-078 | BS 1377:2

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 meckanical jack and handwheel.
Upper beam can be adjusted in height.
Foreseen of fast approach device of the base plate.

The S209-KIT CBR machine comprises:

S209-01 CBR laboratory frame
S212-01 CBR penetration piston
S370-10 Load ring 50 kN capacity
S376 Dial gauge 10x0.01 mm
S212-03 Dial gauge holder

Dimensions: 480x480x1275 mm
Weight: 80 kg approx.

S209-KIT

S211-KIT
CBR LOADING MACHINE, 50 KN
MOTORIZED SPEED RATE: 1.27 MM/MIN

Load is applied through a screw jack driven by an electric motor at a costant penetration rate of 1.27 mm/min achieved by a built in gear box and **assured also under load**.
Upper beam can be adjusted in height.
Foreseen of fast approach device of the base plate and electric end of stroke switches of the load plate to save the machine from wrong manipulations.

The S211-KIT CBR machine comprises:

S211-10 CBR motorized frame
S212-01 CBR penetration piston
S370-10 Load ring 50 kN capacity
S376 Dial gauge 10x0.01 mm
S212-03 Dial gauge holder

Power supply: 230V 1ph 50Hz 750W
Dimensions: 480x480x1275 mm
Weight: 98 kg approx.

S211-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 50Hz

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.

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.

S212M
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, complying with BS 1377:2
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 (with trixial cell and suitable accessories)

The speed rate is infinitely variable, easily and promptly selected.
Display LCD TFT, 800x480 pixel, 7'', touch-screen.
Time/date and language selection (English, French, German, Spanish, Italian, Polish).
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: 500x500x1270 mm
Weight: 140 kg approx.

S212M with accessories for CBR test

S213-05N
CBR/MARSHALL 3 SPEEDS FRAME 50 KN

The frame is provided of three fix speed ranges, easily selectable by a frequency changer (inverter) activated by an electric switch:
1.00 mm/min. for CBR tests (Australian and old BS Standards)
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 50-60Hz 750W
Dimensions:
480x480x1275 mm
Weight: 130 kg approx.

S213-05N
with accessories for CBR test

ACCESSORIES for S212M and S213-05N frames for analogical configuration

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 10x0.01 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 (only for S212M model)

UNCONFINED test (only for S212M model)

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

As Alternative

S212-09N	Upper + lower compression plates, Ø 165 mm with upper seat ball
S212-03	Dial gauge holder
S376	Dial gauge 10x0.01 mm
S370-02S	Load ring 2kN with electric stop safety device
S374	Brake device to hold max. load

Note: When ordering accessories do not duplicate same items.

MULTIFUNCTION TESTING FRAMES

- CBR
- THREE SPEEDS
- UNIVERSAL MULTISPEED

COMBINED WITH CYBER-PLUS PROGRESS, COMPUTERIZED TOUCH-SCREEN DIGITAL DISPLAY SYSTEM

TECHNICAL SPECIFICATIONS

The frame is the same as for the previous load frames (mod. S211-KIT to S213-05N), 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% indipendent linearity.
The CYBER-PLUS PROGRESS computerized multichannel digital display system (technical details: see mod. B044M-SET at p.128, Hardware technical details at p. 213), 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
CBR DIGITAL COMPUTERIZED MACHINE

SPEED RATE: 1.27 mm/min
Technical details of the frame: see mod. S211-KIT, p. 458
SUPPLIED COMPLETE except the software (see mod. SSW-UTM2).

S216 + CBR mould

S214-05N
CBR/MARSHALL 3 SPEEDS LOAD FRAME
DIGITAL, COMPUTERIZED

The frame is provided with three fix speed ranges, easily selectable by an electric switch:
1.00 mm/min. for CBR tests (Australian and old BS Standards)
1.27 mm/min. for CBR tests
50.8 mm/min for Marshall tests.
Technical details of the frame: see mod. S213-05N, p. 459
Supplied complete with Cyber-Plus Progress 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).

S214-05N + MARSHALL accessories

S215A
UNIVERSAL MULTISPEED LOAD FRAME
DIGITAL, TOUCH-SCREEN, COMPUTERIZED

Comprising:

S212M Universal multispeed load frame 50 kN, touch-screen. Technical spec.: see p. 459
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 B044M-SET Cyber-plus 8 Progress touch-screen, p. 128
S337-34 Load Cell 50 kN capacity, complete with cable and connector.
S336-14 Linear Displacement Transducer 50 mm 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 and Leutner tests and Software, to be ordered separately (see accessories).

The Universal Multispeed tester, is the ideal solution to perform the following tests:

- CBR (California Bearing Ratio)
- MARSHALL
- INDIRECT TENSILE
- UNCONFINED COMPRESSION
- QUICK TRIAXIAL
- LEUTNER

S215A with CBR mould

ACCESSORIES for the 3 speeds and the multispeed load frames, mod. S214-05N and S215A to perform

The following tests are compliant with several standards.
See pages 465-467 for further information.

CBR test
S212-01 PENETRATION PISTON
+ accessories for CBR test (p. 453)

MARSHALL test
S212-05 LOAD PISTON
B046N STABILITY MOULD, cast aluminium alloy

INDIRECT TENSILE test
S212-05 LOAD PISTON
B047-02 TENSILE SPLITTING DEVICE
B047-04 SET OF 2 LINEAR TRANSDUCERS STROKE 10 mm

UNCONFINED test
S337-31 STRAIN LOAD CELL 2.5 kN capacity
S212-08N UPPER + LOWER COMPRESSION PLATES, Ø 100 mm + distance piece with rod
As Alternative
S212-09N Upper + lower compression plates, Ø 165 mm with upper seat ball
S337-51 CALIBRATION PROCESS for load cell

QUICK TRIAXIAL TEST (on request with S215A, complete test configuration p. 512)
S337-31 STRAIN LOAD CELL 2.5 kN capacity
S205-11 LOADING PISTON WITH BALL
S305 TRIAXIAL CELL + accessories
S337-51 CALIBRATION PROCESS for load cell

LEUTNER test
Complete configuration at page 121 (only with S215A)

SOFTWARE for the frames combined with Cyber-Plus Progress System

SSW-UTM2 SOFTWARE UTM2
XLS-CBR1 Excel sheet for CBR test according to BS 1377:2
XLS-MAR1 Excel sheet for Marshall test according to EN 12697-34
Technical details of UTM2: see p. 21

S205M
UNITRONIC 50 KN
UNIVERSAL MULTIPURPOSE TOUCH-SCREEN COMPRESSION, FLEXURAL AND TENSILE FRAME

- COMPRESSION AND FLEXURAL TESTS, 50 KN MAX. CAPACITY LOAD
- TENSILE TESTS, 25 KN MAX. CAPACITY LOAD (OPTION MOD. S205-05M)

With automatic load or displacement/deformation control, for testing:

SOIL:
- CBR (California Bearing Ratio)
- UNCONFINED COMPRESSION
- QUICK TRIAXIAL

ASPHALT:
- MARSHALL
- INDIRECT TENSILE
- DIRECT SHEAR (Leutner) on the connection between bituminous mixtures layers
- AUTO SCB

CONCRETE:
- FLEXURE ON BEAMS AND TILES

CEMENT:
- FLEXURE on 40x40x160 mm specimens
- COMPRESSION on cubes 40, 50, 70 mm
- TENSILE on mortar briquettes (option mod. S205-05M)

METAL, PLASTIC, WIRES, ROPES, TEXTILES, PAPERS ETC.
- TENSILE TESTS, 25kN max capacity load (option mod. S205-05M)

CLAY BLOCKS:
- PUNCHING

ROCK AND STONES:
- UNIAXIAL SPLITTING TENSILE

S205M / S205-05M

Equipped with suitable devices, Unitronic tester performs compression, flexural, splitting tensile and direct tensile tests, with automatic load or displacement/deformation control, within the limits of its max. **50 kN capacity** for compression/flexural and **25 kN for tensile** (model S205-05M). The load is applied by a mechanical jack that is driven by a stepper motor and controlled by an internal microprocessor on a **high precision control board**. Stroke electric end switches are applied to the load piston to save the machine from accidental handlings. The crosshead foresees couplings to fix the different test devices. The stress is measured by an electric load cell and the displacement control is achieved directly by the high technology electronic board incorporated into the machine within a variable **speed range up to 51 mm/min** to cover the Marshall test. Unitronic 50 kN is **supplied without accessories** and software to perform specific tests that must be ordered separately.

S205-05M
UNITRONIC 25KN COMPRESSION AND TENSILE FRAME

The Unitronic frame S205M is modified and improved to perform also tensile tests with max. capacity of 25 kN

Note: This modification is possible only in MATEST factory.

S206M

UNITRONIC 200 KN

UNIVERSAL MULTIPURPOSE TOUCHSCREEN COMPRESSION/FLEXURAL AND TENSILE FRAME FOR:

- COMPRESSION / FLEXURAL TESTS, 200 kN MAX. CAPACITY LOAD
- TENSILE TESTS, 50 kN MAX. CAPACITY LOAD

With automatic load or displacement/deformation control, for testing:

SOIL:
- CBR (California Bearing Ratio)

ASPHALT:
- DURIEZ
- MARSHALL
- INDIRECT TENSILE
- DIRECT SHEAR (Leutner) on the connection between bituminous mixtures layers

CONCRETE:
- FLEXURE ON BEAMS AND TILES

CEMENT:
- FLEXURE on 40x40x160 mm specimens
- COMPRESSION on cubes 40, 50, 70 mm
- TENSILE ON MORTAR BRIQUETTES

METAL, PLASTIC, WIRES, ROPES, TEXTILES, PAPERS ETC.
- TENSILE TESTS, 50kN max capacity load

CLAY BLOCKS:
- PUNCHING

ROCK AND STONES:
- UNIAXIAL SPLITTING TENSILE

S206M

By using suitable devices, Unitronic tester, within the limits of its max. **200 kN capacity for compression/flexural and 50 kN for tensile**, 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 step motor and controlled by a microprocessor. Stroke end electric switches are applied to the load piston to save the machine from accidental handlings. The two crossheads foresee couplings to fix the different test devices. 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. Unitronic 200 kN is supplied complete with: electric load cell 200 kN capacity, crosshead displacement device, upper with seat ball and lower compression platens (Ø 216x30 mm). Not included: accessories and software for specific tests must be ordered separately.

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

TECHNICAL SPECIFICATIONS OF UNITRONIC 50 KN AND UNITRONIC 200 KN

Features	S205M/S205-05M	S206M
Max. compression load capacity (kN)	50	200
Max. tensile load capacity (kN)	25 (only S205-05M)	50
Vertical clearance range (mm)	314,5 to 842	0 to 900 (without accessories)
Horizontal clearance (mm)	380	650
Piston stroke (mm)	100	400
Testing speed range (mm/min)	0.01 to 51	0.01 to 100
Load rate (kN/s)	0.05 to 2.4	0.001 to 5
Power supply	230V 1ph 50-60 Hz 150W	230V 1ph 50-60 Hz 850W
Height (mm)	1440	2400
Width (mm)	450	950
Depth (mm)	500	560
Weight (kg)	130	820

FIRMWARE

- Electronic control unit Cyber-plus Progress with touch-screen colour display, that runs like a standard PC for the management and analysis of the data, test results, graphs.
- 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.
- Ports: Ethernet, 2xUSB ports.
- 8 analog channels (24 bit) suitable for connection of load, displacement, deformation, LVDT and strain gauges (by using an external adapter).
- RJ45 network connection.
- The machine can be connected to a PC for remote test execution through suitable software.

H012
UNIMEC 300

NEW

300 KN CAPACITY
BOTH FOR COMPRESSION AND TENSION

Unimec 300 is suitable for a wide range of tests on different kinds of construction materials such as concrete, mortar, steel, soil, asphalt, bitumen and also plastic, rubber, wood and others. It can work in two directions, allowing to perform tests both in tension and in compression, and it is equipped with a high precision load cell to grant accurate results and an integrated device to measure the crosshead displacement. The movement system includes two linear actuators (of the ball-screw type) which provide two main effects: reduction of the friction at minimum, granting a smooth and precise positioning of the crosshead; elimination of manual operations to determine the position of the crosshead, the movement is completely automatized and controlled with an easy-access keyboard.
Thanks to its versatility, Unimec 300 is the best choice for advanced research and evaluation of mechanical properties of different materials in accordance with the latest relevant standards or following procedures not yet described by any standard. The crosshead is provided with a quick coupling in order to make the accessories installation easy and fast. The display position can be regulated according to the user's needs.

Power supply: 230V 1ph 50-60Hz 1500W
Dimensions: 1400x710x1950 mm
Weight: 1000 kg (without accessories)

H012

Note: Further details at p. 409
All test configurations are listed at p. 410...413

S205M | S205-05M | S206M UNITRONIC, SPECIFIC APPLICATIONS

CBR | CALIFORNIA BEARING RATIO

STANDARDS:
EN 13286 -47
ASTM D1883
AASHTO T193
NF P94-078
CNR UNI 10009
BS 1377:2

Test development with displacement control.

Note:
Complete CBR configuration see p. 453

S205M or **S206M** Unitronic
S337-34 Strain gauge load, 50 kN capacity
2xS337-51 Calibration process of load cell/transducer
S212-01 Penetration piston
S218N In-built firmware for CBR test
S336-14 Linear displacement transducer 50 mm stroke, complete with cables and connectors
S305-05 Mounting device of the coupling pliers
S335-15 Coupling pliers to hold transducers
S206-31 Flange/connector of the load cell S337-34 (only if S206M is chosen)

INDIRECT TENSILE TEST

STANDARDS:
EN 12697-23,12
ASTM D6931
AASHTO T283
CNR 134

Test development with displacement control.

S205M or **S206M** Unitronic
S337-34 Strain gauge load, 50 kN capacity
4xS337-51 Calibration process of load cell/transducer
S212-05 Loading piston
B047-02 Indirect tensile device for samples Ø 4'' and 6''
B047-04 Set of TWO displacement transducers with accessories
B043-02N In-built firmware for Indirect Tensile test
S336-14 Linear displacement transducer 50 mm stroke, complete with cables and connectors
S305-05 Mounting device of the coupling pliers
S335-15 Coupling pliers to hold transducers
S206-31 Flange/connector of the load cell S337-34 (only if S206M is chosen)

Note: The software for PC control is available under code SSW-UTM2. More information on page 21.

MARSHALL STABILITY TEST

STANDARDS:
EN 12697-34
ASTM D1559
D5581, D6927
AASHTO T245
BS 598 :107
NF P98-251-2

Test development with displacement control.

S205M or **S206M** Unitronic
S337-34 Strain gauge load, 50 kN capacity
2xS337-51 Calibration process of load cell/transducer
S212-05 Loading piston
B046N Stability mould
B043-01N In-built firmware for Marshall test
S336-14 Linear displacement transducer 50 mm stroke, complete with cables and connectors
S305-05 Mounting device of the coupling pliers
S335-15 Coupling pliers to hold transducers
S206-31 Flange/connector of the load cell S337-34 (only if S206M is chosen)

DIRECT SHEAR (LEUTNER) BETWEEN BITUMINOUS MIXTURE LAYERS

STANDARDS:
ALP A StB T80, 48A
EN 12697-48

Test development with displacement control.

S205M or **S206M** Unitronic
S337-34 Strain gauge load, 50 kN capacity
2xS337-51 Calibration process of load cell/transducer
S212-05 Loading piston
B047-10 Leutner testing head for specimens Ø 150 mm
B047-11 Spacers for Ø 100 mm specimens with Leutner head
B043-03N In-built firmware for Leutner test
S336-14 Linear displacement transducer 50 mm stroke, complete with cables and connectors
S305-05 Mounting device of the coupling pliers
S335-15 Coupling pliers to hold transducers
S206-31 Flange/connector of the load cell S337-34 (only if S206M is chosen)

Direct shear test (Leutner) on the connection between bituminous mix ture layers, carried out on asphalt cylinder specimens Ø 150 mm or 100 mm obtained from road cores or on laboratory made specimens.

TWO POINT FLEXURAL AND TRANSVERSE TESTS ON CONCRETE BEAMS

STANDARDS:
EN 12390-5
ASTM C78

Test development with load control.

S205M or **S206M** Unitronic
S337-34 Strain gauge load, 50 kN capacity (only if S205M is chosen)
S337-51 Calibration process of load cell/transducer (only if S205M is chosen)
S205-16 Four-point flexure device.
Roller dimensions: Ø 40 by 310 mm long
Lower rollers adjustable from 110 to 310 mm
Upper rollers adjustable from 45 to 120 mm
Weight: 44 approx.
C109-11N In-built firmware for flexure tests on concrete beams

PUNCHING TEST ON CLAY BLOCKS

STANDARDS:
EN 15037-2, -3
UNI 9730-3

Test development with load control.

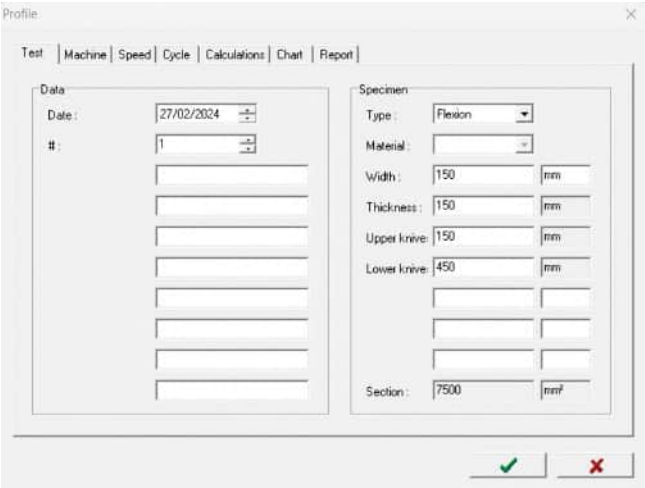
S205M or **S206M** Unitronic
S337-32 Strain gauge load, 10 kN capacity
S337-51 Calibration process of load cell/transducer
C093-11 Flexural punching device
S205-15 Holding beam for the punching device
C109-11N In-built firmware for flexure tests on concrete beams
S206-32 Flange/connector of the load cell S337-32 (only if S206M is chosen)

FLEXURAL TEST FOR CENTRE POINT LOADING ON CLAY TILES AND CONCRETE BEAMS

STANDARDS:
EN 12390-5, EN 538
ASTM C293

Test development with load control.

S205M or **S206M** Unitronic
S337-34 Strain gauge load, 50 kN capacity (only if S205M is chosen)
S337-51 Calibration process of load cell/transducer (only if S205M is chosen)
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 310 mm, and upper central articulated bearer fixed to the load cell.
Bearer dimensions: Ø 40 mm by 310mm long.
Weight: 30 kg approx
C109-11N In-built firmware for flexure tests on concrete beams



SSW-UTM2

Note: The software for PC control is available under code SSW-UTM2. More information on page 21.

UNCONFINED COMPRESSION TEST

STANDARDS:
ASTM D2166
AASHTO T208
BS 1377:2
EN ISO 17892-7

Test development with displacement control.

S205M Unitronic 50 kN
S337-31 Strain gauge load cell, 2.5 kN capacity
2xS337-51 Calibration process of load cell/transducer
S212-08N Upper and lower compression platens Ø 100 mm with accessories.

As alternative:

S212-09N Upper + lower compression platens, Ø 165 mm with upper seat ball (S305-05 and S335-15 already included)
S218-01N In-built firmware for Unconfined compression test
S336-14 Linear displacement transducer 50 mm stroke, complete with cables and connectors
S305-05 Mounting device of the coupling pliers
S335-15 Coupling pliers to hold transducers

UNIAXIAL SPLITTING TENSILE TEST OF ROCK CORE SPECIMENS

STANDARDS:
ASTM D3967

Test development with load control.

S205M Unitronic 50 kN
S337-34 Strain gauge load cell, 50 kN capacity
S337-51 Calibration process of load cell/transducer
S212-05 Loading piston
S218-01N In-built firmware for Unconfined compression test
A148 Compression device jig, see p. 69

Note: The software for PC control is available under code SSW-UTM2. More information on page 21.

QUICK TRIAXIAL TEST

STANDARDS:
ASTM D2850
BS 1377

Test development with displacement control.

Note:
Complete test configuration see p. 512

AUTO SCB SEMI-CIRCULAR BEND

STANDARDS:
EN 12697-44
AASHTO TP124
ASTM D8044

Test development with displacement control.

S205M Unitronic 50 kN

EN 12697-44

B250-01 Basic indirect tensile (idt) jig, for 100-150 mm diameter
B254-01 Scb jig (requires basic idt jig)
B254-51 Pair of scb wear plates
S337-34 Load cell 50 kn capacity
2xS337-51 Calibration process of load cell/transducer
S305-05 Mounting device of the coupling pliers
B045-13 Loading piston
S336-15 Transducer type "B" travel: 10 mm
B045-14 Coupling hardware
S335-15 Universal coupling pliers for transd./dial
B043-05N In-built firmware for auto-scb test

AASHTO TP124 | ASTM D8044

B208 SCB frame
B254-02 Springs
B254-10 Roller support
2xS337-51 Calibration process of load cell/transducer
S337-31(*) Load cell 2,5 kn capacity
B045-13 Loading piston
S336-15 Transducer type "b" travel: 10 mm
B045-14 Coupling hardware
S335-15 Universal coupling pliers for transd./dial
B043-05N In-built firmware for auto-scb test

Note: for more details see p. 127

COMPRESSION TEST ON MORTAR SPECIMENS

STANDARDS:
EN 196-1, 13892-2
ISO 679
ASTM C349

Test development with load control.

S205M or **S206M** Unitronic
S337-34 Strain gauge load cell 50 kN capacity (only for S205M)
S337-51 Calibration process of load cell / Unitronic (only for S205M)
S212-05 Loading piston
E170 Compression device on portion of 40x40x160 mm specimens
E163N In-built firmware for compression test

FLEXURAL TESTS ON MORTAR PRISM 40X40X160 MM

STANDARDS:
EN 196-1
ASTM C348
ISO 679

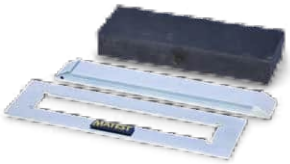
Test development with load control.

S205M or **S206M** Unitronic
S337-32 Strain gauge load cell 10 kN capacity
S337-51 Calibration process of load cell / Unitronic
S212-05 Loading piston
E172-01 Flexure EN device for 40x40x160 mm specimens (available also to ASTM, see p. 392)
S206-32 Flange/connector of the load cell S337-32 (only if S206M is chosen)
E164N Software for flexural test, see p. 21

TRANSVERSE/DEFORMATION TEST ON ADHESIVES FOR TILES

STANDARD:
EN 12004-2

Test development with displacement control.

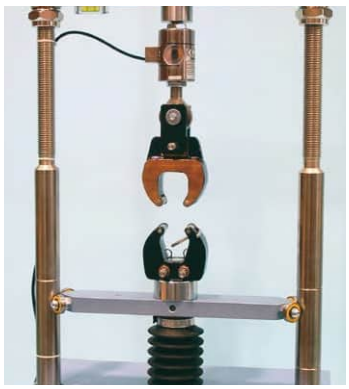


S205-13 A, B, C

S205M Unitronic 50 kN
S205-14 Strain gauge load cell 500 N capacity
S337-51 Calibration process of load cell / Unitronic
S205-13 Flexure device with lower bearers and upper loading piston
S205-13A Template A: rectangular frame, internal dimensions 280x45x5 mm
S205-13B Template B: mould for specimens with dimensions 300x45x3 mm
S205-13C Weight 100 N, cross sectional area of 290x45 mm, for preparation of the spacimen
C109-14N In-built firmware for transverse/deformation test

Note: The software for PC control is available under code SSW-UTM2. More information on page 21.

TENSILE TEST ON MORTAR BRIQUETTES “8” SHAPED



STANDARDS:
ASTM C190, C307
AASHTO T132

Test development with load control.

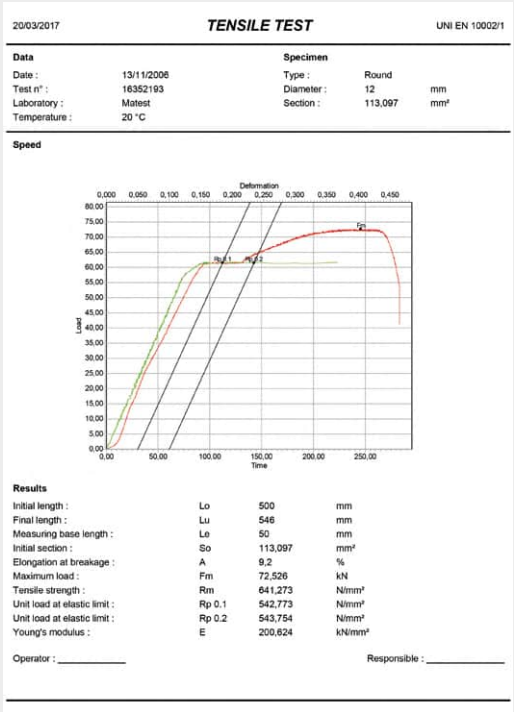
S205-05M or **S206M** Unitronic
S337-35 Tensile/Compression strain load cell 5 kN capacity
S337-51 Calibration process of load cell / Unitronic
S205-07 Tensile jaws “8” shaped for mortar briquette
S206-32 Flange/connector of the load cell S337-35 (only if S206M is chosen)
H009N In-built firmware for tensile test
E111 Briquette mould (see p. 378), optional
SSW-LINK Firmware upgrade for SmartLab, see p. 20

TENSILE TESTS ON METALS, PLASTICS, WIRES, TEXTILES ETC.

STANDARDS:
ISO 6892
ASTM A370

Test development with load control.

S205-05M or **S206M** Unitronic
S337-36 Tensile strain load cell 25 kN capacity (only if S205-05M is chosen)
S337-51 Calibration process of load cell / Unitronic
H005-11 Tensile heads (upper and lower)
S205-09 Coupling for tensile heads installation (only if S205-05M is chosen)
S206-32 Coupling for tensile heads installation (only if S206M is chosen)
H005-21 Flat seizing grips for flat specimens 1 - 10 mm thickness by 25 mm max. width and round specimens Ø 3-5 mm
H005-31 "V" shape seizing grips for round specimens Ø 5-12 mm
H014-06 to H014-10 Extensometer, electronic, for tensile deformation strength tests. (See p. 414)
H009N In-built firmware for tensile test
SSW-LINK Firmware upgrade for SmartLab, see p. 20



20/03/2017 **TENSILE TEST** UNI EN 10002/1

Data

Date :	13/11/2006
Test n° :	16352193
Laboratory :	Matest
Temperature :	20 °C

Specimen

Type :	Round	
Diameter :	12	mm
Section :	113,097	mm²

Speed

Results

Initial length :	Lo	500	mm
Final length :	Lu	546	mm
Measuring base length :	Le	50	mm
Initial section :	So	113,097	mm²
Elongation at breakage :	A	9,2	%
Maximum load :	Fm	72,526	kN
Tensile strength :	Rm	641,273	N/mm²
Unit load at elastic limit :	Rp 0.1	542,773	N/mm²
Unit load at elastic limit :	Rp 0.2	543,754	N/mm²
Young's modulus :	E	200,624	kN/mm²

Operator : _____ Responsible : _____

Test Report

At p. 470 you will find 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 S205-05M with devices for tensile tests of different materials, within the 25kN max. capacity load.

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

DURIEZ TEST ON 80 AND 120 MM DIAMETER SAMPLES

STANDARD: NF P98-251/1, NF P98-251/4

B095-01

S206M Unitronic 200 kN
B096-01 Duriez set Ø 80 mm (p. 127)
B095-01 Duriez set Ø 120 mm (p. 127)
S206-21N In-built firmware for Duriez test

Note: The software for PC control is available under code SSW-UTM2. More information on page 21.

PULL OFF TENSION TEST

STANDARD: TP ASPHALT - StB 81

NEW

S206M Unitronic 200 kN
B260-10SP Pull off tension jig
H009N In-built firmware for tensile test

Note: Accessories for temperature measurement not included.

B260-10SP

FLEXURAL TEST ON CONCRETE BEAMS

STANDARDS: EN 12390-5 I ASTM C78, C293 I AASHTO T97
BS 1881:118

C106

S206M Unitronic 200 kN
C106 Flexure device (p. 290)
C109-11N In-built firmware for flexural tests on concrete beams

SPLITTING TENSILE TEST ON CONCRETE CYLINDERS

STANDARDS: EN 12390-6 I ASTM C496

C100-01 + C101-01

S206M Unitronic 200 kN
C101-01 Splitting tensile test device (technical details and other devices: p. 289)
C100-01 Packing strips for the device C101-01
C109-12N In-built firmware for splitting tensile test

SPLITTING TENSILE TEST ON CONCRETE CUBES AND BLOCK PAVERS

STANDARDS: EN 1338 I EN 12390-6

C100-02 + C103

S206M Unitronic 200 kN
C103 Splitting tensile test device (p. 289)
C100-02 Packing strips for the device C103
C109-12N In-built firmware for Splitting tensile test

COMPRESSION TEST ON MORTAR SPECIMENS

STANDARDS: EN 196-1, 13892-2 I ASTM C349 I ISO 679

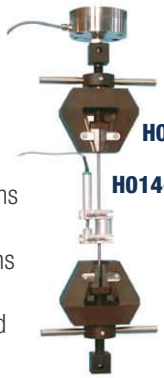
E170

S206M Unitronic 200 kN
E170 Compression device on portions of 40x40x160 mm specimens
(devices for different specimens described at p. 290)
E163N In-built firmware for the compression test

TENSILE TESTS ON METALS, PLASTICS, WIRES, TEXTILES ETC.

STANDARDS: ISO 6892 I ASTM A370

S206M Unitronic 200 kN
S206-33 Flange/connector of the tensile heads H005-11



H005-11
H014-06

Steel applications

H005-11 Tensile heads, upper and lower
H005-21 Flat seizing grip for flat specimens 1-10 mm thickness by 25 mm max. width, and round specimens Ø 3-5 mm
H005-31 "V" shape seizing grips for round specimens Ø 5-12 mm

Textile applications

H005-42 Knurled roller clamping device with max capacity of 20 kN.

H005-42

Wires and rope applications

H005-43 Pair of self-aligned rollers for tensile tests on wires and ropes of thin section.

H005-43

COMPRESSION TEST ON METALS

S206M Unitronic 200 kN
S206-33 Flange/connector
H005-41 Device consisting of an articulated upper plate and a lower fixed one.

H005-41

FLEXURAL AND BENDING TEST ON METALS

S206M Unitronic 200 kN
S206-33 Flange/connector
H005-44 Device for three-point flexural and bending tests on round and flat specimens.

H005-44

OPTIONAL ACCESSORIES

H014 or **H014-06** to **H014-10** Extensometer, electronic, for tensile deformation strength tests on rebars (p. 414)
H009N In-built firmware for tensile test

Note: Accessories for specific tests listed above, are common for different tests. We recommend to check them when ordering, to avoid duplications.

Note: The software for PC control is available under code SSW-UTM2. More information on page 21.

PLATE BEARING TEST

STANDARDS: ASTM D1194, D1195, D1196 | BS 1377:9 | CNR N° 92 and 146 | UNE 7391 | Comparable to DIN 18134

This test is performed for the determination of the bearing capacity of a soil in-situ on road constructions, foundations, road subgrades, airport and highway pavements.
A wide range of plate bearing test equipment is available, together with many accessories according to the different Standards and specific end-user needs.
The hand pumps 100 kN and 200 kN capacity are "Enerpac Made" and all models have double speed, ensuring fast approach.

AVAILABLE MODELS

S222-KIT
PLATE BEARING TEST EQUIPMENT
100 KN CAPACITY - 1 DIAL GAUGE MODEL

ANALOGUE MEASURING SYSTEM WITH DIAL MANOMETER
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 Analogue pressure gauge 0-100 kN, div. 0.5 kN
S226-05 Load plate Ø 300 mm
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 25x0.01 mm
S226-16 Articulated dial gauge support with adjustment device.

Weight: 60 kg approx.

S222D-KIT
PLATE BEARING TEST EQUIPMENT
100KN CAPACITY - 1 DIGITAL GAUGE MODEL

DIGITAL MEASURING SYSTEM WITH DIGITAL MANOMETER

Same composition of S222-KIT except:

S222-02D Digital pressure manometer 0 - 100 kN with 10N resolution, instead of the analogue gauge S222-02.

S222-02D | S225-02D
DIGITAL PRESSURE MANOMETER

The applied load is measured by a high precision electric load cell with digital display, **granting accurate readings also at low loads**.
- 65.000 divisions
- 10N resolution
- linearity: 0.05%
- hysteresis: 0.03%
- repeatability: 0.02%
- display: LCD with high visibility
- display height: 16 mm
- battery operated, 12 months life

S222-02D | S225-02D

S223-01 | S223-02

ACCESSORY for S222-KIT and S223-KIT

S223-01 PRESSURE GAUGE, range 0 - 50 kN, div. 0.25 kN with large dial Ø 200 mm, complete with fast connector, used **for accurate readings at low loads**, as for ex. pre-load of 0.5 kg/cmq.

S223-KIT

PLATE BEARING TEST EQUIPMENT 100 KN CAPACITY - 3 DIAL GAUGES MODEL

ANALOGUE MEASURING SYSTEM WITH DIAL MANOMETER

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 Analogue pressure gauge 0-100 kN, div. 0.5 kN.

S226-13 Upper spherical seat.

S226-05 Load plate Ø 300 mm

S226-06 Intermediate plate Ø 160 mm

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 p. 476)

S377 n° 3 dial gauges 25x0.01 mm

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

Weight: 60 kg approx.

S223-KIT

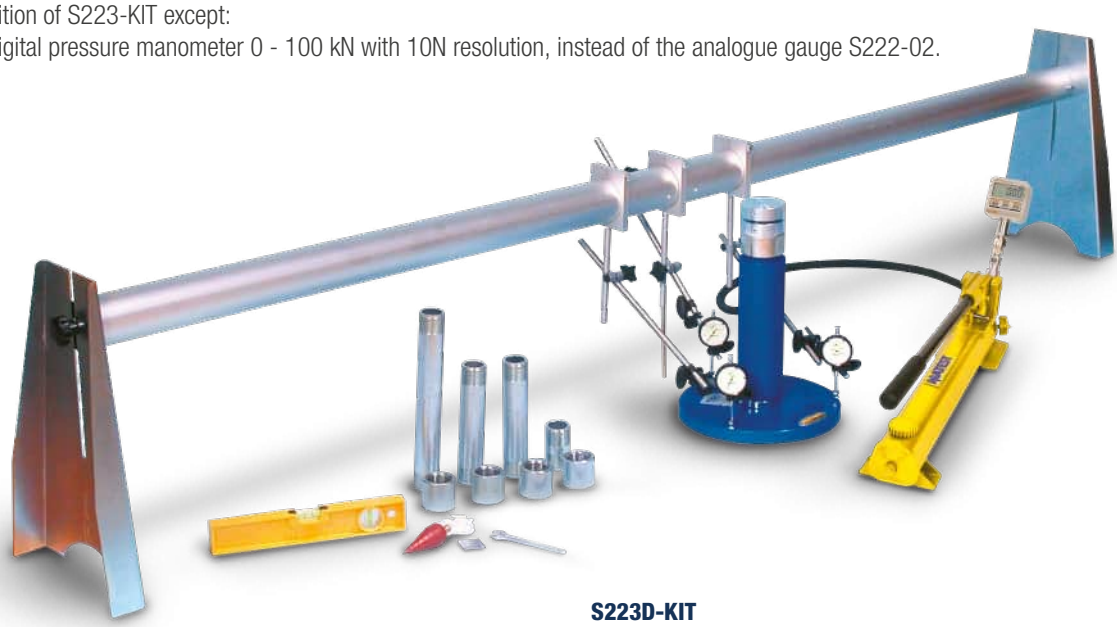
S223D-KIT

PLATE BEARING TEST EQUIPMENT 100 KN CAPACITY - 3 DIAL GAUGES MODEL

DIGITAL MEASURING SYSTEM WITH DIGITAL MANOMETER

Same composition of S223-KIT except:

S222-02D Digital pressure manometer 0 - 100 kN with 10N resolution, instead of the analogue gauge S222-02.



S223D-KIT

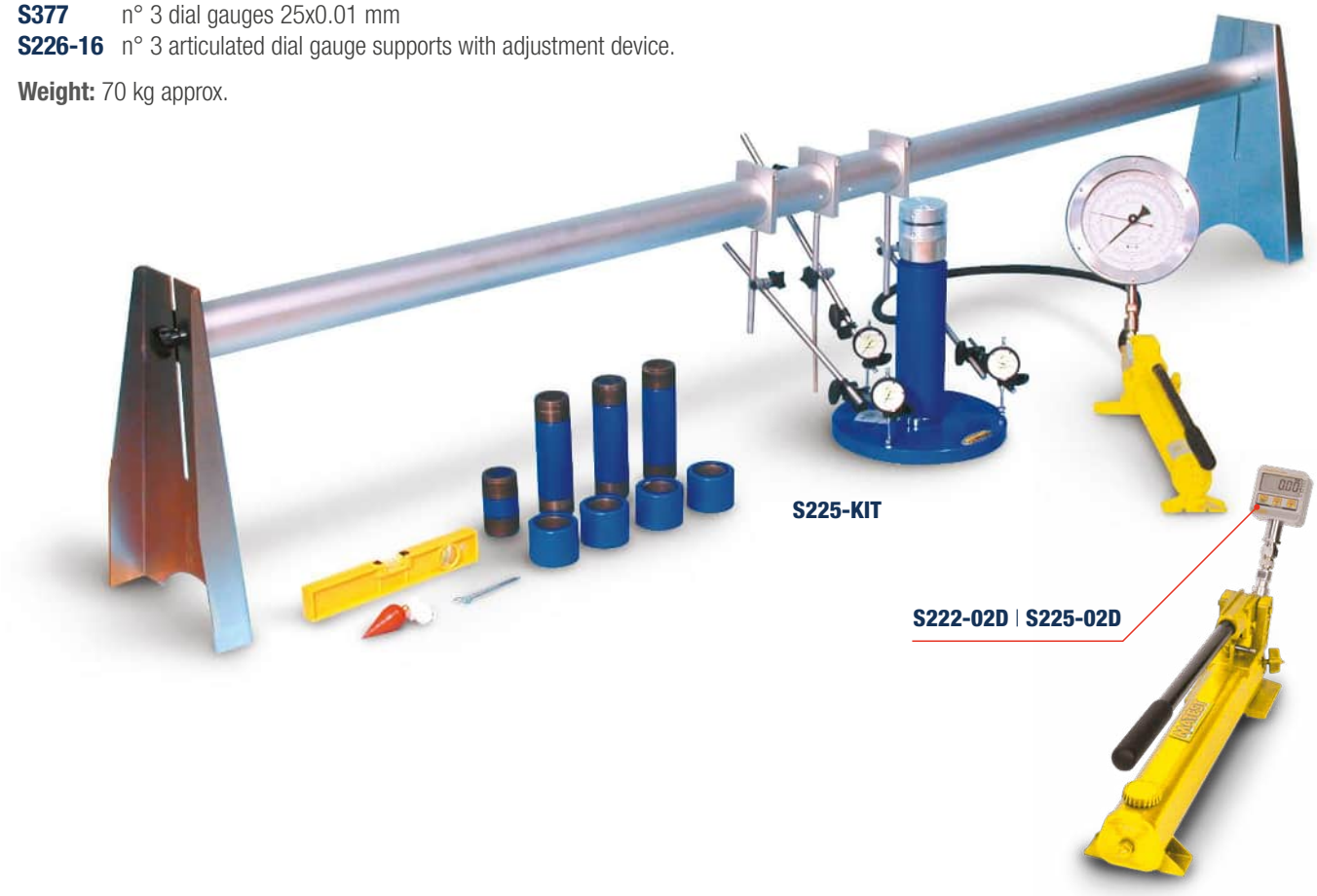
S225-KIT
PLATE BEARING TEST EQUIPMENT 200 KN CAPACITY - 3 DIAL GAUGES MODEL
ANALOGUE MEASURING SYSTEM WITH DIAL MANOMETER

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 Analogue pressure gauge 0-200 kN, div. 1 kN.
S226-13 Upper spherical seat.
S226-05 Load plate Ø 300 mm
S226-06 Intermediate plate Ø 160 mm
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 p. 476
S377 n° 3 dial gauges 25x0.01 mm
S226-16 n° 3 articulated dial gauge supports with adjustment device.

Weight: 70 kg approx.



S225D-KIT
PLATE BEARING TEST EQUIPMENT 200 KN CAPACITY - 3 DIAL GAUGES MODEL
DIGITAL MEASURING SYSTEM WITH DIGITAL MANOMETER

Same composition of S225-KIT except:

S225-02D Digital pressure manometer 0 - 200 kN with 10N resolution, instead of the analogue gauge S225-02.

ACCESSORY for S225-KIT

S223-02 PRESSURE GAUGE, range 0 - 50 kN, div. 0.25 kN with large dial Ø 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
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 p. 135

B103-10

S226-KIT

PLATE BEARING TEST EQUIPMENT 500 KN CAPACITY - 3 DIAL GAUGES MODEL

ANALOGUE MEASURING SYSTEM WITH DIAL MANOMETER

STANDARDS: CNR N° 146, method "B" | BS 1377:9, and using loading plates (accessory) Ø 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 Analogue pressure gauge 0-500 kN, div. 2 kN.

S226-05 Load plate Ø 300 mm

S226-06 Intermediate plate Ø 160 mm

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 p. 476)

S377 n° 3 dial gauges 25x0.01 mm

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

Weight: 110 kg approx.

S226-KIT

S226D-KIT

PLATE BEARING TEST EQUIPMENT 500 KN CAPACITY - 3 DIAL GAUGES MODEL

DIGITAL MEASURING SYSTEM WITH DIGITAL MANOMETER

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

Same composition of S226-KIT except for:

S227-03D Digital pressure manometer 0 - 500 kN with 20N resolution, instead of the analogue gauge S227-03.

S226D-KIT

S224-KIT
DIGITAL PLATE BEARING TEST EQUIPMENT 100 KN CAPACITY
3 LINEAR DISPLACEMENT TRANSDUCERS AND CYBER-PLUS DATA 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.
C405-15M Cyber-Plus Progress touch screen for data acquisition, visualization, processing and storing, directly connected to PC or printer. Technical details: see p. 477
SSW-UTM2 PC Software for remote control
S226-05 Load plate Ø 300 mm
S226-06 Intermediate plate Ø 160 mm
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 p. 476)
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 DATA ACQUISITION SYSTEM

STANDARDS: CNR N° 146, method "B" | BS 1377:9, and using loading plates (accessory) Ø 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.
C405-15M Cyber-Plus Progress touch screen for data acquisition, visualization, processing and storing, directly connected to PC or printer. Technical details: see p. 477
SSW-UTM2 PC Software for remote control
S226-05 Load plate Ø 300 mm
S226-06 Intermediate plate Ø 160 mm
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 p. 476).
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 DATA ACQUISITION SYSTEM

STANDARDS: CNR N° 146, method "B" I BS 1377:9, and using loading plates (accessory) Ø 450, 600, 760 mm, it meets also: ASTM D1195, D1196 I 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.
C405-15M Cyber-Plus 8 Progress touch screen for data acquisition, visualization, processing and storing, directly connected to PC or printer. Technical details: see p. 477
SSW-UTM2 PC Software for remote control
S226-05 Load plate Ø 300 mm
S226-06 Intermediate plate Ø 160 mm
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.

S226-01 + S226-02 + S226-03

ACCESSORIES

S226-01 LOADING PLATE Ø 450 mm
S226-02 LOADING PLATE Ø 600 mm
S226-03 LOADING PLATE Ø 760 mm
S226-09 SET OF TELESCOPIC EXTENSION RODS, aluminium made, to be connected to the datum bar mod. S222-03 (2.5 m long) to obtain a max. adjustable lenght of 5.5 m as requsted by ASTM, CNR Specifications

S226-09 + S222-03

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 with 3 dial gauge or 3 displacement transducers, provided with n° 3 support (S226-16)

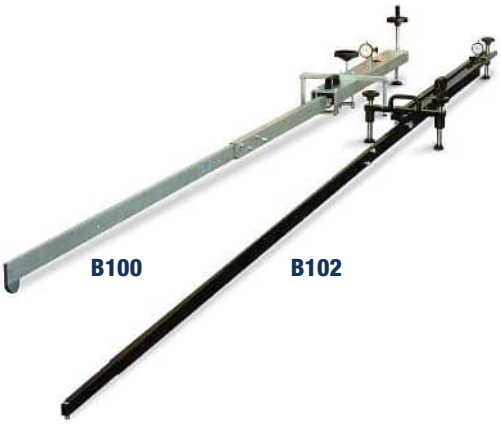
Weight: kg 7 approx.

S223-03 + S226-16

BENKELMAN BEAM APPARATUS

STANDARDS: NF P94-117-1 I NF P98-200/2 I 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 p. 134



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. S222-KIT to mod. S226-KIT (p. 471 to 474) and for Field CBR/Unconfined test equipment mod. S131-KIT, S210-KIT, S220-KIT.
The calibration is carried out only at Matest factory.

C405-15M
CYBER-PLUS TOUCH SCREEN
DATA ACQUISITION AND PROCESSING SYSTEM

8 Channels acquisition and processing data system, 24 bit resolution. Electronic advanced technology, **display** LCD, TFT, 800x480 pixels, 7", **touch screen** , high graphic performances, the unit automatically performs test and data processing. A certificate can be printed through an external USB printer (optional). The Cyber-Plus is equipped with LAN port for connection to PC (software for datalogging included) and with USB port for an unlimited memory storage. 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 p. 213

C405-15M

HARDWARE SPECIFICATIONS

- 8 independent channels available for the load sensors or displacement transducers;
- Stabilized power supply of the analogical channels: 5 Vcc and 3 Vcc;
- Analogue input: ± 20 mV and ± 3 V;
- Nominal resolution: 24 bit;
- Acquisition up to 200 Hz readings for each channel;
- Safety discrete on/off output;
- Display LCD, TFT, 800x480 pixels, 7'', touch screen;
- Time and calendar system.

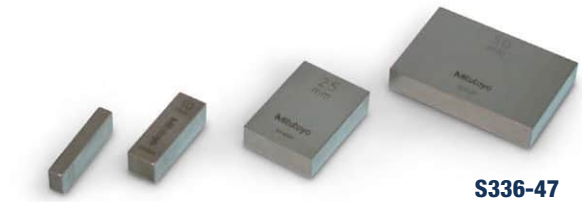
S337-51
Calibration process between one displacement transducer and the data acquisition system C405-15M

AS AN ALTERNATIVE:

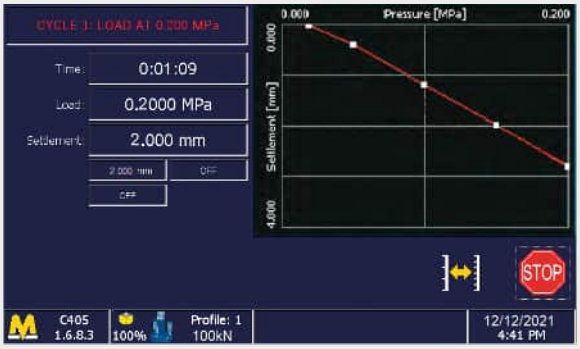
GAUGE BLOCKS. Grade 1
Used to calibrate the linear displacement transducers.

AVAILABLE MODELS

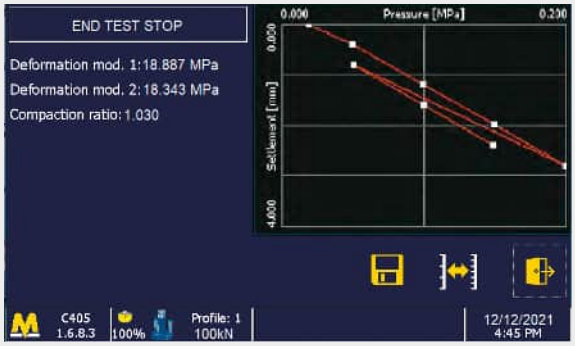
S336-41 Gauge block, nominal length 5 mm
S336-43 Gauge block, nominal length 10 mm
S336-45 Gauge block, nominal length 25 mm
S336-47 Gauge block, nominal length 50 mm



S336-41 S336-43 S336-45 S336-47



Test execution



Final results and test graph

S228N
DYNAMIC PLATE LOAD TEST
LIGHT WEIGHT DEFLECTOMETER

STANDARDS: ASTM E 2835 I TP BF-StB part B 8.3 I ZTV E-StB 2017 I RIL 836 I RVS 08.03.04 (Austria)

This Light Weight Deflectometer is used to determine the dynamic deformation modulus Evd in MPa [MN/m^2] using the dynamic plate load test. Test results provide conclusions on the bearing capacity and compaction quality of soils. The main field of application for LWDs is earthworks in transport infrastructure construction. Further applications are soil investigation and landscaping.

MAIN FEATURES

- Automatic calculation of deflection, s/v value and deformation modulus Evd
- Sensor housing ready for dynamic CBR and 150 mm base plate accessory
- Ergonomic, triangular catch handle with anti-slip powder coating
- All metal parts with corrosion protection and suitable for use at construction sites
- Handheld electronics box (data logger) in robust, weatherproof full leather case
- SD card USB adapter
- Multilingual, backlit and graphics-capable display, display of deflection graphs
- Sensor self-test (2G) and integrated calibration memory
- Preloading impacts can be switched off - Thermo printer interface
- Quick starter manual and calibration protocol
- Integrated WIFI transmitter for wireless, fast and secure transmission of measurement data
- High-precision GPS/GNSS receiver

S228-13

TECHNICAL SPECIFICATIONS

- Load device with 10 kg drop weight, impact load 7.07 kN, measuring range Evd 15-70 MPa (MN/m^2)
- Ready for optional load device with 15 kg drop weight and 1.5 times impact load (10.605 kN); measuring range Evd 70-105 MPa (MN/m^2)
- 300 mm base plate with acceleration sensor (MEMS), max. ground pressure 0.1 MPa (MN/m^2)
- Measuring depth/depth of influence: ca. 600 mm
- Internal memory and SD card for up to 10.000 measurements, automatic storage

S228N + S228-11

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.

- Load device: 210 mm, 1.140 mm (Width, height)
- Base plate: 300 mm, 15 kg (Diameter, weight) Electronics box: 120 mm, 90 mm, 0,5 kg (Width, height, weight)

Power supply: four standard R6 batteries (Mignon type / AA) for ca. 1.500 tests (included)

Total Weight: 15 kg approx.

S228-14

ACCESSORIES

S228-05 DROP WEIGHT of 15 kg. Measuring range of 70-105 MN/m^2.
S228-11 THERMAL PRINTER in case (with power battery, power supply and connection cable).
S228-13 TRANSPORT CART for long distances at the site.
S228-14 MAGNETIC STAND for proper positioning of loading unit.
S228-15 TRANSPORT BOX with wheels, for safe transport and storage.

S228-15

RELATIVE DENSITY OF COHESIONLESS SOIL

VIBRATING TABLE METHOD

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

S238N-KIT
RELATIVE DENSITY OF COHESIONLESS SOILS

STANDARD: EN 13286-5

This test covers the determination of the maximum dry density and the water content (humidity/density ratio) of cohesionless mixtures where the max density by the impact method is lower than the vibratory method.
The method is applicable to materials containing up to 12% fines (< 0.063 mm) by mass and max. particle size is 80 mm.
The test is performed to road construction mixtures.

The set is composed of:

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.

Power supply: 230V 1ph 50-60Hz

S238-11EN Relative density mould 14 liters capacity with accessories.

S238-12 Surcharge weight and base with handle to EN for the 14 liters mould.

Total weight: 290 kg approx.

S238N-KIT

S238-01N-KIT

S238-01N-KIT
RELATIVE DENSITY OF COHESIONLESS SOILS

STANDARDS: ASTM D4253, D4254

The method is applicable for the determination of the relative density of cohesionless soil where impact compaction will not produce a well defined moisture/density relationship curve.
The maximum density of the impact test is normally less than the vibratory method.

The set is composed of:

S238-10 Vibrating electromagnetic table, as above described. Power supply: 230V 1ph 50-60Hz

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

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

S238-14N Surcharge weight and base with handle to ASTM for the 0.5 cu. ft. mould.

S238-15N Surcharge weight and base with handle to ASTM for the 0.1 cu. ft. mould.

S238-16 Relative density gauge measuring set.

Total weight: 310 kg approx.

ACCESSORIES

S238-17 Pouring devices Ø 12.5 and 25 mm

S238-05 Calibration certificate of S238-10 table

S238-17

S244N
PINHOLE TEST EQUIPMENT

DISPERSIBILITY DETERMINATION

STANDARD: 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 p. 482

V230-02 TUBING, inside Ø 8 mm, 5 m long

S244N

S230
ASTM I AASHTO BALLOON DENSITY APPARATUS
1600 ML CAPACITY
STANDARDS: ASTM D2167 I AASHTO T205 I CNR N° 22

Used to determine the in-sity 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: 6 kg approx.

SPARE

S230-01 Rubber balloons, pack of 12

S232
NF BALLOON DENSITY APPARATUS
3000 ML CAPACITY
STANDARD: NF P94-061-2

Used to determine the in-situ density of fine graded compacted or bonded soil, this unit has the same test system of mod. S230, but with a capacity of 3000 ml as requested by French Specification.
A hand-driven piston forces the water into the rubber membrane. A dial gauge measures the water pressure so to execute all the test at the same pressure.
An index engraved on the stem of the piston measures the volume of water filling the hole.
The unit is supplied complete with 6 reinforced rubber membranes, 4 locking clamps, base plate, accessories.

Dimensions: 360x360x700 mm
Weight: 10 kg approx.

SPARE

S232-01 Reinforced rubber membrane, pack of 6

S233
NF BALLOON DENSITY APPARATUS
6000 ML CAPACITY
Identical to mod. S232, but with capacity of 6 litres.

Weight: 15 kg approx.

SPARE

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 Ø 50 mm
V193 STEEL HAMMER 300 g
V194 STEEL HAMMER 1000 g
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.

FIELD DENSITY SAND REPLACEMENT METHOD

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

Used to determine the in-situ density of fine graned compacted soil and to verify the degree of compaction.
The test consists in digging a hole into the ground and then collect, dry and weight the sampled soil.
The hole is now filled with dry sand from the cone container and the volume of sand recorded.
Three versions are available Ø 4" 6.5" 12" each one suitable for different grain sized.
The S231 model Ø 12" is recommended for coarse grained soil and gravel (over 38 mm diameter).

It consists of:

- Metal double cone assembly with valve, galvanized for rust protection.
- Metal base with rimmed centre hole for cone housing, galvanized.
- Two plastic jar, 5 litre capacity. (One jar only 15 litre capacity complete of cone fixing device for S231 version)

The calibrating container is an accessory, to be ordered separately.

ACCESSORIES

S235N STANDARD SAND for density tests, passing 600 micron and retained on 300 micron. ASTM, AASHTO, BS. Bag of 25 kg.

S235-01N STANDARD SAND, passing 0.4 mm and retained on 2 mm. CNR N° 22. Bag of 25 kg

Model	Diameter inch / mm	Double cone with valve (spare)	Metal base with hole (spare)	Plastic jar (spare)	Dimensions mm	Weight kg	Calibrating container (optional accessory)
S234-10	4" (101.6 mm)	**S234-11**	**S234-12**	**V121** (2)	190x190x500	2.300	**S234-13**
S234	6.5" (165.1 mm)	**S234-05**	**S234-06**	**V121** (2)	305x305x600	3.350	**S234-01**
S231	12" (304.8 mm)	**S231-05**	**S231-06**	**S231-11** (1)	620x620x920	13.600	**S231-01**

Note: all parts can be purchased individually.

BS SAND REPLACEMENT APPARATUS

STANDARDS: BS 1377:9 (only S236-KIT and S237-KIT), BS 1924:2

Used to determine the in-situ density of fine graned 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 (Ø 200 mm is recommended for coarse grained soil and gravel).

S236-KIT...S237-KIT

Available Models	Ø mm	Pouring cylinder, shutter and upper cylinder	Metal tray with centre hole	Optional accessory: Calibrating container	Weight of the complete KIT
S236-KIT	100 Consisting of:	**S236-05**	**S236-06**	**S236-07**	kg 10.800
S236-01-KIT	150 Consisting of:	**S236-10**	**S236-11**	**S236-12**	kg 14.150
S237-KIT	200 Consisting of:	**S237-05**	**S237-06**	**S237-07**	kg. 22.600

CONSTANT HEAD PERMEAMETERS

STANDARDS: BS 1377:5 I ASTM D2434 I 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 Ø 75 MM
with three pressure take-off points.
Formed by an acrylic plexiglass body held between two aluminium anodized end plates.

Weight: 3 kg approx.

S245-02
CONSTANT HEAD PERMEABILITY CELL Ø 114 MM
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 approx.

S245-03
MANOMETER TUBES AND STAND, comprising three tubes of constant bore, graduated scale, tubing and connectors.
Dimensions: 150x60x1300 mm
Weight: 5 kg approx.

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 approx.

FALLING HEAD PERMEAMETER

STANDARD: UNI EN ISO 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 satured 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 Ø 3, 4 and 6 mm for the different degrees of permeability, soaking reservoir with cock, tubing and connectors.

Dimensions: 150x60x1300 mm
Weight: 10 kg approx.

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

ALTERNATIVE:

S253
COMPACTION PERMEAMETER
Ø 6" complete.

ACCESSORIES for Compaction Permeameters Ø 4"

S252-01 PLEIN BASE and COLLAR Ø 4" for compaction tests.
S252-02 MOULD BODY Ø 4" with two lateral water inlet/outlet.

ACCESSORIES for Compaction Permeameters Ø 6"

S253-01 PLEIN BASE and COLLAR Ø 6" for compaction tests.
S253-02 MOULD BODY Ø 6" with two lateral water inlet/outlet.

ACCESSORIES

S355 DE-AIRING TANK 20 litre capacity made from acrylic plexiglass (see p. 506)
V205 VACUUM PUMP
V230-03 RUBBER TUBING for vacuum, 3 m long.
S325 NYLON TUBING, 25 m
S350-01 Two-way distribution valve for air or water.

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 Ø 4" or 6" to perform different types of tests at the same time.

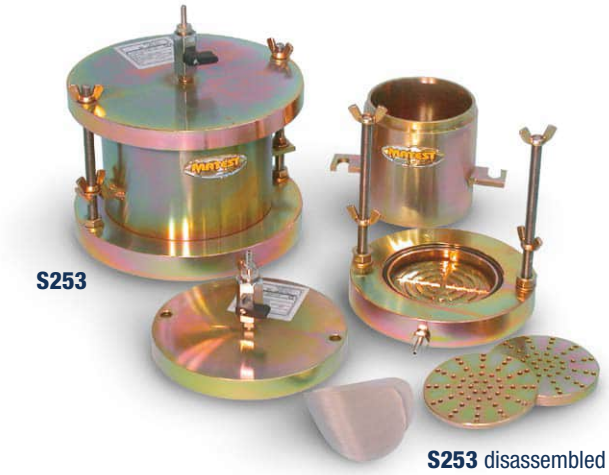
Dimensions: 1050x900x2000/3850 mm
Weight: 75 kg approx.

S248 + Permeameters

COMPACTION PERMEAMETERS

STANDARD: UNI EN ISO 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.
Stell made, galvanized against corrosion.



S253 disassembled

MODELS

S252 COMPACTION PERMEAMETER Ø 4" complete.
Weight: 8 kg approx.

S253 COMPACTION PERMEAMETER Ø 6" complete.
Weight: 16 kg approx.

ACCESSORIES for S252

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

ACCESSORIES for S253

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

ACCESSORIES

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

MODELS

S185-01 Ø 4" cutting collar
S200-09 Ø 6" cutting collar

S200-09

CONSOLIDATION TEST

STANDARDS: ASTM D2435, D3877, D4546 I BS 1377:5
AASHTO T216 I NF P94 090-1, P94-091
UNE 103-602 I UNI EN ISO 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).

S260 with cell and dial gauge

S260
FRONT LOADING OEDOMETER
CONSOLIDATION APPARATUS

Rigidly manufactured from aluminium alloy casting to provide a high degree of accuracy with any frame distorsion 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. Maximun load: 170 kg of slotted weights, corresponding to 1870 kg using the beam ratio 11:1
The oedometer accepts cells up to 100 cm^2
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

Analogue configuration:

S376 DIAL GAUGE 10 mm travel x 0.01 mm subdiv. for vertical displacements.

or:

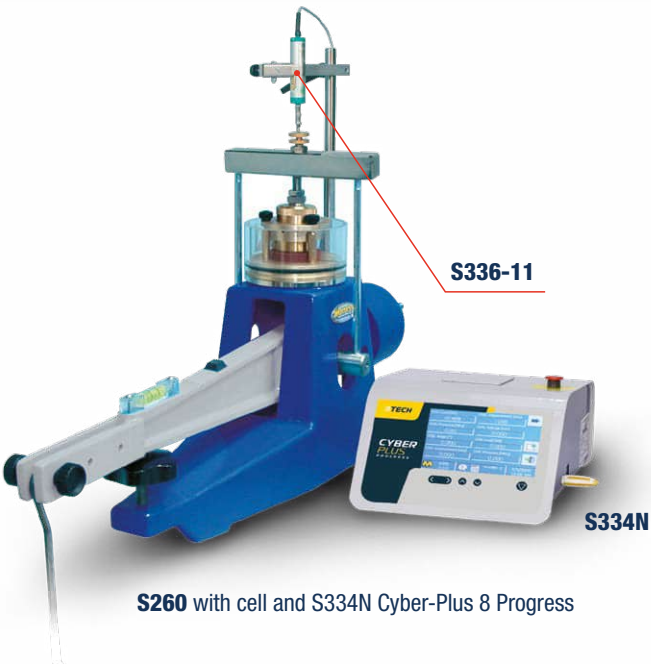
S375-01 DIAL GAUGE 12 mm travel x 0.002 mm subdiv.

or:

S382-01 DIGITAL DIAL indicator 12.7 mm travel x 0.001 mm subdiv.

Alternative solution, electronical configuration:

S336-11 LINEAR VERTICAL DISPLACEMENT TRANSDUCER, 10 mm travel
S336-30 EXTENSION CABLE 2 metres long, or:
S336-31 EXTENSION CABLE 5 meters long, or:
S336-32 EXTENSION CABLE 10 meters long
S337-51 CALIBRATION process of the displacement transducer to the data acquisition unit of the oedometer.



S260 with cell and S334N Cyber-Plus 8 Progress

S334N
CYBER-PLUS 8 PROGRESS

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 p. 509

ACCESSORIES

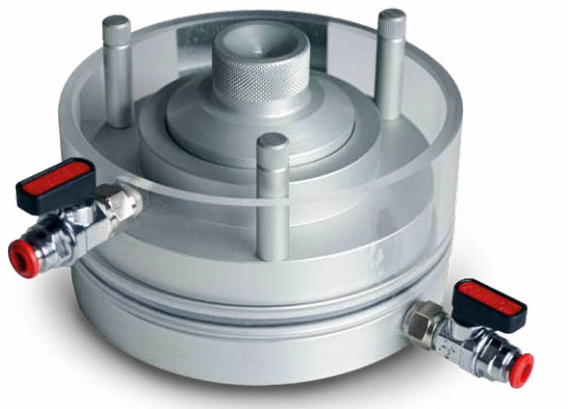
S334-01N 8-CHANNELS internal module, for system expansion to 16 channels.

SSW-LINK Firmware Upgrade to enable SMARTLAB software (see p. 20)

CONSOLIDATION CELLS, BOTH FIXED RING AND PERMEABILITY ATTACHMENT NEW

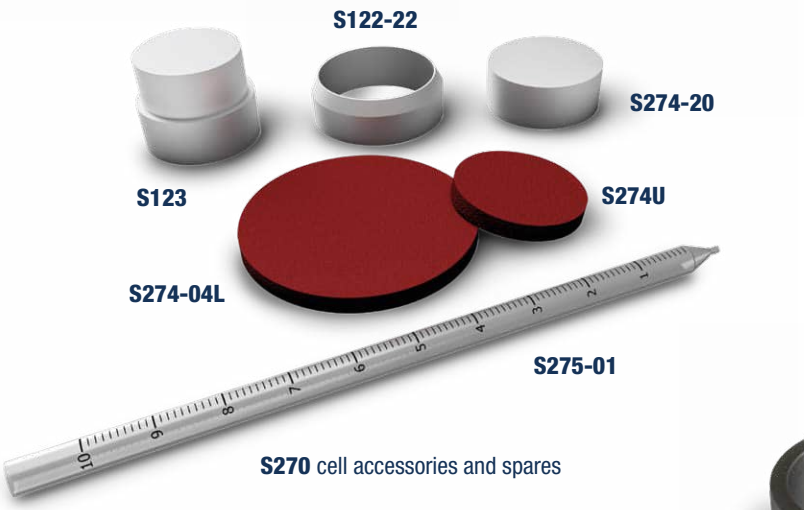
Made from anodised aluminium (stainless steel is available for Ø 50.47 and 71.40 mm models), with specimen holding fixed ring having cutting rim so as to be utilized also to sample undisturbed specimens. Accurately manufactured, these cells are supplied complete with loading piston, couple of porous stones and plexiglass transparent water jacket. Designed to perform also the permeability test, they are provided of a pipe connector with cock, for connection to the graduated glass burette (see accessories).

Aluminium model	Stainless steel model	Specimen Ø mm	Specimen area cm²	Specimen thickness mm	Spare Hollow punch	Specimen tamper	Spare upper porous stone	Spare lower porous stone	Calibration disk	Sampler
S270	S270ST	50.47	20	20	S122-22	S123	S274U	S274-04L	S274-20	S274-30
S270-01	-	63.50	31.67	20	S122-23	S123-05	S274-10U	S274-04L	S274-21	-
S270-02	S270-02ST	71.40	40	20	S122-24	S123-01	S274-01U	S274-04L	S274-22	S274-32
S270-03	-	75.00	44.16	20	S122-25	S123-04	S274-09U	S274-04L	S274-23	-
S270-04	-	79.80	50	20	S122-26	S123-02	S274-02U	S274-04L	S274-24	S274-34
S270-05	-	112.80	100	25	S122-27	S123-03	S274-03U	S274-08L	S274-25	S274-36



S270 cell

S270 cell disassembled



S270 cell accessories and spares

S275N

BURETTE PERMEABILITY ATTACHMENT, 50 ML CAPACITY

Complete with clamp, burette and hose. Recommended for soil samples having great value of permeability.
Burette has 50 ml capacity and subdiv. 0.1 ml.

S275-01 Same as S275N model but with 10 ml capacity.

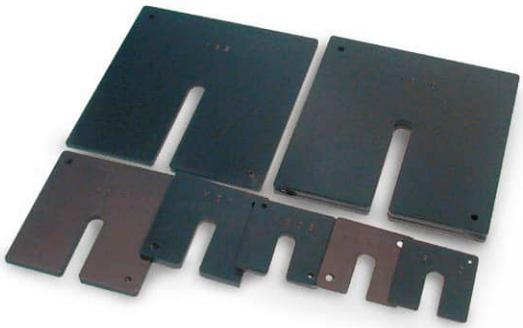
S274-30 Sampler for undisturbed sampling of the specimen

OEDOMETER: ACCESSORIES

SLOTTED WEIGHTS
Steel made, painted against corrosion.

Available slotted weights:

Model	Weight	Model	Weight
S273-06	250 g	**S273-07**	4 kg
S273-05	500 g	**S273-02**	5 kg
S273-04	1 kg	**S273-08**	8 kg
S273-03	2 kg	**S273-01**	10 kg



S260
+ accessories

S265

KIT OF SLOTTED WEIGHTS

S273-KIT	S273-01-KIT	S273-02-KIT
S273-01 = 4x10 kg	**S273-08** = 7x8 kg	**S273-01** = 6x10 kg
S273-02 = 1x5 kg	**S273-07** = 1x4 kg	**S273-02** = 3x5 kg
S273-03 = 2x2 kg	**S273-03** = 1x2 kg	**S273-03** = 1x2 kg
S273-04 = 1x1 kg	**S273-04** = 1x1 kg	**S273-04** = 1x1 kg
	S273-05 = 1x500 g	**S273-05** = 3x500 g
	S273-06 = 2x250 g	**S273-06** = 2x250 g
TOTAL: 50 kg	**TOTAL:** 64 kg	**TOTAL:** 80 kg

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

SPARES

S335-15 Universal coupling pliers for dial gauge/transducer. It accepts all Matest displacement transducers and dial gauges (Ø 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.

S336-30

S260-13

S336-11

S335-15

BUYER'S GUIDE FOR ONE STANDARD CONSOLIDATION SYSTEM AND ONE AUTOMATIC CONSOLIDATION DATA ACQUISITION/PROCESSING SYSTEM.

S260
with accessories

S265-01

S334N

Configuration for one standard Oedometer apparatus	Model
Front loading oedometer	**S260**
Oedometer bench (for one or three oedometers)	**S265 / S265-01**
Dial gauge	**S376 / S375-01**
Consolidation cell	**S270....S270-05**
Set of slotted weights	**S273-KIT / S273-01-KIT / S273-02-KIT**
Hollow punch (to combine to the consolidation cell)	**S122-22...S122-27**
Spare porous stones (to combine to the consolidation cell)	**S274U...S274-09U**
Calibration disc	**S274-20...S274-25**
Specimen tamper	**S123...S123-05**
Permeability measurement:	
Permeability attachment (50 ml burette)	**S275N**

Configuration for one Oedometer apparatus with electronic measurement and data acquisition/processing:	Model
Oedometer with accessories as listed in the standard configuration (without the dial gauge S376), and also:	
Cyber-Plus 8 Progress, 8 channels (expandable to 16 channels) automatic data acquisition/processing	**S334N + S334-01N (optional)**
Displacement transducer (in quantities as the oedometers)	**S336-11**
Extension cable (in quantities as the transducers)	**S336-30 / 31 / 32 (optional)**
Firmware upgrade to enable SmartLab software	**SSW-LINK see p. 20**
Gauge blocks to calibrate the transducers	**S336-43 (optional)**
or:	
Transducer / Oedometer calibration process	**S337-51**

S261
EDOMEC
AUTOMATIC CONSOLIDATION APPARATUS (OEDOMETER)

NEW

itTECH CYBER PLUS PROGRESS

ADVANCED ELECTROMECHANICAL SYSTEM

STANDARDS: BS 1377:5 I ASTM D2435, D3877, D4546 I AASHTO T216 I NF P94-090-1, NF P94-091 I STAS 8942-1-89
UNI EN ISO 17892-5

This automatic consolidation system, ideal for modern and efficient laboratories, has been developed to eliminate or reduce to the absolute minimum any forms of manual intervention.

This machine has innovative technology for controlling the application of loads. The load application system is guaranteed by a sophisticated PID electromechanical system. It is able to control load very accurately, thanks to the high frequency control up to 1KHz. This allows high precision at low loads, high speed of load application at high loads.

The test is configured using a special test icon, in which it is possible to set loads and acquisition times; both the loads and the acquisition times are freely configurable. The large display makes it easy to visualize test data and graphs.

Frame Specifications:

- Standard load cell :10kN (up to 25 kN on request)
- Precision: 0.15 % at full range
- Ram travel: up to 25 mm
- Control frequency: up to 1 kHz
- Horizontal clearance: 175 mm
- Vertical clearance: 140 mm (with load cell)
  273 mm (without load cell)
- Maximum cell size dia: 112.8 mm
- Safety function for automatic machine stop when maximum load or maximum strain/deformation is reached.

Firmware:

Thanks to its advanced firmware, Edomec becomes extremely customizable. It allows to:

- Set different time acquisition windows for each load step;
- Enable or disable settlement check and swelling check for each load step (NOTE: the condition set is the same for all steps).
- Equipped with 4 channels, suitable for connection of load, displacement, deformation, LVDT, and strain gauge (by using an external adapters) transducers.
- Semi-automatic configuration and calibration of all transducers connected.
- The digital controller (PC) works on Windows CE based system and can be easily updated through the USB with no need to uninstall or move the controller.
- Unlimited memory storage with: 2 USB ports, Ethernet port for remote control through PC.

ACCESSORIES

SSW-LINK	FIRMWARE UPGRADE to enable SmartLab software (see p. 20)
S336-11	LINEAR DISPLACEMENT-DEFORMATION TRANSDUCER 10 mm **(needed)**
S337-51	CALIBRATION PROCESS of the linear displacement transducer combined with the Edomec **(needed)**
S270/S270-05	CONSOLIDATION CELLS, different models: see p. 485
S334-12	SWITCH TO CONNECT from 2 to 7 Cyber-plus units to the Ethernet Network.
S261-25	LOAD CELL 25 kN capacity

MAIN FEATURES

- Automatic calculations and real time display of graphs and result according the standard.
- Maximum vertical force: up to 25 kN
- Minimum speed: 0.00001 mm/min
  Maximum speed: 99.99999 mm/min
- 4 channels for acquisition and data processing system.
- Sampling frequency of 2 kHz with a selectable sampling rate between 1 Hz and 20 Hz

S261 + accessories

SMARTLAB SOFTWARE
FOR CONSOLIDATION TEST

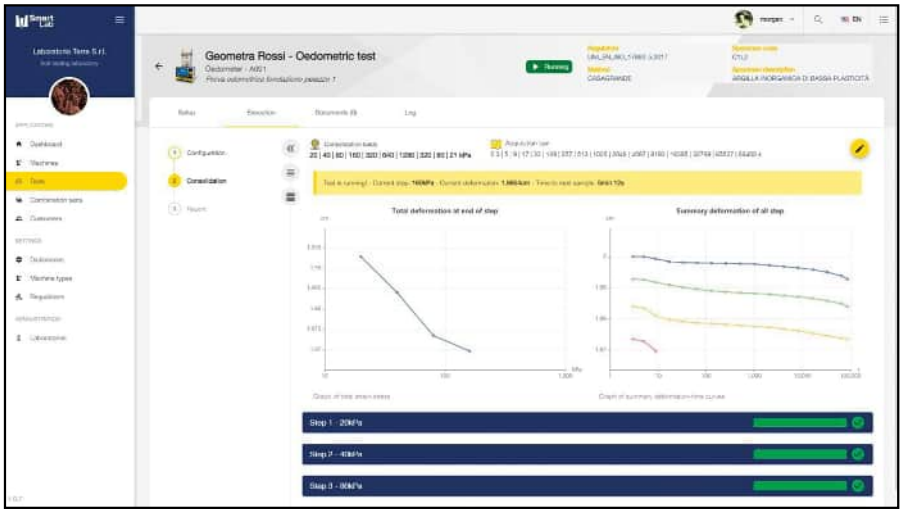
NEW

The oedometric consolidation test allows to determine the compressibility and swelling properties of a soil, through changes in the effective tensional state under one-dimensional condition. For each load step, SmartLab allows you to process the failure-time curve by choosing one of the two analysis methods provided by the standards UNI EN ISO 17892-5; ASTM D2435, D3877, D4546; NF P94-090-1, P94-09, Casagrande or Taylor.

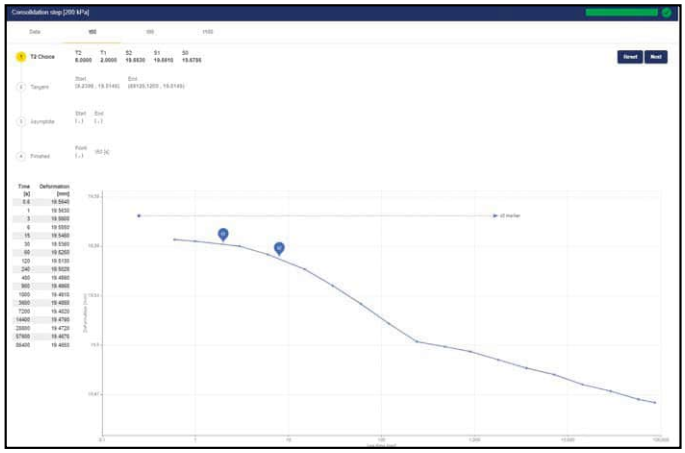
At the end, SmartLab allows the data of the various loading and unloading steps to be exported, providing both a report of the data acquired, and a complete one with all the processed data and graphs required by the standards. With SmartLab is possible to start, monitor and manage tests remotely.

SSW-LINK
FIRMWARE UPGRADE

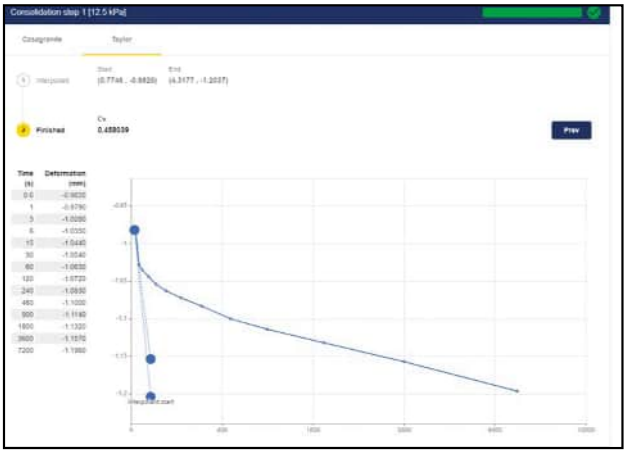
In order to use the SmartLab software, it is necessary to purchase the firmware license which unlocks up to 3 different types of machines (e.g. 1 Oedometer, 1 Shear Machine, 1 Compression machine). See p. 20



Real-fime test visualization of an oedometric consolidation



Casagrande method



Taylor method

PC specifications on which SmartLab acts as a server: CPU Intel Core i5 or AMD Ryzen 5, 16GB RAM memory, 100GB mass memory dedicated to SmartLab, Windows 11 or 10 64-bit. On request, it is possible to order the PC that fulfills all requirements (SPC).

ACCESSORIES

SPC	SmartLab PC
S334-11	Network connection RJ45 cable
S334-12	Switch for Cyber-Plus Progress
SSW-GWAY	SmartLab Gateway communication protocol

DIRECT / RESIDUAL SHEAR TEST APPARATUS

STANDARDS: ASTM D3080 I NF P94-071-1, NF P094-071-2 I AASHTO T236 I UNI EN ISO 17892-10 I STAS 8942-2-82

This apparatus is used to determine the resistance to shearing of all types of soil specimens including both consolidated and drained, undisturbed or remolded. The machine can accommodate round specimens Ø 50, 60, 63.5, 100 mm and square 60x60, 100x100 mm.
The machine has an integral closed loop control motor with epicycloid reducers.
At the beginning of each test, the machine performs an automatic and complete internal check including a position reset resulting in the elimination of all position errors.
A user-friendly microprocessor controlled touch screen is used to input all test patterns providing an efficient and flexible interface.
(All data are input and stored when the machine is in stand-by, without affecting the specimen under test with quick machine setting.)
Facility for shear box maximum extension detection, to automatically stop the test.
Facility 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.
The effects of the primary consolidation can be identified directly on the consolidation curve, only with data acquisition version. Automatic calculation of the appropriate shear velocity with selection of optimal consolidation parameters for t50, t90 and t100 (only with data acquisition version). This provides efficiency and cost effectiveness.

Frame Specifications:

- 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.

MAIN FEATURES

- Automatic calculation of the appropriate shear velocity based on optimal consolidation parameters.
- Shear speed: 0.00001 to 15.0000 mm/min
- Different return speed facility for residual shear test.
- Integral closed loop control motor.
- User-friendly microprocessor controlled touch screen.
- The machine acquires all the necessary parameters for the shear test.

Firmware:

- Electronic control unit Cyber-plus Progress with 7" touch-screen color graphic display, 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 SmartLab 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: 1 USB port.
- Possibility to select different languages.

Power supply: 230V 1ph 50-60Hz 100W
Dimensions: 1040x420xh1350 mm
Weight: 120 kg approx.

S276-KIT + S284

THE DIRECT/RESIDUAL SHEAR TESTING MACHINE IS AVAILABLE IN THREE VERSIONS

S276-KIT
SHEARLAB DIGITAL BASIC VERSION
DIGITAL SHEAR TESTING MACHINE

comprising:

S276-10M 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 0.01mm for horizontal displacement.
S376 Dial indicator 10mm x 0.01mm 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)

S276-01M
AUTO SHEARLAB DATA ACQUISITION VERSION
DIGITAL SHEAR TESTING MACHINE WITH INCORPORATED DATA ACQUISITION SYSTEM AND BASIC FIRMWARE

comprising:

S276-10M Shear Frame with digital Touch-Screen microprocessor, complete with beam loading device, shear box case with adaptors, transducers supports.
S277-20 Load Cell, electric, 3000 N capacity, complete with cable. Load cell 5000 N capacity available on request.
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.

S276-01M + S284

ACCESSORIES

S277-21 LOAD CELL, 5000 N. Alternative solution to the S277-20 load cell 3000 N

SSW-LINK FIRMWARE UPGRADE to enable SmartLab software (see p. 20)

GAUGE BLOCKS. Grade 1
Used to calibrate the linear displacement transducers (see p. 477)

SPARES

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

S280-15 Mounting device 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.

Note: Shear boxes and accessories: see p. 494

S278

SHEARMEC

AUTOMATIC ELECTROMECHANICAL SHEAR MACHINE

DIRECT AND RESIDUAL SHEAR TESTING

STANDARDS: NF P94-071-1, P094-071-2 I ASTM D3080 I AASHTO T236 I UNI EN ISO 17892-10 I STAS 8942-2-82

Shearmec is a machine designed to perform direct and residual shear tests in a fully automatic and reliable way, including consolidation phases, direct and residual shear.

The machine adopts robust electromechanical servo-controlled actuators which ensure a precise application of vertical and horizontal loads. The user-friendly interface allows the entire test to be set up while eliminating or reducing need for manual intervention to perform both standardized tests or tests for research purposes.

S278

MAIN FEATURES

- High performances for both standardized tests and tests for research purposes.
- Cyber-Plus Progress for an accurate setting of the vertical load, thanks to an electromechanical actuator placed under the shear box.
- Automatic calculation of the shear speed in compliance with standards.
- Automatic load frame release for removing of the shear box.
- Connection to SmartLab software for data processing and for remote control.
- Possibility to perform tests 24/7.

TECHNICAL SPECIFICATIONS

- Maximum horizontal force: up to 5 kN
- Maximum travel: 20 mm
- Shear speed: from 0.00001 to 15.0000 mm/min
- Maximum vertical load: up to 10 kN

Power supply: 230V 1ph 50-60Hz 200W
Dimensions: 1030x400x580 mm
Weight: 100 kg approx.

SHEARMEC SYSTEM INCLUDES:

S277-21 Horizontal load cell, electric, 5 kN capacity.
S277-22 Vertical load cell, electric, 10 kN capacity.
S336-11 Linear vertical transducer, 10 mm travel.
S336-12 Linear horizontal transducer, 25 mm travel.
S277-31 Firmware activating 4 connectors for data acquisition.

RECOMMENDED ACCESSORIES

SSW-LINK FIRMWARE UPGRADE to enable SmartLab software. For fully automatic data control, acquisition, processing and visualisation in direct/residual shear tests, with graphics on all the test phases (see p. 20)

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

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)

S280-17 Mounting device 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

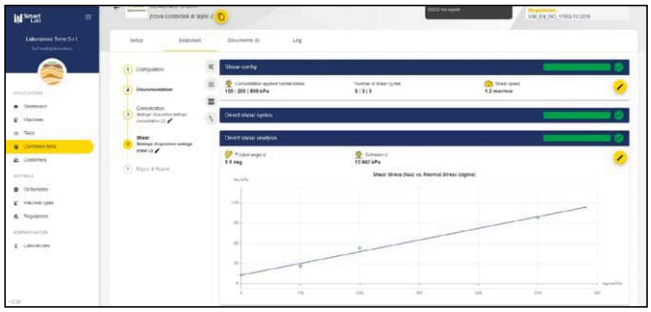
FIRMWARE

Shearmec automatically calculates the appropriate shear velocity to be applied to the specimen by selecting the optimal consolidation parameter among t50, t90 and t100, improving effciency and cost effectiveness.

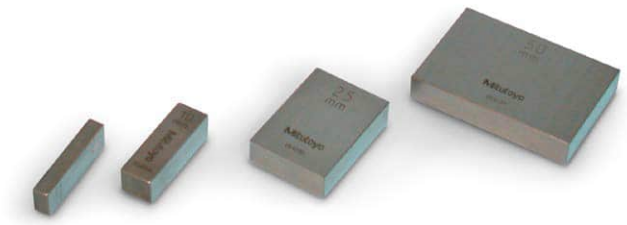
Thanks to its advanced firmware, Shearmec incorporates oedometer functions becoming extremely customizable during the consolidation phase. It allows to:

- Set different time acquisition windows for each load step;
- Enable or disable settlement check and swelling check for each load step (NOTE: the condition set is the same for all steps).

Note: Shear box, hollow punch, tamper (see accessories at page 494) and Software Smartlab are not included and have to be ordered separately.



SmartLab software



S336-41 **S336-43** **S336-45** **S336-47**

S280-16 **S335-15**

ACCESSORIES

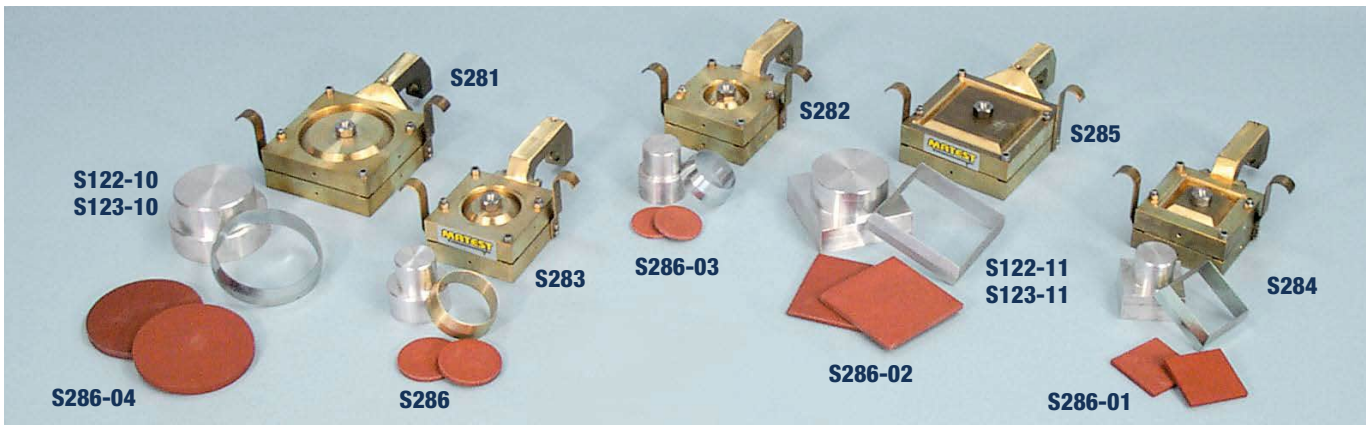
SHEAR BOX assemblies, made from brass, accurately machined, complete with carriage, walled round or square hole, base plate, two grids, two perforated grids, two porous stones, adapters to fit the box holder. The grids of the shear boxes are made of teflon.

Models	Shear box	Spare porous stones (1 pc)
Round specimens Ø 50 mm	**S282**	**S286-03**
Round specimens Ø 60 mm	**S283**	**S286**
Round specimens Ø 63.5	**S283-01**	**S286-05**
Round specimens Ø 100 mm	**S281**	**S286-04**
Square specimens 60x60 mm	**S284**	**S286-01**
Square specimens 100x100 mm	**S285**	**S286-02**

HOLLOW PUNCH (sample cutter) and
TAMPER (extrusion tool)

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

Models	Hollow punch	Tamper
Ø 50xh 23 mm	**S122-08**	**S123-08**
Ø 60xh 23 mm	**S122-09**	**S123-09**
Ø 63.5xh 23 mm	**S122-21**	**S123-17**
Ø 100xh 23 mm	**S122-10**	**S123-10**
Square 60x60xh 23 mm	**S122-11**	**S123-11**
Square 100x100xh 23 mm	**S122-12**	**S123-12**



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 with oedometric cells. Produced in a rugged steel structure, it is supplied complete with lever arms ratio 10:1 having each max. load up to 550 kg, centering devices and dial gauge holders. Supplied without weights, water container, cells and dial gauges or displacement transducers to be ordered separately.

Dimensions: 2300x450x900 mm **Weight:** 150 kg approx.

S290 with accessories

S291-01 **S291**

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

Detail of shear box's with teflon grids

ACCESSORIES for S290

S291 WATER CONTAINER, made from plexiglass and aluminium, it accomadates 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 WATER CONTAINER, it accomodates 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 (for analogic setting).

or:

S336-11 Linear vertical displacement transducer, 10 mm travel (for digital setting).

S337-51 CALIBRATION process of the displacement transducer to the data acquisition unit of the shear machine (for digital setting).

S334N Cyber Plus Progress control unit (for digital setting).

S279

LARGE SHEARMEC 300 mm DIRECT SHEAR

NEW

ELECTROMECHANICAL SHEAR MACHINE FOR LARGE-SIZED SAMPLES

STANDARDS: ASTM D3080 I ASTM D6243 I EN ISO 12957 I UN EN ISO 17892-10

Large Shearmec is an **electromechanical frame** designed by Matest to perform direct and residual shear tests on samples with coarse or medium grain soils, such as gravel. The **stainless steel shear box** has a size of 300x300 mm, in order to accommodate the largest diameter of the grains and obtain shear strength values for the sample as a whole, not just for the single particles. The shear force and the vertical pressure are applied by 2 electromechanical actuators of 100 kN each, with a travel of 150 mm and 75mm respectively. Stresses are measured by 2 electronic load cells of 100 kN, one for the horizontal force and one for the vertical pressure. To facilitate the sample insertion and access to the test area, Matest has developed an innovative upper plate lifting system with self-locking joint which guarantees the axiality of the load. In addition, the lifting device (S279-25) allows to easily remove/insert the shear box, for a safer specimen insertion. The **Cyber Plus Progress** unit, based on a closed-loop control, manages the system completely and automatically, from data acquisition to real-time graph display. The machine can be controlled even remotely through **SmartLab**, the innovative **software platform** which allows both data acquisition and processing and test results export. Large Shearmec can be configured to perform tests on geosynthetic materials as well.
The machine is supplied complete with shear box, load cells, displacement transducers and containment plates.

Power supply: 230V 1F 50-60Hz 2kW
Dimensions: 165x78x(h)145 cm.
Weight: 750 kg approx.

S279

MAIN FEATURES

- Load application system via electromechanical actuators
- Configurable for both soil tests and geosynthetic materials
- Maximum vertical load 100 kN
- Maximum horizontal load 100 kN
- Specimen insertion system facilitated via an upper tilting plate
- Upper plate equipped with ball joint
- Liquid collection containers on the work top
- Test fully configurable from 7-inch display
- Data storage on USB key
- Smartlab software available for remote control of the machine with data and results management

RECOMMENDED ACCESSORIES

SSW-LINK FIRMWARE UPGRADE to enable SmartLab software. For fully automatic data control, acquisition, processing and display of direct/residual shear tests, with graphics on all the test phases (see p. 20)

TECHNICAL SPECIFICATIONS

- Sample size: shear box 300 x 300 x 150 mm
  optional accessory: shear box 150 x 150 mm
- Vertical and horizontal loads: 100 kN
  (100 kN horizontal and vertical load cells)
- Speed: from 0.00001 to 12.00000 mm/min
- Travel: 75 mm
- Consolidation steps: up to 50
- Control and data acquisition:
  Cyber-Plus Progress 8 channels + PC software (optional)
- Drive: both axis consolidation and direct/residual shear.

ACCESSORIES

S279-20 Shear box 150x150 mm
S279-21 Pair of shear plates 150x150 mm for S279-20
S279-25 Shear box lifting device

SPARE PARTS

S279-10 Shear box 300x300 mm
S279-11 Pair of shear plates 300x300 mm
S336-14 Displacement transducer, 50 mm travel
S336-13 Displacement transducer, 100 mm travel

SMARTLAB SOFTWARE

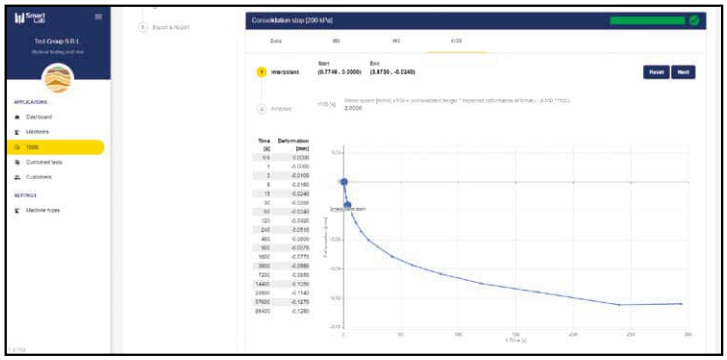
FOR SHEAR TEST WITH S276-01M, S278, S279 MACHINES

NEW

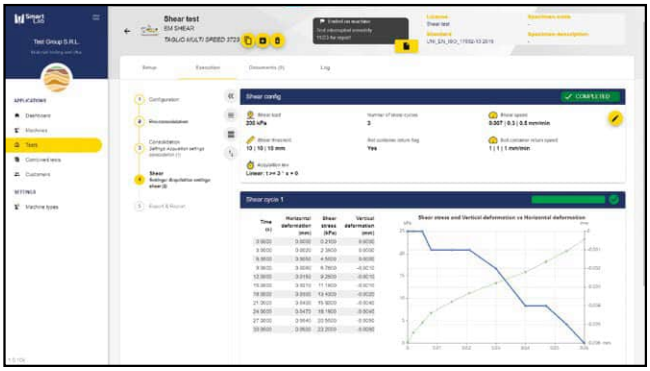
SmartLab is designed for automatic machine management, acquisition, processing and visualization of direct/residual shear tests.

The software allows you to enter the main test parameters such as the size of the shear box and the height of the specimen. The software automatically suggests the acquisition parameters of the consolidation and shear phase. At the end of the consolidation phase, in order to choose the shear speed, SmartLab automatically proposes a guided T50, T90, T100 calculations in order to obtain the most appropriate shear speed.
The user can decide whether to continue the test with the automatically calculated speed or choose the speed that deems appropriate.

According to the reference standards UNI EN ISO 17892-10 and ASTM D3080, tests must be performed on at least three samples with increasing consolidation values. Using SmartLab, the results of these tests can be processed automatically and combined using the “combined test” function.



Graphical processing to idenfify the shear speed



Graphical display of the shear step

SSW-LINK

FIRMWARE UPGRADE

In order to use the SmartLab software, it is necessary to purchase the firmware license which unlocks up to 3 different types of machines (e.g. 1 Tensile Machine, 1 Shear Machine, 1 Compression machine). Additional information at pages 18...20.

PC specifications on which SmartLab acts as a server: CPU Intel Core i5 or AMD Ryzen 5, 16GB RAM memory, 100GB mass memory dedicated to SmartLab, Windows 11 or 10 64-bit. On request, it is possible to order the PC that fulfills all requirements (SPC).

ACCESSORIES

SPC	SmartLab PC
S334-11	Network connection RJ45 cable
S334-12	Switch for Cyber-Plus Progress
SSW-GWAY	SmartLab Gateway communication protocol

TRIAXIAL TESTS

STANDARDS: BS 1377:8 I ASTM D2850, ASTM D4767, ASTM D7181 I NF P94-070, NF P94-074 I UNI EN ISO 17892-8/9

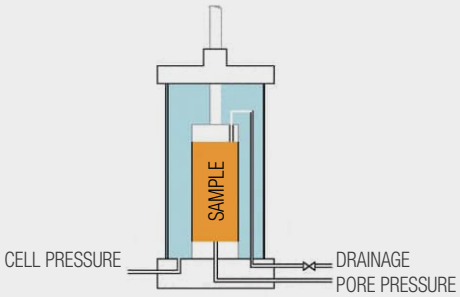
Introduction

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, diaphram walls, anchors
5. Slope stability
6. Ground improvement
7. Design of embankments, earth dams

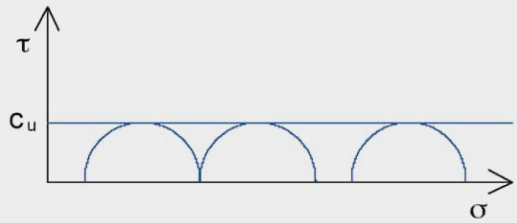
The most widely used testing apparatus for investigating the stress-strain behaviour and the strength parameters of soils is the triaxial apparatus.

Triaxial tests are generally conducted in three main stages: saturation, isotropic consolidation, and shear, which continues until sample failure. First, a cylindrical soil sample, either undisturbed or reconstituted, placed inside a rubber membrane, is saturated to ensure that all pores are filled with water. Once saturation is complete, the sample undergoes isotropic consolidation, where it is subjected to uniform confining pressure while drainage conditions are controlled as needed. Finally, in the shear loading stage, the sample is axially loaded at a constant rate until failure occurs. During this phase, drainage may be allowed or restricted by opening or closing a valve, depending on the test requirements.
These stages are conducted under specific combinations of drainage conditions, resulting in three standard types of triaxial tests. Each test is typically performed on three saturated specimens, each under a different confining pressure to observe variations in behavior.



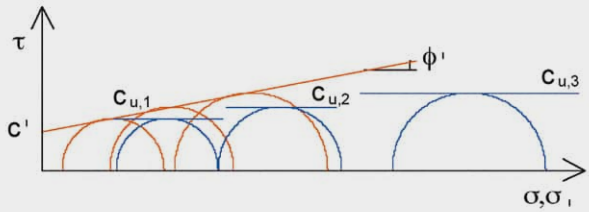
"UU" unconsolidated undrained test

This test is designed to determine the undrained shear strength parameters, specifically the undrained shear strength cu and undrained friction angle ϕu = 0. It is typically performed on fine-grained soils. In this procedure, only the shear phase is conducted, without prior saturation or consolidation of the sample. During the shear phase, the drainage valve is kept closed to prevent any volume change, allowing deformations to occur until failure. This test provides an estimate of undrained shear strength (cu), which can be derived from the Mohr circles plotted in total stresses. While the effective friction angle (ϕu) is not applicable under undrained conditions, any indication of a non-zero value may suggest potential errors in the testing process, such as inadequate saturation or improper test execution. 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.



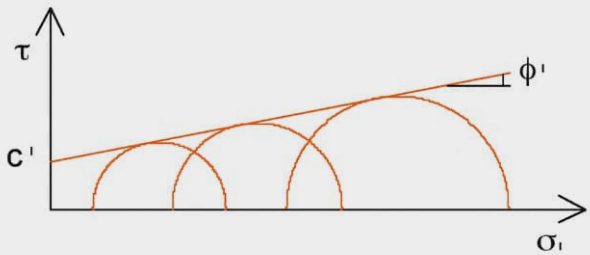
"CU" consolidated undrained test

The CU test is primarily used to determine the undrained shear strength parameters (cu) and effective shear strength parameters (effective cohesion c' and effective friction angle ϕ'). After saturation and consolidation, the shearing phase is performed with the drainage valve closed to measure changes in pore water pressure as the sample undergoes axial loading until failure. During this phase, no further volume change occurs, and deformations continue until the sample reaches failure. This process 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 conducted to determine the effective shear strength parameters, specifically effective cohesion (c') and effective friction angle (ϕ'). It is typically performed on coarse-grained soils. After saturation and consolidation, the shear phase is performed with the drainage valve opened, enabling the sample to deform until failure occurs, while measuring the changes in stress. The results from this test provide values for effective cohesion and effective friction angle, which are derived from the envelope of the effective stress Mohr circles. The stress-strain behaviour and strength parameters obtained are then utilized to model engineering problems under drained conditions, typically relevant in long-term design applications.



S301M
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 70x140 mm) and S306N (max. specimen size 100x200 mm), Matest or other manufacturers made. The load plate is foreseen of electric end of stroke, to save the machine from wrong manipulations.

S301M with data acquisition and accessories

TECHNICAL SPECIFICATIONS

HARDWARE

- Maximum load capacity: 50kN
- Infinitesimal testing speed: from 0.00001 to 12 mm/min.
- Minimum vertical clearance: 480 mm (268 mm with ring)
- Maximum vertical clearance: 1100 mm (888 mm with ring)
- Horizontal clearance: 380 mm
- Platen diameter: 167 mm

FIRMWARE

- Electronic control unit Cyber-plus Progress with touch-screen color graphic display, that runs like a standard PC for the management of the data.
- 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: 1 USB port, 1 SD card.
- 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).

S301M with load ring and accessories

Power supply: 230V 1ph 50-60Hz 600W
Dimensions: 490x510xh1800 mm
Weight: 115 kg approx.

UPGRADING ACCESSORIES for S301M and S301-02

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 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.
SSW-LINK	FIRMWARE UPGRADE to enable SmartLab software. See p. 20

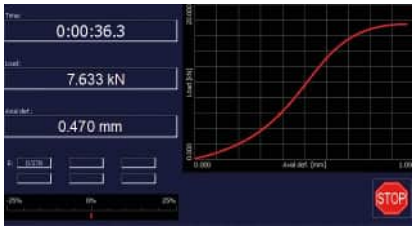
S301-02
AVANT-GARDE
TRIAXIAL LOAD FRAME 50 KN
EXPANDED VARIABLE SPEED RANGE

Matest Avant-garde is the new high-performance load frame specifically designed for advanced laboratories.
The expected variable speed range of this electro-mechanical machine **up to 100 mm/min** makes it suitable to perform Unconfined, CBR and Marshall tests other than standard triaxial tests.
This heavy-duty load frame has provision for automatic load and displacement/deformation control, thanks to the latest generation control board incorporated into the machine. Distinguished by its **elegant shape with rounded corners**, Avant-garde counts with a **touch-orientable display**, front mounted, which allows an easy and innovative control of the main functions and data acquisition, including detailed charts.

S301-02

MAIN FEATURES

- Maximum testing speed: 100 mm/min
- Maximum specimen diameter: 150 mm
- Maximum compression capacity: 50kN
- Suitable to perform Unconfined, CBR, Marshall and Standard Triaxial tests.
- 10 profiles, with a potential of 80 storable calibrations, for an immediate use of multiple sensors.
- Real time display of time, load, deformation, displacement and graph simultaneously.
- Responsive and precise control board.



Load vs time graph during triaxial testing

TECHNICAL SPECIFICATIONS

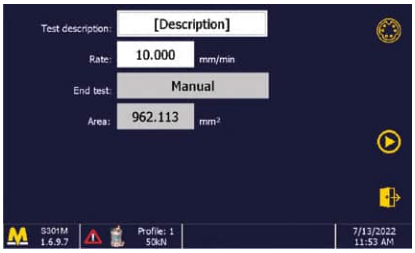
HARDWARE

- Maximum Sample Diameter: 150 mm
- Minimum testing speed: 0.00001 mm/min
- **Maximum testing speed: 100 mm/min**
- Maximum compression force: 50 kN
- Minimum vertical clearance: 315 mm
- Maximum vertical clearance: 1112 mm
- Horizontal clearance: 380 mm
- Platen diameter: 156 mm
- Platen travel: 100 mm

Dimensions: (h x w x d) 1690x510x530 mm approx.
Power supply: 230V 1ph 50/60Hz 1500W
Weight: 130 kg approx.

FIRMWARE

- Display LCD, TFT, 800x480 pixels, 7 inches, graphic touchscreen
- 8 analog channels (24 bit) suitable for connection of load, displacement, deformation, LVDT, temperature (PT100, PT1000, NTC) transducers and strain gauges (by using an external adapter).
- Ethernet, RS232, RS485, 2 x USB Host-port.
- Slot for Micro SD



Triaxial test general settings

TRIAXIAL CELLS

Triaxial cells are provided in two different dimensions, mod. S305 and S306N. 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 (see pages 502-503).

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 **S306N**

Models	S305	S306N	S306N + S306-10
Max. specimen size mm	Ø 70x140	Ø 100x200	Ø 150x300
Max. cell pressure	1700 kPa	1700 kPa	1700 kPa
Overal dimensions mm	Ø 280x480	Ø 350x595	Ø 350x635
Weight kg	8	18	19

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

Note: Cell S306N can be also used for specimens having diameter 100x200, 70x140, 50x100 and 38x76 mm with accessories of suitable diameter.

Accessories for Triaxial Cells:	Ø 38x76 mm	Ø 50x100 mm	Ø 70x140 mm	Ø 100x200 mm	Ø 150x300 mm
Rubber membrane (pack of 10)	**S310**	**S310-01**	**S310-02**	**S310-03**	**S310-04**
"O" ring (pack of 10)	**S311**	**S311-01**	**S311-02**	**S311-03**	**S311-04**
Membrane stretcher	**S312**	**S312-01**	**S312-02**	**S312-03**	**S312-05**
Split former	**S313**	**S313-01**	**S313-02**	**S313-03**	**S313-04**
Split mould	**S313-10**	**S313-11**	**S313-12**	**S313-13**	**S313-14**
Top cap with drainage	**S314**	**S314-01**	**S314-02**	**S314-03**	**B270-11**
Base adapter for cell. mod. S305	**S315**	**S315-01**	**S315-02**	**–**	**–**
Base adapter for cell. mod. S306N	**S315-04**	**S315-05**	**S315-06**	**S315-07**	**B270-10**
Porous disc (2 pcs)	**S316**	**S316-01**	**S316-02**	**S316-03**	**S316-04**
Perspex plain disc (2 pcs)	**S317**	**S317-01**	**S317-02**	**S317-03**	**S317-04**
"O" ring tool	**S318**	**S318-01**	**S318-02**	**S318-03**	**S318-04**
Filter paper for lateral drainage (50 pcs)	**S319**	**S319-01**	**S319-02**	**S319-03**	**S319-04**
Filter paper for base (100 pcs)	**S320**	**S320-01**	**S320-02**	**S320-03**	**S320-04**
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 Ø 6x4 (25 m)	**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**	

Note: Mod. S307 triaxial cell max. 150x300 mm for cyclic tests is described at p. 525

ACCESSORIES

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.

SPLIT MOULD, to trim the ends of undisturbed 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, aluminium used to adapt the triaxial cell to the specimen diameter.

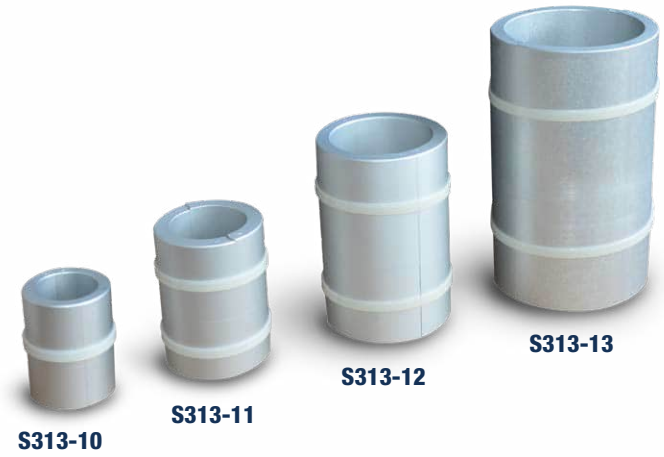
POROUS DISCS, to allow the drainage in or out of the specimen in the whole cross sectional area, toward the top cap and the lower base. Two pieces are required.

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 ø and 50 ml for specimens up to 100 mm ø It is supplied with cell rod and cell couplings.

"O" RING TOOL, 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.

S321...S331

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)**

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 p. 530

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. S301M or S301-02 (see p. 498-499). 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	Capacity
S337-31	2.5 kN
S337-35	5 kN
S337-32	10 kN
S337-33	25 kN
S337-34	50 kN

S337-34

S337-32

S370-03S **S371-07S**

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. S301M or S301-02 (see p. 498).
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.
Rated output: 2 mV/V nominal
Accuracy: 0.1%
Non-linearity: 0.05%

Models	Capacity
S337-02	3 kN
S337-03	5 kN
S337-04	10 kN
S337-05	25 kN

ACCESSORIES

S337-21 LOADING RAM: Loading ram for submersible cells (S305)
S337-22 LOADING RAM: Loading ram for submersible cells (S306N)
S337-51 CALIBRATION PROCESS of the load cell.
Calibration certificate provided.

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)

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

S383 Dial gauge, 25.4x0.001 mm with RS 232 port for PC connection.

Note: For other requirements, dial and digital gauges with different maximum travel and sensibility are also available: see technical details at p. 531.

DISPLACEMENT TRANSDUCERS (automatic readings)

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

TYPES OF AVAILABLE TRANSDUCERS:

TYPE "A": Accurate and versatile linear potentiometric displacement transducer,.
Indipendent linearity < 0.3% (0.3x10 mm)
Max. displacement speed: up to 10 m/s.

MODELS

S336-11 10 mm travel, indipendent linearity 0.3%
S336-12 25 mm travel, indipendent linearity 0.2%
S336-14 50 mm travel, indipendent linearity 0.1%
S336-13 100 mm travel, indipendent linearity 0.1%

TYPE "B": Linear Strain Gauge Transducer. It guarantees good repeatability and noise reduction.
Full bridge at 350 Ohm
Indipendent linearity < 0.1%
Standard sensitivity: 2 mV/V

MODELS

S336-18 5 mm travel
S336-15 10 mm travel
S336-16 25 mm travel
S336-17 50 mm travel

Note: The displacement transducers must be connected to the automatic data acquisition system mod. S334N (see p. 509) or mod. S301-02 and S301M (see p. 498-499)

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 10 m 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 Ø 8 mm to 20 mm).

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. S306N

GAUGE BLOCKS. Grade 1
Used to calibrate the linear displacement transducers.

MODELS

S336-41 Nominal length 5 mm
S336-43 Nominal length 10 mm
S336-45 Nominal length 25 mm
S336-47 Nominal length 50 mm

PRESSURE SYSTEMS

Three different solutions are available:
- **Pressurematic PVC electromechanical**
- **Air/water interface system with air pressure regulator (to be connected to a pneumatic compressor)**
- **Oil/water motorized constant pressure system**

PRESSUREMATIC PVC

Pressurematic is the new solution for geotechnical laboratories demanding automatic pressure and volume control. By using a servo stepper motor directly controlled by the Cyber-Plus Progress, Pressurematic allows to build confining pressure and back pressure up to 3500 kPa with a resolution of 0,1 kPa and to measure change in volume up to 250 cc with resolution of 0,0003 cc.
Typical configuration to perform triaxial test requires 2 Pressurematic and 1 Cyber-Plus Progress (to be ordered separately).

S349A-01

TECHNICAL SPECIFICATIONS

- Output pressure: 3500 kPa
- Volume capacity: 250 cc
- Pressure accuracy: 0.25% of full scale
- Pressure resolution: 0.001 kPa
- Volume resolution: 0.0003 cc
- Closed loop control of pressure regulated to 0.1 kPa
- Closed loop control of volume regulated to 0.0003 cc
- Maximum operational speed: 8 cc/s

Power supply: 110-230V 1ph 50-60Hz
Dimensions: 900x110x230 mm
Weight: 7 Kg approx.

Two available versions:

S349A-KIT Double pressure and volume controller up to 2000 kPa. Composed of:
2xS349A-01 Single Pressurematic up to 2000 kPa (pressure and volume controller up to 2000 kPa).
C109M Cyber-Plus Progress control unit
Or
S349A2-KIT Double pressure and volume controller up to 3500 kPa. Composed of:
2xS349A-02 Single Pressurematic up to 3500 kPa
C109M Cyber-Plus Progress control unit

A144
OIL/WATER CONSTANT PRESSURE SYSTEM

A144

Note: more info at p. 73

S350N
AIR/WATER BLADDER 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. S351N or mod. V207.
The cell set is equipped with an inlet high pressure air valve and 2 outlet valves for pressurized water and water.

Dimensions: 270x300x425 mm
Weight: 9 kg approx.

ACCESSORIES

S350-05N PRESSURE REGULATOR, high accuracy model, to preset and control the work pressure, complete with two outlet air valves.

S355-01 FILTER UNIT (water trap) composed by filtering device and interchangeable cartridge, used to collect moisture.

SPARE

S350-04 Membrane for air/water cell. Pack of 2 pieces.

S355-01 S350-05N S350-04

S350N

LABORATORY COMPRESSOR

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 approx.

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 750 kPa

Power supply:
230V 1ph 50Hz
Weight: 40 kg approx.

V207

PRESSURE PANELS

S342-01
2 WAYS PRESSURE PANEL

This pressure panel is designed to distribute the water pressure used in soil laboratory applications, such as automatic triaxial systems. The panel is constituted by two pressure lines fitted with high accurate regulators and pressure valves.

Dimensions: 416x430x181 mm
Weight: 10 Kg approx.

S342-01

S342-02
3 WAYS PRESSURE PANEL

Identical to the S342-01 but fitted with three pressure lines.

Dimensions: 460x430x181 mm
Weight: 13 Kg approx.

S342-02

ACCESSORY

S342-06 DIGITAL GAUGE to be fitted on S342-01 and S342-02. Resolution: 1 kPa

SPARES

S342-04 Pressure air regulator, 10 bar
S325 Nylon tube Ø 4x6 mm, 25 m long

S342-03
3 WAYS PRESSURE PANEL

Pressure panel with three pressure lines without regulators.

S342-03

S340
DIAL GAUGE UNIT 4 VALVES

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

Dimensions:
410x350x110 mm
Weight:
6 kg approx.

S340

DISTRIBUTION VALVE

S348
FIVE-WAY DISTRIBUTION UNIT

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

Dimensions: 200x200x55 mm
Weight: 3 kg approx.

S350-01
TWO-WAY DISTRIBUTION UNIT

S348

S350-01

MEASUREMENT OF PRESSURE

Two options are available:
- Pressure transducers for digital triaxial configuration
- Digital dial gauge for manual triaxial configuration

PRESSURE TRANSDUCERS

Pressure transducers are used for measuring pore pressure, cell pressure and back pressure in a triaxial system. For each pressure transducer a de-airing block S336-55 is required. Every transducer must be connected to the automatic data acquisition system mod. S334N (see p. 509), or mod. S301M/S301-02 (see p. 498-499).

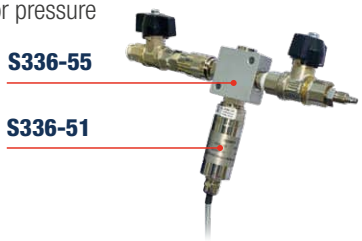
- Input voltage: 10 volts dc, Sensitivity range: 2 - 4 mV/V
- Accuracy: 0.15 fs
- Pressure connection: 0.25 BSP
- Protected against corrosive pore water pressure
- 2 metres cable and 5 pin plug included

MODELS

S336-50 Pressure transducer up to 1000 kPa
S336-51 Pressure transducer up to 2000 kPa
S336-52 Pressure transducer up to 3500 kPa

NEEDED ACCESSORY

S336-55 De-airing block for pressure transducer



ACCESSORIES

S336-30 Extension cable for transducer, 2 m long
S336-31 Extension cable for transducer, 5 m long
S336-32 Extension cable for transducer, 10 m long

Note: it is recommended to limit extension cable to 10 meters to prevent noise interference.

DIAL GAUGE

Digital dial gauge is used for pore pressure measurement in manual triaxial systems.

S342-06 Digital gauge 2000 kPa

NEEDED ACCESSORY

S336-55 De-airing block for pressure transducer

DE-AIRING SYSTEMS

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 approx.

V205-KIT
Consist of:

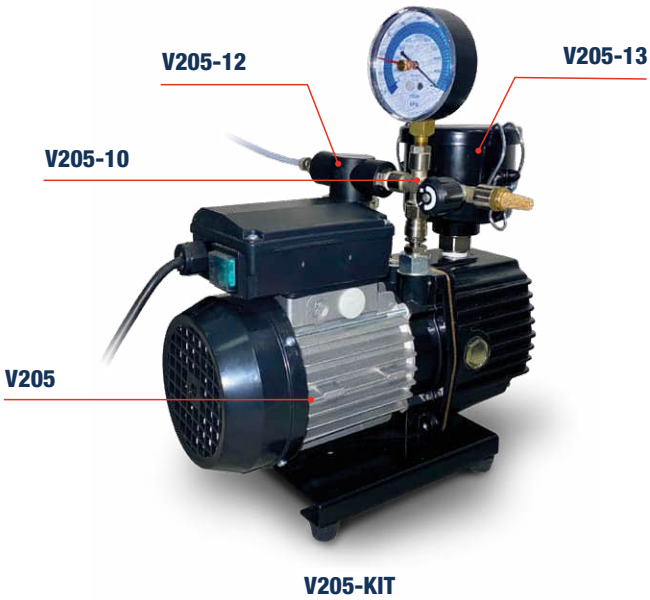
V205 VACUUM PUMP to produce vacuum up to of 0.1 mbar (for details see p. 553)

V205-10 VACUUM REGULATOR supplied with vacuum gauge, control valve.

V205-12 Suction filter and moisture trap.
V230-03 Rubber tube. Suitable for vacuum, 3 m
V205-13 De-oiling filter for vacuum pump

SPARE

V205-11 Special oil for vacuum pumps. Bottle of 500 cc.



MEASURE OF VOLUME CHANGE

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

- **Double burette apparatus.**
- **Standard or automatic volume gauge with displacement transducer or dial gauge.**
- **PVC for automatic measurement (see page 504)**

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 approx.

S358

S338-01-KIT
AUTOMATIC VOLUME GAUGE

A change valve box provides unlimited capacity.
Capacity: unlimited
Accuracy: better than 0.1 ml

Dimensions: 360x270x210 mm
Weight: 7.6 kg approx.

S338-01-KIT consists of:

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 displacement transducer, or dial gauge.
Capacity: 110 ml
Accuracy: better than 0.1 ml.
Easy de-airing of bottom and top chambers.
No measuring device and mounting block are included (see accessories).

Dimensions: 180x180x240 mm
Weight: 4.7 kg approx.

S338N

S338-02N
CONTROL PANEL AUTOMATIC VOLUME CHANGE

For controlling the volume change.

Note:
The volume gauge has to be used with linear displacement transducer which must be connected to the automatic data acquisition system mod. S334N (see p. 509) or mod. S301-05 (see p. 498).

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 p. 503

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

S338-05 Mounting device of the universal coupling pliers mod. S335-15 to fix the displacement transducer/dial gauge to the volume gauge.

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 a lever 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 approx.

ACCESSORIES

S273-KIT Set of slotted weights 50 kg

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:

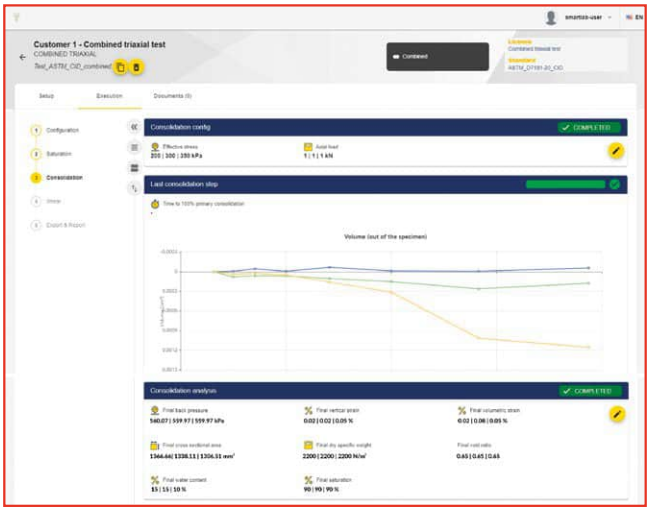
S336-12 Displacement transducer 25 mm travel
S336-14 Displacement transducer 50 mm travel

S359 with accessories

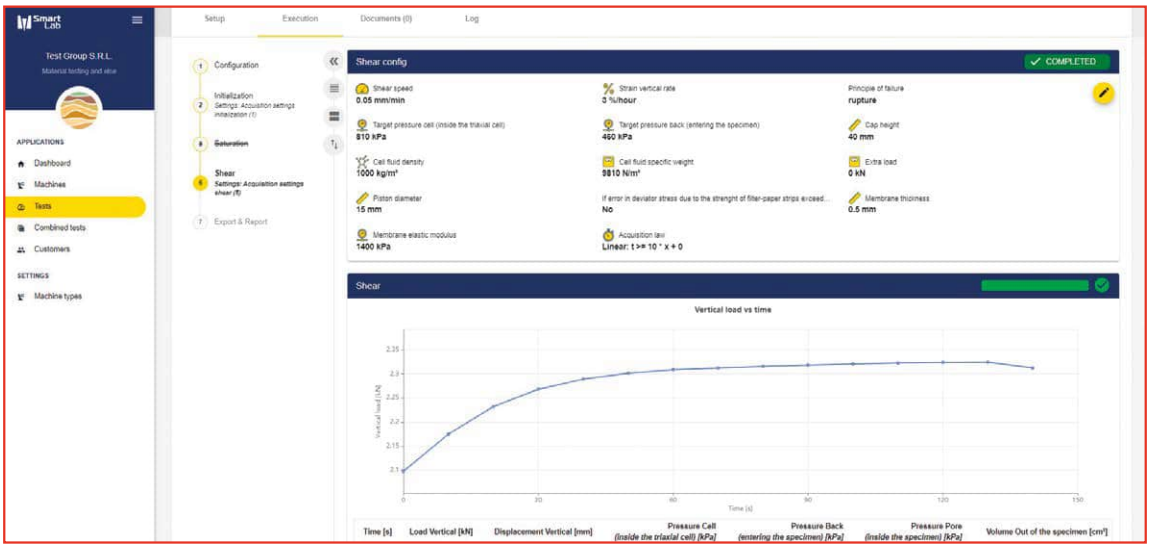
SMARTLAB SOFTWARE
FOR TRIAXIAL TESTING SYSTEM

NEW

SmartLab allows to configure the acquisition parameters necessary to conduct the test. In addition, it performs all of the 3 steps of a triaxial test (saturation, consolidation and shear), calculating the correct shear speed based on consolidation curve elaboration. During the test, SmartLab records data for each calculation step and, at the end, the software saves test data and test parameters. Test reports can perform calculations for all triaxial tests (CU, UU, CD, CAU and CAD). To comply with the current regulations, it is necessary to conduct tests on three samples, having the same origin but subjected to different conditioning. Using SmartLab, the results of these tests can be processed automatically and combined using the "combined test" function.
A complete and customizable report can be obtained in accordance with ASTM D2850, D4767, D7181; EN ISO 17892-8, 17892-9; NF P94-070 without time-consuming manual calculations.



Combined triaxial test



Shear phase during a triaxial test

SSW-LINK
FIRMWARE UPGRADE

In order to use the SmartLab software, it is necessary to purchase the firmware license which unlocks up to 3 different types of machines (e.g. 1 Tensile Machine, 1 Shear Machine, 1 Compression machine). Additional information at pages 18...20

PC specifications on which SmartLab acts as a server: CPU Intel Core i5 or AMD Ryzen 5, 16GB RAM memory, 100GB mass memory dedicated to SmartLab, Windows 11 or 10 64-bit. On request, it is possible to order the PC that fulfills all requirements (SPC).

ACCESSORIES

SPC	SmartLab PC
S334-11	Network connection RJ45 cable
S334-12	Switch for Cyber-Plus Progress
SSW-GWAY	SmartLab Gateway communication protocol

S334N
DATATRONIC 8 CHANNELS CYBER-PLUS PROGRESS
EXPANDABLE TO 16 CHANNELS FOR MATEST EQUIPMENT OR FOR OTHER MANUFACTURERS MACHINE

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. S334-01N), 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.
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.

S334N

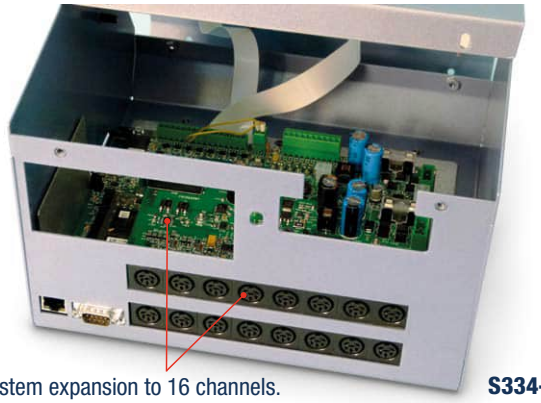
ACCESSORIES

S334-01N 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. S334N) to the Ethernet network. Complete with LAN cable.
SSW-LINK FIRMWARE UPGRADE to enable SmartLab. See p. 20

S334-12
S334-11

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:
  ± 40 mV ... ± 3 V
- User interface:
  Full-color display 800×480 pixels – 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.

Power supply: 230V 1ph 50Hz
Dimensions: 260x270x160 mm
Weight: 5 kg approx.


System expansion to 16 channels.
S334-01N

RECOMMENDED TYPICAL CONFIGURATION OF THE TRIAXIAL SYSTEM WITH ONE CELL IN ANALOGUE, DIGITAL AND DIGITAL WITH SUBMERSIBLE LOAD CELL VERSIONS

APPARATUS SECTION	ITEM CODE	ITEM DESCRIPTION	ALTERNATIVE ITEM	ANALOGUE CELL SET	DIGITAL CELL SET	DIGITAL SEMI-AUTOMATIC CELL SET
Hardware	**S301M**	Digital triaxial load frame 50 kN	S301-02	1	1	1
Software	**S301-05**	Acquisition and data processing	-	-	1	1
	SSW-LINK	Firmware upgrade for SmartLab	-	-	1	1
	S334-11	Network connection RJ45 cable	-	-	1	3
	S334-12	Switch for Cyber-Plus Progress	-	-	-	1
	SPC	PC for SmartLab Software	-	-	1(opt)	1(opt)
Measure of	**S370-05S**	Load proving ring 10 kN	S370/1...	1	-	-
axial force	**S374**	Stem mechanical brake device	-	1(opt)	-	-
	S337-32	Electric load cell 10 kN capacity	S377...	-	1	1
	S337-51	Calibration process for load cell	-	-	1	1
Measure of	**S377**	Dial gauge 25 mm	S379	1	-	-
axial strain	**S336-12**	Displacement transducer 25 mm	S336-16	-	1	1
	S305-05	Mounting device for pliers	-	1	1	1
	S335-15	Universal coupling pliers	-	1	1	1
	S337-51	Calibration process for displacement transducer	-	-	1	1
	S336-45	Gauge block 25 mm	S336-41...	-	1(opt)	1(opt)
De-aired	**S355**	De-airing tank	-	1	1	1
water system	**S350-01**	2-ways distribution valve	-	1	1	1
	V205-KIT	Vacuum pump kit	-	1	1	1
Pore pressure	**S350N**	Air/water interface pressure system	-	2	2	-
system and	**S349A-KIT**	Pressurematic PVC	-	-	-	1
measure	**S350-04**	Membrane for air/water cell (spare)	-	1(opt)	1(opt)	-
	S342-03	3-ways distribution panel	-	-	-	1
	V207	Laboratory air compressor 10 bar	S351N	1	1	-
	S355-01	Filter unit	-	1	1	-
	S342-01+ S342-06	2-ways pressure panel + digital gauge	S340 + S350- 05N* For quantifies see below	1	1	-
	S350-01	2-ways distribution valve	-	2	2	1
	S336-51	Pressure transducer 2000 kPa (cell pressure + pore + back pressure)	S336-50	-	3	3
	S336-55	De-airing block	-	1	3	3
	S342-06	Digital gauge	-	1	-	-
	S337-51	Calibration process for displacement transducer	-	-	3	3
Measure of	**S338-01 KIT**	Automatic volume gauge	-	1	1	-
volume change	**S338-05**	Mounting device for pliers	-	1	1	-
	S335-15	Universal coupling pliers	-	1	1	-
	S377	Dial gauge 25 mm	-	1	-	-
	S336-12	Diplacement transducer 25 mm	-	-	1	-
	S337-51	Calibration process for displacement transducer	-	-	1	-

*Quantities needed: **2x**S350-05N + **2x**S340 for Analogue cell or Digital cell or Digital cell with submersible load cell.

Specimen preparation and accessories (available with Ø 38, 50, 70, 100, 150 mm, see page 500)	**S305**	Triaxial cell dia max. 70 x 140 mm	S306N + S306-10 (opt)	1	1	1
	S310	Rubber membrane (10 pcs) (accordingly to specimen dimensions)	S310-01…04	1+	1+	1+
	S311	"O" ring (10 pcs) (accordingly to specimen dimensions)	S311-01…04	1+	1+	1+
	S312	Membrane stretcher (accordingly to specimen dimensions)	S312-01…04	1+	1+	1+
	S313	Split former (accordingly to specimen dimensions)	S313-01…04	1+	1+	1+
	S313-10	Split mould (accordingly to specimen dimensions)	S313-11…14	1+	1+	1+
	S314	Top cap with drainage (accordingly to specimen dimensions)	S314-01…B270-11	1+	1+	1+
	S315 (only if S305 is chosen)	Base adapter for cell (accordingly to cell model and specimen dimensions)	S315-01/02	1+	1+	1+
	S315-04 (only if S306N is chosen)	Base adapter for cell (accordingly to cell model and specimen dimensions)	S315-05…B270-10	1+	1+	1+
	S316	Porous disc (2 pcs) for CD/CU/UU tests (accordingly to specimen dimensions)	S316-01…04	1+	1+	1+
	S317	Plain disc (2 pcs) for UU test only (accordingly to specimen dimensions)	S317-01…04	1+	1+	1+
	S318	"O" ring tool (accordingly to specimen dimensions)	S318-01…04	1+	1+	1+
	S319	Filter paper for lateral drainage (50 pcs) (accordingly to specimen dimensions)	S319-01…04	1+	1+	1+
	S320	Filter paper for lateral drainage (100 pcs) (accordingly to specimen dimensions)	S320-01…04	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(opt)	1(opt)	1(opt)
	S325	Nylon tube Ø 6x4 (25 m)	-	3	3	3
	S326	Terminal for connection tube (10 pcs)	-	1	1	1
	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
	S332-02	Wearable material recommended spares	-	1	1	1

In order to use a submersible load cell with the digital and digital semi-automatic configurations, it is necessary to order the following items, as alternative to S337-32:

1x **S337-04**

1x **S337-21** (for S305 triaxial cell)

As alternative:

1x **S337-22** (for S306N triaxial cell) see p. 515

In order to perform the permeability test, it is necessary to add to the chosen configuration the following items:

1x **S349A-01**

1x **S336-51**

1x **S337-51**

1x **S336-55**

QUICK TRIAXIAL: SUGGESTED TYPICAL CONFIGURATION

APPARATUS SECTION	ITEM CODE	ITEM DESCRIPTION	ALTERNATIVE ITEM	ANALOGUE CELL SET	SEMI-AUTOMATIC SET
Frame	**S301M**	Digital triaxial load frame 50 kN	S205M, S301-02, S212M	1	1
	S301-05	Acquisition and data processing (only S301M or S301-02)	-	-	1
	S218-02N	Software for quick triaxial test (only S212M or S205M)	-	1	1
	S205-11	Loading piston with ball (only S212M or S205M)	-	1	1
	SSW-LINK	Firmware upgrade for SmartLab (on request for S205M and S212M)	-	-	1
	SPC	PC for SmartLab software (on request for S205M and S212M)	-	-	1 (opt)
Measure of axial force	**S337-32**	Strain gauge load cell 10 kN capacity	S337-33…34	-	1
	S337-51	Calibration process for load cell	-	-	1
	S370-05S	Load proving ring	S370/1-xxS	1	-
	S374	Stem mechanical brake device	-	1	-
Measure of axial strain	**S305-05**	Mounting device of the universal coupling pliers	-	1	1
	S335-15	Universal coupling pliers to hold the transducer/dial gauge	-	1	1
	S336-12	Displacement transducer 25 mm travel	-	-	1
	S337-51	Calibration process for load cell	-	-	1
	S377	Dial gauge 25 mm	-	1	-
De-aired water system (optional)	**S355**	De-airing tank	-	1	1
	S350-01	2-ways distribution valve for air or water	-	1	1
	V205-KIT	Vacuum pump	-	1	1
Measure of pressure and volume change	**S350N**	Air/water interface pressure system	-	1	1
	V207	Laboratory air compressor 10 bar	S351N	1	1
	S355-01	Water trap to collect the water condensation	-	1	1
	S350-05N	Pressure regulator	-	1	1
	S340	Dial gauge unit 4 valves	-	1	1
	S350-01	2-ways distribution valve for air or water	-	1	1
	S336-51	Pressure transducer 2000 kPa (cell pressure + pore + back pressure)	-	-	1
	S336-55	De-airing block	-	-	1
	S337-51	Calibration process for load cell	-	-	1
Triaxial cell and accessories	**S305**	Triaxial cell Ø 70x140 mm	S306N	1	1
	S310	Rubber membrane Ø 38x76 mm (10 pcs)	S310-01 Ø 50x100 mm S310-02 Ø 70x140 mm	1	1
	S311	"O" ring Ø 38x76 mm (10 pcs)	S311-01 Ø 50x100 mm S311-02 Ø 70x140 mm	1	1
	S313	Split former Ø 38x76 mm	S313-01 Ø 50x100 mm S313-02 Ø 70x140 mm	1	1

	S313-10	Split mould Ø 38x76 mm	S313-11 Ø 50x100 mm S313-12 Ø 70x140 mm	1	1
	S314	Top cap with drainage Ø 38x76 mm	S314-01 Ø 50x100 mm S314-02 Ø 70x140 mm	1	1
	S315	Base adapter for cell Ø 38x76 mm	S315-01 Ø 50x100 mm S315-02 Ø 70x140 mm	1	1
	S317	Perspex plain disc Ø 38x76 mm (2 pcs)	S317-01 Ø 50x100 mm S317-02 Ø 70x140 mm	1	1
	S318	"O" ring tool Ø 38x76 mm	S318-01 Ø 50x100 mm S318-02 Ø 70x140 mm	1	1
	S122-13	Stainless core cufter Ø 38x76 mm	S122-14 Ø 50x100 mm S122-15 Ø 70x140 mm	1	1
	S123-13	Dolly for extraction Ø 38x76 mm	S123-14 Ø 50x100 mm S123-15 Ø 70x140 mm	1	1
Specimen preparation	**S310**	Rubber membrane (10 pcs) (accordingly to specimen dimensions)	S310-01…04	1+	1+
	S311	"O" ring (10 pcs) (accordingly to specimen dimensions)	S311-01…04	1+	1+
	S312	Membrane stretcher (accordingly to specimen dimensions)	S312-01…04	1+	1+
	S313	Split former (accordingly to specimen dimensions)	S313-01…04	1+	1+
	S313-10	Split mould (accordingly to specimen dimensions)	S313-11…14	1+	1+
	S314	Top cap with drainage (accordingly to specimen dimensions)	S314-01…B270-11	1+	1+
	S315 (only if S305 is chosen)	Base adapter for cell (accordingly to cell model and specimen dimensions)	S315-01/02	1+	1+
	S315-04 (only if S306N is chosen)	Base adapter for cell (accordingly to cell model and specimen dimensions)	S315-05…B270-10	1+	1+
	S317	Plain disc (2 pcs) for UU test only (accordingly to specimen dimensions)	S317-01…04	1+	1+
	S318	"O" ring tool (accordingly to specimen dimensions)	S318-01…04	1+	1+
	S122-13	Stainless core cutter (accordingly to specimen dimensions)	S122-14…16	1+	1+
	S123-13	Dolly for extraction (accordingly to specimen dimensions)	S123-14…16	1+	1+
	S325	Nylon tube Ø 6x4 (25 m)	-	3	3
	S326	Terminal for connection tube (10 pcs)	-	1	1
	S327	Flaring tool	-	1	1
	S328	Vaseline oil (1 kg)	-	1	1
	S329	Silicon grease (1 kg)	-	1	1
	S330	Grease pump	-	1	1
	S332-02	Wearable material recommended spares	-	1	1

RECOMMENDED TYPICAL CONFIGURATION OF THE TRIAXIAL SYSTEM WITH THREE CELLS IN ANALOGUE, DIGITAL AND DIGITAL SEMI-AUTOMATIC VERSIONS

APPARATUS SECTION	ITEM CODE	ITEM DESCRIPTION	ALTERNATIVE ITEM	3 ANALOGUE CELL SET	3 DIGITAL CELL SET	3 DIGITAL SEMI-AUTOMATIC
Hardware Software	**S301M**	Digital triaxial load frame 50 kN	S301-02	1	1	1
	S301-05	Acquisition and data processing	-	-	1	1
	SSW-LINK	Firmware upgrade for SmartLab	-	-	1	1
	S334-11	Network connection RJ45 cable	-	-	3	5
	S334-12	Switch to connection from 2 to 7 Cyber-Plus units to the Ethernet network	-	-	1	1
	SPC	PC for SmartLab Software	-	-	1 (opt)	1 (opt)
	S334N	Cyber-Plus Progress touch-screen	-	-	1	-
	S334-01N	8-channel internal module, for system expansion to 16 channels	-	-	1	-
	S359	3 cell consolidation frames	-	1	1	1 (opt)
	S273 KIT	Set of slotted weights 50 kg	-	1	1	1 (opt)
	S336-12	Displacement transducer 25 mm	-	-	3	3 (opt)
	S337-51	Calibration process for displacement transducer	-	-	3	3 (opt)
	S336-31	Extension cable 5 m	S336-30…	-	3 (opt)	3 (opt)
	S377	Dial gauge 25 mm	-	3	-	-
Measure of axial force	**S370-05S**	Load proving ring 10 kN	S370/1-xxS	1	-	-
	S374	Stem mechanical brake device	-	1	-	-
	S337-32	Electric load cell 10 kN capacity	S337-31...35	-	1	1
	S337-51	Calibration process for load cell	-	-	1	1
Measure of axial strain	**S377**	Dial gauge 25 mm	-	1	-	-
	S336-12	Displacement transducer 25 mm	-	-	1	1
	S305-05	Mounting device for pliers	-	1	1	1
	S335-15	Universal coupling pliers	-	1	1	1
	S337-51	Calibration process for displacement transducer	-	-	1	1
De-aired water system	**S355**	De-airing tank	-	1	1	1
	S350-01	2-way distribution valve	-	1	1	1
	V205-KIT	Vacuum pump kit	-	1	1	1
Pore pressure system and measure	**S350N**	Air/water interface pressure system	-	6	6	-
	S349A-KIT	Pressurematic PVC	-	-	-	3
	S342-03	3-ways distribution panel	-	-	-	1
	S350-04	Membrane for air/water cell (spare)	-	3 (opt)	3 (opt)	-
	V207	Laboratory air compressor 10 bar	S351N	2	2	-
	S355-01	Filter unit	-	2	2	-
	S342-02+ S342-06	3-ways pressure panel + digital gauge	-	2	2	-
	S350-01	2-ways distribution valve	-	3	3	4
	S336-51	Pressure transducer 2000 kPa (cell pressure + pore + back pressure)	-	-	9	9
	S337-51	Calibration process for load cell	-	-	9	9
	S342-06	Digital gauge for pore pressure	-	3	-	-
	S336-55	De-airing block	-	3	9	9
	S336-31	Extension cable 5 m	S336-30/32	-	9 (opt)	9 (opt)

Measure of Volume change	**S338-01-KIT**	Automatic volume gauge	-	3	3	-
	S338-05	Mounting device for pliers	-	3	3	-
	S335-15	Universal coupling pliers	-	3	3	-
	S377	Dial gauge 25 mm	-	3	-	-
	S336-12	Diplacement transducer 25 mm	-	-	3	-
	S337-51	Calibration process for displacement transducer	-	-	3	-
	S336-31	Extension cable 5 m	S336-30/32	-	3 (opt)	-
Triaxial cell and accessories (available with Ø 38, 50, 70, 100, 150 mm, see page 500)	**S305**	Triaxial cell Ø max. 70x140 mm	S306N/S306N+S306-10	3	3	3
	S310	Rubber membrane (10 pcs) (accordingly to specimen dimensions)	S310-01…04	3	3	3
	S311	"O" ring (10 pcs) (accordingly to specimen dimensions)	S311-01…04	3	3	3
	S312	Membrane stretcher (accordingly to specimen dimensions)	S312-01…04	3	3	3
	S313	Split former (accordingly to specimen dimensions)	S313-01…04	3	3	3
	S313-10	Split mould (accordingly to specimen dimensions)	S313-11…14	3	3	3
	S314	Top cap with drainage (accordingly to specimen dimensions)	S314-01…B270-11	3	3	3
	S315 (only if S305 is chosen)	Base adapter for cell (accordingly to cell model and specimen dimensions)	S315-01/02	3	3	3
	S315-04 (only if S306N is chosen)	Base adapter for cell (accordingly to cell model and specimen dimensions)	S315-05…B270-10	3	3	3
	S316	Porous disc (2 pcs) for CD/CU/UU tests (accordingly to specimen dimensions)	S316-01…04	3	3	3
	S317	Plain disc (2 pcs) for UU tests only (accordingly to specimen dimensions)	S317-01…04	3	3	3
	S318	"O" ring tool (accordingly to specimen dimensions)	S318-01…04	3	3	3
	S319	Filter paper for lateral drainage (50 pcs) (accordingly to specimen dimensions)	S319-01…04	3	3	3
	S320	Filter paper for lateral drainage (100 pcs) (accordingly to specimen dimensions)	S320-01…04	3	3	3
	S122-13	Stainless core cutter (accordingly to specimen dimensions)	S122-14…16	3	3	3
	S123-13	Dolly for extraction (accordingly to specimen dimensions)	S123-14…16	3	3	3
Specimen preparation	**S325**	Nylon tube Ø 6x4 mm (25 m)	-	5	5	3
	S326	Terminal for connection tube (10 pcs)	-	3	3	1
	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
	S332-04	Wearable material recommended spares	-	3	3	1

In order to use a submersible load cell with the digital and digital semi-automatic configurations, it is necessary to order the following items, as alternative to S337-32: 1x**S337-04** / 1x**S337-21** (for S305) / 1x**S337-22** (for S306N)

TRIAXLAB AUTOMATED SYSTEM

STANDARDS: BS 1377:8 I ASTM D2850, D4767, D7181 I NF P94-070, P94-074 I UNI EN ISO 17892

TriaxLab Automated System S301-01N

MAIN FEATURES

- Type of tests: total and effective stress. Stress path, K0 and permeability are available on request.
- Servo feedback controlled precision pressure (Pressurematic) generation system.
- Real time graphing and configurable real time transducers.
- Pre-programmed user-friendly "Method files" through the TestLab Software.
- Compact and versatile for improving productivity and cost effectiveness.
- No need of air source.

Matest TRIAXLAB is an outstanding system specifically designed for advanced soil testing.
This system can be used from educational to construction engineering laboratories to reduce to the absolute minimum any form of manual intervention.

Based on the unparalleled performance of CDAS2 and flexibility of TestLab Software, the new MATEST TriaxLab Automated System is the optimized system to perform automatically total and effective triaxial tests such as:

- CD Consolidated Drained test
- CU Consolidated Undrained test
- UU Unconsolidated Undrained test
- Optional Stress path
- Optional K0 tests
- Optional Permeability tests

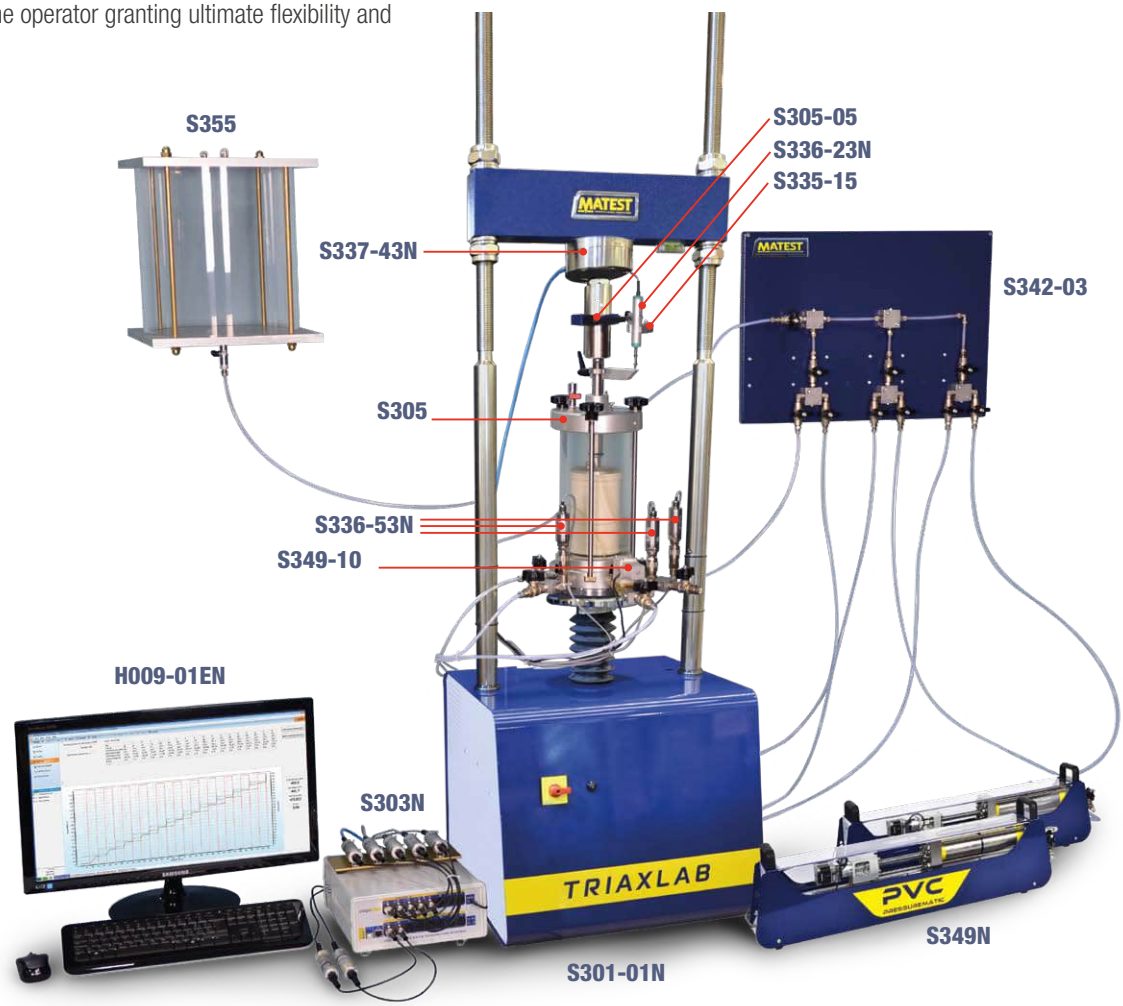
The **TRIAXLAB automated system** basically consists of 3 major groups:

- **Load frame and triaxial cell** with accessories
- **Control system** based on the CDAS2 Control and Data Acquisition System and TestLab Software controlled by PC
- **Data Acquisition System** comprising:
  - 1 load cell for axial force
  - 1 displacement transducer for axial displacement
  - 2 pressure transducers for cell pressure and back pressure
  - 1 pressure transducer for pore pressure
  - 2 Pressurematic for pressure / volume change

To suit the specific customer's requirements the MATEST TriaxLab Automated System basic configuration can be modified by adding or removing the hardware elements which are controlled and monitored under a closed-loop integrated system with the CDAS2 and TestLab Software.
Pre-programmed "Method files" offer the operator the unique opportunity to run a range of tests without the need for specific computer programming. The possibility to customize the Method files is also given to the operator granting ultimate flexibility and versatility.

MAIN FEATURES

- POWERFUL
  Equipped with Pavetest's leading edge Control and Data Acquisition System (CDAS2) and TestLab Software.
- VERSATILE
  Designed for routine tests, central laboratories and for research purposes.
- GREAT EFFICIENCY
  By working in complete automatic mode, it reduces to absolute minimum the manual intervention.
- EASY TO USE
  The system works via the pre-programmed Method Files.
- FLEXIBLE
  Multiple triaxial tests with no need for compressed air supply.



TRIAXLAB AUTOMATED SYSTEM
ORDERING INFO:

HARDWARE - SOFTWARE

S301-01N
DIGITAL TRIAXIAL LOAD FRAME 50 KN

Technical Specifications:
Maximum load capacity: 50 kN
Infinitesimal testing speed:
from 0.00001 to 12 mm/min
Minimum vertical clearance: 400 mm
Maximum vertical clearance: 1100 mm
Horizontal clearance: 380 mm
Platen diameter: 167 mm
Power Supply: 230V 1ph 50/60Hz 600W
Dimension: 495x500x1800 mm approx
Weight: 80 kg

S303N
CDAS2 AND TESTLAB SOFTWARE

Technical Specifications:
Acquisition 16 Channels 20 bit resolution
Sampling rate up to 192 kHz
(all channels)
Smoothing up to 64 times over-sampling
Calibration Automatically on power up
Control Axis 4
Communication USB or Ethernet
Power supply:
90-264 V 50/60 Hz 1 ph 240 W
Dimensions: 100(h) x 310(d) x 250(w) mm

S305
TRIAXIAL CELL MAX. Ø 70X140 MM

Technical Specifications:
Max. specimen size: mm Ø 70x140
Max. cell pressure: 1700 kPa
Overall dimensions: mm Ø 280x480
Weight: 8 kg approx.

S306N
TRIAXIAL CELL MAX. Ø 100X200 MM

Technical Specifications:
Max. specimen size: mm Ø 100x200
Max. cell pressure: 1700 kPa
Overall dimensions: Ø 350x595 mm
Weight: 18 kg approx.

S306N + S306-10
TRIAXIAL CELL MAX. Ø 150X300 MM

Technical Specifications:
Max. specimen size: Ø 150x300 mm
Max. cell pressure: 1700 kPa
Overall dimensions: Ø 350x655 mm
Weight: 19 kg approx.

MEASURE OF AXIAL FORCE

S337-43N
LOAD CELL 25 KN WITH SIGNAL CONDITIONER

Rated output: 2 mV/V nominal
Accuracy: 0.1%

S337-41N
LOAD CELL 50 KN WITH SIGNAL CONDITIONER

Rated output: 2 mV/V nominal
Accuracy: 0.1%

MEASURE OF AXIAL STRAIN

S336-23N
TRANSDUCER TYPE "A" TRAVEL 25 MM WITH SIGNAL CONDITIONER

Independent linearity: <0.2% (0.2 x 25 mm)
Max. displacement speed: up to 10 m/S

Note: For different requirements load cells capacity and transducers stroke or sub-mersible load cells, other capacities available on request.

ACCESSORIES

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

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).

S337-51
Calibration process of one force, strain and pressure device that is combined with the CDAS control and data acquisition system.

KO TEST ACCESSORIES

ON-SAMPLE LVDT FOR RADIAL STRAIN MEASUREMENT (FOR Ø 38 MM SAMPLE)

S305-14 Transducer holder ring for S305 cell
S305-13 Radial belt for Ø 38 mm sample
S336-25N LVDT ± 2.5 mm with signal conditioner

DEAIRED WATER SYSTEM

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 approx.

S355

ACCESSORIES

V205-KIT
Consists of:

V205
VACUUM PUMP
To produce vacuum up to of 0.1 mbar
(see p. 553)

V205-KIT

V205-10 - V205-12
VACUUM REGULATOR It is supplied with vacuum gauge, control valve, suction filter and moisture trap.

V230-03 Rubber tube.
Suitable for vacuum, 3 m
V205-13 De-oiling filter for vacuum pump

MEASURE OF PORE PRESSURE SYSTEM AND VOLUME CHANGE

S349N
PRESSUREMATIC PVC FOR AUTOMATIC PRESSURE AND VOLUME CONTROL

Technical Specifications:
Output pressure: 3500 kPa
Volume capacity: 250 cc. Details at p. 520

NEEDED ACCESSORIES

S336-53N Pressure transducer 2000 kPa with signal conditioner.
S336-55 De-airing block for pressure transducer
S349-10 Solenoid valve
S342-03 3 ways water distribution panel

S303N
CDAS2 – CONTROL AND DATA ACQUSITION SYSTEM

S303N CDAS2 16 Channels

MAIN FEATURES

- Directly communicates with the TestLab software, providing automatic test execution and data processing.
- Compact high reliability data acquisition and control.
- Up to 5 kHz data acquisition and feedback control provides excellent waveform fidelity.
- Normalized (±10V) analog data acquisition inputs provide flexibility to use any transducer in any channel.
- Software and test methods expandable for future requirements.

Pavetest's compact Control and Data Acquisition System (CDAS2) delivers unparalleled performance, real time control and ultimate versatility in acquisition and provide a flexible and user friendly testing solution for soils when coupled with the Matest TriaxLab Automated System and the Cyclic TriaxLab Automated one.

The CDAS2 provides excellent waveform fidelity from integrated acquisition and control functions, with low level sampling at speeds of up to 192,000 samples per second simultaneously on all channels (using up to 64x oversampling).

S303N CDAS2 provides an optimized solution for the TriaxLab Automated Systems. The CDAS2 works with close synchronization to the TestLab software providing dynamic and precise servo control of the TriaxLab frame, Pressurematic systems. Acquisition and control is provided for:

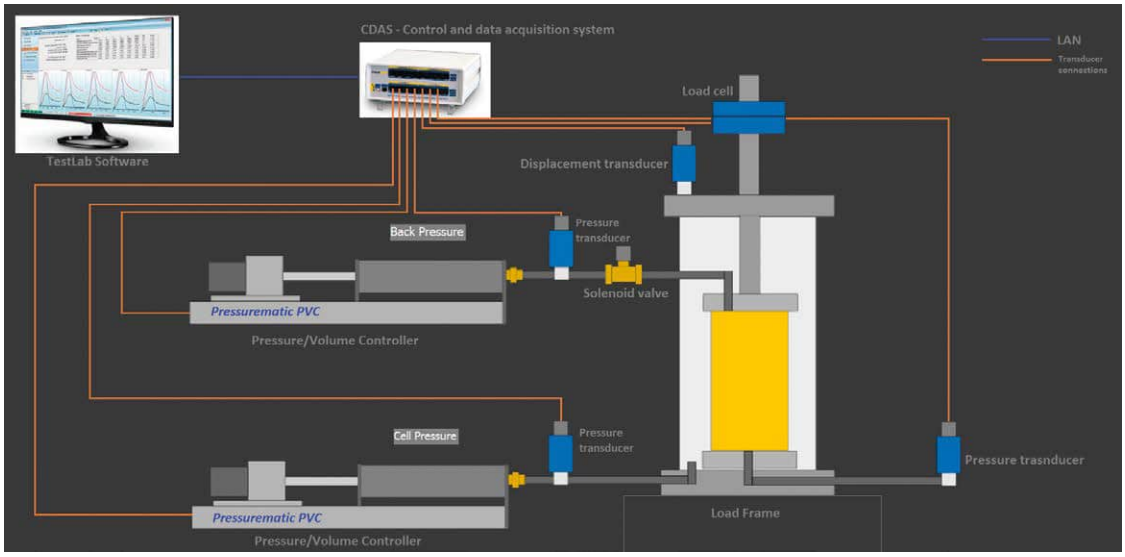
- Vertical load and displacement
- Confining and back pressure (through the solenoid valve)
- Volume change and water pressures
- Local strain

TECHNICAL SPECIFICATIONS

S303N
16 Channel CDAS2
Acquisition 16 CH, 20 bit resolution

- Sampling rate up to 192 kHz (all channels)
- Smoothing up to 64 times over-sampling for low noise performance
- Calibration automatically on power up
- Control Axis 4
- Communication USB or Ethernet

Power supply: 90-264V 50-60Hz 1pPh 240W
Dimensions: 100 (h) x 310 (d) x 250 (w) mm
Weight: 2 kg approx.



TriaxLab conceptual schematic

S349N
PRESSUREMATIC PVC

MAIN FEATURES

- Compact stainless steel construction
- Powered and controlled by the CDAS2 and TestLab Software
- Closed loop control up to 3500 kPa
- 0.001 kPa pressure and 0.0003 cc volume resolution
- High volume capacity: 250 cc
- Graduated scale for approximate volume change indication
- No need of air source

Pressurematic is the new solution for geotechnical laboratories demanding automatic pressure and volume control. By using a servo stepper motor directly controlled by the TestLab software and CDAS2, Pressurematic allows to build confining pressure and back pressure up to 3500 kPa. The unparalleled performance of the CDAS2 allows to regulate the pressure under a closed loop control regulated to 0.1 kPa.
The operation is continuously monitored by the TestLab software, thus catering to all levels of operator experience.

Standard effective stress tests require 2 Pressurematic units: one for cell pressure and the other for back pressure which can be also used to measure the change in volume of the specimen to 0.0003 cc. The latter is provided with a solenoid valve directly installed on the triaxial cell and used to open and close the pressure line whenever it is needed.

S349N

TECHNICAL SPECIFICATIONS

- Output pressure: 3500 kPa
- Volume capacity: 250 cc
- Pressure accuracy: 0.25% of full scale
- Pressure resolution: 0.001 kPa
- Volume resolution: 0.0003 cc
- Closed loop control of pressure regulated to 0.1 kPa
- Closed loop control of volume regulated to 0.0003 cc
- Maximum operational speed: 8 cc/s

Power supply: 24V DC 1A powered from CDAS2
Dimensions: 900x110x230 mm approx
Weight: 7 Kg approx.

NEEDED ACCESSORIES

S336-53N Pressure transducer up to 2000 kPa
S336-55 De-airing block for pressure transducer
S349-10 Solenoid valve
S342-03 3 ways water distribution panel

S342-03

TRIAXLAB AUTOMATED SYSTEM: SUGGESTED TYPICAL CONFIGURATION

APPARATUS SECTION	ITEM CODE	ITEM DESCRIPTION	ALTERNATIVE ITEM	DIGITAL AUTOMATIC	DIGITAL AUTOMATIC with Submersible Load Cell
Hardware Software	**S301-01N**	Triaxial load frame 50 kN for triaxlab automated system	-	1	1
	H009-01EN	PC	-	1 (opt)	1 (opt)
	S303N	16 ch CDAS2 & TestLab Software	-	1	1
	S305	Triaxial cell max Ø 70x140 mm	S306N/S306N+ S306-10	1	1
Measure of axial force	**S337-43N**	Load cell 25 kN with signal conditioner	S337-41N (other capacities are available on request)	1	-
	S337-06N	Submersible load cell 10 kN with signal conditioner	S337-07N (other capacities are available on request)	-	1
	S337-21	Loading ram	S337-22	-	1
	S337-51	Calibration process	-	1	1
Measure of axial strain	**S336-23N**	Transducer type "A" travel 25 mm with signal conditioner	-	1	1
	S337-51	Calibration process	-	1	1
	S335-15	Universal coupling pliers	-	1	1
	S305-05	Mounting device for universal coupling pliers	-	1	1
De-aired water system	**S355**	De-airing tank 20 litres capacity	-	1	1
	S350-01	2 ways distribution valve	-	1	1
	V205 KIT	Vacuum pump	-	1	1
Measure of pressure and volume change	**S349N**	Pressurematic PVC	-	2	2
	S349-10	Solenoid valve	-	1	1
	S342-03	3-ways water distribution panel	-	1	1
	S336-53N	Pressure transducer 2000 kPa	-	3	3
	S336-55	De-airing block for pressure transducer	-	3	3
	S337-51	Calibration process	-	3	3
Specimen preparation and accessories	**S310**	Rubber membrane (10 pcs) (accordingly to specimen dimensions) Ø 38x76 mm	S310-01 Ø 50x100mm S310-02 Ø 70x140mm S310-03 Ø 100x200mm S310-04 Ø 150x300mm	1	1
	S311	"O" ring (10 pcs) (accordingly to specimen dimensions) Ø 38x76 mm	S311-01 Ø 50x100mm S311-02 Ø 70x140mm S311-03 Ø 100x200mm S311-04 Ø 150x300mm	1	1
	S312	Membrane stretcher (accordingly to specimen dimensions) Ø 38x76 mm	S312-01 Ø 50x100mm S312-02 Ø 70x140mm S312-03 Ø 100x200mm S312-05 Ø 150x300mm	1	1
	S313	Split former (accordingly to specimen dimensions) Ø 38x76 mm	S313-01 Ø 50x100mm S313-02 Ø 70x140mm S313-03 Ø 100x200mm S313-04 Ø 150x300mm	1	1

Specimen preparation and accessories	**S313-10**	Split mould (accordingly to specimen dimensions) Ø 38x76 mm	S313-11 Ø 50x100mm S313-12 Ø 70x140mm S313-13 Ø 100x200mm S313-14 Ø 150x300mm	1	1
	S314	Top cap with drainage (accordingly to specimen dimensions) Ø 38x76 mm	S314-01 Ø 50x100mm S314-02 Ø 70x140mm S314-03 Ø 100x200mm B270-11 Ø 150x300mm	1	1
	S315	Base adapter for cell (accordingly to cell model and specimen dimensions) Ø 38x76 mm (only if S305 is chosen)	S315-01 Ø 50x100mm S315-02 Ø 70x140mm	1	1
	S315-04	Base adapter for cell (accordingly to cell model and specimen dimensions) Ø 38x76 mm (only if S306N is chosen)	S315-05 Ø 50x100mm S315-06 Ø 70x140mm S315-07 Ø 100x200mm B270-10 Ø 150x300mm	1	1
	S316	Porous disc (2 pcs) for CD/CU/UU tests (accordingly to specimen dimensions) Ø 38x76 mm	S316-01 Ø 50x100mm S316-02 Ø 70x140mm S316-03 Ø 100x200mm S316-04 Ø 150x300mm	1	1
	S317	Plain disc (2 pcs) for UU test only (accordingly to specimen dimensions) Ø 38x76 mm	S317-01 Ø 50x100mm S317-02 Ø 70x140mm S317-03 Ø 100x200mm S317-04 Ø 150x300mm	1	1
	S318	"O" ring tool (accordingly to specimen dimensions) Ø 38x76 mm	S318-01 Ø 50x100mm S318-02 Ø 70x140mm S318-03 Ø 100x200mm S318-04 Ø 150x300mm	1	1
	S319	Filter paper for lateral drainage (50 pcs) (accordingly to specimen dimensions) Ø 38x76 mm	S319-01 Ø 50x100mm S319-02 Ø 70x140mm S319-03 Ø 100x200mm S319-04 Ø 150x300mm	1	1
	S320	Filter paper for lateral drainage (100 pcs) (accordingly to specimen dimensions) Ø 38x76 mm	S320-01 Ø 50x100mm S320-02 Ø 70x140mm S320-03 Ø 100x200mm S320-04 Ø 150x300mm	1	1
	S122-13	Stainless core cutter (accordingly to specimen dimensions) Ø 38x76 mm	S122-14 Ø 50x100mm S122-15 Ø 70x140mm S122-16 Ø 100x200mm	1	1
	S123-13	Dolly for extraction (accordingly to specimen dimensions) Ø 38x76 mm	S123-14 Ø 50x100mm S123-15 Ø 70x140mm S123-16 Ø 100x200mm	1	1
	S325	Nylon tube Ø 6x4 (25 m)	-	3	3
	S326	Terminal for connection tube (10 pcs)	-	2	2
	S327	Flaring tool	-	1	1
	S328	Vaseline oil (1 kg)	-	1	1
	S329	Silicon grease (1 kg)	-	1	1
	S330	Grease pump	-	1	1
	S332-02	Wearable material recommended spares	-	1+	1+

In order to perform the permeability test it is necessary to add to the configuration the following products:

1x **S349N** Pressurematic PVC
1x **S349-10** Solenoid Valve
1x **S336-53N** Pressure transducer 2000 kPa with signal conditioner
1x **S337-51** Calibration process
1x **S336-55** De-airing block 20 litres

CYCLIC TRIAXLAB AUTOMATED SYSTEM

STANDARDS: ASTM D7181 I ASTM D2850 I ASTM D3999 I ASTM D4767 I ASTM D5311 I BS 1377:8 I AASHTO T307

MAIN FEATURES

- Automatic execution of static and dynamic triaxial tests.
- 4 axis control and 16 channel control Data Acquisition System.
- Servo feedback controlled precision pressure (Pressurematic) generation system.
- Digital Servo-Pneumatic Control to provide accurate loading wave shapes up to 70 Hz.
- Real time charting.
- Compact and versatile for improving productivity and cost effectiveness.
- Pre-programmed user friendly “Method files” through the TestLab Software.
- Possibility to upload user-defined wave-shapes (e.g. earthquakes time series) through Replay Editor.
- Fully configurable to suit a large range of testing applications including maximum shear modulus calculation through bender elements option.
- Programmable Dashboard display showing real-time system status and test result.

DTS-9 Cyclic TriaxLab Automated System

The Cyclic TriaxLab automated with its innovative features represents the most ideal solution for modern laboratories that need to investigate the effects of vibration and dynamic loading for soil and unbound granular materials.

Typical applications include:

- Civil engineering including seismic and blasting analysis
- Environmental engineering
- Construction and architectural design
- Advanced research on soils

Based on the 4 axis control and 16 channel control and Data Acquisition CDAS2, Matest Cyclic TriaxLab has provision for:

- Vertical load tension/compression up to 9 kN
- Vertical displacement up to 50 mm
- Cell pressure up to 2200 KPa
- Back pressure up to 2200 KPa

The Cyclic TriaxLab automated system is subdivided into 3 major groups similarly to the TriaxLab Automated System:

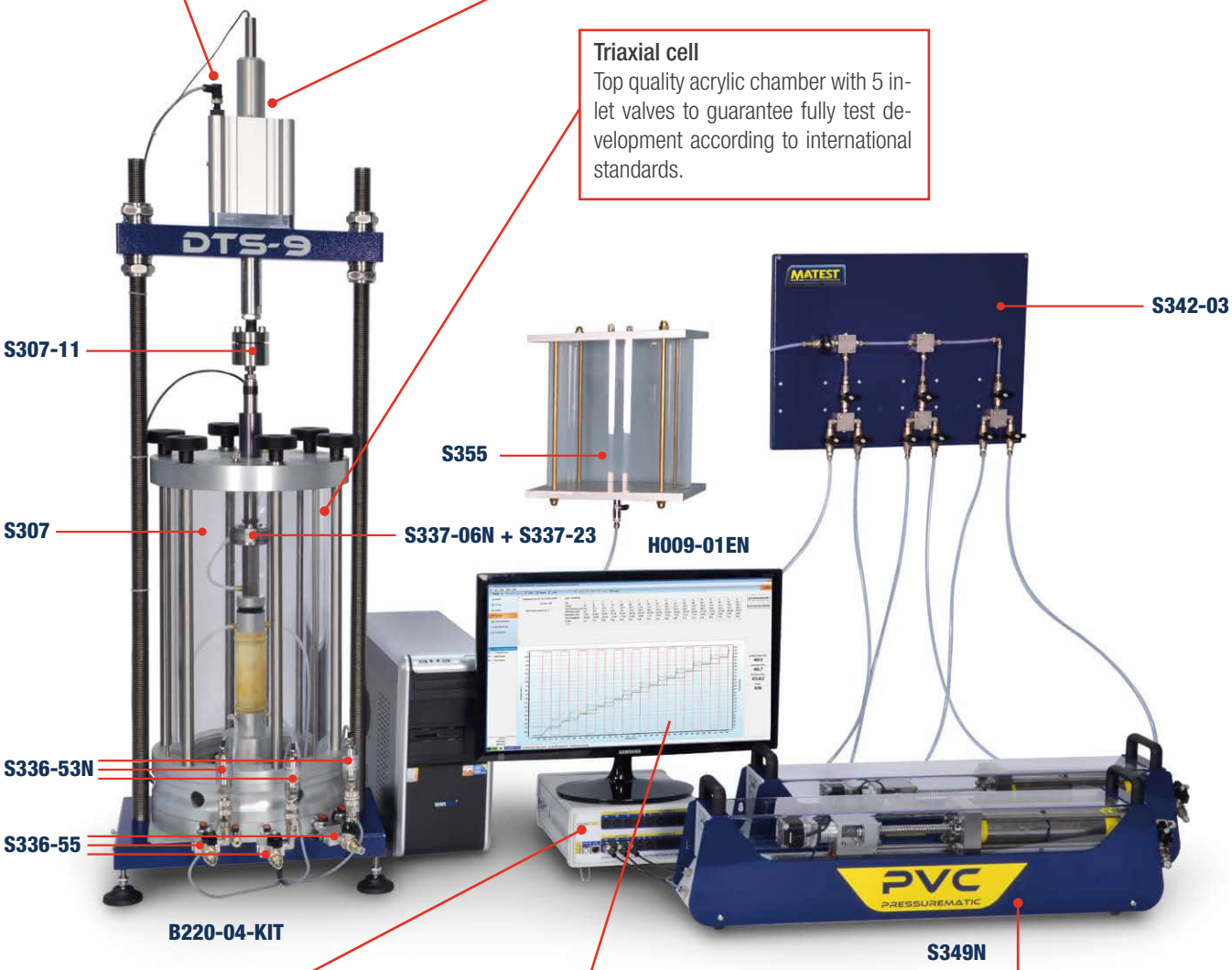
- **Fully digital controlled load frame** and fit for purpose Triaxial cell with accessories
- **Control system** based on the CDAS2
- Data Acquisition System comprising:
  - 1 submersible load cell for axial force
  - 3 pressure transducers for cell pressure, back pressure and pore pressure
  - 2 Pressurematic for pressure/volume change

To suit the specific customer's requirements the MATEST Cyclic TriaxLab Automated System basic configuration can be modified by adding or removing the hardware elements which are controlled and monitored under a closed-loop integrated system with the CDAS2 and TestLab Software.
Pre-programmed "Method files" offer the operator the unique opportunity to run a range of tests without the need for specific computer programming. The possibility to customize the Method files is also given to the operator granting ultimate flexibility and versatility.

Servo-valve
High performance, pneumatic servo-valve

Load frame & actuator
Fully digital control of a high performance pneumatic servo-valve to provide accurate loading wave shapes up to 70 Hz.

Triaxial cell
Top quality acrylic chamber with 5 inlet valves to guarantee fully test development according to international standards.



CDAS2
The Compact Control and Data Acquisition System (CDAS2) delivers unparalleled performance, real time control and ultimate versatility in acquisition.

TestLab software
TestLab software allows for real time graphing of results and configurable real time transducer levels display with unprecedented clarity of results and analytical power.

Pressurematic
The units are used for cell and back pressure control up to 2000 KPa. Automatic volume changes to 0.001 cc is also provided.

CYCLIC TRIAXLAB AUTOMATED SYSTEM ORDERING INFO:

HARDWARE - SOFTWARE

B220-04-KIT
DTS9 WITH MANUAL CROSSHEAD

The machine includes:

B220-14
20 kN load frame with manual crosshead
9 kN servo-pneumatic actuator with its LVDT, 50mm stroke, 70 Hz frequency.

Power supply: 90-264V 50-60Hz 1ph 240W
Dimensions: 1262(h)x400(d)x470(w)
Weight: 80 kg load frame

S303N
16 Channel Control and Data Acquisition System (CDAS2) and TestLab software.
For technical specifications, see p. 519

B270-12
Air reservoir assembly with membrane dryer. It requires pressurized air, minimum 7 bar (not included)

As alternative:

B220-05-KIT
DTS16 WITH MANUAL CROSSHEAD

The machine includes:

B220-15
20 kN load frame with manual crosshead 16 kN Servo-Pneumatic actuator with its LVDT 30 mm stroke, 70 Hz frequency.

Power supply, dimensions and weight are the same as B220-04-KIT.

S303N 16-ch CDAS2 and TestLab software.

B270-12 Air reservoir assembly with membrane dryer.

S307
TRIAXIAL CELL MAX Ø 150X300 MM

Technical specifications:

- Max specimen mm Ø 150x300
- Max cell pressure 2200 kPa
- Overall dimensions mm Ø 338x648
- Weight 40 kg approx.

S306N+S306-10
TRIAXIAL CELL MAX Ø 150X300 MM

Technical specificafions:

- Max. specimen size: Ø 150x300 mm
- Max. cell pressure: 1700 kPa
- Overall dimensions: Ø 350x655 mm
- Weight: 19 kg approx.

MEASURE OF AXIAL FORCE

S337-06N
SUBMERSIBLE LOAD CELL 10 KN WITH SIGNAL CONDITIONER

- Rated output 2 mV/V nominal
- Accuracy 0.1%

Note: For different requirements load cells capacity and transducers stroke or submersible load cells, see p. 502
Other capacities are available on request.

ACCESSORIES FOR TRIAXIAL CELL

S337-23 Loading ram for the submersible load cell (only for S307)
S337-22 Loading ram for the submersible load cell (only for S306N)
S307-05 Transducers holder ring
S307-06 Distance piece in replacement of submersible load cell
S307-10 Vacuum generator
S307-19 Vacuum adaptor
S307-11 Alignment coupler assembly
S307-12 Spherical exclusion
S307-13 Base pedestal spacer
S307-14 Piston stop device

S307 with accessories

DEAIRED WATER SYSTEM

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 approx.

ACCESSORIES

V205-KIT
Consists of:

V205
VACUUM PUMP
To produce vacuum up to of 0.1 mbar
(see p. 553)

V205-10 - V205-12
VACUUM REGULATOR It is supplied with vacuum gauge, control valve, suction filter and moisture trap.

V230-03 Rubber tube. Suitable for vacuum, 3 m
V205-13 De-oiling filter for vacuum pump

Note: Other models of vacuum pumps described at p. 553

MEASURE OF PRESSURE SYSTEM AND VOLUME CHANGE

S349N
PRESSUREMATIC PVC FOR AUTOMATIC PRESSURE AND VOLUME CONTROL

Output pressure: 3500 kPa

Volume capacity: 250 cc

For Technical Specifications, see p. 520

NEEDED ACCESSORIES

S336-53N Pressure transducer 2000 kPa with signal conditioner.
S336-55 De-airing block for pressure transducer
S349-10 Solenoid valve
B204-16 Air compressor 11 bar 500 litres
S332-08 Hose and fittings designed for a more reactive response of the dynamic triaxial system
S342-03 3 ways water distribution panel

TESTLAB SOFTWARE

Developed with ultimate flexibility in mind, TestLab test and control software caters to all levels of operator experience. By using pre-programmed **Method files**, an inexperienced operator can run a range of international test methods without the need for any programming.
Moreover, a test **Wizard**, available with popular tests, can guide the operator step by step based on a "recipe book" approach.
Most importantly, the experienced engineer and/or researcher need not be constrained by the functions and analysis in the method files provided. The operator may clone, modify and/or generate his/her own method file to suit their specific requirements. The Excel based data analysis offers the operator the flexibility to implement alternative analysis and customize reporting facilities.
TestLab allows for real time graphing of results and configurable real time transducer levels display with unprecedented clarity of results and analytical power. These features make the TestLab software the optimized solution for the new Matest Triaxlab Automated and Cyclic Systems.
It is provided with CDAS2 mod. S303N see p. 519.

MAIN FEATURES

- Pre-programmed Method files based on international test methods for complete control of triaxial testing for saturation, consolidation and shearing phases.
- Integrated data results post processing feature with MS Excel.
- Standard and user customizable test reporting.
- Real time graphing of results and configurable real time transducer.
- Flexible and user-friendly with unprecedented clarity of results and analytical power.
- Automatic B value measurement.
- Automatic backpressure solenoid valve control.

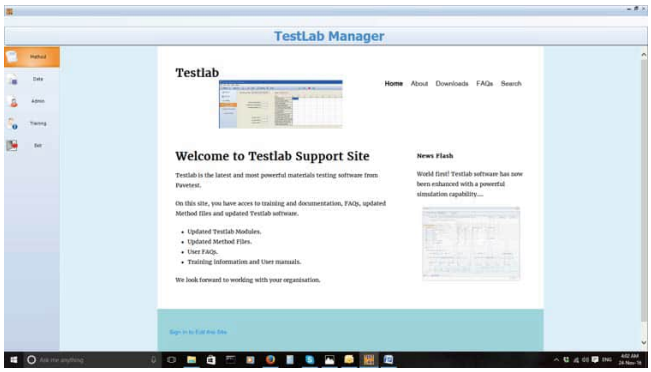
TESTLAB, A NEW APPROACH

TestLab is an open architecture user programmable software application. Our engineers have taken the time to review all the relevant international test standards and used TestLab "Test Designer" to program method files according to these standards. Basically, any of these tests can be designed, cloned and/or modified by the user within TestLab. The user is no longer restricted to the test applications provided at time of purchase the possibilities are only limited by the skill and imagination of the user.

TESTLAB MANAGER

The TestLab materials testing software is designed to interface with the CDAS and a wide range of Pavetest machines including Automatic TriaxLab system. A TestLab Manager interface allows users to easily and efficiently locate the necessary method files to load and execute.
The method files for soil testing include: saturation, consolidation, CU compression test, CD compression test, UU compression test in accordance with:

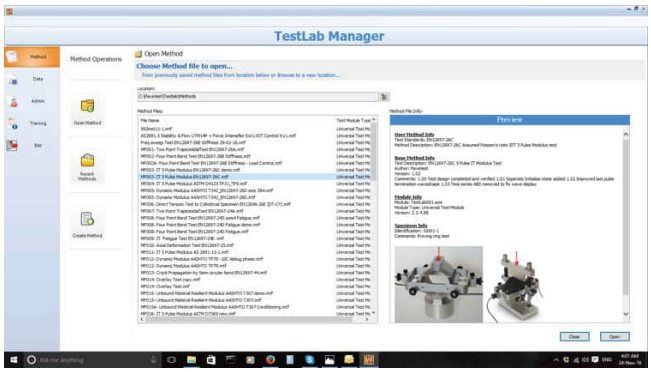
- ASTM 04767, ASTM D7181, BS 1377: part 8
- ASTM D2850, BS 1377: part 7



TestLab Manager

TEST METHOD SELECTION

The operator can run pre-programmed Method files, in accordance to the requested Standards, or configure an application test and then save that configuration to a customised Method file. This includes the real-time transducer and calibration allocations, comprising all the stresses, strain and volume changes for automatic triaxial testing; control parameters for the Pressurematic; solenoid valves and triaxial frames; terminal conditions as for instance end of stroke or maximum capacity limits, test pause features for the Pressurematic live control, additional options to hold the stress and strain applied to the specimen.



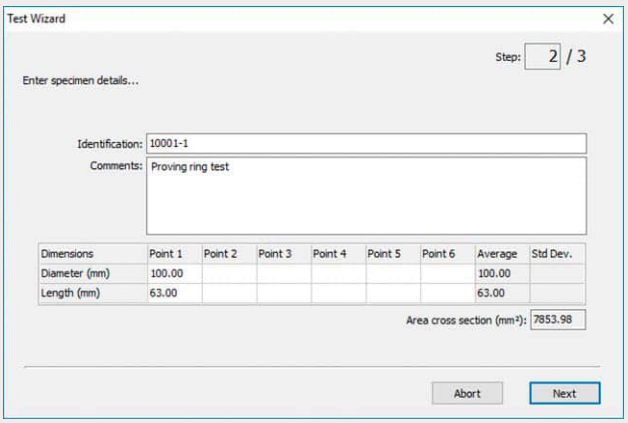
Selection of Method Files

TESTLAB, USER FRIENDLY INTERFACE FOR SOIL TESTING

TEST WIZARD

The wizard section provides a prompted menu approach to running a test. The user is driven to enter information throughout a series of easy steps. Examples of input information for consolidated drained compression test include:

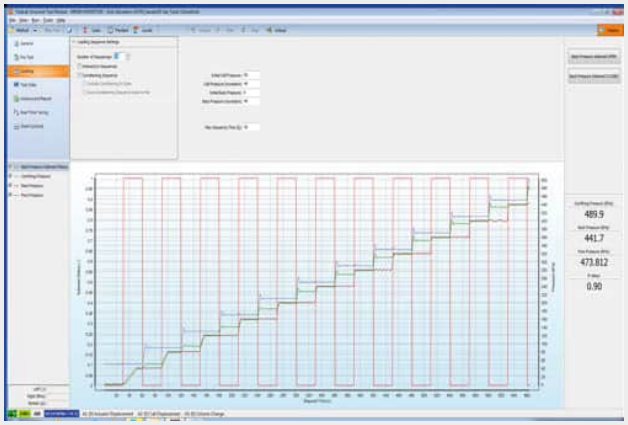
- Specimen Information: axial gauge length (mm), Consolidated Height (mm), Consolidated Area (mm^2), Membrane Modulus (MPa), Membrane thickness (mm), Filter Paper Kfp (kN/mm), Filter Paper Perimeter Pfp (mm), Axial Strain Limit (%), Break Detect (% drop)
- Loading sequences settings: confining pressure (kPa), Road Seal Diameter (mm), back pressure valve, Loading rate (%/min)
- Test data: Axial Load (kN), Axial Deformation (mm), Total and Effective Stress (kPa), Back and Pore Pressure (kPa), Volume Change (cc) and Axial Strain (%)
- Real time tuning (PID control increments) and chart controls (Corrected Deviator Stress, Axial Stress, Radial Stress, Induced Pore Pressure, Effective Radial Stress)



User guided Test wizard

TESTLAB UNIVERSAL TEST

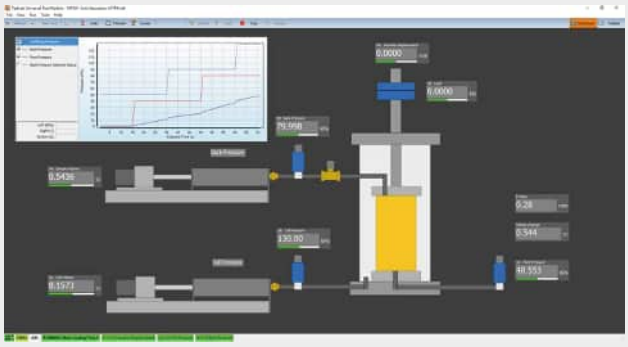
The Test Data section displays run-time information, such as the loading time, cycle count, transducer readings (force, displacement, pressure), stress calculations.
Volume changes, B valve, consolidation parameters (t100), stress path, optional K0 and permeability coefficients.



ASTM D4767, D7181-11 Automatic Saturation

REAL TIME DASHBOARD DISPLAY

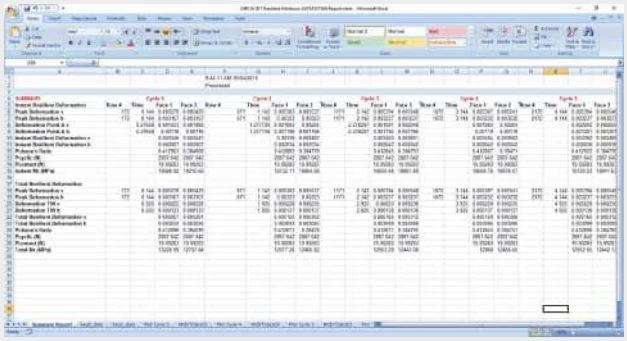
For the automatic static and cyclic triaxial tests, Pavetest provides the user with an alternative, simpler and more intuitive representation of the current status of both machine and test method. This dashboard display feature of TestLab shows real time transducer levels, computed data and charted data before, during and after the test has completed.



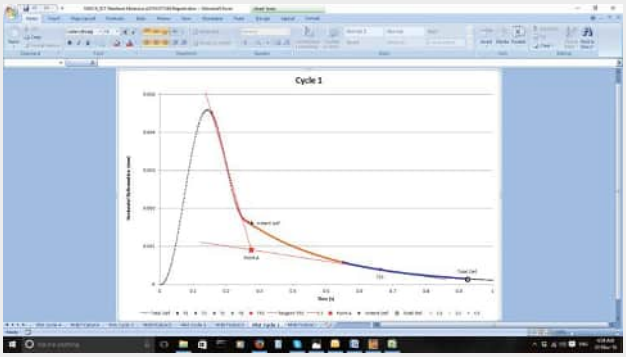
Typical dashboard screen

POST PROCESSING

All TestLab Method file tests provide the facility to send the data directly to an Excel workbook including test input and results data. This facility provides a means of efficiently post processing raw data results and customizing reports from within Excel and optionally displaying summary result in TestLab.



Post processing summary results



Excel post processing report

CYCLIC TRIAXLAB AUTOMATED SYSTEM: SUGGESTED TYPICAL CONFIGURATION

APPARATUS SECTION	ITEM CODE	ITEM DESCRIPTION	ALTERNATIVE ITEM	DIGITAL SEMI-AUTOMATIC
Frame, actuator and controller	**B220-04-KIT**	Loading frame + Triple axis control & data acquisition system (CDAS2) + 9 kN Servo-Pneumatic actuator assembly, 50 mm stroke, LVDT ± 50 mm calibrated over ± 37.5 mm	B220-05-KIT	1
	H009-01EN	PC	-	1 (opt)
Triaxial cells with accessories	**S307**	Triaxial cell for specimens up to 150x300 mm	S306N, S306N+S306-10	1
	S337-06N	Submersible load cell calibrated to -5/+5 kN	-	1
	S337-23	Loading ram for submersible load cell (for S307)	S337-22	1
	S337-51	Calibration process	-	1
	S307-10	Vacuum generator	-	1
	S307-11	Alignment coupler assembly	-	1
	S307-12	Spherical extension	-	1
	S307-19	Vacuum adaptor	-	1
	S307-13	Base pedestal spacer (only for S307)	-	1
	S307-06	Distance piece in replacement of submersible load cell	-	1
	S307-14	Electric switch for maximum piston stroke (only for S307)	-	1
De-aired water system	**S355**	De-airing tank 20 litres	-	1
	S355-01	Filter unit	-	1
	V205-KIT	Vacuum pump	-	1
	S350-01	Two-ways distribufion valve for air or water	-	1
	B204-16	Air compressor 11 bar – 500 litres tank	-	1
Measure of pressure and volume change	**S349N**	Pressurematic PVC	-	2
	S349-10	Solenoid valve	-	1
	S336-53N	Pressure transducer 2000 kPa	-	3
	S336-55	De-airing block for pressure transducer	-	3
	S342-03	3-ways distribution panel	-	1
	S337-51	Calibration process	-	3
Accessories for specimen preparation (Available with the following dimensions Ø 38 mm, 50 mm, 70 mm, 100 mm and 150 mm. Further information see p. .....)	**S307-20**	Vacuum plate Ø 38 mm specimen	S307-30/40/50/60	1
	S307-21	Vacuum top platen Ø 38 specimen	S307-31/41/51/61	1
	S310	Rubber membrane Ø 38 mm (100 pcs)	S310-01/02/03/04	1
	S311	Sealing ring Ø 38 mm (10 pcs)	S311-01/02/03/04	1
	S312	Membrane stretcher Ø 38 mm	S312-01/02/03/04	1
	S313	Split former Ø 38 mm	S313-01/02/03/04	1
	S313-10	Two-part splitmould Ø 38 mm	S313-11/12/13/14	1
	S315-10	Plinth Ø 38 mm for cell mod. S307	S315-11/12/13/14	1
	S315-04	Base adapter for cell (for S306N)	S315-04/05/06/07/B270-10	1
	S316	Porous disc Ø 38 mm (2 pcs)	S316-01/02/03/04	1
	S317	Plein disc Ø 38 mm (2 pcs)	S317-01/02/03/04	1
	S318	"O" ring tool for plinth Ø 38 mm	S318-01/02/03/04	1
	S319	Filter paper drain Ø 38 mm (50 pcs)	S319-01/02/03/04	1
	S320	Filter paper for base Ø 38 mm (100 pcs)	S320-01/02/03/04	1
	S122-13	Hollow punch Ø 38 mm triaxial	S122-14/15/16	1
	S123-13	Tamper Ø 38 mm triaxial	S123-14/15/16	1

Other elements	S325	Nylon tube Ø 4 mm (25 m)	-	1
	S326	Terminal for connection tube (10 pcs)	-	1
	S327	Flaring tool	-	1
	S328	Vaseline oil, 1000 ml	-	1
	S329	Water-repellent grease (1000 g)	-	1
	S330	Grease pump	-	1
	S332-04	Spares and wearable 1 cell automatic	-	1
	S332-08	Hose and fittings designed for a more reactive response of the dynamic triaxial system	-	1

In order to perform the **permeability** test it is necessary to add to the configuration the following products:

1x **S349N** Pressurematic PVC

1x **S349-10** Solenoid Valve

1x **S336-53N** Pressure transducer 2000 kPa with signal conditioner

1x **S337-51** Calibration process

1x **S336-55** De-airing block 20 litres

Examples of Cyclic Triaxlab installed in laboratories in Italy

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 ± 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

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, 80 mm mod. S379-01 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
S379-01	100	0:01

DIGITAL DIAL INDICATORS

With battery and RS 232 Port for PC (see needed accessory)

Model	Travel mm	Division mm
S382-01	12.7	0.001
S383	25.4	0.001

NEEDED ACCESSORY

S382-13 CABLE to connect S382-01 and S383 to PC through USB port for direct visualization and recording of the measurement.

S390N + S336-12

ACCESSORIES

S380 MAGNETIC DIAL HOLDER, comprising a fix rod and an adjustable rod.
MAGNETIC BASE FORCE 25 kg approx.

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 ± 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 approx.

ACCESSORY for S390

S390-01 ADDITIONAL PARTS for calibrating C090-16, C134N and C090-30.

S390N
CALIBRATION UNIT FOR EXTENSOMETERS AND DIAL GAUGES

Simple model, stainless steel and aluminium made, complete with mechanical micrometer with friction 50 mm travel and 0.01 mm resolution. Sample holders to fit dial gauges with stem having 8 mm diameter and extensometers having 19 mm diameter

Weight: 2 kg approx.

HANNA
HI 145
ON OFF
HOLD

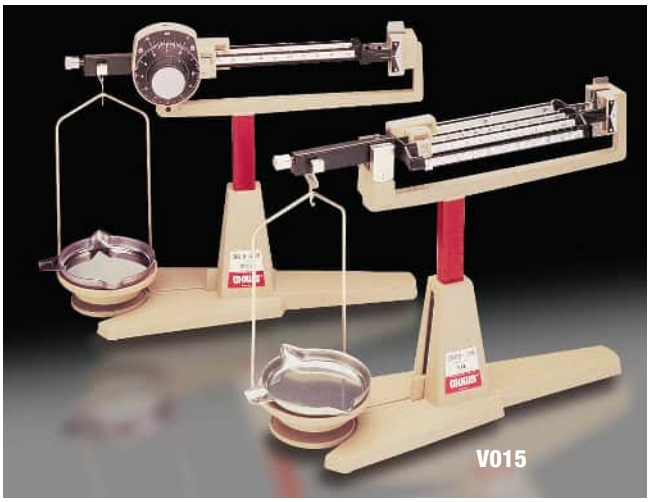
SECTION V

GENERAL EQUIPMENT

This section proposes a wide range of laboratory equipment and accessories that cannot be located in a specific application, but they are used for general purposes and are suitable to perform properly different measuring procedures of liquids and solids, weighing, temperature, containers, still, pH, chemicals, reagents etc. from scales to pumps, from thermometers to laboratory glassware, Matest complete its range of equipment for testing building materials.

MECHANICAL BALANCES ORIGINAL OHAUS

AVAILABLE MODELS



V015
CENT-O-GRAM Balance 311 g capacity x 0.01 g. sensitivity, four beams. Includes stainless steel pan, zero adjustment. **Weight:** 3 kg

V016
TRIPLE BEAM Balance 2610 capacity x 0.1 g sensitivity. Includes stainless steel pan, set of weights. **Weight:** 4 kg

V017
HEAVY DUTY SOLUTION Balance 20 kg capacity x 1 g sensitivity. Complete with set of weights, sliding weight for tare up to 2270 g, holding plate 280 mm diameter. **Weight:** 20 kg approx.

V059
ROTARY AUTOMATIC SCALE
200 KG CAPACITY, 50 G DIVISION

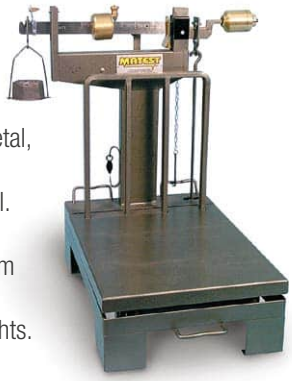
Five pointer turns allowig a larger amplitude of the subdivision.
Double quadrant and under quadrant sicking for multiples.
Oil oscillation shock-absorber, with exterior adjustment.
Displacement of the head in all positions without angulation limit.
Rotating rear wheels.
Pan, mass-produced, stainless steel.
Platform dimensions: 60x65 cm

Dimensions:
420x770x1050 mm
Weight: 45 kg

V059

V051
BATCHING SCALE

Capacity: 200 kg
Sens. 100 g
Completely produced in painted metal, double oscillation, case in strong profiled, platform in reinforced steel.
The sliding weight and accessories are brass made while the rod is from chromed steel.
Supplied complete with set of weights.


V051

SEMI-AUTOMATIC ZERO-CENTERING BALANCE

This scale with central zero is particularly suitable for predetermined weights. It has two pans; the sample is placed on the main pan and the weights are placed on the other until the pointer indicates the dial. Weights are not included and should be ordered separately.

MODEL

V034
Capacity 30 kg sens. 5 g
Dial -250 +250 g

V034

WEIGHTS FOR BALANCES

V036

SET OF BRASS WEIGHTS comprised in a wooden box.
Total weight reaching 1000 g. The set is formed by: 1x500 g, 1x200 g, 2x100 g, 1x50 g, 1x20 g, 2x10 g, 1x5 g, 2x2 g, 1x1 g

B057-05	Weight	100 g, brass calibrated
V036-02	Weight	0.5 kg, cast iron, calibrated
V037	Weight	1 kg, cast iron, calibrated
V038	Weight	2 kg, cast iron, calibrated
V039	Weight	5 kg, cast iron, calibrated
V040	Weight	10 kg, cast iron, calibrated

V036-02...V040

STANDARD CALIBRATION WEIGHTS

Used for the periodic verification of the balance readings. CLASS: M1
Made in Italy. Contained in a plastic box.
The weights are also available with ACCREDIA Calibration Certificate.

V035-03

Code	Weight
V035-01	50 g
V035-02	100 g
V035-03	200 g
V035-04	500 g
V035-05	1 kg
V035-06	2 kg
V035-07	5 kg

MOISTURE DETERMINATION BALANCES

AVAILABLE MODELS

V023-01
MOISTURE 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 50-60Hz

V023-03
MOISTURE BALANCE, as above, but 60 g capacity x 0.001/0.01 g sensitivity.

V023-01...V023-03

ELECTRONIC ANALYTICAL BALANCES

AVAILABLE MODELS

V065-02
ELECTRONIC ANALYTICAL BALANCE
Capacity: 250 g Readability: 0.1 mg
Tolerance: ± 0.2 mg
Outer keyboard with direct reading on a wide LCD display.
Data interface: RS 232
Single pan Ø 80 mm
Tare range: by subtraction up to full capacity.
Dust proof plexiglass cover. Ideal for very accurate weightings and for heat of hydration cement tests.

Power supply: 230V 50-60Hz 1ph
Dimensions: 315x225x330 mm
Weight: 10 kg approx.

V065-02...V065-03

V065-03
ELECTRONIC ANALYTICAL BALANCE, as above, but 220 g capacity x 0.1 mg readability.

ELECTRONIC PRECISION TOP LOADING AND PLATFORM BALANCES

Designed for laboratory general purposes, most of them are fitted with under balance weighting facility for specific gravity tests, and RS232 for PC or printer connection.
Sturdy and precise, they are fitted with strain gauge cells and large backlighted display.
Immediate and automatic zeroing and tare, automatic changeover of scale sensitivity (dual range models only).
Power supply and standard - optional accessories are listed for each model of balance and described in the legend.

V070-02...V070-06

V071-10...V072-02

V072-06N, V075-11...V075-13

V073-04

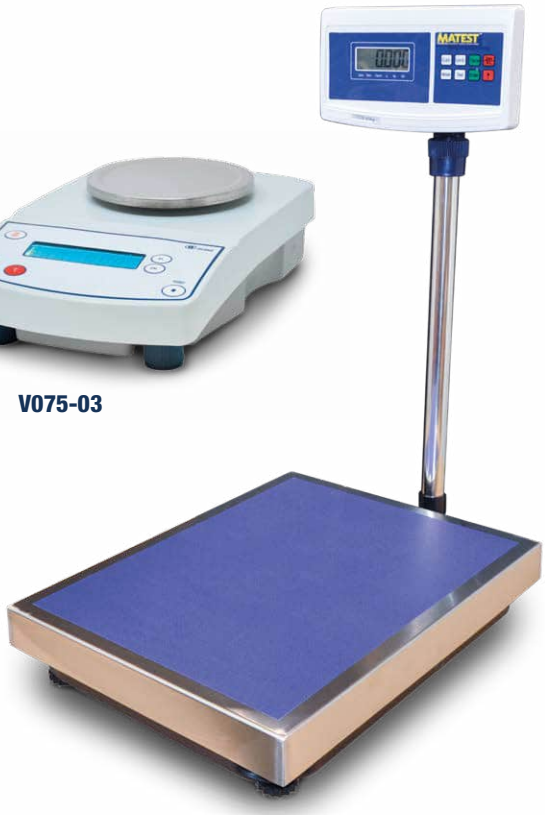
V073-01

V075-02...V075-04

V075-06

V075-03

V073-06



V075-20...V075-22

Model	Capacity	Readability	Pan dimensions mm	Standard accessories	Optional accessories
V070-02	210 g	0.001 g	Ø 110	A + (F) + G	H
V070-05N	300 g	0.001 g	Ø 110	G + A	H
V070-06	520 g	0.001 g	Ø 110	A + F + G	
V070-06S	420 g	0.001 g	Ø 80	A + (F) + G	H
V071-07	3100 g	0.01 g	Ø 160	A + (F) + G	H
V071-10	2200 g	0.01 g	Ø 160	A + (F) + G	H
V071-11	4200 g	0.01 g	Ø 130	A + (F) + G	H
V071-13	3000 g	0.01 g	Ø 160	A + (F) + G	H
V072-02	800/5500 g	0.01/0.1 g	Ø 160	A + (F) + G	H
V072-06N	15 kg	0.1 g	300x225	E + F + G	H
V073-01	16 kg	0.1 g	320x360	E + F + A	H
V073-04	4500/32000 g	0.1/1 g	320x210	A + F + G	H
V073-06	60 kg	1 g	450x600	E + G + A	H
V073-12	20 kg	0.1 g	320x220	E + F + A	
V073-13	32 kg	0.1 g	320x220	E + F + A	
V075-02	300 g	0.005 g	Ø 120	E + G + A	H
V075-03	600 g	0.01 g	Ø 130	E + G + A	H
V075-04	1500 g	0.01 g	Ø 120	E + G + A + (F)	H
V075-06	3000 g	0.05 g	125x145	E + G + A + (F)	H
V075-11	6 kg	0.1 g	225x300	E + F + G + A	H
V075-12	15 kg	0.2 g	225x300	E + F + G + A	H
V075-12SP	16 kg	0.1 g	225x300	Function Hold	
V075-13	30 kg	0.5 g	225x300	E + F + G + A	H
V075-20	60 kg	2 g	450x600	E	
V075-21	150 kg	5 g	450x600	E	
V075-22	300 kg	10 g	600x600	E	

LEGEND

STANDARD ACCESSORIES

A = Power supply only 230V 1ph 50-60Hz
E = Power supply: rechargeable batteries and also 230V 1ph 50-60Hz
F = Under balance weighting facility for specific gravity tests
G = RS 232 port
(F) = Predisposition only, no hook

OPTIONAL ACCESSORIES

H = **V074-12** Printer complete with connection cable
V074-13 Traceable calibration certificate

V085
SPECIFIC GRAVITY FRAME
(BOUYANCY BALANCE SYSTEM)

STANDARDS: EN 12697, EN 1097-6 I EN 12390:7
ASTM C127, C128 I AASHTO T84 I BS 812:2, 1881:114

Used for specific gravity determination of concrete, aggregates etc. To be used with a suitable electronic balance fitted with an under - hook facility.
Robust steel frame made, it incorporates on its lower part a platform adjustable in height, holding a water container, and allowing the specific gravity test. The balance is not included and must be ordered separately.

Dimensions: 510x510x1150 mm
Weight: 50 kg approx.

ACCESSORIES

V085-01 CRADDLE for holding concrete cube and cylinder specimens
V041 DENSITY BASKET, stainless steel, Ø 200x200 mm, mesh 3.35 mm

V086-KIT
SPECIFIC GRAVITY KIT

Used for specific gravity determination of solid materials.
Simplified and economical solution.
The kit is composed of:
V086 Support bridge frame with hook rod.
V042 Density tank, plastic, 370x370x330 mm
V041 Density basket, stainless steel, Ø 200x200 mm, mesh size 3.35 mm
To be used with a suitable electronic balance fitted with under-hook facility.

ACCESSORY

V085-01 CRADDLE for holding concrete cube and cylinder specimens.

DENSITY BASKETS
STAINLESS STEEL MADE

AVAILABLE MODELS

V041 DENSITY BASKET
STANDARD: AASHTO T85
Used for specific gravity tests, Ø 200x200 mm, mesh size 3.35 mm (N° 6 ASTM). Weight 1.5 kg approx.

B017-01 Ø 130x135 mm, dual mesh size 0.063 and 0.400 mm

B017-02 Ø 130x135 mm, mesh size 0.4 mm

A103 Ø 120x160 mm, mesh size 3.35 mm

A103-01 Ø 95x120 mm, mesh size 1.18 mm

A103-02 Ø 95x120 mm, mesh size 0.600 mm

A103-03 Ø 65x80 mm, mesh size 0.150 mm

V042
DENSITY TANK PLASTIC,
dimensions 370x370x330 mm
Weight: 3 kg approx.

LABORATORY GLASSWARE

MEASURING CYLINDERS

available in the following models:

Capacity	transparent plastic spouted	glass with stopper	opaque plastic spouted	transparent glass spouted
10 ml	**V098**	**V099**	**V100**	**V101**
25 ml	**V098-01**	**V099-01**	**V100-01**	**V101-01**
50 ml	**V098-02**	**V099-02**	**V100-02**	**V101-02**
100 ml	**V098-03**	**V099-03**	**V100-03**	**V101-03**
250 ml	**V098-04**	**V099-04**	**V100-04**	**V101-04**
500 ml	**V098-05**	**V099-05**	**V100-05**	**V101-05**
1000 ml	**V098-06**	**V099-06**	**V100-06**	**V101-06**
2000 ml	**V098-07**	**V099-07**	**V100-07**	**V101-07**

BEAKERS

pyrex glass with spout. Squat form.

Model	Capacity
V104	25 ml
V104-01	50 ml
V104-02	100 ml
V104-03	250 ml
V104-04	600 ml
V104-05	1000 ml
V104-06	2000 ml
V104-07	5000 ml

PYKNOMETERS

STANDARD: EN 1097-6

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

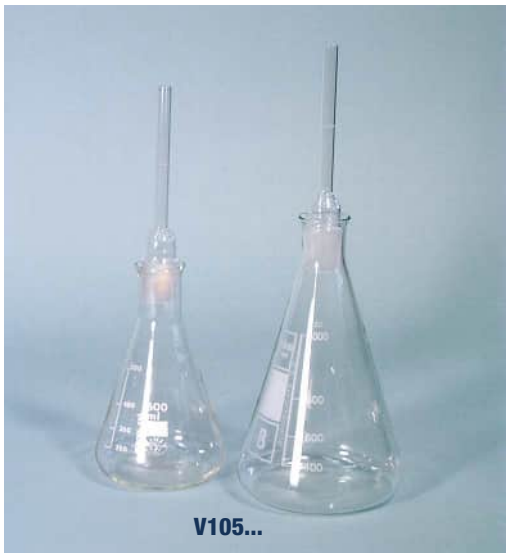
Model	Capacity
V103	500 ml
V103-01	1000 ml
V103-02	2000 ml

PYKNOMETERS

Pyrex glass, with ground-in-perforated stopper.

Capacity	Mouth 29 mm	Wide Mouth 50 mm	
250 ml	**V105-03**	=	
500 ml	**V105**	**V105-04**	**V105-04V***
1000 ml	**V105-01**	**V105-05**	**V105-05V***
2000 ml	**V105-02**	**V105-06**	**V105-06V***
3000 ml	=	**V105-08**	

* Vacuum tests



CONICAL FLASKS, ERLENMEYER

Pyrex glass wide mouth.

Model	Capacity
V106	100 ml
V106-01	250 ml
V106-02	500 ml
V106-03	1000 ml
V106-04	2000 ml

FILTER FLASKS

Pyrex glass, for Vacuum filtering.

Model	Capacity	Perforated bung with glass tube
V107	250 ml	**V107-11**
V107-01	500 ml	**V107-12**
V107-02	1000 ml	**V107-13**
V107-03	2000 ml	**V107-14**

VOLUMETRIC FLASK

Borosilicate glass, with plastic stopper
STANDARDS: BS-ISO 1042 I ASTM D854

Model	Capacity
V109	100 ml
V109-01	250 ml
V109-02	500 ml
V109-03	1000 ml
V109-08	2000 ml

VOLUMETRIC FLASK

Unstoppered, borosilicate glass.

Model	Capacity
V109-04	100 ml
V109-05	250 ml
V109-06	500 ml
V109-07	1000 ml
V109-09	2000 ml

SPECIFIC GRAVITY GAY-LUSSAC BOTTLES

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

REAGENT BOTTLES

Model	Capacity
V108-10	250 ml
V108-11	500 ml
V108-12	1000 ml

GRADUATED IMPURITIES TEST BOTTLES

Stoppered, pyrex glass

Model	Capacity	Standard
S132-01	500 ml	ASTM C40
S132-02	500 ml	UNI 8020-14
S132-03	1000 ml	ASTM C40

WEIGHTING BOTTLES

Glass, with cover

Model	Dimensions
V110	Ø 50 x 30 mm
V110-01	Ø 25 x 40 mm
V110-02	Ø 70 x 50 mm
V110-03	Ø 40 x 60 mm

GLASS FUNNELS

Model	Diameter
V119	35 mm
V119-01	50 mm
V119-02	100 mm
V119-03	150 mm

V111
HUBBARD SPECIFIC GRAVITY BOTTLE

STANDARD: ASTM D70 I EN ISO 3838

Capacity: 24 ml

V111-01
HUBBARD-CARMICK SPECIFIC GRAVITY BOTTLE

STANDARD: ASTM D70 I EN ISO 3838

Capacity: 25 ml

V124
DROPPING BOTTLE

Capacity: 100 ml

WATCH GLASS (beaker cover)

Model	Diameter
V115	100 mm
V115-01	140 mm

PETRI DISH with cover, pyrex glass

Model	Diameter
V123	100 mm
V123-01	60 mm

MEASURING PIPETTES, MOHR type, graduated

Model	Capacity	Sub-divisions
V142	1 ml	0.01 ml
V142-01	5 ml	0.1 ml
V142-02	10 ml	0.1 ml
V142-03	25 ml	0.1 ml
V142-04	50 ml	0.2 ml
V142-05	100 ml	0.2 ml

GRADUATED BURETTES, BENT

Soda glass with stopcock

Model	Capacity	Sub-divisions
V143	25 ml	0.1 ml
V143-01	50 ml	0.1 ml
V143-02	100 ml	0.2 ml

GRADUATED BURETTES, STRAIGHT

Soda glass with stopcock

Model	Capacity	Sub-divisions
V143-05	10 ml	0.02 ml
V143-06	25 ml	0.1 ml
V143-07	50 ml	0.1 ml
V143-08	100 ml	0.2 ml

V138
FILTER FUNNEL, PYREX GLASS

Ø 90 mm for particle analysis tests to BS 1377

V138

V300-15
DISSICATORS SALTS, SILICA GEL

Box of 1000 g

V147
STIRRING ROD, glass, Ø 8 mm x 250 mm long. Pack of 10

V147-01
MARKING PENCIL, glass. Pack of 12

DESICCATORS BOROSILICATE GLASS

Complete with perforated porcelain plate.

A039 A035

Without vacuum		With vacuum	
A035	Ø 200 mm	A039	Ø 200 mm
A036	Ø. 250 mm	A040	Ø 250 mm
A036-01	Ø 300 mm	A040-01	Ø 300 mm

PLASTIC PRODUCTS

DECANTERS, polypropylene made

Model	Capacity
V102-01	500 ml
V102-02	1000 ml
V102-03	2000 ml
V102-04	3000 ml

S157-05
BEAKER, graduated, plastic, 2000 ml capacity.
STANDARD: EN 933-9

WASH BOTTLES, plastic

Model	Capacity
V120	100 ml
V120-01	250 ml
V120-02	500 ml
V120-03	1000 ml

FUNNELS, plastic

Model	Diameter
V135	100 mm
V135-01	140 mm
V135-02	210 mm

FUNNELS, wide mouth, plastic

Model	Diameter	
V136	max. 80 mm	min. 15 mm
V136-01	max. 120 mm	min. 30 mm
V136-02	max. 150 mm	min. 35 mm

BOTTLES, plastic, wide mouth stoppered

Model	Capacity
V118	250 ml
V118-01	500 ml
V118-02	1000 ml
V118-03	2000 ml
V121	5 litres
V121-01	10 litres

V128
BUCKET plastic, with handle
capacity 12 litres

BOXES plastic, stacking

Model	Dimensions	Capacity
V127	380x280x200 mm	20 litres
V127-01	560x330x280 mm	50 litres
V127-02	650x380x320 mm	80 litres

SAMPLE BAGS
Heavy plastic, pack of 100 pcs

Model	Dimensions
V145-10	25x35 cm
V145-11	40x60 cm

PORCELAIN PRODUCTS

MORTAR AND PESTLE, porcelain

Model	Diameter	Height
V112	100 mm	60 mm
V112-01	125 mm	65 mm
V112-02	150 mm	76 mm
V112-03	180 mm	92 mm
V112-04	200 mm	100 mm

V113
RUBBER HEADED PESTLE
For soil mortar conforming to ASTM D421, BS 1377:2, BS 1924:1

EVAPORATING DISHES, porcelain, with spout

Model	Diameter
V114-01	80 mm
V114-02	100 mm
V114-03	120 mm
V114-04	160 mm
V114-05	210 mm
V114-06	254 mm

V117 POCELAIN CRUCIBLE, 30 ml squat form
V117-01 PORCELAIN LID for V117
V117-02 PORCELAIN CRUCIBLE, 50 ml squat form
V117-03 PORCELAIN LID for V117-02

V117-04 PLATINUM CRUCIBLE 25 ml capacity, Ø 35x38 mm weight 18 g, thickness 0.25 mm

V117-04

V114-10
SILICA EVAPORATING DISH
Ø 130 mm x 30 mm high.
Capacity: 160 ml

V140
BUCHNER FUNNEL, porcelain, 115 mm diameter for use with Ø 110 mm filter paper.

V148
WEATHER STATION for external use.
Comprising: aneroid barometer, min/max thermometer, hair hygrometer.

V148-01
ANEMOMETER DIGITAL CUPS, PORTABLE
for direct reading of wind speed.

Data logger: 100 points.

Cups system, highly sensible.

Functions: MIN, MAX and HOLD.

Large LCD display with Auto Power Off.

Measuring range: 0.9 to 35 m/s; resolution: 0.1 m/s; precision: ± 2%

Measuring systems: m/s, km/h, knots, mp/h, ft/min.

Feeding: 4 batteries AAA, 1.5V

Weight: 180g

V167
RAIN GAUGE, for measuring rain fall. Simple model in plastic material

V167-01N
RAIN GAUGE, for measuring rain fall; professional model, PVC made. Capacity 250 cc corresponding to 25 mm of rain with 1 mm resolution.
Collection area: 10.000 mm²

V168
THERMOHYGROGRAPH, for external use.
Simultaneous recording of temperature and humidity on the same chart.
Temperature range: -15 °C +45 °C
Humidity range: 0 - 100%
Time scale: 24 hours or 7 days.
Battery operated. Supplied complete

Dimensions: 280x150x250 mm
Weight: 3 kg

V168

V168-01
THERMOHYGROGRAPH, internal use, same to mod. V168 but with temperature range 0 +40 °C.
Battery operated

V148

V148-01

V167

V167-01N

SPARES

V168-02N	Diagrams for thermohygrograph mod. V168. Pack of 100
V168-03N	Diagrams for thermohygrograph mod. V168-01. Pack of 100
V168-04N	Writing pen for thermohygrograph. Pack of 2

V169
HAIR HYGROMETER, range 0 to 100%

V169

DIGITAL THERMOMETERS

Complete with depth stainless steel probe, for temperature measurements of liquid, fluid, semisolid, granular materials, air.
The probe is directly connected to the digital unit.

Model	Temp. range °C	Resolution °C	Accuracy °C	Probe dimensions Ø x lenght
V150N	-50 +300	0.1	± 1 (up to 150 °C)	3x105 mm
V151N	-50 +200	0.1	± 1	3.5x110 mm
V152N	-50 +300	0.1	± 0.2 (-30 +170 °C)	3x103 mm

V153
DIGITAL THERMOMETER, including remote probe connected to the instrument with a cable 1 metre long.

Temperature range: -50 +150 °C
Resolution: 0.1 °C. Accuracy: ± 0.3 °C
Stainless steel probe Ø 3x160 mm

V154N
DIGITAL THERMOMETER

Handy and versatile, it uses a type K thermocouple sensor to take measurements on the highest scales. It is a watertight thermometer with advanced features such as a self-diagnosis system when switching-on, battery charge indicator and automatic switch-off.

Measurement range: -50 to +300 °C resol. 0.1 °C
(-50 to +199.99 °C) and 1 °C (200 to 300 °C)
Probe accuracy: ± 0.4 °C
Battery: 1.5V AAA (3) duration 3500 hours
Supplied with a penetration probe Ø 3x120 mm.
Max. temperature 900 °C. 1 metre long.

V154N

SPARES for V154N

V154-01 PENETRATION PROBE Ø 3x120 mm. Max temperature: 900 °C 1 metre long.

V154M
V154-02...

V155
INFRARED THERMOMETER

To measure surface temperatures without touching the object.
Measuring range: -50 °C +750 °C
Resolution: 0.1 °C up to 200 °C
Functions: Hold and autoswitch-off.
Battery type: 9V

V155

V154M
DIGITAL MICROPROCESSOR THERMOMETER

Rugged, easy to use portable instrument with K type sensor for high temperature measurements, it is equipped with a membrane keyboard and microprocessor with memory functions of hold, min/max temperatures measured in the cycle, readings in °C or °F.
Dual temperature range: -50 to +199.9 °C resol. 0.1 °C
+200 to +1350 °C resol. 1 °C
Supplied complete with penetration probe Ø 1.5x255 mm.
Max. temperature 1100 °C. 1 metre long.
Accuracy: ± 0.2% full scale
Power supply: 1x5 AAA (3) batteries with 1600 hours use

SPARE PART for V154M

V154-01M PENETRATION PROBE Ø 1.5x255 mm. Max temperature: 1100 °C. 1 metre long.

ACCESSORIES for V154N and V154M

Stainless steel probes, complete with 1 metre cable and connector

V154-02 SURFACE PROBE, Ø 16x200 mm Max. temperature: 650 °C
V154-03 AIR PROBE, Ø 3x245 mm Max. temperature: 300 °C
V154-04 GENERAL PURPOSE PENETRATION PROBE Ø 5x230 mm. Max. temperature: 900 °C
V154-05 K-TYPE THERMOCOUPLE 5 m long
V154-06 COUPLING UNIT

DIAL THERMOMETERS

For temperature measurement of freshly mixed concrete, bituminous mixtures and general purpose use. Stainless steel made, the terminal part of the stem in **pointed** to get easier the penetration into the material.

Model	Range °C	Sub-divisions °C	Dial Ø	Stem lenght mm
V160	-40 +40	1	50 mm	250
V160-01	0 +60	1	50 mm	250
V160-02	0 +100	2	50 mm	250
V160-03	0 +250	5	50 mm	250
V160-04	0 +300	5	50 mm	250
V160-06	0 +250	5	75 mm	600

ASTM, IP, NF, ALCHOL THERMOMETERS

Model	Range °C	Graduation °C	ASTM	IP
B057-08A	23 / 27	0.1		38C
B063-01A	-2 / 300	1	7C	5C
B064-03A	155 / 170	0.5	13C	47C
B069-11A	-2 / 400	1	8C	6C
B072-01A	-2 / 80	0.2	15C	60C
B072-02A	30 / 200	0.5	16C	61C
B077-02A	-38 / 30	0.5		42C
B082-01A	18 / 28	0.2	23C	
B082-02A	39 / 54	0.2	24C	
B082-03A	95 / 105	0.2	25C	
B082-04*	0 / 55	0.2	NF T66-020	
B083-07A	0 / 44	0.2		8C
B086-10A	-6 / 400	2.0	11C	28C
B088-12AG	58.5 / 61.5	0.1	47C	
B088-13AG	133.5/136.5	0.1	110C	
B089A	19 / 27	0.1	17C	
B089-01A	34 / 42	0.1	18C	
B089-02A	49 / 57	0.1	19C	
B089-03A	57 / 65	0.1	20C	
B089-04A	79 / 87	0.1	21C	
B089-05A	95 / 103	0.1	22C	
B092-10A	-5 / 110	0.5	9C	15C
B092-11A	-20 / 50	0.5	57C	
B094-10A	90 / 370	2.0	10C	16C

* Mercury thermometer

B057-08A...B094-10A

B089AH
SHELF FOR FIXING THERMOMETERS

NEW

It can store up to 20 thermometers. It is designed to keep thermometers in a vertical and stable position. Useful to remove bubbles and helps restoring a continuous alcohol column.

B089AH

ARMOURED THERMOMETERS, pocket size, alchol

Model	Range °C	Graduation °C
V162A	0...100	1
V162-01A	0...200	2

V163A
Max./Min. Thermometer
range -30 °C +50 °C

V163A

THERMOMETERS glass stem and alcool system, for general laboratory use.

Model	Range °C	Graduation °C
V164A	0 + 50	0.5
V164-01A	-10 + 100	1
V164-02A	-10 + 200	1
V164-03A	-10 + 360	2

V164A V162A

V170
STOP WATCH
Digital, non magnetic, having also watch functions.
Precision 0.1 second.

V170-01
STOP WATCH
Mechanical dial type, non magnetic. Precision 0.1 second.

V171
TIMING DEVICE
From 0 to 60 minutes, with alarm.

SOIL HYDROMETERS

V172	Range 0.995 - 1.038 g/ml, div. 0.001 - 151 H
V172-02	Range -5 + 60 g/litre - 152 H
V172-03N	Range 0.995 - 1.030 g/ml ISO 17892-4, BS 1377, DIN 18123 **long stem**
V172-04	Range 1.000 to 1.200 g/ml for additives
V172-05	Range 1.200 to 1.300 g/ml for aggregates. EN 1367-2

V172...

V165-01
THERMO-HYGROMETER
Measuring range: 0 to +50 °C / +10 to +95 %RH
Accuracy: ± 0.5 °C / ± 3 %RH
Resolution: 0.1 °C / 0.1 %RH
Operating temperature: 0 to + 50 °C
Battery: 9V

Dimensions: 111x90x40 mm
Weight: 170 g approx.

V166-01N
CONDUCTIVITY METER – THERMOMETER
Digital, portable. Used for site and laboratory measurements of the conductivity in soils.
Measuring scale: 0 - 4000 uS/cm - resolution 1 uS/cm - accuracy 1%
Temperature in °C and °F., range 0 – 50 °C resolution 0.1 °C
Calibration and temperature compensation: automatic.
Use conditions: 0 to 50 °C, R.H. 95%
Feeding: battery

Dimensions: 50x196x21 mm
Weight: 74g

V166-01N

V165-01

V173-01
BUNSEN BURNER, universal, with air control.
IT CANNOT BE SOLD IN the european community.

As an alternative:

V173-01CE
BUNSEN BURNER, universal, with air control. Complete with gas-stop valve controlled by a flame sensor and maximum thermostat with reset button.
It can be sold in the european market, but not usable in closed spaces.

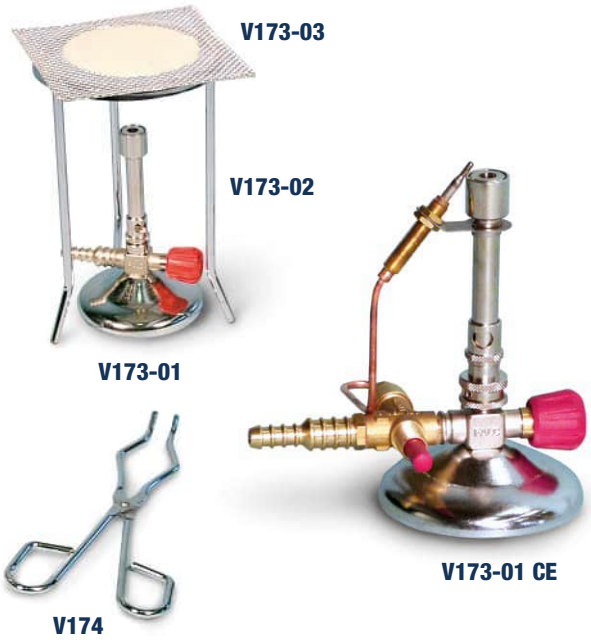
V173-02 Tripod Ø 100 x 150 mm
V173-05 Tripod Ø 120 x 210 mm
V173-06 Tripod Ø 150 x 220 mm
V173-03 Iron wire gauze, 150 mm square with ceramic centre
V173-04 Iron wire gauze, 200 mm square with ceramic centre

V174 CRUCIBLE TONGS

V175 VERNIER CALIPER, 0-150 mm x 0.02 mm
V175-01 VERNIER CALIPER, 0-205 mm x 0.02 mm

V175-02 DIGITAL VERNIER CALIPER, 0-200 mm x 0.01 mm
Readings in mm and inch.
V175-03 DIGITAL VERNIER CALIPER, 0-153 mm x 0.01 mm
V175-04 DIGITAL VERNIER CALIPER, 0-300 mm x 0.01 mm

V176 STEEL FOLDING RULER, 2 metres long
V176-01 STEEL RULER, 300 mm long, 0.5 mm grad.
V176-02 STEEL RULER, 500 mm long, 0.5 mm grad.



V177 WORKING SAFETY GLOVES
V177-01 NEOPRENE GLOVES

V178 SOFT BRUSH, for cleaning sieves etc.
V178-01 FINE WIRE BRUSH
V178-03 BOTTLE BRUSH Ø 50 mm

V179 BRISTLE, round, Ø 35 mm soft hair
V179-01 BRISTLE, flat 62 mm soft hair
V179-02 SIEVE BRUSH, double-ended, brass/nylon
V179-03 SIEVE BRUSH, double-ended, soft/hard nylon
V179-04 SIEVE BRUSH, fine brass
V179-05 SOFT HAIR BRUSH, Ø 3 mm - BS812
V179-06 BRISTLE, flat, 60 mm, nylon

METAL CONTAINERS AND PRODUCTS

MIXING BOWLS, stainless steel

Model	Diameter
V116-03	160 mm
V116	240 mm
V116-01	290 mm
V116-02	320 mm

V112-05
MORTAR AND PESTLE, stainless steel, Ø 135 mm

TINS, with or without cover

V122 Ø 55 x 36 mm aluminum, with cover
V122-01 Ø 55 x 65 mm aluminum, with cover
V122-02 Ø 75 x 50 mm aluminum, with cover
V122-03 Ø 57 x 32 mm aluminum, without cover
V122-04 Ø 45 x 13 mm aluminum, without cover
V122-05 Ø 55 x 35 mm brass, without cover
V122-06 Ø 70 x 45 mm brass, without cover
V122-07 Ø 90 x 20 mm aluminum, with cover
V122-08 Ø 55 x 40 mm aluminum, without cover
V122-11 Ø 55 x 36 mm aluminum, without cover

PLASTIC CONTAINERS WITH AIRTIGHT LID

Pack o1 10 pieces

Model	Capacity	Handle	Quantity
V125-12	1 litres	no	10 pcs
V125-16	6.1 litres	yes	10 pcs
V125-18	12.5 litres	yes	10 pcs

SAMPLE CONTAINERS, TINNED STEEL, AIRTIGHT LID

Model	Capacity
V125	0.5 litre
V125-01	1 litre
V125-02	3 litres
V125-03	5 litres
V125-04	11 litres

PANS aluminum, galvanized and stainless steel made

Model	Dimensions mm	Material
V182	600x600x80	galvanized steel
V182-03	500x400x120	galvanized steel
V182-04	250x120x80	galvanized steel
V182-06	306x306x38	galvanized steel
V182-07	460x460x50	galvanized steel
V182-08	910x910x76	galvanized steel
V182-01	370x260x50	alluminum
V182-02	330x220x50	alluminum
V182-05	270x180x50	alluminum
V182-10	265x195x47	stainless steel
V182-11	315x240x50	stainless steel
V182-12	370x270x57	stainless steel
V182-13	420x305x60	stainless steel

SCOOPS

ROUND ALUMINIUM

Model	Dimensions mm	Capacity ml
V183	245x80	325
V184	260x90	500
V184-01	335x120	1000
V184-02	380x145	1550
V184-03	420x160	2600

FLAT ALUMINIUM

Model	Dimensions mm	Capacity ml
V184-04	210x70	165
V184-05	310x110	450

ROUND STAINLESS STEEL

Model	Dimensions mm	Capacity ml
V185	100x185	500 ml
V185-01	120x200	1000 ml
V185-02	150x270	2000 ml
V185-03	125x250	5 kg of concrete

STANDARDS: EN 12350-1 I UNI 9416
BS 1881:101

A068-05

V185...V185-02

V183...V184-03

V184-04

V185-03

V189

V187

V188

V194 **V195** **V193** **V199** **V198**

A068-05	SCOOP steel made, 700x300x100 mm
V186	SAMPLING SPOON, large sized
V186-01	LADLE, stainless steel
V187	RECTANGULAR TROWEL 120x260 mm stainless steel
V188	TROWEL 100x200 mm - stainless steel
V189	TROWEL 60x140 mm - stainless steel
V189-01	TROWEL 90x115x165 mm EN12350-4
V193	STEEL HAMMER, 300 g
V194	STEEL MALLET, 1000 g
V194-01	STEEL MALLET, 2000 g
V195	RUBBER MALLET, head Ø 55 mm
V196	SHOVEL, with handle
V197	PICK MATTOCK, with handle
V198	DENSITY CHISEL, 300 mm long x 25 mm wide
V199	DENSITY PICK, small sized
S124	WIRE SAW
S125	TRIMMING KNIFE

V197

V196

SPATULAS

FLEXIBLE, STAINLESS STEEL

Model	Blade length mm
V192	100
V192-01	150
V192-02	200
V192-03	300

V186-01

V186

RIGID, STAINLESS STEEL

Model	Blade width mm
V192-04	20
V192-05	50
V192-06	70
V192-07	100

V192...V192-07

V192-08

V192-08 CHATTAWAY SPATULA 120 mm long.

HOT PLATES

Laboratory general utility hot plates, used to dry soil and aggregate samples, and for other general heating applications.

Power supply: 230V 1ph 50-60Hz

AVAILABLE MODELS

ROUND PLATES

Cast iron plate, with temperature control by a multiposition thermostat.

V200 PLATE DIAMETER 185 mm - 1500 W

V200-02 PLATE DIAMETER 220 mm - 2000 W

B074

V200

RECTANGULAR AND SQUARE PLATES

- aluminium alloy plate
- max. temperature: 350 °C
- thermostat range 0-350 °C with fluid expansion probe
- insulation class: 1
- two fuses to ensure electrical protection
- bipolar main luminous switch
- pilot light to signal active status of the heating element

V200-01N RECTANGULAR PLATE 200x300 mm - 1500 W

V200-03N SQUARE HOT PLATE 380x380 mm - 2000 W

V200-05N RECTANGULAR PLATE 400x500 mm - 2000 W

V200-06N RECTANGULAR PLATE 400x600 mm - 2000 W

V200-05N

V200-01N

HOT PLATES

(They can be used also for the determination of the softening point of bitumen, see p. 150-151)

B074 ROUND PLATE Ø 160 mm - 1000 W

B073-01

HOT PLATE WITH MAGNETIC STIRRER

Complete with thermoregulator for temperature adjustment and magnetic stirrer with electronic adjustment from 150 to 1500 rpm. Suitable for tests in distilled water with softening point between +30 °C to +80 °C.

Power supply: 230V 1ph 50Hz 750W

Weight: 4 kg approx.

B073-01 / B073-02

B073-02

HOT PLATE WITH MAGNETIC STIRRER

Same to mod. B073-01, but with more powerful electric heating resistance, suitable **also** for tests in glycerine with softening point over +80 °C up to +150 °C.

VACUUM PUMPS

Lubrified, paddle rotatory type.
Supplied compete with:
Thermal protection with automatic resetting, assembled inside the motor.
On/Off luminous switch, cable, carrying handle, base, bottle of special oil.
CE labelled with certificate of conformity.
Ideal for laboratory and site use to produce vacuum
Rotation speed: 2800 rpm

Power supply: 230V 1ph 50-60Hz

V205 **V205-01** **V205-02**

V205 pump with accessories

V205-11

AVAILABLE MODELS

Models		V205	V205-01	V205-02
Free air displacement	litres/min.	75	75	150
Flow rate	m^3/h	4.5	4.5	9.0
Ultimate vacuum	mbar	0.1	0.01	0.01
Stages		1	2	2
Motor power	W	180	240	370
Dimensions	mm	300x150x240	300x150x280	350x150x275
Weight	kg	8.4	9.8	11

ACCESSORIES

V205-10 VACUUM REGULATOR, complete with vacuum gauge Ø 80 mm, regulation cock, suction filter.

V230-03 RUBBER TUBE, lined for vacuum, 3 m long

V205-12 CONDENSED WATER TRAP

V205-13 OIL SEPARATOR FILTER

V205-13

SPARES

V205-11 Special oil for vacuum pumps. Bottle of 500 cc.

V205-10

V202
ASPIRATOR PUMP, used with current water having approx. pressure of 0.7 kg/cm^2 to create a moderate vacuum.

V202

V201
WARM AIR DRIER
For general laboratory purposes, to dry soil and aggregate samples.

Power supply: 230V 1ph 50Hz 1200W

V201

V201-01
BUTANE THREE-BURNER
field heater, to be used with a common butane cylinder.
Dimensions: 600x320x90 mm approx
Weight: 5 kg approx.

V201-01

V208-05
UNINTERRUPTIBLE POWER SUPPLY
Used to protect electrical devices from fluctuations in the power supply and to provide emergency power for a limited time
- Imput voltage: 230V
- 50-60Hz 1ph
- Output voltage 230V

Dimensions: 150x240x360 mm
Weight: 16 kg approx.

V208-05

V208-10N
VOLTAGE STABILIZER
It maintains the voltage stable, by adjusting and linearizing the tension variations.
Advantages: high quality of the tension, better load protection against electromagnetic disturbances.
Recommended when electronic, informatic, PC devices are used.
Power: 4 kVA
Accuracy: ± 3%

Nominal output voltage:
18A 230V 1ph 50Hz
Dimensions: 190x320x420 mm
Weight: 30 kg approx.

V208-10N

S351N
LABORATORY AIR COMPRESSOR
It reaches a maximum pressure of 15 bar and it is normally used with the air/water interface system (see p. 504).
Sucked air: 84 litre/minute.
Reservoir capacity: 3 litres.

Power supply: 230V 1ph 50Hz 0.75HP
Dimensions: 460x300x470 mm
Weight: 22 kg approx.

S351N

V207
LABORATORY AIR COMPRESSOR
Max. pressure: 10 bar
Air delivery: 240 litre/minute.
Reservoir capacity: 50 litres

Power supply: 230V 1ph 50Hz 1.5KW
Weight: 40 kg approx.

V207

V206
AIR COMPRESSOR
Max pressure: 8 bar
Air delivery: 222 litre/minute
Reservoir capacity: 24 litres

Power supply: 230V 1ph 50 Hz 1.5 KW
Weight: 30 kg approx.

V206

V206-01
AIR COMPRESSOR
Max pressure: 10 bar
Air delivery : 260 litre/minute
Air reservoir: 90 litres capacity

V206-02
AIR COMPRESSOR
Max pressure: 10 bar
Air delivery: 390 litres/minute
Air reservoir: 200 litres capacity

WATER STILLS

Stainless steel manufactured, they are used to produce distilled water for laboratory purposes, they are equipped with an automatic device to keep the water at a constant level and to cut off the current in case of shortage of water, overheating.

Power supply: 230V 1ph 50-60Hz

V211

AVAILABLE MODELS

V211
WATER STILL 4 LITRES/H CAPACITY

Power: 3000W
Dimensions: 250x222x542 mm.
Weight: 13 kg approx.

V211-01
WATER STILL 8 LITRES/H CAPACITY

Power: 6000W
Dimensions: 260x260x610 mm.
Weight: 16.5 kg approx.

PH METERS, DIGITAL

STANDARDS: ASTM D1067 | BS 1377:3

AVAILABLE MODELS

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

V215-02N

PH / °C ORP (OXIDATION REDUCTION POTENTIAL) METER LABORATORY MODEL

Range pH: -2.00 to 16.00 - Resolut. 0,01pH
Temperature: -20 to 120.0 °C - Resolut. 0.1 °C
Automatic 1 or 5 points calibration with 7 memorised buffers.
Automatic temperature compensation.
Digital electrodes with mini-jack connector.
Power supply: SVdc (230V adapter included)
Supplied complete with: electrode, temperature probe, electrode-holder, adaptor, calibration solutions.

Dimensions: 202x140x13 mm
Weight: 250 g

NEW

V215-02N

ACCESSORIES (for all pH models)

V215-11 BUFFER SOLUTION, pH 4.01
V215-12 BUFFER SOLUTION, pH 7.01
V215-13 BUFFER SOLUTION, pH 10.1
V215-14 ELECTRODES MAINTENANCE SOLUTION

METAL STANDS, with rod

V219 Metal stand, base 165x140.
Rod Ø 10x500 mm
Weight: 3 kg approx.

V219-01 Metal stand, base 200x260.
Rod Ø. 12x800 mm
Weight: 5 kg approx.

V219...

V220...

V220 Hoffman screw clamp, max opening 25 mm
V220-01 Mohr clamp
V220-02 Double sleeve metal/metal. Ø 10...25 mm
V220-03 Double sleeve metal/metal. Ø 10...20 mm
V220-04 Simple clamp. Ø 10...20 mm
V220-05 Simple clamp. Ø 20...30 mm

V222
TOOL KIT

For general purpose uses and normal maintenance of laboratory equipment.

Weight: 7 kg approx.

V222

LABORATORY TROLLEY

Used for laboratory displacement of heavy pieces like moulds, soil and concrete samples etc.
Steel made, mounted on rubber wheels.

V223 Scissor lift table, max load capacity 300 kg
Table dimensions: 815x500x50 mm
Shelf height: 280-290 mm
Roller Ø: 120 mm. **Weight:** 72 kg
V224 Trolley platform size 735x475 mm **Weight:** 9 kg approx.
V224-01 Trolley platform size 910x610 mm **Weight:** 17 kg approx.
V225 Trolley at double shelf size 790x480 mm
Weight: 21 kg approx.

V223

V225

V224

V226
WHEEL BARROW, pneumatic type

V226

RUBBER TUBING

Model	Inside diameter	Length
V230	5 mm	5 metres
V230-01	6 mm	5 metres
V230-02	8 mm	5 metres

V230-03
SPECIAL TUBING FOR VACUUM

Applications 8 mm inside diameter by 3 metre length.

V230...

V241
SAND BATH

For the homogeneous heating or evaporation of the content of beakers flasks et.

Inside dimensions: 300x240x90 mm Volume: 7 litres
Overall dimensions: 420x400x280 mm
Power supply: 230V 1 ph 50/60 Hz
Weight: 17 kg approx.

V241

B052

THERMOSTATIC WATER BATHS

See Sections: Asphalt/Bitumen p. 131
Cement/Mortars p. 380
Soils p. 455

V218...

FILTER PAPER, pack of 100 pieces

Model	Whatman n° x Ø	Degree of filtration
V218-01	1 x 110 mm	Fast
V218-02	1 x 150 mm	Fast
S200-14	5 x 150 mm	Slow
V218-05	40 x 150 mm	Middle
V218-06	44 x 150 mm	Slow
V218-07	44 x 110 mm	Slow
V218-08	50 x 110 mm	Slow
V218-09	54 x 150 mm	Fast
V218-10	540 x 150 mm	Middle
V218-11	541 x 110 mm	Slow
V218-12	54 x 400 mm	Fast

CHEMICALS

Model	Description	Q.ty
V300-05	Distilled water	2000 ml
V300-15	Silica gel	1000 g
V300-16	Glycerine	1000 ml
S328	Vaseline oil	1000 ml
V300-19	Paraffin wax	5000 g
V300-23	Sodium hexametaphosphate	1000 g

Model	Description	Q.ty
V300-25	Sodium sulfate	1000 g
V300-28	Blue of methylene	100 g
V300-29	Kaolinite	500 g
V300-30N	Ion exchange resin	1000 ml

Note: Several chemicals classified as dangerous, cannot be supplied for shipping safety problems.

V300...

INDEX

ANALYTICAL	559 - 569
STANDARDS	570 - 577
PRODUCT CODE	578 - 592

A	Mod.	Page
Abrams cone	C178-KIT	308
Abrasimeter for concrete tiles, natural stones	A112	58
Abrasimeter for glazed tiles	A109	62
Abrasion machine, Dorry	A111N	58
Abrasion machine, Los Angeles	A075N	48, 88
Abrasion tester Böhme	C129	57, 300
Abrasion tester, Planetary	B053-20	136
Abrasive chargers	A076-01	48
Abrasive white corundum sand	A112-01	58
Abson, recovery of binder	B018-10	85
Absorption cone and tamper	S148	47, 136, 455
Accelerated concrete curing	C307	325, 378, 468
Accelerated polishing machine	A128N	57, 91
Accessories for tests on metals	H001A-11	401
Accessories, compression and flexural on cement	E170 / E172-01	388
Accessories, compression and flexure on concrete	C097-01 / C126	288-295
Accredia hardness certificate	C097-08	288
Adhesion test apparatus, Vialit	B053	136
Adhesion tester, plaster	E142	341, 373
Adhesive for tiles	C313-05N	28, 327
Admixtures for concrete	C199-10	314
Affinity between aggregate and bitumen	B022SP	88
Ageing Vessel	B091M	158, 159
Aggregate crushing value apparatus	A082	53, 262, 263
Aggregate density by water displacement	A086	53
Aggregate impact value apparatus	A080-KIT	50
Aggregate shape gauge	A072	46
Air bath, bitumen	B016	141
Air compressors	S351N, V207	554, 504
Air content measurer, mortar	E029	357
Air content meter, cement	E027	358
Air drier	V201	554
Air entrainment meter, concrete	C195	312
Air jet sieve shaker	A058-05N	38, 51, 442
Air permeability apparatus, Blaine	E009-KIT	356
Air/water pressure system, triaxial test	S350N	504
AMA - Asphalt Mix Analyzer	B003	76
AMPT/SPT Asphalt Mixture Performance Tester	B200L	194
Analytical balance	V065-02	535
Andreasen pipette	S144	52, 439
Anemometer	V148-01	545
Angle measurer, Gyratory	B041-28	107
Annular surcharge weight	S200-07	453
Anvil for test hammers, concrete	C390	63, 344, 345
APS - Automatic Pave Saw	B040M	116
ARC - Asphalt Roller Compactor	B039N	108
Armoured thermometers	V162A	547
Array meter for concrete, resistivity method	C412-01	348
Asphalt compactors	B031N1 / B033N	98, 99
Asphalt content, furnace by ignition method	B005N	80, 81
Asphalt indentation penetrometer	B059-10	89
Asphalt Institute vacuum viscometers	B088-34	163
Asphalt Mix Analyzer - AMA	B003	76
Asphalt mixers	B025N	95
Asphalt Mixture Performance Tester	B200L	194
Asphalt permeameter	B024	132
Asphalt samples sealing device	B114	93
Asphalt samples vacuum drying device	B115	93
Asphalt Shear box Compactor - ASC	B039A	111
Aspirator pump	V202	455, 553
Assessment of fines aggregates: methylene set	S157-KIT	52, 439
Augers, hand and power head	S092-KIT / S097	428
Autoclave expansion, cement	E070	367
Automated Core Drill - ACD	B040-20	118
Automatic binder extraction unit	B008	78, 79
Automatic Pave Saw - APS	B040M	116
AutoRice	B067A	87
Autotec, automatic servo-controlled system two channels	C098N	212, 383
Axial displacement transducer	S336-11	503
Axial strain dial indicators	S377	503

B	Mod.	Page
Bacon sampler	B060	142
Bags, plastic	V145-10	543
Balance, moisture determination	V023-01	28, 443, 535
Balance, mud Baroid	E037-01	360
Balances, electronic	V070-02	536, 537
Balances, mechanical	V015	534
Balances, semi-automatic zero-centering	V031	534
Ball penetration measuring apparatus	E031	359
Balloon density apparatus	S230	480
Bar (grid) sieves	A048N-KIT	33
Bar container, mortar	E067-05	61, 370
Barcode scanner	C099-01	215
Baroid mud density balance	E037-01	360
Barton comb	A122	62
Basket, density	V041	47, 92, 538
Batching scales	V051	534
Bath, air	B016	141
Bath, cooling for resilience tests	H052	418
Bath, Le Chatelier	E064N	369
Baths, bitumen	B052	131, 557
Baths, Marshall	B051	130, 131
Baths, water	E136	47, 380, 455
BBR - Bending Beam Rheometer	B216	202
Beaker EN 933-9	S157-05	439, 543
Beakers, pyrex glass	V104	539
Beam apparatus, Benkelman	B100	134, 476
Beam device, travelling	B098N	133
Beam moulds, concrete	C254	316
Bearing capacity	S222-KIT	471, 476
Bearing plate equipment, soil	S222D-KIT	471
Bearing plate, asphalt	B103-10	135, 473
Bench for compression machines	C126	267, 292
Bender elements	S307-03	525, 529

Bending accessories, steel	H001A-40	402
Bending Beam Rheometer BBR	B216	202
Bending machine, steel	H065N	420, 421
Benkelman beam apparatus	B100	134, 476
Binder adhesion, Vialit	B053	136
Binder drainage, basket method	B022-20	92
Binder extraction unit	B008	78, 79
Binder recovery apparatus	B018	85
Bits, diamond for drilling machines	C339-01	118, 335
Bitumen ageing vessel	B091M	158, 159
Bitumen content furnace	B005N	80
Bitumen emulsion, lab mill	B062-10	164
Bituminous emulsions: mixing stability with cement	B076-23	147
Bituminous emulsions: residue on sieving	B076-21	147
Bladder air/water pressure system	S350N	504
Blade, diamond	C350-12	336
Blaine air permeability apparatus	E009-KIT	356
Bleeding determination, concrete	C199-10	314
Blue methylene test set	S157-KIT	52, 439
Blue of methylene	V300-28	439, 557
Böhme abrasion tester	C129	57, 300
Bond strength tester, Pull-Off	E142	341, 373
Bottle dropping	V124	541
Bottle roller	B022T	52, 88
Bottle specific gravity	V108	455, 540
Bottle, reagent	V108-10	540
Bottles, plastic	V118	543
Bouyancy balance system	V085	92, 538
Bowls, mixing	V116	550
Boxes, plastic	V127	306, 543
Breaking point, Fraas apparatus	B077	146
Breaking value of cationic emulsions	B090	142
Brickworks, testing	C358-01	338
Briquette mould, cement	E111	378, 468
Bristles	V179	37, 549
British gypsum crystacal plaster	A129-04N	66
Broaching machine, steel	H057N1	419
BRTA viscometers	B084-01	153
Brushes	V178	549
Buchner funnel	V140	544
Bucket	V128	543
Bulk cement sampler	E020	357
Bulk density measures, aggregates	A069	32
Bulk density of bitumen	V085	538
Bulk density of cement	E025	357
Bulk density of lime	E091	359
Bunsen burner	V173-01	549
Burettes, graduated	V143	542
Burner, butane	V201-01	554

C	Mod.	Page
Cabinet with aspirator for binder extraction unit	B008-10	78
Cabinet with aspirators	B079N	147
Cabinet, freeze and thaw	C313N	28, 326
Calcimeter, Dietrich-Frühling	A105	59, 371
Calcium carbide meter	A028N	30
Calibration anvil for concrete test hammers	C390	63, 344, 345
Calibration certificate (Accredia)	C138-11	303
Calibration device for Benkelman	B100-02	134
Calibration equipment for ductilometers	B055-27-KIT	146
Calibration equipment	C138M	146, 302
Calibration unit for extensometers and dial gauges	S390	531
California bearing ratio - CBR	S200-01N	452, 458
Calipers, Vernier	V175	549
Calorimeter, cement	E061N	366
Cannon BS-IP-RF viscometers	B088-80	163
Cannon-Fenske viscometers	B088-50	163
Cannon-Manning vacuum viscometers	B088-20	163
Capping equipment, gypsum method	C290-05	329
Capping equipment, sulphur method	C290-01N	329
Capping pads and retainers	C107-09	291, 328
Carbide meters	A028N	30
Carbonate content, aggregates	A105	59, 371
Casagrande liquid limit	S170	444
CBR field apparatus	S220-KIT	457, 476
CBR loading machines	S209-KIT	458
CBR moulds	S200-01N	453, 454
CBR/Marshall testers	S213-05N S214-05N	122, 459
CBR/Proctor compactor	S199	450
CDAS - 16 channels	B209-16	166, 172
CDAS - 8 channels	B209-08	166, 192
Cement air content meter	E027	358
Cement compression machines	E151 / E183N	382
Cement moulds	E102	378
Cementometers	C214-01	315
Centrifuge extractors	B011 / B015	82
Chapman flask	A029	31
Charpy pendulum testers	H062	419
Chattaway spatula	V192-08	357, 551
Chemical products	V300-05	557
Chisel	V198	480, 551
Chloride content	A019-01	29, 437
Chloride field test system	C375-01	342
Chloride ion penetration meter	C378-01	342
Clamp, Mohr and Hoffman	V220, V220-01	556
Clamping device for vibrating table	C281-05	322, 323
Clamping devices	A110-12	55, 91
Classification test for coarse recycled aggregate	S156-20	52
Clay block punching test	C093-11	269, 271, 276, 279, 296, 466
Clay slats punching device	C095-05	26, 348, 296
Cleansing bath, ultrasonic	A104N	45
Clegg hammer	S196N	454
Cleveland flash tester	B086	154
Climatic chamber freeze/thaw tests	C313N	28, 326, 327
Cohesion tester	B053-10	136
Cohesionless relative density, soil	S238N-KIT	479
Cold bend testing machine, steel	H065N	420, 421
Colour standard glass scale	S132N	59, 434

Combined second frames, concrete	C092-01	280
Combined second frames, mortar	C092-05	281, 393
Compacting factor apparatus	C185	309, 357
Compaction apparatus, filler	A124	53
Compaction hammer vibrating	S197N1	101, 454
Compaction moulds and rammers, Proctor	S185 / S187	448
Compaction moulds, Marshall	B029N-KIT	98, 100
Compaction permeameters, soil	S252	482, 483
Compactor, CBR/Proctor	S199	450
Compactor, roller	B039N	108, 109
Compactor, shear box	B039A	111
Compactors, automatic Marshall	B031N1	98
Compactors, gyratory	B041M / B045-01	102
Compactors, hand operated Marshall	B032-KIT	99
Compression device, cement and mortar	E170	388
Compression device, rock	A147	69
Compression platens, steel	H001A-50	402
Compression tester, unconfined, soil	S131-KIT	457, 476
Compression testing machines high stability	C088N / C089F	241
Compression testing machines, cement	E151 / E183N	382
Compression testing machines, concrete	C020 / C086	219
Compressometer-extensometer, elastic modulus	C134N	260
Compressometer-extensometers	C130N / C133	261
Compressors, air	S351N, V206	554
Concrete compression testers	C020 / C089	219
Concrete pipe testing machine	C093-05	265, 277
Concrete test hammers	C380	344, 345
Concrete workability meter	C189	310
Conductivity meter	V166-01N	548
Cone and tamper, sand absorption	S148	47, 136, 455
Cone penetrometers, liquid limit	S165, S166	446
Configuration of advanced parameters	C104-09	215
Confined flowability determination	C172/C173	306
Conical flasks, Erlenmeyer	V106	539, 540
Conical penetration needle, Vicat	E044-40N	361, 364
Conical sieve	B024-05	132
Consistometer Vebé	C183	307, 357
Consistometer, Walz	C188	310, 357
Consolidation apparatus, oedometer	S260, S261	484
Consolidation cells	S270	485, 487, 488
Consolidation frame	S290	494
Consolidation frame, three-cells	S359	507, 514
Constant and falling head permeameters	S245-01/S246-01	482
Containers, stell and plastic	V116, V125-12	550
Continuous flow filterless centrifuge	B014	83
Conversion frame, CBR	S221	457
Cooling bath for resilience test	H052	418
Cor Map, corrosion meter	C414	348
Core drill bits	C339-01	118, 335
Core drilling barrel, triaxial test	A136-04	72
Core drilling machine, rocks	A140-01	72
Core drilling machines	C318N	333, 335
Core face preparation device	C300-08	64, 331
Core trimmer and cut-off machine	C377-05	65, 332
Corn emery	A128-02	57
Cover meter, profometer	C396N	348
Crack detection microscope	C399	337
Crack opening measurement	C090-16	285, 411
Crack width gauges	C408	351
Craking test mould, NF P15-434	E067	371
Cross hole ultrasonic system	C373-10N	343
Crucibles, porcelain and platinum	V117 / V117-04	544
Crusher, laboratory	A092	56
Crushing coefficient machine	A108	59
Crushing resistance determination	A081-01	46, 263
Crushing value apparatus	A082	53, 262, 263
Cube moulds, cement	E110	378
Cube moulds, concrete	C223	318, 320
Cube, auto-centering device	C107	229, 291
Curing bath with cooling device	B052-02	121, 131, 380
Curing cabinets, cement	E136 / E138	380
Curing room vaporiser	C311-01N	325, 328
Curing tank, accelerated	C307	325, 378, 468
Curing tanks	C302	324
Cut-back asphalts, distillation	B069A	147
Cutting machine, specimen	C348T	60, 336
Cyber-Plus Progress, contol unit	C109M	213, 215
Cyber-Plus Progress, datalogger	S334N/C405-15M	509, 350
Cyclic Triaxlab Automated System	B220-04-KIT	524, 525, 528
Cyclic Triaxlab compression	B271-KIT	186
Cylinder moulds, concrete	C228	318-320
Cylinders capping equipment	C290-01N	329
Cylinders, graduated	V098	539

D	Mod.	Page
Datatronic 8 channels, control unit	S334N	509
Deaerator, vibro	A059-02-KIT	33, 40, 86
De-airing and vacuum system	V205-KIT	506, 518, 525
De-airing tank	S355	506
Dean-Stark, water in bituminous materials	B076	147
Decanters, plastic	V102-01	543
Deflection measurement device, concrete	C090-15	285
Deflectometer, lightweight	S228N	478
Deflectometer, telescopic	C405-10N	350
Deflectometers, swing arm	C405N	351
Degassing Oven, Vacuum	B091M-01	159
Demoulding oil	C265N	317
Density apparatus, balloon	S230	480
Density baskets	V041	47, 92, 538
Density chisel	V198	480, 551
Density gauge, no nuclear	B110	133
Density of fresh concrete	C199	314
Density of hardened concrete	V085	92, 314, 538
Density pick	V199	480, 551
Desiccators	A035	31, 455, 542
Deval testing machine	A079	50
Device with central screw	C105	288
Dewar flask	E062-01	366
Dial gauges	S375	531
Dial pocket penetrometers	S065	430
Diamond blades for cutting machines	C350-12	336

Diamond core drill bits	C339-01	118, 335
Diathermic oil	B065-14N	86
Dibber tool	S240-02	480
Die cutter soil sampler	S118	436
Dietrich-Fruhling calcimeter	A105	59, 371
Digitec, 2 channels semi-automatic control unit	C108N	211
Direct shear, large Shearmec	S279	495
Direct shear, Leutner	B047-10	121, 126, 465
Direct tension testing kit	B264-KIT	190
Direct/residual shear machines	S276-KIT S276-01M	490
Dish, evaporating	V114-01	544
Dish, Petri	V123	541
Displacement transducers	S336-11	503
Distance pieces, compression machines	C111	228, 246, 295
Distillation of cut-back asphalt	B069A	147
Distillation of emulsified asphalt	B063	143
Distilled water	V300-05	557
Distribution valve	S348	505
Door stop safety switch	C121-51	292
Drainage basket, binder	B022-20	92
Draining pavements, permeameter	B024-05	132
Drier, warm air	V201	554
Drill bits	C339-01	118, 335
Drilling machines, asphalt cores	B040-20	118
Drilling machines, concrete	C318N	333
Drilling muds, sand content	E037-10	360
Dropping ball apparatus	E031	359
Dropping bottle	V124	541
Dry-ice maker	H050	418
Drying ovens	A005-01	24
Drying shrinkage determination	A107	61
DSR - Dynamic Shear Rheometer	B085-07N	157
DTS-130, 130 kN Servo-Hydraulic Dynamic Testing System	B240	177
DTS-16, 16 kN Servo Pneumatic Dynamic Testing System	B220-01-KIT	172
DTS-30, 30 kN Servo-Hydraulic Dynamic Testing System	B230	174
Dual low capacity digital range	C097-01	288
Ductilometers	B054	144
Ductilometers with data acquisition system	B055-10	144-146
Duriez test set	B095-01	127, 469
Dynamic cone penetrometer (DCP)	S051N	426
Dynamic plate load test	S228N	478
Dynamic shear Rheometer	B085-07N	157
Dynamic Test Configurations	/	180-191
Dynamic Testing System, 130 kN Servo-Hydraulic	B240	177
Dynamic Testing System, 30 kN Servo-Hydraulic	B230	174
Dynamic Testing Systems, 16 kN Servo-Pneumatic	B220-01-KIT	172
Dynamic viscosity, rotational viscometer	B085-21N	160
Dynamometers, Pull-Off bond strength	E142	341, 373

E	Mod.	Page
Earth resistivity meter	S077N	433
Edomec, automatic oedometer	S261	485, 488
Efflux index apparatus	A073N	46
Elastic modulus on concrete	C125M	218, 258
Elastic modulus on mortar	E190M	394
Elastic modulus on rocks	A150M	67-70
Elasticity of Chatelier mould	E066-03	369, 370
Electric generator, portable	C332	333
Electro-hydraulic loading and control system	C109-09N	277
Electromagnetic CE system for centrifuge	B011-10	82
Electromagnetic vibro-deaerator	A059-02-KIT	33, 40, 86
Electromechanical gyratory compactors	B045, C158	104, 321
Electromechanical shear machine	S278	492, 496
Electromechanical universal testing machine	H012	298, 409, 464
Electronic balances	V065-02	535
Electronic universal extensometer/compressometer	C134N	260
Electro-welded wire nets test, accessory	H003-14	404
Elongation index of aggregates	A071	46
Emery, corn and flour	A128-02	57
Emulsified asphalt distillation apparatus	B063	143
End-over-end shaker	A117	59, 443
Energy absorption test on sprayed concrete slabs	C095N-16	275
Engler viscometers	B080	153
Equivalent test, sand	S158-20-KIT	51, 440
Erlenmeyer flasks	V106	539
Evaporating dishes ì	V114-01	544
Evaporation, rotary apparatus	B065	86, 152
Expansion of Portland cement, autoclave	E070	367
Explosion proof centrifuges	B011-01	82
Extensometer for wire strands	H003-18	414
Extensometer, plaster	E080	371
Extensometer/compressometer, universal	C134N	260
Extraction of binder	B008	78
Extraction of binder, centrifuges	B011	82
Extractors, asphalt	B016-10	84
Extruder for rocks	A141N	72
Extruders, asphalt and soil	S114	101, 435

F	Mod.	Page
Falling head permeameter	S246-01	482
Feeler strips	C250-12	320
Fibre reinforced concrete applications	/	286
Field CBR apparatus	S220-KIT	457
Field density	S230	480
Field inspection vane tester	S057	426
Filler compaction apparatus	A124	53
Filter discs, centrifuge	B010-15	82
Filter flasks, glass	V107	540
Filter funnel	V138	542
Filter paper	V218-01	557
Filter press, muds	E037-05	360

Filterless centrifuge	B014	83
Fine wire brush	V178-01	549
Fineness of cement, Blaine apparatus	E009-KIT	356
Fineness of fly ash by wet sieving	E017	357
Flakiness / thickness gauge	A070	46
Flakiness index	A048N-KIT	33
Flakiness sieves	A049-KIT	33
Flash and fire tester, Cleveland	B086	154
Flash point, viscometer	B092A	155
Flask, Chapman	A029	31
Flasks, Erlenmeyer	V106	539
Flasks, volumetric	V109	540
Flat jack method	C358-01	338
Flatness verification of specimens	C250-10	320
Flexural and compression tests on cement	E152 / E183N	386-391
Flexural and transverse testing frames	C095N / C093-03N	265
Flexural device with centre point	S205-18	296, 297, 466
Flexural device, clay blocks	C093-11	269, 271, 276, 279, 296, 466
Flexural frame, high stiffness and stability	C090-06N	270
Flexural test device, concrete beams	C106	290
Flexural testing machines, concrete	C090 / C091-03A	264
Flexural tests on clay block portion	C095-05	296
Flexural toughness of FRC concrete	C095N-17	275, 287
Flexure devices, mortar prisms	E172-01	388
Flexure test on concrete beams, accessory	C095N-11	274, 287
Flooding system, controlled cabinet	C313-05N	28, 327
Flour Emery	A128-03	57
Flow cone apparatus, cement	E038	360
Flow meter, Marshall	B047	119
Flow tables, cement	E086N-KIT	372
Flow tables, concrete	C208, C192-KIT	309, 315
Flow time determination	C174N	307
Fluidity test of grouts	E059	365
Fly ash fineness by wet sieving	E017	357
Force transfer digital tester	C155M	301
Four point bending jig	B212	182, 193
Four Point Bending System - Servo Pneumatic	B210-KIT	192
Four point flexure device	S205-16	296, 297, 466
Fraass apparatus	B077	146
FRC tests	/	286
Free expansion in plastic period, cement	E060	365
Freeze and thaw chambers	C313N	28, 326, 327
Fresh concrete testing	C180-KIT	308
Friction tester (Skid)	A113	54, 90, 300
Front loading oedometer	S260	484, 487
Fume exhaust cupboard	B079N	83, 147
Funnel, Buchner	V140	544
Funnel, Marsh viscometer	E037	360
Funnels, glass	V119	541
Funnels, plastic	V135	543
Furnace, ignition method for asphalt	B005N	80
Furnaces	A022	27

G	Mod.	Page
GAM - Gyratory Angle Measurer	B041-28	107
Gas jar	A116-11	59, 443
Gasometer, Dietrich-Frühling	A105	59, 371
Gauge, non nuclear	S059	432
Gauges, compression machines	C118-03	292
Gauges, crack width	C408	351
Gauges, dial indicators	S375	531
Gauges, flakiness, thickness	A070	46
Gauges, go-not go	C250-16	320
Gay-Lussac bottles	V108	455, 540
General equipment	/	534-557
Generator, electric portable	C332	333
Geological hammers	A132	62
Geometrical properties of aggregates	S156-20	52
Gillmore apparatus	E058	361
Glass microspheres	A057-31	44
Glassware	V098	539
Gloves	V177	549
Glycerine	V300-16	557
Gooch crucible	B075-05	152
Graduated impurities test bottle	S132-01	434, 541
Grids, bae sieves	A048-01	33
Grinder - Polisher	A095	63
Grinding machine	C299	330
Grooving tools	S173-03	444
Grouts tests	E036-KIT	359
Guards, safety for compression machines	C121	292
Gypsum tests	E055N	361
Gyratory compactor for concrete	C158	321
Gyratory compactors	B041M, B045	102
GyroResearch, gyratory compactor	B045-01	102-106

H	Mod.	Page
Hamburg wheel tracker, Smartracker	B038AM	112-115
Hammer with microprocessor, concrete	C386M	345
Hammer, geological	A132	62
Hammers, rebound concrete test	C380	344
Hammers, steel and rubber	V193	551
Hardened concrete testing	C254-01	340
Hardness test kit of water	S137	434
Heat of hydration calorimeter	E061N	366
Heater, immersion	B051-01	130
Heater, isomantle	B028-01	94
Heater, soil	S155-09	438
Hoek triaxial cells, rocks	A135 / A139	72
Hoffman screw clamp	V220	556
Hollow punches and tampers	S122-08	494
Hollow punches and tampers, direct/ residual shear	S122-08	436, 494
Hopper, feed	E106	378
Hot extraction apparatus, bitumen	B017-KIT	84
Hot extractor set	B016-10	84
Hot plate with magnetic stirrer	B073-01	29, 150, 552
Hot plates	B074, V200	552
Hubbard-Carmik gravity bottles	V111	146, 541
Humidity and temperature cabinet	C313N	326

Hydration calorimeter, cement	E061N	366
Hydraulic constant isotropic cell pressure system	A142N	73
Hydraulic pumping systems, compression testers	C113	210, 293
Hydraulic shrinkage determination	C365	340
Hydraulic shrinkage of cement	E072	367
Hydrometer test set	S155-KIT	438
Hydrometers, soil	V172	548
Hygrometer, hair	V169	545

I	Mod.	Page
Identification label	C223-05	320
Ignition method, bitumen furnace	B005N	80
Impact compactors, Marshall	B031N1 / B033N	98
Impact failure test on tiles	C096	299
Impact soil tester	S196N	454
Impact value apparatus, aggregates	A080-KIT	50
Impermeability, water in concrete	C435	353
Impurities test bottle	S132-01	541
Indentation penetrometer	B059-10	89
Index of velocity of rocks	C369N, C372M	346, 347
Indirect resilience modulus test	B250-KIT	180
Indirect tensile fatigue	B251-KIT	180
Indirect tensile, asphalt	B047-02	119, 121
Infrared thermometer	V155	546
Inverter device	C099N	215
Ion exchange device	S140	437
Ion exchange resin	V300-30	437, 557
IP thermometers	B057-08A	547
Isomantle heater	B028-01	94
Isotropic cell pressure system	A142N	73

J	Mod.	Page
Jacks, flat for tests on brickworks	C358-01	338
Jar mill	A091-10	56
Jaws laboratory crusher	A092	56
Jig, core face preparation	C300-08	64
Jigs for automated asphalt saw	B040-10M	117
Joisel apparatus	C211	311
Jolting apparatus, cement	E130	378
J-Ring, confined flowability	C174N	307

K	Mod.	Page
Kaolinite	V300-29	439, 557
Kelly ball apparatus	C186	310
Kerbs and slabs device	C091-13	290
Kinematic viscosity determination	B088N..	162
Knife, trimming	S125	436, 551
Kohlraush calibration flask	B082-06	153
K-slump tester	C187	310
K-type thermocouple	C216	315
Kumagawa extractor	B061	84

L	Mod.	Page
Ladle	V186-01	329, 551
Langavant calorimeter	E062-10	366
Lateral pressure control system	C104MLPP	70
Lathe, soil	S120	436
L-box apparatus	C172	306
Le Chatelier flask	E014	357
Le Chatelier, mould	E066	369
Le Chatelier, water bath	E064N	369
Length comparators, cement	E077-KIT	368
Length gauge, aggregates	A071	46
Leutner test	B047-10	121, 126, 465
Lightweight aggregates, crushing resistance	A081-01	46, 263
Lightweight dynamic penetrometer	S050	426
Lime testing reactivity apparatus	E034	358
Linear displacement transducers	S336-14	503
Linear shrinkage mould, soil	S176	445
Liquid limit casagrande method	S170	444
Liquid limit cone method	S165-KIT	446
Load cells, calibration equipment	B055-27-KIT	146
Load cells, standard	C140	303
Load cells, strain gauges	C142	303
Load frame, 3 speeds	S214-05N	122, 460
Load frame, Marshall	B042-KIT	119
Load proving rings	S370 / S372	530
Los Angeles abrasion machine	A075N	48
Loss on heating, TFOT	B064N	148
Loss on ignition of cement	A024	27

M	Mod.	Page
Mackintosh prospecting kit	S051-01	427
Macrotexture depth, Sand patch	B099-10	132
Magnesium sulphate test	A103	60,538
Magnetic stirrer	B073-01	29, 150, 437
Magnetic, holder	S380	531
Mallets, rubber and steel	V194	480, 551
Mandrels	H066-04	421
Mandrels for bend-rebend test	H001B-42	403
Marking pencil	V147-01	542
Marking-off machine	H020	418
Marsh funnel mud viscometer	E037	360
Marshall compaction mould	B029N-KIT	98
Marshall load frames	B042-KIT	119
Marshall test software	B043-01N	120, 129
Marshall, automatic compactors	B031N1 / B033N	98, 99
Marshall, manual compactors	B032-KIT	99
Marshall, water baths	B051	130
Masses, standard calibration weight	V035-01	535
Max./Min thermometer	V163A	547
Measurers, unit weight	C199	314
Measuring cylinders	V098	539
Measuring pipettes	V142	542
Measuring tester digital, concrete	C155M	301
Mechanical strain gauges	C360-KIT	337
Melting pot	A106N	29, 329
Methylene blue test set	S157-KIT	439
Micro-coring equipment	C377	65, 332
Micro-Deval machine	A077	49
Microlance moisture meter	A021	31
Microscope, crack detection	C399	337
Microspheres, glass	A057-31	44

Microwave oven	A009	28
Mill, emulsion	B062-10	164
Mill, jar	A091-10	56
Mineral filler method	B090	142
Mixer, dry materials	A093	56
Mixers, asphalt/bitumen	B025N	95
Mixers, concrete	C163	304
Mixers, mortar	E092M	374
Mixing bowls	V116	550
Modified Proctor mould	S186	448
Modulus of elasticity, mortars	E190M	394
Mohr clamp	V220-01	556
Mohr, pipettes	V142	542
Mohs hardness scale set	A115N	62
Moist curing room	C309-10	325
Moisture density (Proctor test)	S185	448
Moisture density gauge, nuclear	S058	432
Moisture determination balance	V023-01	443, 535
Moisture induced stress tester	B068	93
Moisture meter, surveymaster	C374	342
Moisture meters	A021	31
Moisture testers, aggregates/soil	A028N	30
Moisture/density relationship	S238-01N-KIT	479
Mortar and pestle, porcelain	V112	544
Mortar and pestle, stainless steel	V112-05	550
Mortar bar container	E067-05	370
Mortar mixers	E092M	374
MOT straightedge	B099-KIT	134
Mould, craking test	E067	371
Mould, Duriez test	B095-01	127, 469
Mould, grout spread test	E036-01	359
Mould, Le Chatelier	E066	369
Mould, P.R.D.	B097	101
Moulds CBR	S200-01N	453
Moulds Marshall, ASTM	B030-KIT	101
Moulds Marshall, EN	B029N-KIT	98
Moulds Proctor	S185	448
Moulds, cement	E102 / E112	378
Moulds, concrete	C223	318-320
Moulds, ductility	B054-01A	144
Moulds, expansion and shrinkage test	E072	367
Moulds, gyratory compactor	B041-05	105
Moulds, soil	S195-01	456
Mud Baroid balance	E037-01	360
Muds testing	E038	360
Muffle furnaces	A022	27
Multispeed testers	S212M, S215A	459, 461
Multi-tester 200 kN	S206M	125, 463
Multi-tester 50 kN	S205M	124, 462

N	Mod.	Page
NDT concrete	C380	344
Needle cleaning device	E044-30	364
Needle for penetrometer	B057-06	139, 140
Neoprene gloves	V177-01	549
Neoprene pads	C107-18	291, 328
Noise reduction cabinet	A058N	41
Nuclear gauge verification and calibration device	S058-11	432
Nuclear moisture density gauge	S058	432

O	Mod.	Page
O ring	S311	501
Oedometer	S260	484, 487
Oedometer, automatic	S261	485, 488
Ohaus, balances	V015	534
Oil, demoulding	C265N	317
Oil, hydraulic for compression machines	C114-10N	293
Oil/water constant pressure system	A144	73
Organic impurities in soils	S132N	59, 434
Oven, rolling thin-film	B066M	148
Ovens, laboratory	A005-01	24
Overlay Tester	B215	198

P	Mod.	Page
Packaged cement tube sampler	E021	357
Packing set, compression machines	C122	294
Packing strips	C100-01	289
Pads, neoprene	C107-18	291, 328
Pan type mixers	C164	304
Pans, aluminium and stainless steel	V182	550
Paraffin wax	V300-19	29, 366, 557
Particle charge tester	B063-10	143
Particle density and water absorption	V085	538
Particle density of filler	V108-01	47, 455, 540
Particle loss and resistance to fuel	A075N	48
Particle shape, aggregates	A048N-KIT	33
Particle size analysis of soils	S155-KIT	438
Particle size distribution	S143-KIT	439
Pat test	E082	369
PAV, Pressure Ageing Vessel	B091M	158
Pavement core drilling machines	C319	334
PaveMix, bitumen mixer	B026-05N	96
Pavetest Products	B200L / B293-02	166-205
Pedestal, compaction	B036	99
Pencil, marking	V147-01	542
Pendulum testers, Charpy	H062	419
Penetration depth of water	C435	353
Penetration of bituminous materials	B059M	138
Penetrometer load ring	S086	431
Penetrometer, asphalt indentation	B059-10	89
Penetrometer, automatic	B059M	138
Penetrometer, concrete	C213	311
Penetrometer, dynamic cone (DCP)	S051N	426
Penetrometer, Kelly ball	C186	310
Penetrometer, lightweight	S050	426
Penetrometer, Proctor	S088	431
Penetrometers, bitumen	B056-KIT	142
Penetrometers, liquid limit	S165	446
Penetrometers, pocket soil	S065	430
Pensky-Martens tester	B094A-KIT	155
Percentage refusal, P.R.D.	B097	101
Permeability apparatus, Blaine air	E009-KIT	356
Permeability apparatus, concrete	C430	352
Permeability attachment	S275N	73, 485

Permeability of rock	A135-05	73
Permeameter for in situ drainability	B024	132
Permeameter stand, soil	S248	483
Permeameter, radial-flow falling head	B024-10	132
Permeameters, soil	S245-01	482
Personal computer for testing machines	H009-01	288
Pestle, rubber heated	V113	436, 544
Petri dish	V123	541
PH metres	V215	437, 555
Pick mattock	V197	551
Pinhole test equipment	S244N	479
Pipe testing machine	C093-05	277
Pipette, Andreasen	S144	52, 439
Pipette, measuring	V142	542
Planetary abrasion tester	B053-20	136
Planetary mixers	B025N	95
Plaster adhesion tester	E142	341, 373
Plaster extensometer	E080	371
Plastic cube, cylinder and beam moulds	C223	318
Plastic limit set, soil	S178	445
Plastic products	V102-01	543
Plasticity meter, concrete	C190	310
Plate bearing test, asphalt	B103-05-KIT	135
Plate bearing test, soil	S222D-KIT	471
Platens for compression machines	C110	295
Plates, hot	V200	29, 552
Platform balances	V075-20	536, 537
Platinum crucible	V117-04	544
Plunger	S156-20	52
Plunger penetration apparatus	E083	371
Pocket penetrometers and shear vanes	S065	430
Pocket penetrometers for concrete	C194	311
Point load tester	A125N	63
Poisson's ratio determination	A021	31
Poker vibrators	C272	323
Polarity of bitumen emulsion	B063-10	143
Polished stone value apparatus	A128N	57, 91
Polisher - Grinder	A095	63
Polystyrene cube mould, concrete	C231N1	319
Porcelain products	V112	544
Pore pressure measurement	S336-50	506
Porosimeters, concrete	C195	312
Porous stones	S274U	485
Portable coring machine	C318N	333
Pot for melting wax	A106N	29, 329
Potential alkali reactivity, cement-aggregates	E067-05	370
Potential alkali reactivity, concrete-aggregates	A101M, A030	31, 61
Potential corrosion meter	C414	348
Potentiometric transducers	S336-11	503
PRD mould B097 101		
Pressure Ageing Vessel	B091M	158
Pressure and volume control	S349A-01 / S349N	504, 520
Pressure control panels	S342-01	505, 510
Pressure maintainer	A129-02	66, 73
Pressure transducers, concrete	C116-01N	293
Pressure transducers, pore	S336-50	506
Pressurematic PVC	S349A-01 / S349N	504, 520
Printer, laser, bench	C128	288
Prism moulds, cement	E102	378
Prism moulds, shrinkage	E114/E075	368
Probe, Windsor	C410	349
Proctor and CBR compactor	S199	450
Proctor moulds and rammers	S185 / S187	448
Proctor penetrometer	S088	431
Profilometers (Barton comb)	A122	62
Profometers, metal detector	C396N	348
Prospecting kits, soil	S052-KIT	427
Proving rings, load	S370 / S372-12	530
Pull-Off, bond strength tester	E142	341, 373
Pull-Out tester	C376N	341
Pulse velocity tester, ultrasonic	C369N	346
Pump, submersible	C306-02	325
Pumping units	C113	210, 293
Punching test on clay blocks	C093-11	269, 271, 276, 279, 296, 466
Pyknometer, soil	S147	455
Pyknometer, vacuum, asphalt	B067N	86
Pyknometers, pyrex glass	V103	47, 539

Q	Mod.	Page
Quantab, chloride titrator strips	A019-01	29, 437
Quartering canvas	A085	53

R	Mod.	Page
Radial-Flow falling head permeameter	B024-10	132
Rain gauges	V167	545
Rammers, proctor compaction	S187	449
Rate indicator, CBR	S210-02	458
Rate of spread device	B053-05	136
Reaction container	A030	31
Reactivity of lime test apparatus	E034	358
Reagent bottles	V108-10	540
Rebar detector and cover meters	C396N	348
Rebound concrete hammers	C380	344
Recovery apparatus, binder	B018	85
Recovery solvent, still	B021	83
Redwood, viscometer	B084-01	153
Reference cement	E010-02	356
Reference fillers	B090-19	142
Reference rods	E078-01	61, 368
Reflux extractor	B019-KIT	85
Refrigerator, water	E141	381
Refusal, percentage density test	B097	101
Relative density of aggregates	S147	455
Relative density of cohesionless soil	S238N-KIT	479
Residue on sieving, bituminous emulsions	B076-21	147
Resilience test, cooling bath	H052	418
Resilience test, pendulum testers	H062	419
Resistivity array meter, concrete	C412-01	348
Resistivity meter, soil	S077N	433
Resonance frequency meter	C393N	343
Restrained expansion	E114	340
Retainers, capping	C107-09	291, 328

Rheometer, bendind beam	B216	202
Rheometers, dynamic shear	B085-07N	157
Rice-Test	B067N	86
Riffle boxes	A062	32
Ring and Ball apparatus	B072	150
Ring and Ball apparatus, automatic	B070M	151
Rings, load proving	S370 / S372	530
Rings, load proving with safety device	S370-01S	502
Road surface irregularity	B098N	133
Rock and masonry saw	C348T	60, 336
Rock classification hammer	C381	63, 344
Rock compression device	A147	69
Rock cradle	A121	63
Rock elastic modulus	A150M	67
Rock index of velocity	C372M	347
Rock shear box apparatus	A129	66
Rock strength index	A125N	63
Rock triaxial Hoek cells	A135	72
Roller Compactor, asphalt	B039N	108
Roller, bottle	B022T	52, 88
Rolling Thin-Film Oven	B066M	148
Rotary automatic scale	V059	534
Rotary evaporation apparatus	B065	86, 152
Rotational viscometers	B085-21N	160
Rubber tubing	V230	556
Rules	V176	549

S	Mod.	Page
Safety electromagnetic micro-switch	B011-10	82
Safety guards, concrete	C121	292
Sample containers, airtight lid	V125	550
Sample splitters, aggregates	A062	32
Sampler, Bacon	B060	142
Samplers, cement	E020	357
Samplers, die cutting	S118	436
Samplers, surface soil	S084N-KIT	429
Sampling equipment for soil	S052-KIT	427
Sand absorption cone and tamper	S148	136, 455
Sand bath	V241	557
Sand content of drilling muds	E037-10	360
Sand density cone apparatus	S234	481
Sand equivalent shakers	S160N	442
Sand equivalent test set	S158-KIT	440
Sand for mortar mixers	E097-01N	375, 377
Sand patch equipment	B099-10	132
Sand replacement apparatus	S236-KIT	481
Sand, standard	S235N	481
Saw, asphalt automatic	B040M	116
Saw, rock and masonry	C348T	336
Saybolt viscometers	B087	154
Scales	V059	534
SCB, semi circular bend test	S205M	127, 462
SCC self compacting concrete	C171	306
Scoops	V183	551
Scraper	S240-01	480
Scratch hardness test	A087	50
Seismograph	S079N	433
Servo-Plus Progress, control unit	C104N	214
Servo-Research control unit	C104-03N	218, 282-287
Setting time and consistency of cement	E055N / E044A	361, 362
Setting time of concrete by penetration	C213	311
Settling tendency of bitumen emulsions	B075-01	152
Shaker for sieves, high capacity	A061N	42
Shaker, End-Over-End	A117	59, 443
Shakers for sieves, electromagnetic	A059-01-KIT	40
Shakers, sand equivalent	S160N	442
Shape gauge, aggregates	A072	46
Shear apparatus, direct/residual	S276-KIT	490
Shear box apparatus, rocks	A129	66
Shear box compactor, asphalt	B039A	111
Shear boxes	S282	494
Shear rheometers, bitumen	B085-07N	157
Shear vane devices	S075	430
Shearlab, shear test apparatus	S276-KIT	490
Shearmec, automatic shear machine	S278	492
Shovel	V196	551
Shrinkage limit set	S175	445
Shrinkage of cement/mortar	E075	367
Shrinkage of concrete	C365	340
Sieve conical	B024-05	132
Sieve grids (bar), flakiness	A048N-KIT	33
Sieve shakers	A060-01 / A061N	42-44
Siever, air jet	A058-05N	38
Sieves	A052…	34
Sieves, wet washing	A045	37
Silica evaporating dish	V114-10	544
Silica gel	V300-15	557
Silica sand, type Ottawa	E097-02	375, 377
Skid tester	A113	54
Slabs and kerbs device	C091-13	290
Slake durability apparatus	A130	64
Slaking vessel	E035	358
Slotted distance pieces	C111-27	234
Slotted weights	S273-01	486
Slump cone, Abrams	C178-KIT	308
Slump flow table, concrete	C192-KIT	309
Slurry seal mixxture, cohesion test	B053-10	136
SmartLab software	SSW-LINK	18
Smartracker	B038AM	112
Soaking tank	S201-05	452
Sodium hexametaphosphate	V300-23, V300-25	557
Softening point apparatus Wilhelmi	B072-20	143
Softening point, ring and ball	B072	150
Softmatic, automatic ring and ball	B070M	151
Software, SmartLab	SSW-LINK	18
Software, TestLab	/	167
Software, UTM2	/	21
Soil colour chart, Munsell	S133N	434
Soil hydrometers	V172	548
Soil moulds	S195-01	456
Soil prospecting kit	S052-KIT	427
Soil samplers	S084N-KIT / S053	429
Solubility of bituminous binders	B075-05	152
Solvent recovery still	B021	83
Soundness of building lime	E081-10	370
Soundness of cement and lime	E064N	369

Soundness of hydrated lime	E082	369
Soxhlet modified method	B016-20	84
Spatulas	V192	445, 551
Special configuration of advanced parameters	C104-09	215
Specific gravity bottle	V108, V111	455
Specific gravity frame	V085	538
Specific gravity, cement	E014	357
Speedy moisture testers	A025-01	30
Splitter, asphalt	B007	87
Splitters for aggregates	A062	32
Splitting tensile test devices, concrete	C100	299
Splitting tensile test, asphalt	B047-02	119, 126, 465
Splitting tensile test, rock	A148	69, 467
Spoon	V186	480, 551
Sprayed concrete, energy absorption	C090-14, C095N-16	271, 275
SPT asphalt mixture performance tester	B200L	194
Stability mould, Marshall	B046N	119-123, 126
Stability test, Marshall	/	126, 465
Stability verification	C155M	301
Stabilized soil strength	S195-01	456
Stand alone Four Point Bending System	B210-KIT	192
Stand alone TSRST	B282-10	200
Stands, metal	V219	556
Static elastic modulus, concrete	C125M	258
Steam bath	E081-10	370
Steel testing equipment	/	398-423
Stiffening time of cement	E083-10	371
Stirrers	S156-01 / S157-01	438, 439
Stirrer, high speed	S156-01	438
Stirrer, magnetic	B073-01	29, 150, 437
Stirring rods	V147	542
Stop watch	V170	440, 548
Storage stability of asphalt emulsions	B063-05	143
Straight edge, MOT	B099-KIT	134
Strain gauge load cells, electric	S337-31...	413, 502
Strain gauges, concrete	C360-KIT	337
Strain gauges, uniaxial and triaxial tests	C125-10	68, 259, 395
Strain transducers	S336-15	503
Strap wrench	C344	335
Strength index, rocks	A125N	63
Strength of stabilized soil	S195-01	456
Stress-path	A201	71
STS-25 static testing system	B225V	204
Submersible circulating pump	C306-02	325
Submersible load cells	S337-02	502
Sulphate test strips	A019-03	29, 437
Sulphur capping equipment	C290-01N	329
Surface soil samplers	S084N-KIT	429
Survey, earth resisitivity meter	S077N	433
Surveymaster, moisture meter	C374	342
Swelling and settling ratio	S194-23/26	453

T	Mod.	Page
Table, flow of concrete	C208	315
Table, flow of mortar	E086-KIT	372
Tables, vibrating	C278	322
Tag closed/open viscometers	B092A	155
Tampers, soil	S123...	436
Tamping bar	C261	317
Tanks curing, concrete	C302	324
Tar (Redwood) viscometers	B084-01	153
Telescopic tubolar sensor	C405-10N	350
Temperature and humidity cabinets	C313N	326
Temperature control panel	C309-10	325
Temperature measurement	V150N	546
Temperature monitoring	C216	315
Tensile and compression machines	H010-01N	405
Tensile splitting test for concrete	C100	299
Tensile testing device, asphalt	B047-02	119, 121
Tensile testing machines	H001A	399, 404
Tensile tests on mortar briquettes	S205-07	468
TestLab software	/	167
TFOT bitumen oven	B064	149
Thermal properties of aggregates	A103-10	60
Thermal shock resistance	A023	27, 62
Thermohygrograph	V168	545
Thermo-hygrometer	V165-01	548
Thermometer, infrared	V155	546
Thermometer, concrete temperature	C216	315
Thermometers	V150N	546
Thermometers, armoured	V162A	547
Thermostat, analogic	C306-05	325
Thickness gauge	A070	46
Thin-Film ovens, RTFOT	B066M	148
Tiles, testing on	S205-18	296, 297, 466
Tilt Test	A122-10	64, 88
Timing device	V171	548
Tins	V122	550
Tongs, crucible	V174	549
Tool kit	V222	556
Top loading digital balances	V070-02	536
Transducer, crack opening	C090-16	285
Transducers, linear	S336-11	503
Transducers, pressure	C116-01N	293
Transducers, for triaxial systems	S336-50	506
Transfer dish	B057-03	139, 140, 142
Transverse deformation test on tile adhesive	S205-13	468
Travelling beam device	B098N	133
Trays, mixing	V182	317, 550
Trays, screen	A061-07…	43
Triaxial cells	S305	500
Triaxial load frame	S301M / S301-02	498
Triaxial testing kit	B274-KIT	187
Triaxial tests on rock	/	70
Triaxlab Automated System	S301-01N	516
Triaxlab Automated System, Cyclic	B220-04-KIT	524-528
Trimmer, soil lathe	S120	436
Trimming knife	S125	436, 551
Trimming/cut off machine for cores	C377-05	65, 332
Triple beam balance	V016	534
TRL dynamic cone penetrometer	S051N	426
Trolleys	V224	556
Trowels	V187	317, 551
TSRST, thermal asphalt system	B282-10	201

Tubing, rubber	V230	556
Two point bending (2PB)	B280-KIT	184
Two-way hydraulic valve	C115-01	293
Two-way pressure panel	S342-01	505, 510

U	Mod.	Page
Ultrasonic cleansing bath	A104N	45
Ultrasonic cross-hole system	C373-10N	343
Ultrasonic pulse velocity testers	C369N /C372M	346, 347
Unbonded capping pads and retainers	C107-09	291, 328
Unconfined compression platens	S212-08N	459, 467
Unconfined compression tester, soil	S131-KIT	457
Uniaxial cyclic compression	B260-KIT	181, 184
Uniaxial splitting tensile, rock	S205M	124, 296, 462
Unimec 300 kN universal frame	H012	409
Unit weight measurers	C199	314
Unitronic 200 kN universal frame	S206M	125, 463
Unitronic 50 kN universal frame	S205M	124, 462
Universal carbide meters	A028N	30
Universal multispeed load frames	S212M	123, 459, 461
Universal tensile/compression machine	H010-01N	405
Universal testing machines, steel	H001A/H001DS	398-400
U-shape box, confined flowability	C173	306

V	Mod.	Page
Vacuum Degassing Oven	B091M-01	159
Vacuum pumps	V205	506, 553
Vacuum pyknometers, bitumen	B067N	86
Vacuum viscometer bath	B088-01N	162, 163
Valves, hydraulic, two way	C115-01	293
Vane testers	S057	426
Vane, laboratory apparatus	S074N	431
Vaporisers, curing rooms	C311-01N	325, 328
Vaseline oil	S328	557
VDO, Vacuum Degassing Oven	B091M-01	159
Vebé consistometer	C183	307
Verification of force transfer	C155M	301
Vernier calipers	V175	549
V-Funnel apparatus, SCC	C171	306
Vialit, binder adhesion tester	B053	136
Vibrating compaction hammer	S197N1	454
Vibrating machine, cement cubes	E132	379
Vibrating table, Vebé	C184N	307
Vibrating tables, concrete	C278	322
Vibrators, poker	C272	323
Vibratory compaction method	B097	101
Vibro-deaerator	A059-02-KIT	40, 86
Vicat apparatus, manual	E055N	361
Vicatronic, automatic Vicat apparatus	E044A	362
Viscometer bath	B088N	162, 163
Viscometer, Marsh funnel for cement	E037	360
Viscometers, bitumen	B080 / B094-KIT	153
Viscometers, kinematic	B088-20 / B088-90	163
Viscometers, rotational	B085-21N	160, 161
Void content of fine aggregate	A071-10	45
Voids content of dry filler	A124	53
Voids of aggregates	A069	32
Voltage stabilizer	V208-10	554
Volume change apparatus, 2 burettes	S358	507
Volumeter for aggregates	A086	53
Volumetric flasks, glass	V109	540

W	Mod.	Page
Walz consistometer	C188	310
Warm air dryer	V201	554
Wash bottles	V120	543
Washing sieves	A045	37
Watch glass	V115	541
Watch, stop	V170	548
Water impermeability tester	C435	353
Water bath for bitumen penetrometer	B058	142
Water bath with cooling device	B052-02	131
Water bath: Le Chatelier	E064N	369
Water baths, curing of cement	E136 / E139	380
Water baths, Marshall	B051	130
Water in bitumen emulsions	B075, B076	147
Water level indicators, soil	S061	429
Water permeability one-coat, mortar	E035-10	365
Water permeability, concrete	C430	352
Water refrigerator	E141	381
Water retention apparatus, cement	E039-01	359
Water sensitivity, asphalt	B052-02	131
Water stills	V211	555
Water test set for concrete	C220	311
Water vapour permeability	E082-11N	370
Wax paraffin	V300-19	29, 366, 557
Wax, melting pot	A106N	29, 329
Weather station	V148	545
Weighting bottles	V110	541
Weights for balances	V036	535
Weights, slotted	S273-KIT...	486, 491
Welded wire nets test	H003-14	404
Wet washing sieves	A045	37
Whatman filter paper	V218-01	557
Wheelbarrow	V226	556
Wheeltracker, Hamburg	B038AM	112-115
Wilhelmi, softening point apparatus	B072-20	143
Windsor probe	C410	349
Wire mesh filter method	B017-KIT	84
Wire strands extensometer	H003-18	414
Workability apparatus, cement	E081	370
Workability apparatus, concrete	C189	310
Workable life and correction time of fresh mortar	E083-10	371

Y	Mod.	Page
Yield of lime	E035	358
Young modulus	A021	31

Z	Mod.	Page
Zeitfhchs cross-arm viscometers	B088-70	163

AASHTO	Page
AASHTO M320, M332	157
AASHTO PP75	93
AASHTO R28	158, 159
AASHTO T100	47, 455
AASHTO T107	367
AASHTO T119	308
AASHTO T126	316, 317, 323, 329
AASHTO T127	357
AASHTO T131	361, 362
AASHTO T132	378, 468
AASHTO T133	357
AASHTO T134	448
AASHTO T137	357
AASHTO T142	31
AASHTO T152	312
AASHTO T153	356
AASHTO T154	361
AASHTO T162	374, 376
AASHTO T164	82
AASHTO T166	92
AASHTO T176	51, 440, 441, 442
AASHTO T179	149
AASHTO T180	448, 450, 451
AASHTO T19	314
AASHTO T191	481
AASHTO T193	128, 129, 450-453, 457, 458, 461, 465
AASHTO T197	311
AASHTO T201	163
AASHTO T202	162, 428, 430
AASHTO T205	480
AASHTO T208	457, 467
AASHTO T209	86, 87
AASHTO T21	59, 434, 443, 482, 484, 488
AASHTO T215	482
AASHTO T216	484, 488
AASHTO T217	443
AASHTO T22	209, 219-238, 241-253, 291, 328, 405
AASHTO T23	316, 317, 323, 324
AASHTO T231	329
AASHTO T236	490, 492
AASHTO T240	148
AASHTO T245	100, 101, 119, 120, 126, 128, 130, 465
AASHTO T256	134, 135, 476
AASHTO T260	342
AASHTO T27	32
AASHTO T277	342
AASHTO T283	119, 121, 123, 126, 128, 129, 465
AASHTO T300, T301	145
AASHTO T307	186, 523
AASHTO T308	80
AASHTO T310	432
AASHTO T312	102, 103, 104
AASHTO T313	202, 203
AASHTO T314	205
AASHTO T315	157
AASHTO T316	157, 160
AASHTO T321	111, 182, 192
AASHTO T322	111, 182
AASHTO T324	114, 115
AASHTO T342	185
AASHTO T343	123
AASHTO T344	107
AASHTO T350	157
AASHTO T378	187, 194, 195, 197
AASHTO T393	188, 196
AASHTO T399	432
AASHTO T40	142
AASHTO T47	149
AASHTO T48	154
AASHTO T49	138, 140, 141
AASHTO T51	144, 145
AASHTO T53	150, 151
AASHTO T54	153
AASHTO T55	147
AASHTO T72	154
AASHTO T73	155
AASHTO T78	147
AASHTO T84	47, 538
AASHTO T85	92, 538
AASHTO T851	228, 229, 234, 246, 291, 328
AASHTO T86	427, 428
AASHTO T87	32
AASHTO T88	438
AASHTO T89	444
AASHTO T90, T92	445
AASHTO T96	48
AASHTO T97	229, 235, 237, 239, 247, 249, 255, 257, 266
AASHTO T99	448, 450, 451
AASHTO TP10	189, 200, 204, 205
AASHTO TP105	204
AASHTO TP107	194
AASHTO TP124	127, 188, 196, 204, 205, 467
AASHTO TP31	180
AASHTO TP33	45
AASHTO TP4	102
AASHTO TP46	186

ACI	Page
ACI 228.2R	348
ACI 347	349

AG:PT	Page
AG:PT/T231	115
AG:PT/T233	182
AG:PT/T274	182

ALP	Page
ALP A StB T48A	121, 126, 465
ALP A StB T80	121, 126, 465

AMAAC	Page
AMAAC Mex Protocol	114

API	Page
API 509	155

AS	Page
AS 1141.21	262
AS 1289	450
AS/NZS 2891	102, 180, 184

ASTM	Page
ASTM 03	192
ASTM 8225	183
ASTM A1061	401, 414
ASTM A370	398, 401, 410, 415, 419, 469, 470
ASTM A615	402, 403, 420, 421
ASTM C1018	282, 285
ASTM C1040	432
ASTM C109	290, 375, 377, 378, 380, 381, 383-391, 411
ASTM C110	359
ASTM C114	342
ASTM C117	52
ASTM C1170	307
ASTM C1194	290, 384-392
ASTM C1202	342
ASTM C1231	228, 229, 234, 246, 291, 328, 398
ASTM C124	315
ASTM C1252	45, 46
ASTM C127	25, 26, 538
ASTM C128	47, 538
ASTM C131	48, 88
ASTM C1314	216, 230-233, 250-253
ASTM C136	25, 26, 32, 310, 412
ASTM C1362	310
ASTM C138	314
ASTM C1398	361
ASTM C140	216, 217, 230-233, 250-253
ASTM C141	361
ASTM C143	308
ASTM C1506	359
ASTM C151	367
ASTM C1550	272, 273, 275, 282, 284-287
ASTM C1567	370
ASTM C1609	270, 274, 282, 284-287, 298, 411
ASTM C1702	366
ASTM C1760	342
ASTM C183	307, 357
ASTM C185	309, 357
ASTM C187	361, 362, 364
ASTM C188	357
ASTM C190	378, 380, 381, 468
ASTM C191	361, 362, 364, 380, 381
ASTM C192	316, 323, 324, 329
ASTM C204	356
ASTM C215	343
ASTM C227	61, 370
ASTM C230	372
ASTM C231	312, 313
ASTM C266	361
ASTM C289	31, 56
ASTM C29	32, 314
ASTM C293	266, 268, 270-274, 278, 290, 296, 297, 466
ASTM C301	277
ASTM C305	374, 376
ASTM C307	378, 468
ASTM C31	329
ASTM C348	378, 383, 386-388, 390, 391, 392, 411, 468
ASTM C349	270-273, 290, 383-392, 468, 470
ASTM C359	374, 376
ASTM C360	310
ASTM C39	209, 216, 219-253, 291, 316, 317, 329, 405
ASTM C391	209
ASTM C40	59, 311, 434, 541
ASTM C403	311
ASTM C426	337, 340
ASTM C430	357
ASTM C451	374, 376
ASTM C469	68, 258, 261, 284
ASTM C490	367, 368
ASTM C496	217, 270-279, 289, 297, 412, 470
ASTM C497	277
ASTM C511	380, 381
ASTM C597	346, 347
ASTM C617	329
ASTM C666	343
ASTM C671, C682	60
ASTM C684	325
ASTM C70	31
ASTM C702	53
ASTM C78	217, 266-274, 278, 290, 466, 470
ASTM C803	349
ASTM C805	63, 344, 345
ASTM C876	348
ASTM C88	60
ASTM C900	341
ASTM C91	359, 361
ASTM D1067	437, 555
ASTM D113	144, 145
ASTM D1186	92
ASTM D1194	471
ASTM D1195, D1196	471, 473, 474, 475, 476
ASTM D1310	155
ASTM D140	142
ASTM D1452	427, 428
ASTM D1556	481
ASTM D1557	25, 26, 432, 448, 450, 451
ASTM D1558	431
ASTM D1559	25, 26, 119-122, 126-130, 461, 465
ASTM D1587	435
ASTM D1665	153
ASTM D1754	149
ASTM D1856	83, 85
ASTM D1883	128, 129, 435, 450-453, 457, 458, 461, 465
ASTM D2041	86, 87
ASTM D2042	152
ASTM D2166	128, 129, 457, 461, 467
ASTM D2167	480
ASTM D217	138, 139
ASTM D2170	162, 163
ASTM D2171	162
ASTM D2172	78, 79, 82, 85

ASTM D2196	160
ASTM D2	50
ASTM D2419	51, 440, 441, 442
ASTM D2434	482
ASTM D2435	484, 488, 489
ASTM D244	143, 147
ASTM D2573	426, 430
ASTM D2664	67, 70, 259, 284
ASTM D2726	92
ASTM D2850	461, 467, 508, 516, 523, 526
ASTM D2872	148
ASTM D2937	429
ASTM D2938	69, 71
ASTM D2950	432
ASTM D3080	490, 492, 495
ASTM D3143	155
ASTM D3148	67, 70, 259, 264
ASTM D36	150, 151
ASTM D3877	484, 488, 489
ASTM D3910	136
ASTM D3967	69, 467
ASTM D3999	523
ASTM D402	147
ASTM D4123	128, 180
ASTM D420	427, 428
ASTM D422	438
ASTM D4253, D4254	479
ASTM D427	445
ASTM D4318	444, 445
ASTM D4380	360
ASTM D4402	157, 160, 161
ASTM D4429	457
ASTM D4543	64, 330
ASTM D4546	484, 488, 489
ASTM D4644	64
ASTM D4647	480
ASTM D4648	431
ASTM D4767	497, 508, 516, 523, 527
ASTM D4791	46
ASTM D490	153
ASTM D4944	443
ASTM D4965	134, 135
ASTM D5	138, 139, 140, 141
ASTM D5311	523
ASTM D5404	86
ASTM D5407	67, 70, 259, 264
ASTM D558	25, 26, 448, 450
ASTM D5581	100, 101, 119-123, 126-130, 461, 465
ASTM D559	25, 26, 450
ASTM D56	155
ASTM D560	25, 26
ASTM D5607	66
ASTM D5731, D5873	63
ASTM D5874	454
ASTM D6	149
ASTM D6084	144, 145
ASTM D6243	495
ASTM D6307	80
ASTM D6521	158, 159
ASTM D6648	202, 203
ASTM D6752	93
ASTM D6758	432
ASTM D6760	343
ASTM D6857	93
ASTM D6925	102-104
ASTM D6926	99-101
ASTM D6927	119-123, 126-130, 461, 465
ASTM D6928	49
ASTM D6931	119, 121, 122, 123, 126, 128, 129, 461, 465
ASTM D6935	147
ASTM D6938	432
ASTM D6951	426
ASTM D698	25, 26, 432, 435, 448, 450, 451
ASTM D70	146, 541
ASTM D7012	67, 69, 70, 71, 284
ASTM D7013	432
ASTM D7063	93
ASTM D7113	133
ASTM D7115	107
ASTM D7175	157
ASTM D7181	497, 508, 516, 523, 526
ASTM D7227	93
ASTM D7313	189, 204, 205
ASTM D7369	182
ASTM D7428	49
ASTM D7460	182, 192
ASTM D7698	432
ASTM D7759	432
ASTM D7870	93
ASTM D7981	111
ASTM D8044	127, 188, 196, 204, 205, 467
ASTM D8079	108
ASTM D8159	76
ASTM D8360	183
ASTM D854	465, 540
ASTM D88, D92	154
ASTM D93	155
ASTM D95	147
ASTM E11	34, 35, 37, 43
ASTM E23	419
ASTM E290	402, 421
ASTM E303	54, 90
ASTM E4	405
ASTM E74	302, 303
ASTM E8	398, 401, 404, 415
ASTM E965	132
ASTM G57	433
ASTM WK26816	191, 196, 198, 199, 204, 205

BS	Page
BS 131	456
BS 1191	369, 371
BS 1377	461, 467, 542, 548
BS 1377:1	26
BS 1377:2	32, 47, 59, 138-141, 435 , 444-461, 465, 467, 482, 484, 488, 526, 544

BS 1377:3	29, 433, 437, 565
BS 1377:7	431, 526
BS 1377:8	497, 516, 523, 526
BS 1377:9	429, 457, 471-476, 481
BS 1610	219-227, 230-233, 236, 405
BS 1881	367, 368
BS 1881:101	551
BS 1881:103	309
BS 1881:115	241-245, 248, 250-253, 256
BS 1881:118	266, 268, 270, 271, 278, 290, 470
BS 1881:121	258, 260, 284
BS 1881:114	47, 314, 538
BS 1881:204	348
BS 1881:206	337
BS 1881:207	341, 349, 373
BS 1881:209	343
BS 1924:1	25, 26, 32, 544
BS 1924:2	101, 435, 448, 456, 453, 454, 456, 457, 481
BS 2000	149, 150, 151, 153
BS 410	34, 35
BS 4359:2	356
BS 4550	290, 379, 384-392
BS 4551-1	359, 372
BS 5911	277
BS 598	435, 465
BS 598:102	85
BS 598:107	98, 119, 120, 126, 128, 129, 465
BS 598:110	112-115
BS 6073	230-233, 250-253, 367, 368
BS 6073-1	268, 278, 299
BS 6463	369
BS 6463-4	359
BS 6576	443
BS 6717	58
BS 7263	268, 278
BS 812	32, 37, 47, 50, 52, 53, 314, 455, 549
BS 812:1	32
BS 812:102	61
BS 812:105.1	33, 46
BS 812:110	53, 248, 262
BS 812:111	248, 263
BS 812:114	57, 91
BS 812:117	29, 437
BS 812:124	60
BS 812:2	47, 538
BS 812-113	58
BS 890	369
BS ISO 1042	540

CNR	Page
CNR N.100	143
CNR N.101	147
CNR N.102	153
CNR N.105	57, 91
CNR N.113	46
CNR N.123	53
CNR N.133	85
CNR N.134	119, 121
CNR N.141	134
CNR N.146	471-476
CNR N.22	429, 480, 481
CNR N.27	51
CNR N.29	450
CNR N.34	48
CNR N.35	151
CNR N.38	82
CNR N.4	59
CNR N.50	149
CNR N.62 / N.64	32
CNR N.69	448, 450, 451
CNR N.80	60
CNR N.81	142
CNR N.92	471, 473-476
CNR N.95	46
CNR N.98	142
CNR N.99	143
CNR UNI 10009	128, 129, 450, 451, 452, 457, 458, 461, 465

D.M.	Page
D.M. 17/01/2018	420

DIN	Page
DIN 1045	348
DIN 1048	68, 284, 309, 310, 312, 353
DIN 1164	368, 384-388, 390, 392
DIN 1164-5	374, 376
DIN 1164-7	374
DIN 1168	361
DIN 12039	47
DIN 18127	448-450
DIN 18134	471
DIN 1996-15	143
DIN 4030	311
DIN 4035	277
DIN 4094	426
DIN 4187-1	34-36
DIN 4226	46
DIN 51220	209, 241-245, 248, 250-253, 256, 302, 405
DIN 51302-2	301
DIN 51804	141
DIN 52011	150, 151
DIN 52108	57, 300
DIN 52210	138

DUTCH RAW	Page
DUTCH RAW	450

EN	Page
EN 10002	405
EN 1008	311
EN 101	62
EN 1015-11	384-388, 390-392
EN 1015-12	341, 373
EN 1015-19	370
EN 1015-21	365
EN 1015-3	372

EN 1015-4, 1015-9	371
EN 1015-7	358
EN 102, 10545-6	58
EN 1097-1	49
EN 1097-2	48, 62, 88
EN 1097-3	32
EN 1097-4	53
EN 1097-5	25, 26
EN 1097-6	47, 136, 314, 455, 538, 539
EN 1097-7	47
EN 1097-8	54, 55, 57, 58, 90, 91
EN 11039-2	282, 284, 285
EN 12004	28, 327
EN 12004-2	341, 373, 468
EN 12272-1, 12272-3	136
EN 12274-3 / 12274-5	136
EN 12350-1	309, 551
EN 12350-2	308
EN 12350-3, 12350-12	307
EN 12350-4	310, 551
EN 12350-5	309
EN 12350-6	314
EN 12350-7	312, 313
EN 12350-8 / 12350-10	306
EN 12390-1	316, 317, 320
EN 12390-13	258-260, 284, 287
EN 12390-16	337
EN 12390-2	64, 304, 305, 322-324, 330, 381
EN 12390-3	216, 329
EN 12390-4	209, 241-245, 248, 250-253, 256, 301, 454
EN 12390-5	217, 266-274, 278, 290, 466, 470
EN 12390-6	217, 269-273, 289, 412, 470
EN 12390-7	47, 92, 314
EN 12390-8	353
EN 12390-9	28
EN 12504-2	63, 344
EN 12504-3	341
EN 12504-4	346, 347
EN 12592	152
EN 12593	146
EN 12595	162, 163
EN 12596	162
EN 12607-1	148
EN 12607-2	149
EN 12607-3	86, 152
EN 12617-4	367, 368
EN 12697	538
EN 12697-1	27, 76, 78, 79, 82-85
EN 12697-10	97, 98, 101-104, 454
EN 12697-11	88
EN 12697-12	120, 121, 128
EN 12697-13, 12697-18	92
EN 12697-14	84
EN 12697-17	48, 88
EN 12697-20	89
EN 12697-22	112-115
EN 12697-23	119-123, 126, 128, 129, 461, 465
EN 12697-24	180, 182, 184, 192
EN 12697-25	181, 186
EN 12697-26	180, 182, 184, 190, 192
EN 12697-27	132
EN 12697-3	86
EN 12697-30	98
EN 12697-31	102-104, 107
EN 12697-32	101, 454
EN 12697-33	108, 109
EN 12697-34	120, 122, 126, 128, 129, 130, 461, 465
EN 12697-35	96
EN 12697-40	132
EN 12697-43	48, 88
EN 12697-44	127, 187, 467
EN 12697-46	189, 200
EN 12697-48	121, 126, 465
EN 12697-5	86, 87
EN 12697-6	92
EN 12697-9	101, 454
EN 12808-2	58
EN 12808-4	367, 368
EN 12808-5	378
EN 12846-01, 12846-02	153
EN 12847	147, 152
EN 12848	147
EN 12849	152
EN 13036-1	132
EN 13036-4	54, 55, 90, 91
EN 13036-7	134
EN 13055	363
EN 13055-1	46
EN 13075-1	142
EN 13108	27
EN 13108-6	89
EN 13266-4	101
EN 13279-2	361, 362, 364, 372
EN 13286-2	435, 448, 450, 451
EN 13286-4	454
EN 13286-41	386, 387, 454
EN 13286-42	289, 412
EN 13286-43	412
EN 13286-47	128, 129, 435, 450, 452, 453, 457, 458, 461
EN 13286-5	479
EN 13286-53	456
EN 13294	371
EN 13302	160, 161
EN 13303	149
EN 13357	153
EN 1338	54-58, 217, 269-273, 289, 300, 412, 470
EN 1339	55, 57, 58, 91, 217, 270- 274, 300
EN 13395-2	365
EN 13398	144, 145
EN 1340	57, 58, 269-274, 279, 290, 300
EN 1340-4	268
EN 1341	54, 55, 57, 58, 90, 91, 300
EN 13412	258, 260, 284, 300, 394, 412
EN 1342	54, 55, 57, 58, 90, 91, 300
EN 1343	57, 58, 91
EN 1344	58

EN 13450	49
EN 1348	28, 327, 373
EN 13503-2	248
EN 13589	144, 145
EN 1367-1	28, 60
EN 1367-2	60, 548
EN 1367-4	61
EN 1367-5	27, 62
EN 13687-2	341, 373
EN 13702	157
EN 13703	145
EN 13748-2	57, 300
EN 13880-2	139, 141
EN 13880-3	142
EN 13892-2	290, 384-392, 468, 470
EN 13892-3	57, 300
EN 13963	341, 373
EN 14157	57, 58, 300
EN 1426	138-141
EN 1427	150, 151
EN 1428, 1429	147
EN 1430, 1431	143
EN 1436	54, 90
EN 14488-3	282, 284, 285, 298, 411
EN 14488-5	270-275, 282, 284-286, 412
EN 14496	341, 373
EN 14580	67, 70, 71, 259, 284
EN 14617-4	58
EN 14651	271, 274, 282, 284-287, 298, 411
EN 14769	158, 159
EN 14770	157
EN 14771	203
EN 15037	296, 297
EN 15037-2	269-271, 276, 279, 412, 466
EN 15037-3	269, 271, 276, 279, 412
EN 15048-2	404
EN 15366	132
EN 154	62
EN 1542	341, 373
EN 16659	157
EN 17892-12	444, 446
EN 1871	143
EN 1916	277
EN 1926	67, 70, 71, 259, 284
EN 196	270-273, 364
EN 196-1	290, 374-392, 411, 468, 470
EN 196-2	27, 365
EN 196-21	27
EN 196-3	361-364, 369, 374, 376
EN 196-6	356, 357
EN 196-7	357
EN 196-8	366, 380
EN 196-9	366
EN 1997-2	59
EN 206	311
EN 22592	154
EN 22719	155
EN 413-2	358, 370, 371, 374, 376
EN 445	359, 360
EN 451-2	357
EN 459-1	369
EN 459-2	27, 358, 359, 365, 370, 371, 372, 374, 376
EN 480-1	374, 376
EN 480-2	361, 362, 364
EN 480-4	314
EN 58	142
EN 772-1	216, 230-233, 250-253
EN 932-5	25, 26, 40, 42, 60
EN 933-10	38, 51, 442
EN 933-11	52
EN 933-2	34-36, 43
EN 933-3	32, 33, 56
EN 933-4, 933-7	46
EN 933-5	46, 386, 387, 390
EN 933-6	46, 56
EN 933-8	51, 440-442
EN 933-9	52, 439, 543

EN ISO	Page
EN ISO 10545-7	62
EN ISO 12957	495
EN ISO 376	302, 303
EN ISO 3838	146, 541
EN ISO 679	267, 279, 290, 374, 378-381, 384-392, 468, 470
EN ISO 7500-1	212, 214, 302, 398, 405
EN ISO 9597	369

ERMCO-EFNARC	Page
ERMCO-EFNARC	306

EUROCODE	Page
Eurocode 2	348

GOST	Page
GOST 10180	219-233, 236, 242-245, 248, 250-253, 256
GOST 11505-75	145
GOST 26798-1	384-392
GOST 33137	157

IP	Page
IP 179	179
IP 184	153
IP 222	162
IP 34, 35	155
IP 36	154
IP 485, 487	152
IP 49	138
IP 494	142
IP 74-77	147

ISO	Page
ISO 10414-1	360
ISO 10545-6	58
ISO 17892-4	439, 548
ISO 1920-10	258, 260
ISO 2137	141

ISO 2431	360
ISO 2592	154
ISO 2719	155
ISO 3310-1	34, 35, 40, 42, 43
ISO 3310-2	34, 36, 43
ISO 4624	341, 373
ISO 5173	402
ISO 565	34
ISO 6784	68, 284
ISO 679	290, 374, 380, 381, 384-392, 468, 470
ISO 6872	32
ISO 6892	415, 469, 471
ISO 6892-1	410
ISO 7438	402, 420, 421
ISO 8491	402
ISO 8749	404
ISO 898-1, 898-2	404

ISRM	Page
ISRM	63, 66, 67, 69, 71, 259, 284

ISSA	Page
ISSA TB139	136

ITALIAN HIGHWAY SYSTEM	Page
ITALIAN HIGHWAY SYSTEM	132

ITALIAN ROYAL DECREE	Page
IRC, n° 2234	299

JIS K 2207	Page
JIS K 2207	138

LCPC	Page
LCPC	84, 311

MPW BEGIUM	Page
MPW OF BEGIUM	132

NF	Page
NF P094-071-2	490, 492
NF P15-432	369
NF P15-433	367, 368
NF P15-434	368, 371
NF P18-054	455
NF P18-400	316, 317
NF P18-401	378
NF P18-408	289, 412
NF P18-411	219, 241-245, 248, 405
NF P18-414	343
NF P18-427	368
NF P18-452	310, 370
NF P18-507	360
NF P18-553	32
NF P18-558	47
NF P18-561	33
NF P18-564	46
NF P18-573	48
NF P18-574	50
NF P18-575	57, 91
NF P18-576	49
NF P18-577	50
NF P94-048	31
NF P94-051	444, 445
NF P94-051-1	444
NF P94-052-1	446
NF P94-054	455
NF P94-061-2	480
NF P94-061-3	481
NF P94-066	450
NF P94-068	52, 439
NF P94-070	497, 508, 516
NF P94-071-1	490, 492
NF P94-074	497, 516
NF P94-078	128, 129, 448, 452, 453, 457, 458, 461, 465
NF P94-090-1	484, 488, 489
NF P94-091	484
NF P94-093	448, 450, 452, 453
NF P94-100	456
NF P94-117-1	135, 473, 476
NF P98-216-1	132
NF P98-200-2	134, 135, 476
NF P98-230-2	456
NF P98-231-1	448, 452, 453
NF P98-251-1	127, 469
NF P98-251-2	98, 119, 120, 126, 128, 129, 465
NF P98-251-4	469
NF P98-274-1	136
NF T60-118	154
NF T66-003	147
NF T66-004	138, 140, 141
NF T66-008	150, 151
NF T66-011	149
NF T66-022	143
NF T66-023	147
NF X11-504	34, 35
NF XP18-598	51, 440-442
NF XP94-060-1	445

NLT	Page
NLT 123	147
NLT 154	47
NLT 177	53
NLT 320	136
NLT 354	33, 46

NT Build	Page
NT Build 427	321
NT Build 492	342

RIL	Page
RIL 836	476

RILEM	Page
RILEM report N. 23	306

RVS	Page
RVS 08.03.04	478

SHRP	Page
SHRP M-002	102-104, 202, 203

SNV	Page
SNV 70312	476

STAS	Page
STAS 8942-1-89	488
STAS 8942-2-82	490, 492

TEX	Page
TEX-248-F	191, 196, 198, 204, 205

TP Asphalt StB	Page
TP Asphalt StB T5	86
TP Asphalt StB 25	181, 184
TP Asphalt StB 33	108, 109
TP Asphalt StB 46A	189
TP Asphalt StB 48A	121, 126, 465
TP Asphalt StB T80	121, 126, 465
TP Asphalt StB 81	181, 469

TP BF	Page
TP BF-StB part B 8.3	478

UNE	Page
UNE 103 / 108	445
UNE 103300	26
UNE 103-502	452, 453
UNE 103-602	484
UNE 127024	58
UNE 7050	34, 36
UNE 7072	147
UNE 7110	149
UNE 7111	150, 151
UNE 7112	147
UNE 7136	86
UNE 7255, 7365	450
UNE 7371	481
UNE 7377	444
UNE 7391	471
UNE 80102	369
UNE 83120	32
UNE 83131	51, 440, 441, 442
UNE 83180	52, 439

UNI	Page
UNI 10014	444, 445
UNI 10157	341
UNI 10532	58
UNI 10766	65, 332
UNI 10834	271
UNI 11039-2	282, 284, 285
UNI 11044	306
UNI 11307	340
UNI 11604	61
UNI 2331, 2333	34, 35
UNI 2334	34, 36
UNI 4161	150, 151
UNI 6132	330
UNI 6394-2	47
UNI 6555	340
UNI 6556	68, 284
UNI 6782	371
UNI 7122	314
UNI 7123	311
UNI 7676	398, 401, 414, 415
UNI 8020-14	59, 434, 541
UNI 8147, 8148	340, 368
UNI 8520	32, 439-442
UNI 8520-6	32
UNI 8520-10, 8520-20	60
UNI 8520-15	51, 52, 440
UNI 8520-18	33
UNI 8520-22	31
UNI 85209-22	31
UNI 8996, 8998	365
UNI 9416	551
UNI 9535	348
UNI 9536	341
UNI 9730-3	269-273, 276, 279, 296, 297, 299, 412, 466
UNI 9771	343
UNI CNR 10009	128, 129, 450, 451, 452, 457, 458, 461, 465
UNI EN 10080	398, 401
UNI EN 1097-2	48, 62, 88
UNI EN 12697-39	80
UNI EN ISO 14146	343
UNI EN ISO 148-1	419
UNI EN ISO 15630-1	398, 401, 402, 405, 418, 420, 421
UNI EN ISO 15630-2	398, 401, 404
UNI EN ISO 15630-3	398, 401, 402
UNI EN ISO 17892	516
UNI EN ISO 17892-10	490, 492, 496
UNI EN ISO 17892-5	484, 488, 489
UNI EN ISO 17892-6	446
UNI EN ISO 17892-11	482, 483
UNI EN ISO 17892-12	444, 446
UNI EN ISO 17892-8	497, 508
UNI EN ISO 17892-9	497, 508
UNI EN ISO 6892-1	398, 401, 405, 410, 415, 418, 469, 470
UNI EN ISO 7438	402, 420, 421
UNI EN ISO 7500-1	302, 398, 405
UNI EN ISO 9016	419

ZTV	Page
ZTV E-StB 2017	521

A	Page
A005-01 / A005-08	24
A006-08A	24, 25
A007-51 / A007-53	24
A008-01 / A008-54	25
A009	28
A010 / A010-13	26
A019-01 / A019-03	29, 437
A021 / A021-10N	31
A022 / A022-01	27
A023, A023-01	27, 62
A024 / A024-01	27
A025-01 / A028SPN	30
A029, A030	31
A031-01 / A032-37	36
A035 / A036-01	31, 455, 542
A037-01 / A038-38	36
A039 / A040-01	31, 455, 542
A041 / A043	34
A045 / A047	37
A045-02 / A045-08	37
A046-02 / A046-11	37
A047-02 / A047-12	37
A048-01 / A048-13	33
A048-14	33, 49
A048-15 / A048-22	33
A048-18	57
A049-KIT	33
A050 / A051SP	34
A052	34, 35
A052-00 / A052-36	35
A052-37	35, 440
A052-38 / A052-43	35
A052-44	35, 440
A052-45 / A052-77	35
A053	34, 35
A053-00 / A053-77	35
A056 / A057-07	37
A057-31 / A058-01	44
A058-05N	38, 51, 442
A058-14M / A058-15N	38
A058-20 / A058-97	39
A058N	41
A059-01-KIT	40, 41
A059-02-KIT	33, 40, 86
A059-03-KIT / A059-04-KIT	33, 40, 41
A059-21	41
A060-01	33, 41, 44
A061-03 / A061-06	42
A061-07 / A061-96	43
A061-97, A061-98	42
A061N	42
A062, A062-02	32
A062-11 / A062-48	43
A063 / A069	32
A068-05	32, 551
A068-01 / A069-04	32
A070, A071	46
A071-10	45
A072 / A073N	46
A075-11, A075-12	48
A075N	48, 88
A076-01 / A076-11	48
A077 / A078-02 / A078-17	49
A079 / A080-KIT	50
A081-01, A081-02	46, 263
A082 / A086	53
A087	50
A091-02 / A093-11	56
A095, A095-01	63
A101 / A101M	61
A103 / A103-03	60, 538
A103-10, A103-11	60
A104-01N, A104N	45
A105	59, 371
A106-01	29
A106N	29, 92, 329, 430
A106T	29
A107, A107-11	61
A107-20 / A107-23	62
A108	59
A109	62
A110-01 / A110-22	55, 91
A111-11 / A112-11	58
A113	54, 90, 300
A113-01	54, 90
A115N	62
A116-11, A116-12	59, 443
A117	59, 443
A121	63
A122, A122-01	62
A122-10	64, 88
A124 / A124-01	53
A125-01	63, 299
A125-02	63
A125N / A126	63
A128-02 / A128-13	57
A128N	57, 91
A129	66
A129-01 / A129-04N	66
A129-02	66, 73
A130 / A130-11	64
A131 / A131-01	66
A132, A132-01	62
A135 / A135-04	72
A135-05	73
A136 / A136-04	72
A136-05	73
A137	72, 73
A137-02 / A137-04	72
A137-05	73
A138 / A138-04	72
A138-05	73
A139	72
A139-02 / A139-04	72
A139-05	73

A140-01 / A141N	72
A142N	73
A144	73
A147 / A148-02	69
A150-01N	68
A150M	67, 70
A201	71

B	Page
B003	76
B003-01 / B003-22	77
B005N	80
B005-10N, B005-11N	81
B007, B007-11	87
B008	78, 79
B008-01 / B008-06	79
B008-10	78
B008-11	77, 79
B010-11 / B011-10	82
B014, B014-01	83
B015	79
B016	141
B016-10 / B016-23	84
B017-01, B017-02	84, 538
B017-03, B017-05	84
B017-KIT	84
B018 / B020-KIT	85
B021	83
B022-12	88
B022-20, B022-21	92
B022SP	88
B022ST, B022T	52, 88
B023 / B023-08	164
B024 / B024-10	132
B025-01N	95, 431
B025-01NK / B025-14N	95
B025-13N	95, 431
B026-05N	96
B026-10N	97
B028-01	94
B028-03	94, 377, 431
B029-01-KIT / B029-04	101
B029N-KIT	98, 100
B030-01N	98, 101
B030-01NF / B030-02N	98
B030-03, B030-04	98, 101
B030-05	98, 101, 105, 321
B030-06, B030-08	101
B030-KIT	100, 101
B030N	98, 101
B031-01, B031N1	98
B032-01, B032-11	100
B032-KIT, B033-01N	99
B033-03	99, 100
B033-04	99
B033-11N	98
B033N	99
B034N	99, 100
B035-01N, B035-11N	100
B035-12N	99, 100
B035-13	100
B036, B037	99
B038-09 / B038-24	110
B038A-01 / B038A-20	115
B038A-16	114, 115
B038AM	112, 113
B038AM-06	115
B038AM-15	114
B039-02 / B039-24	110
B039A / B039A-05	111
B039N	108, 109
B040-01 / B040-14	117
B040-20 / B040-33	118
B040M	116, 117
B041-05, B041-06	105
B041-08 / B041-14	105, 321
B041-15, B041-16	106
B041-17, B041-18	105, 321
B041-19	106
B041-20 / B041-27	106, 321
B041-28	107
B041-30, B041-33	106, 321
B041-35	106
B041-50 / B041-55	107
B041M	102, 103
B041MEN	103
B042-01	119
B042-KIT	119, 128
B043-01N	120, 122, 126, 129, 461, 465
B043-02N	121, 122, 126, 129, 461, 465
B043-03N	121, 126, 465
B043-05N	127, 467
B043-KIT	120, 121
B044-03	121
B044M-SET	128, 129
B045 / B045-01	102, 103, 104, 106
B045-13	127, 467
B045-14	467
B045-23	106, 321
B045EN	104
B046-02	122, 123
B046-03	119, 120, 122, 123
B046N	119-123, 126, 459, 465
B047, B047-01	119, 123, 459
B047-02	119, 121, 126, 465
B047-02S	119, 121
B047-03	119
B047-04, B047-11	121, 126, 465
B051	130, 131
B051-01, B051-02	130
B052	131, 557
B052-01	131
B052-02	121, 131, 380
B052-10A	131
B053 / B053-23	136

B054	144, 145
B054-01A / B055	144
B055-10	144 - 146
B055-15 / B055-26	145
B055-27-KIT / B055-35	146
B056-01, B056-02	140, 141
B056-09	139, 141
B056	140, 142
B057-01 / B057-01L	140
B057-02	140, 141, 446, 447
B057-03	139, 140, 142
B057-04	140
B057-04N	139
B057-05	140, 369, 370, 535
B057-05N	139
B057-06 / B057-07L	139, 140
B057-08A	139, 140, 547
B057-09	139, 141
B057	140
B058, B058-01	139, 142
B058M	139
B059-10 / B059-21	89
B059M	138, 139
B059M-11	139
B060	142
B061 / B061-03	84
B062-10	164
B063A	143
B063-01A	143, 547
B063-05 / B06310	143
B064-01 / B064-02SP	149
B064-03A	148, 547
B064-04	149, 158
B064A	149
B065, B065-01	86, 152
B065-12 / B065-16	86
B066-02N / B066N	148
B067-01N	86
B067A	87
B067N	86
B067T, B067T-01	87
B068	93
B069-11A	147, 547
B069A	147
B070-11 / B070M	151
B072	150
B072-01A	150, 547
B072-02A	143, 150, 547
B072-03	150, 151
B072-04 / B072-07	150
B072-20	143
B073-01	29, 150, 437, 552
B073-02	143, 150, 552
B074	29, 150, 552
B074-01	150
B075	147, 152
B075-01 / B075-08	152
B076 / B076-26	147
B077, B077-01	146
B077-02A	146, 547
B079-01	147
B079N	83, 147
B080, B081	153
B082-01A / B082-03A	153, 547
B082-04	547
B082-05 / B083-06	153
B083-07A	153, 547
B083-08 / B084-02	153
B085-07N, B085-08N	157
B085-21N, B085-22N	160, 161
B085-25N / B085-29	161
B085-33N	160, 161
B085-34N / B085-40N	161
B086-02	154
B086-10A	154, 547
B086A / B087-12	154
B088	162
B088-01N	162, 163
B088-03N	162
B088-05N / B088-08N	162, 163
B088-07N	162
B088-12A / B088-13A	162, 547
B088-16N / B088-17N	162
B088-20 / B088-90	163
B088N	162, 163
B089-01A / B089-05A	154, 547
B089-06 / B089-08	154
B089A	140, 154, 547
B090 / B090-20N	142
B091M	158, 159
B091M-01	159
B091M-10 / B091M1-KIT	158
B091M-20	159
B092-10A / B092-11A	155, 547
B092A / B093A	155
B094-10A	155, 547
B094A	155
B095-01	127, 469
B095-02 / B095-07	127
B096-01	127, 469
B096-02 / B096-07	127
B097	101
B097-11N, B097-12N	101, 454
B098-01N / B098N	133
B099-01N	134
B099-10 / B099-17	132
B099-KIT / B099N	134
B100	134, 476
B100-02	134
B102	134, 135, 476
B103-05-KIT	135
B103-10	135, 473
B110	133
B114, B115	93
B200-01N	187
B200-02	185

B200-03	185, 187
B200-04	195
B200-05 / B200-08	185, 197
B200-09	195
B200-10	187, 195
B200-11, B200-12	190, 197
B200-13, B200-13X	195, 199
B200-14 / B200-18	197
B200-20, B200-21	195
B200-22	175, 178
B200L	194, 195
B201-52	180-190, 195, 197, 205
B201-53	186, 187, 195
B201-KIT	195
B202	185, 187, 190, 195, 197
B202-01 / B202-03	185, 190, 197
B202-04	190, 195
B202-05, B202-06	195
B202-07 / B202-09	197
B203	185, 187, 195
B204-KIT / B204-01-KIT	191, 196
B204-02	191, 196, 199, 205
B204-03	191, 196, 199
B204-13	191, 196, 199
B204-14	205
B204-16	525, 528
B207-01, B207-02	196
B207-KIT	197
B208	127, 188, 196, 205, 467
B209-08	166, 192
B209-16	166, 172
B210	193
B210-01	192, 193
B210-02, B210-03	182, 193
B210-04N	193
B210-05N	182, 193
B210-06N	182
B210-KIT	192
B212	182, 193
B215	198, 199
B216	202
B216-01 / B216-09N	203
B220-01-KIT / B220-02-KIT	172
B220-01N	173
B220-02	172
B220-02N	173
B220-04-KIT, B220-05-KIT	524, 525, 528
B220-08N	171, 195
B220-11, B220-12	172, 173
B220-14, B220-15	525
B221	172, 173, 193
B225-10 / B225-13	205
B225H, B225V	204, 205
B230	174 - 176
B230-01N	175
B230-02NSP	178
B230-04N	171
B230-05	182

B232	174, 175, 177, 178
B233, B234	175, 178
B240	177, 178
B240-01N / B240-08	178
B240L	177
B250	180
B250-01	127, 180, 182, 183, 187, 467
B250-03 / B250-06-KIT	180
B250-07-KIT	171, 173, 175, 178, 193, 205
B250-08, B250-09	180
B250-10 / B250-12	171, 173, 175, 193
B250-11	171, 173, 175, 193
B250-12	171, 173, 175, 193
B250-13 / B252-KIT	180
B253	183, 196
B253-01	182, 196
B253-01-KIT	196
B253-02	182
B253-03	182, 196
B253-04, B253-05	185, 190
B253-06	183
B253-53	182-190, 195-197, 205
B253-KIT	182
B254-01	127, 187, 467
B254-02	127, 188, 196, 205, 467
B254-02-KIT	188, 196, 205
B254-03	188, 196
B254-10	127, 188, 196, 205, 467
B254-11	188, 205
B254-12	127, 188, 205
B254-13 / B254-15	188, 205
B254-16	205
B254-51	127, 187, 467
B254-KIT	187
B255-KIT	185
B256-01-KIT / B257-KIT	183
B260-01N	181, 184
B260-02	181
B260-03, B260-04	184
B260-05 / B260-10	181
B260-10SP	469
B260-KIT	181, 184
B261-01	181, 189, 190, 191
B261-02	190, 191
B261-03	190
B261-KIT, B263-KIT	181, 184
B262-KIT	184
B264-KIT	190
B265	170, 171
B265-01	171
B270-01	186, 187
B270-02	186
B270-03, B270-04	186, 187
B270-05, B270-06	186
B270-10, B270-11	186, 500, 511, 515, 522
B270-12	172, 173, 192, 193, 525
B270-15	186
B270-16	187

B270-17	186, 187
B270-18	186, 195
B270-19	195
B270-20, B270-21	197
B271-KIT, B272-KIT	186
B274-KIT	187
B276-KIT	186
B280-KIT	184
B282-01-KIT	205
B282-01N	189, 205
B282-02	189, 201, 205
B282-03	189
B282-04 / B282-07	189, 205
B282-08	189, 201, 205
B282-09	205
B282-10 / B282-18	201
B282-21	205
B282-KIT, B283-KIT	189
B284-01	189, 201, 205
B290-01N	180
B290-02N	181, 184, 186, 187, 188, 205
B290-02NOT	205
B290-03N	180
B290-04N	182, 196
B290-05N	184, 188, 191, 205
B290-06N	185, 188, 190, 191, 205
B290-07N	187, 188, 189, 201, 205
B290-09N	189, 205
B290-12N	189, 201
B292-01N	171, 173, 175, 193
B292-01NSP	171, 195
B293-01N	186, 187
B293-02N	186

C	Page
C020	220, 228
C021 / C024D	220
C024N	221
C025A	220
C025N	221
C036	220, 292
C036F	240
C037 / C040D	220
C040N	221
C041-11	228
C041A	220
C041N	221, 292
C051F	240
C053	222, 228, 229, 292, 295
C054 / C055D	222
C055N	223, 280, 281, 393
C056-11	228, 234
C056A	222
C056N	223, 228, 229, 295, 393
C058	228, 229, 295
C058-02	224, 295
C058-03 / C058-04D	224
C058-04N	225
C058-05A	224
C058-05N	225, 292, 295
C058F / C066F	240
C068	226, 228, 292, 295
C068-11	228, 234
C069 / C070D	226
C070N	227
C071A	226
C071N	227, 228, 292, 295
C073F	240
C075	230, 292, 295
C076 / C077D	230
C077N	231
C078A	230, 280, 281
C078N	231, 292, 295
C079-01F	240
C079-03	232, 292, 295
C079-04, C079-05D	232
C079-05N	233
C079-06A	232
C079-06N	233, 235, 292, 295
C082 / C085-01	238
C082-02 / C083-03	239
C086-02N, C086-03N	236, 292
C086-10	236, 237, 248
C086-11	237
C087-01N	256
C087-11 / C087-16	257
C087N / C088-01N	256
C088-10N, C088-11N	248, 292
C088N	256
C089	242, 246, 284, 292
C089-01	242
C089-01B	250
C089-02D	242
C089-02N	243, 294
C089-04A	242
C089-04N	243
C089-06	244, 292
C089-06F	240
C089-07, C089-08D	244
C089-08N	245
C089-10A	244
C089-10N	245, 246, 292
C089-11, C089-12	246, 254
C089-15	252, 292
C089-15F	240
C089-16, C089-17D	252
C089-17N, C089-19N	253
C089-19A	252
C089-21D	250
C089-21N	251
C089-22A	250
C089-22F	240
C089-22N	251, 292
C089B	250, 254, 292
C089F	240, 283, 287
C090	264, 266

C090-01 / C090-03N	266
C090-06CF	284, 287
C090-06F	240
C090-06D / C090-07N	270
C090-12 / C090-14	271
C090-14SP	275
C090-15 / C090-18	285, 287, 298, 411
C090-19	271
C090-20	285
C090-21	271
C090-22	271, 287
C090-23	287
C090-30	261, 285, 287, 298, 411
C090F, C091-01F	240
C091-02D / C091-03N	268
C091-10 / C091-14	269
C091-13	269, 271, 279, 290
C092-01 / C092-04	280
C092-05 / C092-07	281, 393
C092-09	407
C092-11 / C092-15	280
C093-02D / C093-03N	278
C093-05	265, 277
C093-11	269, 271, 276, 279, 296, 466
C093F	240
C094N, C094N1	299
C095	299
C095-05	296
C095F	240, 284, 287
C095N	272
C095N-05	281
C095N-11	274, 287
C095N-12	274
C095N-13	274, 290
C095N-14 / C095N-16	275
C095N-17	275, 287
C095N-18	274, 275, 287, 295
C095N-19	274
C096	299
C096F	240, 284, 287
C096N	273
C097-01 / C097-08	288
C098-01N	211, 212
C098N	212, 383
C099-01 / C099N	215
C100	299
C100-01, C100-02	289, 297, 412, 470
C100-03 / C101	289
C101-01	289, 297, 412, 470
C102	289
C103	299
C103-01	235, 255, 289
C103-02	269, 271, 276, 289
C104-01N, C104-02N	214, 215
C104-03N	218, 282-287
C104-03N2, C104-03N3	284
C104-04 / C104-09	215
C104-10N	229
C104-11N	262, 263
C104-31	263, 389
C104-31SP	263
C104MLPP	67, 70, 283, 284
C104N / C104NP	214, 215
C105	234, 288
C106	290
C106-10	388
C107, C107-01	229, 291
C107-09 / C107-29	239, 291-328
C108N	211, 212, 383
C109-09N	265, 277
C109-10	212
C109-10N	298, 411
C109-11	212
C109-11N	296, 297, 466, 470
C109-12	212
C109-12N	297, 412, 470
C109-14N	298, 389, 391, 411, 468
C109-15N	285, 287
C109-16N	271, 297, 412
C109M	213, 215
C110	295
C110-01 / C110-14	295
C110-15	228, 246, 249, 294
C110-20	228, 246, 294
C110-30	229, 234, 246, 291
C111 / C111-50	295
C111-12SC	246
C111-13SC / C111-15SC	246
C111-32SC	246
C112-05	234, 254, 295
C112-10	228, 295
C112-11	237, 249, 257, 295
C113	210, 293, 294
C114	210, 293
C114-01	293
C114-10N, C114AUTO	210, 293
C115-01	293
C115-02	276, 293
C115-03 / C116-09N	293
C116-09S	475, 476
C116-10N / C116-13N	293
C117	237, 249, 254, 257
C118-03 / C118-14	292
C121	228, 234, 292
C121-01 / C121-10	292
C121-51, C121-52	292
C122-01 / C122-07	294
C123	212
C123-01N	407
C123N	68
C125-01N	259
C125-03N	284, 287
C125-09 / C125-15	68, 259, 395
C125M	218, 258
C126	292
C127-11	212

C127N	212, 215
C128	288
C129	57, 300
C129-01N, C129-02	300
C130-05	260, 261, 412
C130-06	412
C130N / C133-01	261
C134-01N	68, 259, 260, 395
C134-10	68, 259, 260, 287, 395, 412
C134N	260
C135	412
C138-05	146, 303
C138-10	146
C138-11 / C138-15	303
C138M	146, 302
C140-01	302, 303
C140-02 / C140-09	303
C140-10	303, 406
C140-11	303
C142	303
C142-01 / C142-06	303
C142-07	302, 303
C142-08 / C142-12	303
C154 / C155-05	301
C155-10N	301, 302, 303
C155-15 / C155M	301
C158	321
C161 / C162-02	305
C163 / C165	304
C165N	305
C170	307
C170-01	306, 307
C171, C172	306
C173	306
C174-01N / C174N	307
C178-KIT, C179-KIT	308
C180-01	308, 309
C180-02	308, 309, 317
C180-03	308
C180-03P	309
C180-04	308, 309
C180-06 / C180-KIT	308
C181	306, 308, 309
C181P	309
C182-KIT	308
C182P-KIT	309
C183	307
C184-10N / C184N	307
C185	309
C186 / C190	310
C192-01 / C192-KIT	309
C194, C194-01	311
C195, C196	312
C196M, C197M	313
C197, C197-01	312
C198	312
C199 / C205-01	314
C208, C208-01	315
C211, C213	311
C214-01	315
C216	315, 546
C216-01	315
C220, C221	311
C222-10	320
C223	318, 320
C223-01, C223-05	320
C223M	318
C223R, C224	318, 320
C228	318, 319, 320
C228-01	319, 320
C229	318, 319, 320
C230	320, 372
C230-01	316, 320
C230-03	318, 320
C230-05	320
C230L	318, 319, 320
C230N	318, 320
C231N1	319
C232	319, 320
C232-01	320
C232M	319
C232N	318, 319, 320
C234-03	320
C235	318, 319, 320
C235-01	320
C237	318, 319, 320
C237-01	319
C238	318, 319, 320
C247 / C249-01	316
C250-10 / C250-17CER	320
C253	317
C253-01	316, 317, 322
C253-02	317
C253-03	316, 317
C253-06	317
C254	316
C254-01	316, 340
C254-02 / C258-02	316
C258-03	307, 316
C258-04 / C258-06	316
C259-05 / C261	317
C262	306, 317
C265N	317
C271N / C274M-KIT	323
C278 / C279	322
C279-01	323
C279-02	59, 322, 323, 443
C279-04	322, 323
C281-01 / C281-04	322
C281-05 / C282	322, 323
C290-01N / C296	329
C299	64, 65, 330, 331, 332
C299-10	330
C300-01 / C300-09N	330, 331
C300-08	64, 331
C302, C302-10	324

C302-02	317, 325
C304 / C304-02	324
C305-01	325
C306-01, C306-02	325
C306-03	89, 130, 325, 438, 439
C306-04, C306-05	325
C307	325, 378, 468
C309-10 / C309-14	325
C311-01N	325, 328
C312-02N / C312-11	328
C313-01N	28, 326
C313-05N	28, 327
C313-11N / C313-15N	327
C313N, C316N	28, 326
C318-10	333
C318N	333, 335
C319	132, 334
C319-02	334
C322, C322-01	335
C324N	333, 335
C330	335
C331, C331-02	334
C332	333
C339-01, C339-02	118, 335
C339-03	335
C339-03B	118
C339-04	118, 335
C339-05 / C345	335
C346 / C346-03	118, 335
C346-04	335
C348T	60, 336
C349T / C350-12	336
C350-13	336, 418
C350-14	60, 336
C350-15 / C350T	336
C351	336, 418
C352 / C353	60, 336
C358-01 / C358-16	338
C358-21	339
C358-23N	338, 339
C360-01-KIT / C361-01	337
C361-KIT	337, 339
C362-01 / C363-03	337
C364 / C366-12	340
C369N	62, 346
C370-02	346, 347
C370-04M	347
C370-06	346
C370-07, C370-08	346, 347
C370-09M	347
C370-10	346
C372-10, C372-11	346, 347
C372M	62, 345, 347
C373-10N	343
C374 / C375-03	342
C376-01 / C376M	341
C377 / C377-16	65, 332
C378-01 / C378-11	342
C380	344, 345
C380-01	344
C381	63, 344
C381-10	344
C386M	345, 347
C390	63, 344, 345
C393N	343
C396N, C398	348
C399	337
C405-10N	350
C405-15M	66, 339, 350, 475, 476, 477
C405-20 / C405-30	350
C405N / C408-03	351
C410 / C410-11	349
C412-01, C414	348
C430 / C432-06	352
C435 / C435-11	353

E	Page
E009-KIT / E011-01N	356
E014 / E025	357
E027 / E028-02	358
E029	357
E031, E031-01	359
E034 / E035	358
E035-10	365
E036-KIT	359
E037 / E038-02	360
E039-01	359
E042-01N, E042-02N	361, 364
E042-06N	364
E042N	361, 364
E043 / E044-08	364
E044-11M, E044-12M	363
E044-30	364
E044-40N	361, 364
E044-41N, E044-45	364
E044-48N	361, 364
E044A	362, 364
E046-01N / E055-05	361, 364
E055-06	361
E055-07	357, 361, 364
E055-08A	356, 361
E055-10 / E055-13	361, 364
E055-15, E058	361
E059 / E060-03	365
E061-12 / E062-10	366
E064N, E065	369
E066 / E066-04	369, 370
E067	371
E067-05	61, 370
E070	367
E072 / E075-11	367, 368
E077-KIT	368
E078-01	61, 368
E078-03, E078-04	368
E078-05	340, 368
E078-06	61

E078-KIT	61, 340, 368
E080	371
E081, E081-10	370
E082	369
E082-01N	371
E082-11N	370
E083 / E083-11	371
E085-05N, E087-05	372
E087-06	61, 357, 372
E087-KIT / E090N-KIT	372
E091	359
E092-05, E092-06	374, 375
E092-10	375
E092M	374, 375
E093N	376, 377
E094N	94, 376, 377
E094NSP	376
E095-01	94, 377
E095-03	94, 376, 377
E095-04	375, 376, 377
E095-05	377
E095N	94, 377, 431
E096-01	377
E097-01N / E097-02SP	375, 377
E102 / E106	378
E107, E107-01	368
E110, E110-01	378
E111	378, 468
E112	378
E113	368
E114 / E115-01	340, 368
E115-02	340
E130	378, 379
E130-11 / E133	379
E134-11	381
E136	47, 380, 381, 455
E136-01	131, 380, 381
E138	381
E138-11	353, 381
E139	380
E140 / E140-11	381
E141	325, 381
E142, E142-01	341, 373
E142-10 / E143-13	373
E151	384
E152	386
E155	384
E156	386
E159-01D	281, 384, 393
E159-01N	281, 385, 393
E159D	281, 384, 393
E159N	281, 385, 393
E160-01D	386
E160-01N	281, 387, 393
E160D	386
E160N	281, 387, 393
E161-01A	386
E161-01N	281, 387, 393
E161-02A	281, 384, 393
E161-02N	281, 385, 393
E161-03A	386
E161-03N	281, 387, 393
E161-05, E161-06	388, 391
E161-11, E161-12	388
E161-15	294
E161A	281, 384, 393
E161N	281, 385, 393
E163	212
E163N	411, 468, 470
E164	212
E164N	411, 468
E170	388
E170-01, E170-01GO	388, 392
E170-11	392
E171	290, 388, 391, 392
E171-01	290, 384, 388, 391, 392
E172-01	388
E172-01GO	392
E172-02	388, 390, 391, 392
E181N	390, 393
E183-10	391
E183-11, E183-12	294
E183F	283, 284
E183N	390, 393, 394
E190M	394

H	Page
H001-29N / H001-31N	401
H001-45	404
H001A	399-404
H001A-11 / H001A-22	401
H001A-40	402
H001A-43 / H001A-47	404
H001A-50 / H001A-60	402
H001B	399-404
H001B-11 / H001B-22	401
H001B-40, H001B-41	402
H001B-42	403
H001B-43 / H001B-50	404
H001B-60	402
H001BS	398-404, 407, 414
H001BS-31 / H001BS-33	401
H001BS-60	402
H001C-10 / H001C-22	401
H001C-40	402
H001C-50	404
H001CS	400, 401, 402, 404, 414
H001CS-31 / H001CS-33	401
H001CS-60	402
H001D-11 / H001D-22	401
H001D-40, H001D-41	402
H001D-42	403
H001D-43 / H001D-47	404
H001DS	400, 401, 402, 404, 414
H001DS-31 / H001DS-33	401
H001DS-60	402

H003-14	404
H003-18	414
H005-11 / H005-31	408, 469, 470
H005-41 / H005-44	470
H009-01 / H009-01EN	212
H009N	407-410, 413, 417, 469, 470
H010-01N, H010-02N	405
H010-10N / H010-15N	406
H010-31SP	406, 407
H010-40	407
H011-15	406
H012	125, 298, 409, 464
H012-10, H012-11	410
H012-20	298, **411**, 412
H012-21	298, 411
H012-22 / H012-24	412
H012-30	413
H014	414, 470
H014-04 / H014-12	414
H017, H017-05	416
H017-10 / H017-60	417
H020 / H054	418
H057N1	418
H057-10N / H057-11N	419
H062M	419
H062-01M / H062-05	419
H065-01 / H068-23	420-422

S	Page
S050, S050-01	426
S051N	426
S051-01	427
S051-10 / S051-12N	426
S052-KIT	427
S053	427, **429**
S053-04	429
S054	427, 429
S057, S057-01	426
S058 / S058-12	432
S059 / S059-10	432
S061 / S061-02	429
S065 / S071	430
S074N	431
S074-01N / S074-12N	431
S075 / S076-01	430
S077N / S079N	433
S082-01 / S083-03	429
S084N-KIT	429
S086, S088	431
S092-01 / S092ASTA	427
S092-KIT / S094-KIT	428
S093-01, S094-01	427
S095	428
S097 / S097-06	428
S110 / S113-17	435
S114	101, 435
S118, S120	436
S122-08 / S122-12	436, 494
S122-13 / S122-16	436, 500
S122-21	436, 494
S122-22 / S122-27	436, 485, 487
S123	436, 485, 487
S123-01 / S123-05	436, 485, 487
S123-08 / S123-12	436, 494
S123-13 / S123-16	436, 500
S123-17	436, 494
S124, S125	436, 551
S131-11	457
S131-KIT	457
S132-01	59, 88, 434, 541
S132-02	59, 434, 541
S132-03	52, 59, 434, 541
S132N	59, 434
S133N / S138	434
S140	437
S143-KIT	439
S144, S144-01	52, 439
S144-02 / S144-10	439
S147	47, 455
S148	47, 136, 455
S155-01 / S155-03	438
S155-04 / S155-09S	438, 439
S155-10A	380, 438, 439
S155-11 / S156-13	438
S156-20	52
S157-01 / S157-10	439
S157-05	439, 543
S157-06	142, 439
S157-KIT	52, 439
S158-01GN	441
S158-01N / S158-10	440, 441
S158-11, S158-12	440
S158-KIT, S158-20-KIT	51, 440
S159-KIT, S159-01-KIT	51, 441
S160N / S161	51, 442
S165	446
S165-01, S165-02	447
S166-01N / S166-06	447
S166	446
S170 / S173-10	444
S175 / S179	445
S185	448
S185-01	449, 483
S186	448
S187, S187-01	449
S188, S188-01	449, 453
S188-02	449
S189 / S194-04	448
S194-09 / S194-11	449
S194-14 / S194-26	453
S195-01 / S195-28	456
S196N	454
S197N1, S197-01N	101, 454
S198-22, S198-23	451
S199	450
S199-06 / S199-14	450, 451

S199TS	451
S199T-03 / S199T-04	451
S200-01N / S200-04	453
S200-04F	452, 453
S200-05 / S200-08	453
S200-09	449, 453, 483
S200-10N	453
S200-11	306, 378, 453
S200-12N, S200-13N	453
S200-14	101, 105, 321, 453, 557
S201	453
S201-01 / S201-12	453
S202N, S203	453
S203-01	453
S205-05M	124, 408, **462**
S205-07, S205-08N	468
S205-09	408, 469
S205-11	297, 461, 512
S205-13, S205-14	468
S205-15	296, 297, 412, 466
S205-16 / S205-18	296, 297, 466
S205M	124, 296, **462**
S206-21N	127, 469
S206-31	126, 465
S206-32	466, 468
S206-33	470
S206M	125, 297, 408, 463
S209-01, S210-02	458
S210-KIT	457, 476
S211-10	458
S211-KIT	128, 458, 460
S212-01	457, 458, 459, 461, 465
S212-03	457, 458, 459
S212-05	122, 123, 126, 459, 461, 465, 467, 468
S212-08N	459, 467
S212-09N	459, 461, 467
S212A	461
S212M	122, 123, 459, 461, 512
S213-05N	122, 123, 128, 459, 460
S214-05N	122, 460, 461
S215A	122, 461
S216	460
S218-01N	129, 461, 467
S218-02N	461, 512
S218N	129, 460, 461, 465
S220-01	457
S220-KIT	457, 476
S221, S221-01	457
S222-01	471, 472, 475
S222-02	471, 472
S222-02D	471, 472, 473
S222-03	471, 472, 473, 474, 475, 476
S222D-KIT	471
S222-KIT	471, 476
S223-01	471
S223-02	471, 473
S223-03	472, 473, 474, 475, 476
S223D-KIT	472
S223-KIT	471, 472
S224-01-KIT	475
S224-02-KIT	475, 476
S224-21N	66, 475, 476
S224-KIT	475
S225-01	135, 473, 475
S225-02	135, 473
S225-02D	471, 473
S225D-KIT	473
S225-KIT	135, 473
S226-01 / S226-03	476
S226-05	471, 472, 473, 474, 475, 476
S226-06	472, 473, 474, 475, 476
S226-09	476
S226-12	471
S226-13	135, 472, 473, 475
S226-16	471, 472, 473, 474, 475, 476
S226-50	476
S226D-KIT / S227-03D	474
S228-05 / S228N	478
S230, S230-01	480
S231 / S231-11	481
S232 / S233-01	480
S234 / S237-KIT	481
S238-01N-KIT / S238N-KIT	479
S240-01 / S240-05	480
S244N	479
S245-01 / S245-03	482
S245-04	480, 482
S246-01	482
S248	483
S252 / S253-02	482, 483
S253	482, 483
S253-01	482, 483
S253-02	482, 483
S260	484, 487
S260-13	486
S261	485, 488
S265, S265-01	486, 487
S270, S270-05	485, 487, 488
S273-01	486
S273-01-KIT	486, 487
S273-02	486
S273-02-KIT	486, 487
S273-03 / S273-08	486
S273-KIT	486, 487, 491, 494, 507
S274-01U / S274-32	485
S275N	73, 485, 487
S276-01M, S276-10M	491
S276-KIT	490, 491, 496
S277-20	491
S277-21	491, 493
S277-22	493
S277-31	491, 493
S278	492, 496
S279	495, 496
S279-10 / S279-25	495
S280-15, S280-16	491, 493

S281 / S291-01	494
S301-01N	516, 517, 518, 521
S301-02	499
S301-05	498, 507, 510, 512, 514
S301-06	498
S301M	498, 502, 503, 506, 510, 512, 514
S303N	517, 518, 519, 521, 525, 526
S305	500
S305-05	503
S305-14, S305-15	518
S306-10	186
S306N	500
S307	500, 524, 525, 528, 529
S307-03 / S307-08	525, 529
S307-10	525, 528
S307-11	191, 524, 525, 528
S307-12 / S307-19	525, 528
S307-20, S307-21	528
S307-22 / S307-24	525, 529
S307-30, S307-31	528
S310	501
S310-01	197, 500, 511, 512, 515, 521, 528
S310-02	500, 512
S310-03, S310-04	500
S311	501
S311-01	197, 500, 511, 512, 515, 521, 528
S311-02	500, 512, 521
S311-03	186, 187, 195, 500, 521
S311-04	500, 521
S312	500, 501, 511, 515, 521, 528
S312-01	500, 511, 515, 521, 528
S312-02, S312-03	500, 521
S312-04	521
S312-05	500
S313	500, 501, 511, 512, 515, 521, 528
S313-01	500, 511, 512, 515, 521, 528
S313-02	500, 512, 521
S313-03, S313-04	500, 521
S313-10, S313-11	500, 501, 511, 513, 515, 522, 528
S313-12	500, 501, 513, 522
S313-13	500, 501, 522
S313-14	500, 522
S314	500, 501, 511, 513, 515, 522
S314-01	500, 511, 513, 515, 522
S314-02	500, 513, 522
S314-03	186, 500, 522
S315	500, 501, 511, 513, 515, 522
S315-01	500, 511, 513, 515, 522
S315-02	500, 513, 522
S315-04	500, 511, 515, 522, 528
S315-05	500, 511, 515, 522
S315-06	500, 522
S315-07	186, 500, 522
S315-10, S315-11	528
S316	500, 501, 511, 515, 522, 528
S316-01	500, 511, 515, 522, 528
S316-02	500, 522
S316-03	186, 500, 522
S316-04	500, 522
S317	500, 501, 511, 513, 515, 522, 528
S317-01	500, 511, 513, 515, 522, 528
S317-02	500, 513, 522
S317-03, S317-04	500, 522
S318	500, 501, 511, 513, 515, 522, 528
S318-01	500, 511, 513, 515, 522, 528
S318-02	500, 513, 522
S318-03, S318-04	500, 522
S319	500, 501, 511, 515, 522, 528
S319-01	500, 511, 515, 522, 528
S319-02 / S319-04	500, 522
S320	500, 501, 511, 515, 522, 528
S320-01	500, 511, 515, 522, 528
S320-02 / S320-04	500, 522
S321	500, 501, 511
S322	500, 511
S325	505
S326	500, 511, 513, 515, 522, 529
S327	500, 511, 515, 522, 529
S328	500, 511, 513, 515, 522, 529, 557
S329, S330	500, 511, 513, 515, 522, 529
S331	501
S332-02	511, 522
S332-04	513, 515, 529
S332-08	525, 529
S334-01N	484, 487, 509, 514
S334-11 / S334N	509
S335-15 / S336-12	503
S336-13	495, 503
S336-14	503
S336-15	127, 467, 503
S336-16	503, 507, 510
S336-17 / S336-18	503
S336-19	271, 275, 287, 412
S336-23N	517, 518, 521
S336-25	518
S336-30	484, 486, 487, 503, 506, 514
S336-31	475, 476, 484, 491, 503, 506, 514
S336-32	484, 503, 506
S336-41	477, 486, 493, 503, 510
S336-43	477, 486, 487, 493, 503
S336-45	477, 493, 503, 510
S336-47	477, 493, 503
S336-50	506, 510
S336-51	506, 510, 511, 512, 514
S336-52	506
S336-53N	517-525, 528, 529
S336-55	506
S337-02, S337-03	502
S337-04	502, 511
S337-05	502
S337-06N	521, 524, 525, 528
S337-21	502, 511, 521
S337-22	502, 521, 525, 528
S337-23	524, 525, 528
S337-31	127, **413**, 461, 467, **502**
S337-32	502

S337-33	127, 413, 502
S337-34	502
S337-35	127, 413, 502
S337-36	408, 469
S337-41N	518, 521
S337-43N	517, 518, 521
S337-51	412, 465, 468, 477, 484, 488, 494, 502
S337-52	106, 321
S338-01-KIT	507, 515
S338-02N	507
S338-05	507, 510, 515
S338N	507
S340	505, 510, 512
S342-01	505, 510
S342-02	505, 514
S342-03, S342-04	505
S342-06	505, 506, 510, 514
S348	505
S349-10	517-522, 525, 528, 529
S349A-01, S349A-02	504
S349A-KIT, S349A2-KIT	504
S349N	520
S350-01	505
S350-04, S350-05N	504
S350N	504
S351N	504, 554
S355	506
S355-01	504, 510, 512, 514, 528
S358	507
S359	507, 514
S370	530
S370-01 / S370-11	530
S370-01S	502
S370-02S	459
S370-03S / S370-07S	502
S370-08S	123, 459
S370-09S	530
S370-10S	123, 459, 502
S371-01S / S371-10S	502
S374	530
S374-01	458
S374-02	530
S375	261, 340, **531**
S375-01	484, 487, 531
S376, S377	531
S378	351, 531
S379	351, 503, 507, 510, 531
S379-01 / S380-01	531
S382-01	340, 484, 531
S382-13	61, 337, 340, 351, 368, 531
S383	351, 503, 531
S390, S390N	531
SPC	20
SSW-GWAY, SSW-LINK	20, 217, 383, 415, 489, 496, 508

V	Page
V015 / V017	534
V023-01	28, 443, 535
V023-03	535
V031, V034	534
V035-01 / V040	535
V041	47, 92, 538
V042	538
V051, V059	534
V065-02, V065-03	535
V070-02 / V075-12	537
V075-12SP	371, 537
V075-13 / V075-22	536, 537
V085	47, 92, 314, **538**
V085-01, V086-KIT	538
V098 / V100	539
V100-01	445, 539
V100-02 / V101-02	539
V101-03	153, 539
V101-04	53, 539
V101-05	313, 539
V101-06	539
V101-07	52, 539
V102-01 / V102-04	543
V103	47, 539, 540
V103-01	47, 539
V103-02 / V104-02	539
V104-03	438, 539
V104-04 / V105-03	539
V105-04	47, 539
V105-04V	539
V105-05	47, 539
V105-05V	539
V105-06	47, 539
V105-06V / V105-08	539
V106	539, 540
V106-01 / V106-04	539
V107 / V107-14	540
V108	455, 540
V108-01 / V108-03	47, 455, 540
V108-10 / V109-09	540
V110 / V110-03	541
V111, V111-01	146, 541
V112	544
V112-01	436, 544
V112-02 / V112-04	544
V112-05	550
V113	436, 544
V114-01, V114-02	544
V114-03	445, 544
V114-04 / V114-10	544
V115, V115-01	541
V116 / V116-03	550
V117 / V117-04	544
V118 / V118-03	543
V119 / V119-03	541
V120 / V120-03	543
V121	440, 441, 481, 543
V121-01	543
V122	445, 550
V122-01, V122-02	550

V122-03, V122-04	445, 550
V122-05	139, 140, 149, 159, 447, 550
V122-06	139, 140, 159, 447, 550
V122-07	550
V122-08	140, 447, 550
V122-11	140, 550
V123 / V124	541
V125 / V125-02	550
V125-03	60, 480, 550
V125-04 / V125-18	550
V127	306, 543
V127-01 / V136	543
V136-01	440, 441, 543
V136-02	543
V138	542
V140	544
V142 / V143-08	542
V145-10, V145-11	543
V147, V147-01	542
V148, V148-01	545
V150N / V154-01	546
V154-02	92, 546
V154-03 / V154-06	546
V154N	92, 546
V155	546
V160 / V164A	547
V165-01, V166-01N	548
V167 / V169	545
V170	440, 548
V170-01, V171	548
V172, V172-02	438, 548
V172-03N	438, 439, 548
V172-04	548
V172-05	60, 548
V173-01, V173-02	549
V173-03	84, 85, 549
V173-04	85, 549
V173-05, V173-06	549
V174	161, 549
V175, V175-01	549
V175-02	92, 320, 549
V175-02CER	320
V175-03	53, 320, 549
V175-03CER	320
V175-04, V176	549
V176-01	308, 309, 549
V176-02	440, 441, 549
V177 / V178	549
V178-01	308, 309, 317, 549
V178-03	549
V179	549
V179-01 / V179-06	549
V182	317, 550
V182-01 / V182-13	550
V183	480, 551
V184	308, 309, 551
V184-01	317, 551
V184-02 / V185-02	551
V185-03	309, 551
V186	480, 551
V186-01	329, 551
V187	317, 551
V188	480, 551
V189	551
V189-01	310, 551
V192	445, 551
V192-01 / V192-07	551
V192-08	357, 551
V193, V194	480, 551
V194-01	551
V195	317, 318, 480, 551
V196, V197	551
V198, V199	480, 551
V200	29, 84, 85, 552
V200-01N	29, 552
V200-02	29, 84, 85, 552
V200-03N / V200-06N	29, 552
V201, V201-01	554
V202	455, 553
V205	85, 359, 506, 518, 521, 525, 553
V205-01	86, 553
V205-02	553
V205-10	85, 86, 506, 518, 525, 553
V205-11	506, 553
V205-12	86, 506, 518, 525, 553
V205-13	506, 518, 525, 553
V205-KIT	506, 510, 512, 514, 518, 525, 528
V206	136, 353, 482, 554
V206-01, V206-02	381, 554
V207	106, 504, 510, 512, 514, 554
V208-05, V208-10	554
V211, V211-01	555
V215, V215-01N	437, 555
V215-02N / V215-14	555
V218-01 / V218-12	557
V219 / V230-01	556
V230-02	480, 556
V230-03	556
V241, V300-05	557
V300-15	31, 455, 542, 557
V300-16	557
V300-19	29, 92, 366, 557
V300-23	438, 557
V300-25	557
V300-28, V300-29	439, 557
V300-30	437, 557

Matest S.p.A.
Via delle Industrie, 25
Treviolo, (BG) Italy

MATEST.COM