3 CEMENTS

Sampling

Standards EN 196/7; UNE 80.401; ASTM C 183; AASHTO T127

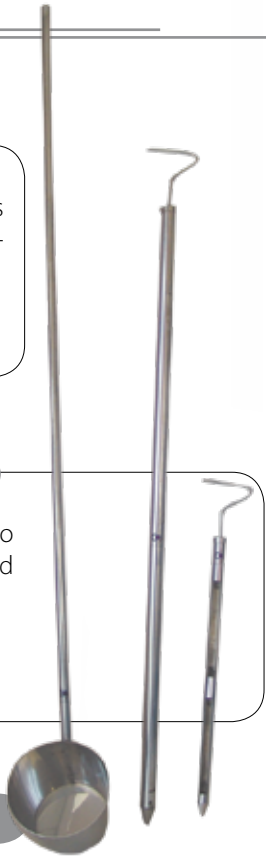
C0001 Sampling equipment for cement in sacks

For sampling cement in sacks. Consisting of two concentric brass tubes with lengthways slots. The inner tube rotates and closes the slots, preventing the sample from escaping.
Internal volume: 1.2 litres.
Dimensions: Ø 32 x 700 mm.

C0002 Sampling device

For sampling cement in sacks or transport vehicles. Consisting of two concentric brass tubes with lengthways slots. The inner tube rotates and closes, preventing the sample from escaping.
Internal volume: 3 litres.
Dimensions: 40x1500 mm.

C0003 Sampling spoon with handle



Chemical tests

Standards EN 932/1; UNE EN 196-2

C0005 Flame photometer

Designed for routine determination of Sodium (Na) and Potassium (K); with the possibility of incorporating additional filters to measure Lithium (Li), Barium (Ba) and Calcium (Ca). For user safety, the device includes an automatic power failure detector, making it ideal for industrial, clinical and educational use.

Technical characteristics:
Wavelength range: 405 - 700 nm.
Reading display: High contrast digital (LCD).
Zero: Automatic.
Photometric range: 0 - 100.0%.
Transmittance: 0.000 - 3.500.
Absorbance: 0 - 9.999.
Concentration/Factor 9.999
Photometric linearity: 1%.
Lamp: Long-lasting tungsten.
Photometric accuracy: 1 %.
Repeatability: ± 0.5% T.
Response time: 3 seconds.
Stability: Drift of 0.003 h after 1/2 h warm up at 0 A.
Data input: Membrane keypad.
Dimensions: 225 x 230 x 90 mm.
Weight: 1.8 kg.

Supplied complete with an electronic power failure safety device, sodium and potassium filters, connection tubes and collars, compression plug, water separator, fuses and instruction/maintenance manual.

Accessories:

C0005/1 Barium filter.
C0005/2 Calcium filter.
C0005/3 Lithium filter.
C0005/4 Air compressor.
C0005/5 Butane regulator.

Determining cement fineness

Standards EN 196-6; UNE 80.122; ASTM C 204; BS 4359; NF P-15 442; AASHTO T153

Cement fineness is a property that can be carefully controlled during the manufacturing process. The total specific surface of cement represents the surface area available for hydration. There are several methods for measuring the specific surface of cement. Air permeability is the method used that provides the most accurate and repetitive results.

C0010 Blaine Permeability Meter

Used to determine the specific surface of cement. The instrument consists of a support with a U-shaped manometer tube, a stainless steel cell with a perforated disc and a piston, a suction pump, manometer fluid and filter paper.
Dimensions: 380 x 150 x 150 mm.
Weight: 1.5 kg.

Accessories:
C0010/2 Reference cement 114p (10 g).
C0010/8 Glass thermometer -10 +50 ºC.

Spare parts:
C0010/1 Filter paper (1000 units).
C0010/3 Manometer fluid (100 ml).
C0010/4 U-shaped manometer tube.
C0010/5 Stainless steel cell with perforated disc.
C0010/6 Perforated disc.
C0010/7 Suction pump.

Standards UNE EN 451-2; DM 3/6/68

C0012 Apparatus to determine residue by means of water flow

Used to determine the fineness of cement. Consisting of a shower type spraying lid with a stopcock and pressure gauge; a sieve measuring Ø 85 x 95 mm high, made of chrome plated brass and two stainless steel meshes with mesh sizes of 0.18 and 0.09 mm. The test consists in placing a 25 g cement sample in the sieve and washing it with the shower for 2 minutes. The cement residue that remains is obtained by drying the sieve at 110°C.
Dimensions Ø 80 x 130 mm.
Weight: 2.5 kg.

Spare parts:
C0012/1 Spare mesh with mesh size 0.18 mm.
C0012/2 Spare mesh with mesh size 0.09 mm.

C0013 Apparatus for determining fly ash by wet method

Consisting of a special sieve measuring Ø 50 mm made of stainless steel and with a mesh size of 0.045 mm, a spray nozzle of Ø 17.5mm with 17 holes measuring Ø 0.5 mm according to specifications, an 80 mm pressure gauge and connection couplings to the water supply.
Approximate weight: 3 kg

Consistency

Determining setting times and the consistency of cement requires the use of a clean mix with standard consistency. The Vicat test is generally indicated as the method to use in order to determine the water content, which produces the required consistency. Mortar, silt and cement consistencies are determined using a probe penetration method, as specified in EN standards for these types of materials. The setting point or useful life of fresh mortar is also determined by the probe penetration method. Other frequently used methods include the jolting table or the falling ball method. The corresponding instruments required to perform these tests are described in this section.

Vicat method

Standards EN 196-3; ASTM C187, 191; BS 4550; AASHTO T131; NF P15-414 P15-431; DIN 1168

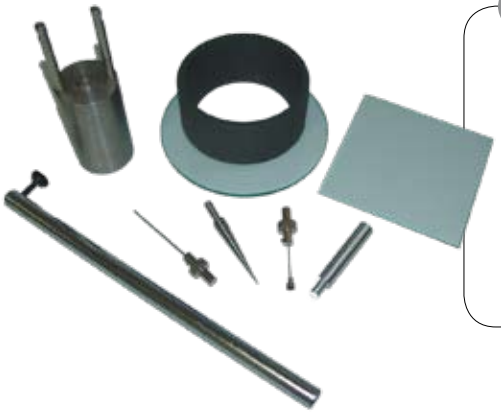
This method is used to determine the amount of water needed to produce a cement paste with standard consistency.

C0015 Manual Vicat needle

Consisting of a base with support, a sliding probe measuring Ø 10 m and weighing 300 g, and a graduated scale. Supplied complete with a Ø 1.13 mm needle for initial setting and a Ø 1.13 mm needle for final setting, a Ø 120 mm glass base and a tapered mold measuring (EN) Ø 70/80 x 40 mm.

Accessories and spare parts

C0015/1 Ø 1 mm needle for initial setting (ASTM, AASHTO).
C0015/2 Ø 1.13 mm needle for initial setting (EN, BS, DIN, NF, UNE).
C0015/3 Ø 1.13 mm needle for final setting (EN, NF, DIN, BS).
C0015/4 Additional weight of 700 g (EN, NF).
C0015/5 Glass base (EN, ASTM).
C0015/6 Vicat mold Ø 70/80x40mm (EN, NF).
C0015/7 Vicat mold Ø 60/70x40mm (ASTM, AASHTO).
C0015/8 Ø 10 mm probe (EN, ASTM).
C0015/9 Bronze mold Ø 80/90x40mm (BS).
C0015/10 Bronze split mold Ø 80/90x40 mm (BS).
C0015/11 Glass thermometer ranging from –10 to 50ºC.
C0015/12 Ø 1.13 mm hardened needle for initial setting. (EN, BS, DIN, NF, UNE).



C0015/Y Vicat manual needle for plaster

Consisting of a base, a sliding probe measuring 10 mm and weighing 100 g, and a graduated scale. Supplied complete with needle, Ø 120 mm glass base and tapered mold in compliance with UNE standards.

Accessories and spare parts:

C0015/Y/1 100 g probe.
C0015Y//2 Conical penetration needle of Ø 8 x 50 mm long.

Consistency

Standards EN 196/3; D.M. 3/6/68; ASTM C191; DIN 1164 1168; BS 4550; NF P15-414; P15-431; AASHTO T131

This type of test has traditionally been conducted using a simple apparatus consisting of a base and a support, a sliding probe and a graduated scale (manual Vicat needle) to read the penetration depth.

The apparatus described here is completely automatic, thereby eliminating possible test inaccuracies and guaranteeing maximum reliability. This instrument records the results on paper, so an operator is not necessary and the progress of the test can be determined without doubts or inaccuracies.

C0016 Automatic Vicat apparatus

Automatic Vicat needle to determine the setting time, operating at fixed intervals, with data recording. With this needle, the entire process is automatic from the moment the test parameter are selected, thus preventing any of the possible errors made during a manual process. The equipment also includes a program for testing plaster, in compliance with DIN 1168. The probe weighs 300 g (1000 g AFNOR) and needle diameter is 1.13 mm (1 mm ASTM). The equipment performs a complete penetration cycle in 30 seconds or at intervals of 1 - 5 - 10 - 15 - 30 minutes between penetrations.

The equipment enables the selection of any of the following test programs:

Standards EN - AFNOR - BS - DIN
26 penetrations, mold Ø 70/80/40.

Standard ASTM
41 penetrations, mold Ø 60/70/40.

Standard UNE
90 penetrations, mold Ø 80/90/40.

Plaster tests as per DIN 1168
22 penetrations.

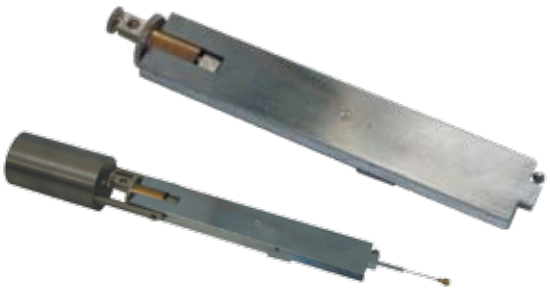
This apparatus is made of a light alloy making the instrument sufficiently solid and resistant to withstand any working conditions. Its light weight makes it easy to transport. Testing times ranging from 1 to 99 minutes can be selected and it has program start delay ranging from 0 to 360 minutes. The sample tray turns automatically so the needle penetrates in a different position every time from a pre-selected position depending on the selected testing standard. Optionally and on request, an automatic needle cleaning device can be mounted, without modifying the section or the results of the test. Initial and final setting times are drawn on the diagram based on the number and depth of the penetrations. When the test is completed, the device stops automatically. In the event of a power failure, an error message will appear on the display when the test restarts to indicate the time when the interruption occurred (number of penetrations made and test time lapsed).

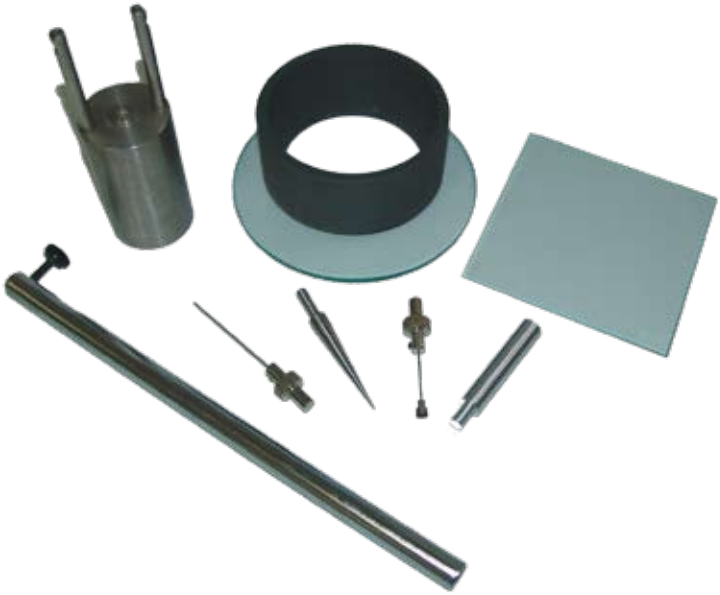
Technical characteristics:
Membrane keypad with backlit LCD display of 128X64 pixels.
Needle height calibration programme.
Test execution programme.
Language selection, Spanish, French, German and Italian.
Support tray for glass base with automatic centring system.
Automatic system to adjust the pressure of the chart recorder pen on the paper.
Power supply: 15V DC – with electric power supply 100-250V/1ph/43-63Hz.
Dimensions: 200x420x300 mm.
Weight: 11 kg.

The apparatus is supplied complete with:
1.3 mm diameter needle (EN, BS, DIN, NF, UNE).
1 mm diameter needle (ASTM, AASHTO).
300 g probe.
Ø 70/80 x 40 mm tapered mold (EN).
Ø 120 mm glass base.
Chart recorder pen.
Chart recorder paper (100 units).
Instructions manual.
Test accessories for different standards must be requested separately.
With the specific accessories, available to order, the apparatus can also perform the consistency test for GIPS plasters.

Accessories and spare parts:
C0016/1 Ø 1 mm needle for initial setting (ASTM, AASHTO).
C0016/2 Ø 1.13 mm needle for initial setting (EN, NF, DIN, BS).
C0016/3 Ø 1.13 mm needle for final setting (EN, NF, DIN, BS).
C0016/4 Additional weight of 700 g (EN, NF).
C0016/5 Needle cleaning device.
C0016/6 Consistency test probe.
C0016/7 Ø 10 mm consistency test probe (EN, ASTM).
C0015/6 Vicat mold Ø 70/80x40 mm (EN, NF).
C0015/7 Vicat mold Ø 60/70x40 mm (ASTM, AASHTO).
C0015/9 Bronze mold Ø 80/90x40mm (BS).
C0015/10 Bronze split mold Ø 80/90x40 mm (BS).
C0016/10 Glass base.
C0016/11 Set of five chart recorder pens.
C0016/12 Chart recorder paper (100 units).
C0016/13 300 g probe.

Accessories for plaster:
C0016/14 Cone-shaped mold.
C0016/15 100 g aluminium probe.
C0016/16 Tapered point.





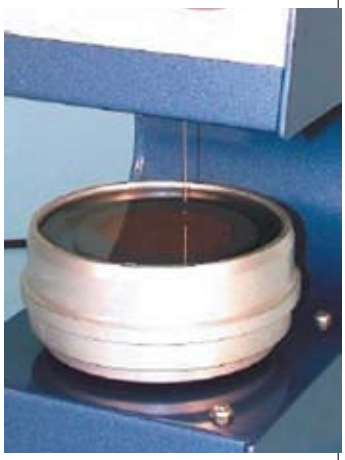
C0016/18 Thermostat controlled heating and cooling unit

The system produces water at a controlled temperature of 20ºC ± 1º C that is recirculated in the C00169/17 tank for testing at controlled temperature and humidity levels, as indicated in Standard EN 196-3. It can be used with a single Vicat needle.

Power supply:
Single phase 220-240 V/50 Hz. 1150 W.
Dimensions:
625 x 380 x 410 mm.
Weight: 26 kg.

C0016/17 Molding tank

For testing samples immersed in water. The test must be performed in a room with controlled temperature of 20ºC ± 1º C. The saturated humidity is obtained by immersing the sample in water as indicated in Standard EN 196-3.

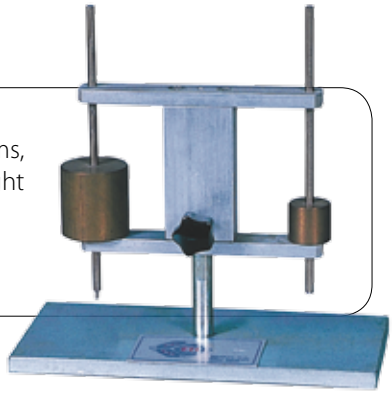


Gilmore method

Standards ASTM C91, C141, C266; AASHTO T 154

C0017 Gilmore Apparatus

Used to determine the setting time of cement. Consisting of two horizontal supporting arms, a vertical adjustable supporting shaft and two needles with stainless steel tips. Made of a light aluminium alloy, it includes two calibrated weights as per specifications.
Weight: 3 kg.



Standards EN 413-2, 459-2, 1015-4.

C0018 Penetration plunger device

Used to determine consistency in mortar, silt and cement.
The apparatus consists of a robust base with a device for locating the testing cup. Fall height can be adjusted up to 100 mm. The equipment is supplied complete with test cup and tamper.
Dimensions: 200 x 200 x 700 mm.
Weight: 10 kg.

Jolting tables

Jolting tables are used to determine cement and mortar consistency. PROETI manufactures several models, depending on the standard required.

Standards UNE 83.258

C0019 Manually operated jolting table

Consisting of a round glass table measuring Ø 350 mm, supported by a cast steel base in the form of a tripod and a crank that raises a cam allowing the table to fall from a height of 10 mm. Supplied complete with a Ø 100 mm bronze mold and a tamper made of non-absorbent material.
Dimensions: 300 x 290 x 300 mm.
Weight: 20 kg.

Standards EN 1015-3; EN 459-2

C0020 Motor-driven jolting table

Consisting of a round stainless steel table measuring Ø 300 mm, supported by a cast steel base in the form of a tripod and a gear motor that raises a cam allowing the table to fall from a height of 10 mm. Supplied complete with an electronic impact meter with automatic stop mode, a Ø 100 mm bronze mold and a wooden tamper.
Power supply: 220 V. / 50 Hz.
Weight: 45 kg.

Accessories
C0019/1 Ø 70/100 x 60 mm tapered mold as per EN.
C0019/2 Ø 40mm wooden tamper.

Spare parts
C0019/3 Jolting table glass.

Standards ASTM C230; BS 4551

C0021 Manually operated jolting table for mortar.

Consisting of a round stainless steel table measuring Ø 254 mm, supported by a cast steel base in the form of a tripod and a crank that raises a cam allowing the table to fall from a height of 12.7 mm. Supplied complete with Ø 101.6 mm bronze mold and wooden tamper.
Weight: 20 kg.

Accessories
C0021/1 Ø 101.6/69.9 x 50.8 mm tapered mold.
C0021/2 12 x 25 x 250 mm wooden tamper.

Standards ASTM C230; BS 4551

C0022 Motor-driven jolting table for mortar

Consisting of a round stainless steel table measuring Ø 254 mm, supported by a cast steel base in the form of a tripod and a gear motor that raises a cam allowing the table to fall from a height of 12.7 mm. Supplied complete with an electronic impact meter with automatic stop mode, a Ø 101.6 mm bronze mold and a wooden tamper.
Power supply: 220 V. / 50 Hz.
Weight: 25 kg.

Accessories
V0076 Sample diameter gauge (200 x 0.02).
V0077 Sample diameter gauge (300 x 0.02).
V0079 Digital sample diameter gauge (200 x 0.02).

Falling ball consistency

Standards BS 4551-1, 6463-4

C0023 Falling ball apparatus

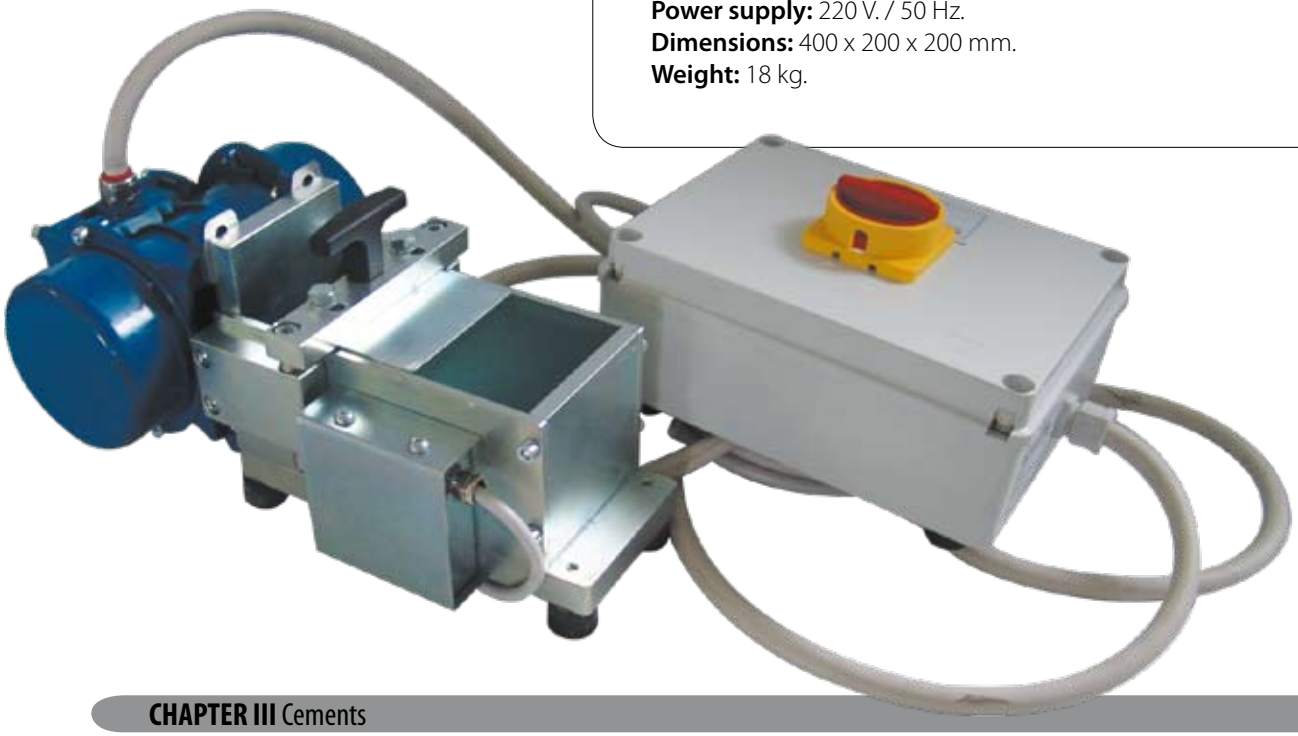
Used to measure the consistency of cement mortar. The test consists in allowing a Ø 25 mm acrylic ball fall freely from a height of 250 mm onto a mortar sample contained in a mold measuring Ø100 x 25 mm. The penetration of the ball in the mortar determines the consistency of the sample being tested.
The apparatus basically consists of a height adjustable vertical support, a falling device, an acrylic ball and a brass mold.
Weight: 6 kg.

Accessories
C0023/1 Device to measure the penetration of the ball in the sample. Consisting of a metal support with 25 x 0.01 mm dial gauge.
Spare parts
C0023/2 Ø 100 x 25 mm brass mold.

Standards EN 413-2; AFNOR P18-452

C0024 LCL Plasticity meter

Used to verify the homogeneity of a fresh mortar mix based on its plasticity, as specified in Standard EN 413-2. The unit consists of a small rectangular container divided by a removable separator and a vibrator coupled to one of the walls of the container. The test consists of introducing the fresh mortar into the first compartment and removing the spacer that divides the container. This automatically activates the vibrator; the test ends by recording the vibration time required for the sample to spread homogeneously over the second compartment.
Power supply: 220 V. / 50 Hz.
Dimensions: 400 x 200 x 200 mm.
Weight: 18 kg.



Stability and expansion

Cement consistency is especially important. It is essential that it does not experience any notable change in volume once hardened. Volume variations are not apparent over a period of months or even years. Therefore, test methods have been developed to determine the consistency of the material to be tested.

Le Chatelier test

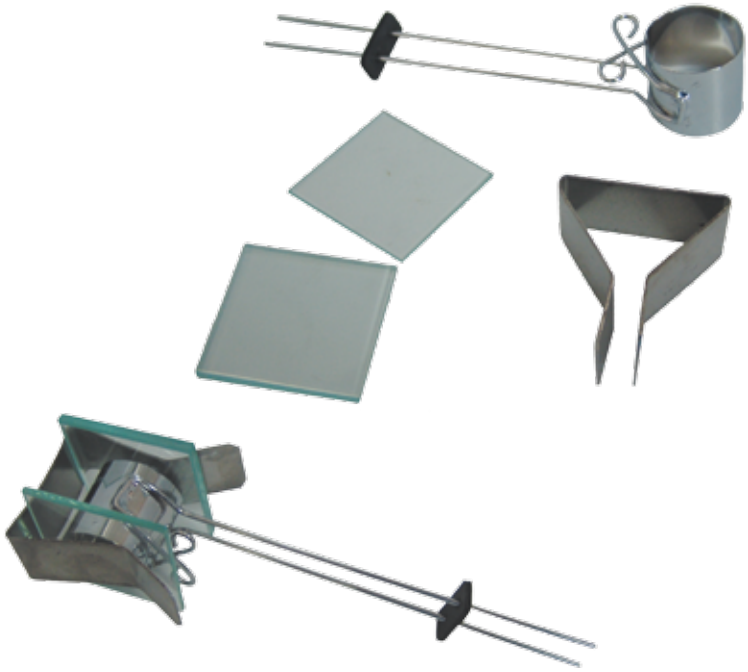
This method is used to determine dimensional stability or expansion in cement.

Standards UNE EN 196-3;UNE 80.103; EN ISO 9597; BS 6463; NF P15-4362

C0030 Le Chatelier water bath

Made of stainless steel and equipped with 1000 W heating elements to enable the water to reach boiling point in 25 minutes. Temperature regulation system controlled by electric thermostat, from ambient temperature to 100°C. Supplied complete with heating element cover-tray, cover and thermometer. Provides capacity for 6 simultaneous tests.
Power supply: 220 V. / 50 Hz.
Internal dimensions: 310 x 300 x 150 mm.

Spare parts
C0031 Le Chatelier mold, Ø 30 x 300 mm long.
C0032 Glass plates (2), 50 x 50 mm.
C0033 Le Chatelier clamp to hold the glass plates.
C0033/1 Equipment to check the Le Chatelier clamps.
C0034 100 g weight to place on the glass plates.



Autoclave for expansion tests

This method is used to determine dimensional stability or expansion in cement.

Standards ASTM C141, C151; UNE 80113

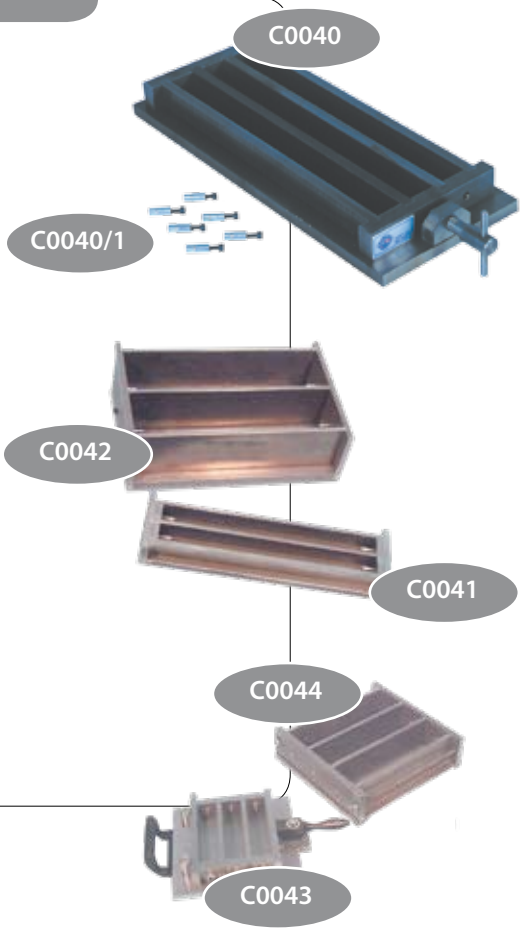
C0035 Autoclave

Autoclave designed for performing expansion tests on cement specimens. Consisting of a high pressure cylindrical container made of special heat insulated steel and coated in a protective layer or film. Heating is carried out by means of two electrical resistance elements. The control panel includes: a pressure gauge with an integrated pressure regulator, a thermostat, and buttons for temperature input and equipment start/stop. The autoclave includes a safety valve.
Power supply: 1 x 220-240 V. 50 Hz. 3500 W. 295 psi.
Internal dimensions: 450 x 475 x 1080 mm.
Weight: 75 kg.

Standards ASTM C490, C348; BS1 881, 6073; NF P18-427; UNE 80113

Expansion test molds

C0040 Three-gang prism mold for producing specimens measuring 25.4 x 25.4 x 287 mm, made of treated and ground steel, fully dismountable, in compliance with UNE 7207.
C0041 Two-gang prism mold for producing specimens measuring 25 x 25 x 250 mm, made of treated and ground steel, fully dismountable, in compliance with ASTM C490.
C0042 Two-gang prism mold for producing specimens measuring 75 x 75 x 254 mm, made of treated and ground steel, fully dismountable, in compliance with BS 1881, 6073.
C0043 Three-gang prism mold for producing specimens measuring 40 x 40 x 160 mm, made of treated and ground steel, fully dismountable, in compliance with ASTM C348.
C0044 Three-gang prism mold for producing specimens measuring 70 x 70 x 280 mm, made of treated and ground steel, fully dismountable, in compliance with NF P 18-427.
C0040/1 Contact points for C0040 mold (pack of 12).
C0040/1 Contact points for C0041 and C0042 molds (pack of 12).
C0040/1 Contact points for C0043 and C0044 molds (pack of 12).



Standards EN 1367-4, 12617-4; ASTM C151; C490 ; NF P15-433; P18-427; BS 1881:5, 6073, 812: 102; DIN 1164

C0037 Shrinkage measuring device

Designed to measure linear variation in mortar specimens. Consisting of a steel frame with an adjustable bridge at the top and a dial gauge measuring 5 x 0.001mm. The reference bar must be ordered separately.
Dimensions: 0180x450 mm
Weight: 10 kg.

Accessories:
C0037/1 Reference bar for specimens measuring 25x25x250 and 75x75x254 mm as per ASTM C490 y BS 1881.
C0037/2 Reference bar for specimens measuring 40x40x160 as per EN 12617, ASTM C348 and NF P15-433.
C0037/3 Reference bar for specimens measuring 70x70x280 mm as per NF P18-427.
C0037/4 Reference bar for specimens measuring 50x50x200 mm as per EN 1367-04.
V0014 Dial gauge, 5 x 0.001 mm.
V0023 Digital dial gauge, 25 x 0.001 mm, with RS232 connection to a PC.
V0023/1 Connection cable from the digital dial gauge to the PC.

Construction lime

Standards EN 459/2

C0058 Apparatus to determine apparent density

Consisting of a cylindrical container with capacity for 1 L, a connection element with closing valve and a feeder head with closing lever mounted on springs to hold and release the valve.
Weight: 5 kg

Lime stability test

Standards EN 459/1 - BS 890, 1191

C0038 PAT Test

Used to determine the stability of lime and plaster. Consisting of a brass mold measuring Ø 100 x 5mm high, with an inner angle of 5º and a glass base plate. Three molds are needed to perform the test.

Standards EN 459/2

C0062 Hydration container

Designed to determine the hydration properties of quicklime. Comprising a metal container with a thermally insulated double wall and lid.
Internal dimensions: Ø 113 ± 0.5 x 140 mm.
Total dimensions: Ø 155 x 160 mm.

Standards EN 459/2

C0059 Kleine apparatus to determine the carbon dioxide level

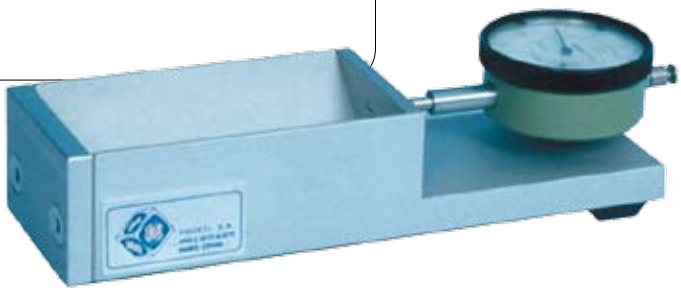
Consisting of a 50 ml Erlenmeyer flask for decomposition, an absorption container with a KOH (potassium hydroxide) solution, levelling bottle with a sealing liquid, a burette, a glass tube for coating, stopcocks and capillary tubes, all of which is mounted on a wooden panel.
Approximate weight: 10 kg.

Plaster expansion

Standards BS 1191; UNE 6782

C0039 Plaster extensometer

Used to measure linear expansion in plaster mixes. Consisting of a V-shaped container measuring 100 x 60 x 25 mm with a square, closed end that transmits the movement to a 10 x 0.01 mm dial gauge.
Dimensions: 250 x 80 x 60 mm.
Weight: 3 kg.



Cement hydration heat

Standards EN 196/8 – ASTM C 186 – BS 4550, 1370 – DIN 1164

C0045 Calorimeter

Designed to determine the hydration heat of hydraulic and Portland cement. Consisting of a Dewar glass housed in a wooden box opened split into two halves for easy access and easy replacement. A second wooden box, also split into two halves, houses the first box and guarantees perfect heat insulation. The device is supplied complete with a constant speed electrical stirrer, Beckmann thermometer and glass funnel. The stirrer paddle must be ordered separately, depending on the test standard.
Power supply: 1 x 230 V. 50 Hz. 150 W.
Dimensions: 350 x 250 x 680 mm.
Weight: approx. 12 kg.

Accessories

C0045/1 Stirrer paddle in compliance with EN 196/8.
C0045/2 Stirrer paddle in compliance with ASTM C186.
S0023 Electrical paraffin heater.

Spare parts

C0045/3 Dewar Glass.
C0045/4 Beckmann Thermometer.
C0045/5 Glass funnel.

Occluded air and density

Mortar has a wide variety of uses, the most frequent of which is that of bonding bricks and blockwork. Both occluded air and density are important if the hardness and strength of the mortar are to be adequate. Specifications often require minimum density and occluded air values. The devices described below have been designed to perform standard tests on mortar and similar materials.

Determining occluded air in mortar

Standards UNE EN 1015/7; EN 413/2, 459/2, - UNE 83.815 - DIN 18.555

C0050 Manual air entrainment meter, capacity 1 l

Designed to determine the volume of air contained in fresh mortar and silt mixtures. The reading is performed directly using a pressure gauge that indicates the percentage value, with a range 0 – 50%. Supplied with a manual air pump.
Volume: 1 l.
Dimensions: Ø 200 x 320 mm.
Weight: 3.5 kg.

C0051 Electric air entrainment meter, capacity 1 l

Designed to determine the volume of air contained in fresh mortar and silt mixtures. The reading is performed directly using a pressure gauge that indicates the percentage value, with a range 0 – 50%. This model includes an electric mini-compressor that supplies pressurised air at a constant pressure during the entire test.
Power supply: 1 x 230 V / 50 Hz.
Volume: 1 l.
Dimensions: Ø 200 x 320 mm.
Weight: 4 kg.

Accessories:
C0050/2 Filling hopper.

Standards ASTM C185 – AASHTO T 137

Density method for determining air content in mortar mixtures

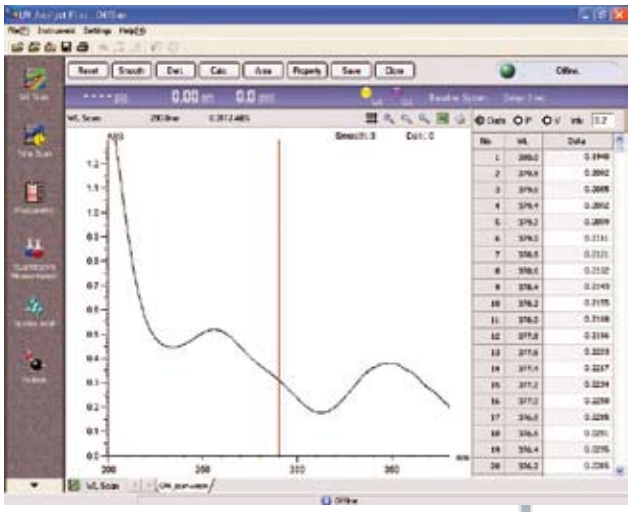
The density method for determining air content in mortar provides more repeatable results than those provided by the pressure method. The equipment needed is simple, although it does require knowledge of the specific gravity of the components and the mix proportions by weight.

C0060 400 ml measure, 76 x 90 mm.
C0056 Glass base plate, 100 x 100 mm. Thickness: 6.4 mm.
C0057 Hard plastic tamper, Ø 37.5 ± 0.5 mm.
C0061 Leveller, 100 x 3 x 19 mm.

Standards UNE EN 196-2; 1996

V9994 Thermo-cement spectrophotometer system

The thermo-cement system is a unit consisting of a spectrophotometer with a 200 ml thermostatised cuvette for titrimetric assessment by photometry, an adjustable speed paddle stirrer and PID digital temperature controller for temperatures of up to 99.9ºC with 0.1ºC of accuracy. The unit complies with standard UNE – EN196-2:1996 for the colorimetric analysis of cement.



Spectrophotometer:
200 ml heated cuvette and Pt100 temperature sensor.
Concave diffraction grating, 1200 lines.
Bandwidth: 5 nanometres.
Range: 330 - 850 nm (in 0.1 nm).
Scales: Abs 0.170-2.000.
Trans 0-150%.
Scanning: from 60 to 800 nm/minute.
LCD screen, graphic data and printing.
RS232 port and parallel port.

Supplied with a stirrer and an opening in the lid of the sample compartment to adapt the assessment burette and the stirrer.
Power supply: 230V/50-60 Hz.
Digital visible spectrophotometer for the analysis of cement in compliance with UNE-EN196.2:1996, with thermostatic cuvette tray, cuvette and stirrer.

V9994/1 Temperature controller d-85
Range: ambient to 99.9ºC.
Accuracy: ± 0.1ºC.
Proportional adjustment: PID.
Digital display: current and programmed temperature.
Power supply: 230V / 50-60 Hz.

Spare parts
V9994/2 200 ml optical glass cuvette.
V9994/3 Adjustable paddle stirrer.

Determining workability

This test consists of pouring 1 l of sample into the hopper, ensuring that it is evenly distributed. Thirty seconds later, the discharge bar is pulled slowly upwards to release the paste and allow it uniformly run through the slump trough. The "slump value" is determined by measuring the horizontal distance between the centre of the discharge opening and the end of the paste after 30 seconds.

Standards EN 13395-2

C0064 Apparatus for testing the slump of paste

Made of galvanised steel sheeting, consisting of a filling funnel measuring Ø 200 mm with an opening of 35 mm, a discharge bar to release the paste, and the slump trough.
Dimensions: 930 x 150 x 350 mm
Weight: 12 kg

Standards EN 1015-9

C0063 Complete workability period unit in accordance with standard EN 1015-9

Used to determine the workability period of a sample of fresh mortar. After a slump value is defined, the workability can be defined by measuring the time in minutes until the sample reaches its stiffness or workability limit.

The unit consists of:
Rigid brass mold.
Penetration probe.
Brass washer and support.
Scale not included.

Relative density of hydraulic cement

EN 196/6; UNE 83.103; NLT 155; ASTM C188; AASHTO T 133; BS 4550

C0065 Le Chatelier Flask

For determining the density of hydraulic cement. Graduated between 0 and 1 cm^3 and between 18 and 24 cm^3.
Capacity: 250 ± 0.05 cm^3.

Relative density of cement

Standards EN 196/6; NLT 157; ASTM C91, C110

C0067 Equipment for measuring the apparent density of cement

As specified by the "Committee of Construction Materials Testing Methods". Consisting of a funnel-shaped sieve with a tripod, with 1 l capacity, spatula and leveller.
Dimensions: Ø 350 x 520 mm.
Weight: 3 kg.

Apparent density of plaster

Standards UNE 102032

C0067/1

Equipment to determine the apparent density of plaster.

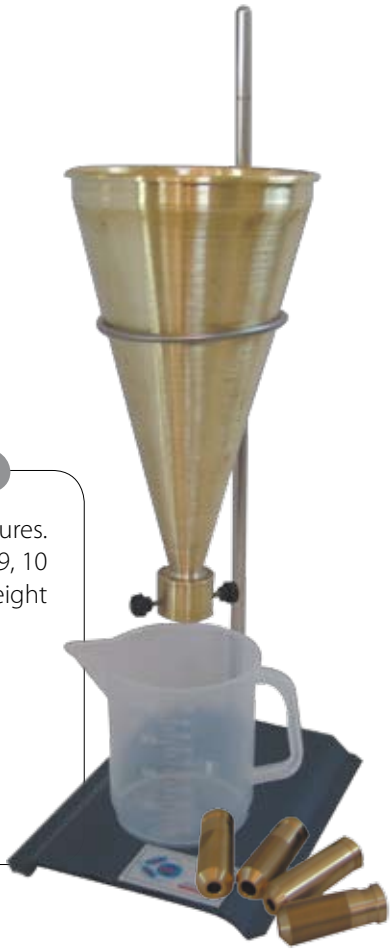
Grout fluidity

Standards EN 455; NF P18-358, P18-507

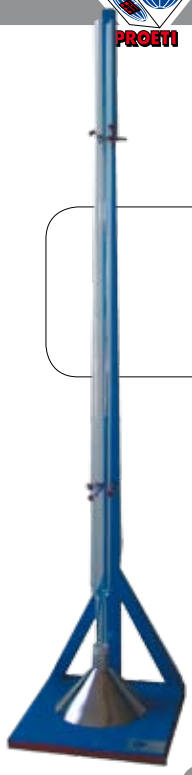
C0068 Funnel viscosity meter

Designed to measure the viscosity of fluid cement and mortar mixtures. Supplied complete with four interchangeable nozzles measuring Ø 8, 9, 10 and 11 mm for use depending on mortar viscosity, a base plate, a height adjustable plate and a graduated plastic container.
Dimensions: Ø 160 x 370 mm.
Weight: approx. 8 kg.

Accessories:
C0068/1 Ø 12.5 mm interchangeable nozzle.
C0068/2 Ø 150 mm sieve, mesh size 1.5 mm.



Determining permeability
Standards EN 1015-19, UNE EN 1015-21



C0073 Apparatus to determine water permeability.

In compliance with Standard UNE EN 1015-21. Consisting of a metal base to hold the 1000 ml graduated glass burette, a metal cone measuring Ø 200 mm and 100 mm high.

C0072

Equipment to determine the steam permeability hardened mortar used in rendering and plastering. Consisting of a round PVC test container with an intake section of approx. 0.02 m^2 on which the test specimen is sealed. Complete with airtight seal.

C0071

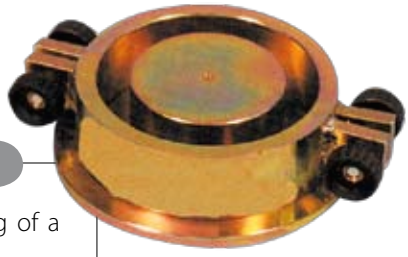
Round mold made of flexible material to facilitate removal of the sample from the mold.

Water retention
Standards ASTM C91, C110

C0070 Water retention equipment

Designed to determine how much water is retained in cement and silt. Consisting of a water suction device, three-way stopcock, adjustable base support, mercury column and filtering funnel.
Dimensions: 400 x 300 x 600 mm.
Weight: approx. 8 kg.

Cracking test
Standards NF P15-434



C0075 Mold

Designed to measure the formation of cracks in cement. Consisting of a base plate, split mold, central crown and collar.
Weight: 8 kg.

Mixing, molding, curing and breaking

The results of strength tests on cements and other materials such as lime and fly ash depend on the method and the quality of the equipment used. With publication of ISO 679 and the consequent publication of EN 196/1, a standard system has been developed for strength tests, based on the compression strength of mortar prisms.

Mixing

Standards EN 196/1, 196/3, 413/2, 459/2; ISO 679; ASTM C305; AASHTO T 162

The correct sequence for homogeneous mixing is important if the results are to be repetitive and uniform. Mixers should be sufficiently powerful in order to ensure that the speed of the motor is not affected by the components of the mixture; they are designed to ensure that mixing action and paddle do not decompose the individual sand particles and preferably to provide automatic mixing cycles.

C0085 Electrical laboratory mixer

Of a robust construction, with two planetary rotation speeds for the mixing process.
Vat capacity: 5 litres.

Supplied complete with vat, stainless steel paddle, sand dispenser and protection door that stops the test automatically if opened, in compliance with Directive EC 89/392.
Power supply: 380 V three phase 50 Hz.
Dimensions: 340 x 460 x 500 mm.
Weight: 44 kg.

C0086 Automatic laboratory mixer

Of a robust construction, especially designed for the effective mixing of cement and mortar pastes. Including three cycles with automatic mixing sequences.
Vat capacity: 5 litres.
Equipped with two speeds: 140 ± 5 or 275 ± 5 rpm for rotation and 62 ± 5 or 125 ± 5 rpm for planetary movement.
Providing the option to select automatic mixing or one of the two automatic programmes.

When a programme is selected, speed changes, stops and mixing times are notified by a sound signal. Equipped with an automatic dispenser for filling the hopper with sand within the required 30 time frame. Supplied complete with vat, stainless steel paddle, sand dispenser and protection door that stops the test automatically if opened, in compliance with Directive EC 89/392.
Power supply: 380 V. three phase 50 Hz.
Dimensions: 340 x 460 x 700 mm.
Weight: 45 kg.

Accessories and spare parts:

C0085/1 Stainless steel vat, capacity 5 l.
C0085/2 Mixing paddle with an anchoring system, as per EN 196/1.
C0085/3 Mixing paddle adapter.
C0085/4 Dispensing hopper for manually adding water, additives, etc. to the vat during the various mixing cycles.
C0085/5 Standard sand, as per EN 196/1. In bags of 1,350 g.

C0087 Computerised, programmable automatic mixer

Of a robust, durable construction for intensive use in the laboratory.

Characteristics:
Silent, low maintenance planetary transmission.
Automatic sand dispenser designed to guarantee correct filling, free of residue and without separating fine and coarse parts.
Additive dispenser (see accessory C0087/1).
Automatic water dispenser (see accessory C0087/2).
Transparent safety shield for the mixing area, allowing you to watch the mixture during the test and check the rotation speed on the rpm counter.
Supplied complete with polished stainless steel vat and paddle. Easy, fast vat assembly and removal.

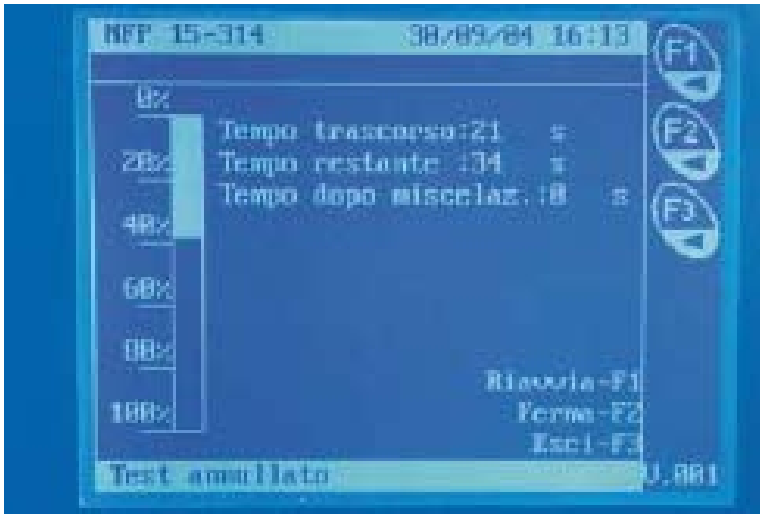
Programming:
Different programmes with automatic mixing cycles as per standards.
The operator can use a PC to personalise up to 3 different mixing cycles.
Sound signals synchronised with the test cycles.
High resolution and contrast LCD display to view the status of the various test functions.
Allows manual mixing cycles.

Able to store up to 100 tests and upload them to a PC via an RS232 connection.
- Various language selection options.
- Detailed indication of all the test parameters, displays the current cycle and its status via a progress bar, speed, active phase (sand, water) status of the test (correct execution or test interruption with loss of results) current test type.

Power supply: 1x 220-240V 50Hz.
Dimensions: 530 x 620 x 780 mm.
Weight: 85 kg.

Accessories and spare parts

C0087/1 Dispensing hopper for manually adding water, additives, etc. to the vat during the various mixing cycles.
C0087/2 Dispensing funnel with hopper for automatically adding water (via software) to the vat during the mixing phase.
C0087/4 Polished, stainless steel mixing paddle.
C0087/3 Stainless steel vat, capacity 5 l.



Sample preparation

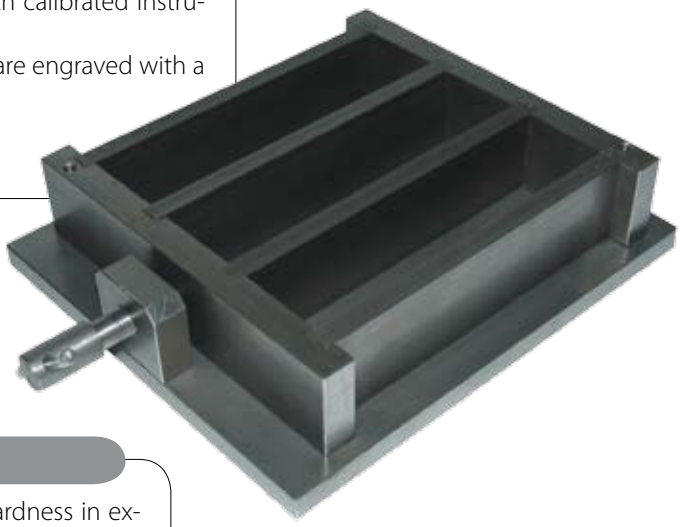
Standards EN 196/1, 196/3, 413/2, 459/2; ISO 679; NF P15-413 P18-401; ASTM C109, 348; AASHTO T 106; BS 4550

Proper preparation during the molding of cubes and prisms is essential if the strength tests to be performed on the sample are to be significant. The molds should be made of a material capable of withstanding tough operating conditions.

The molds described in this section have been designed and manufactured according to the requirements of the aforementioned standards.

C0089 "Certified" triple mold for 40 x 40 x 160 mm specimens

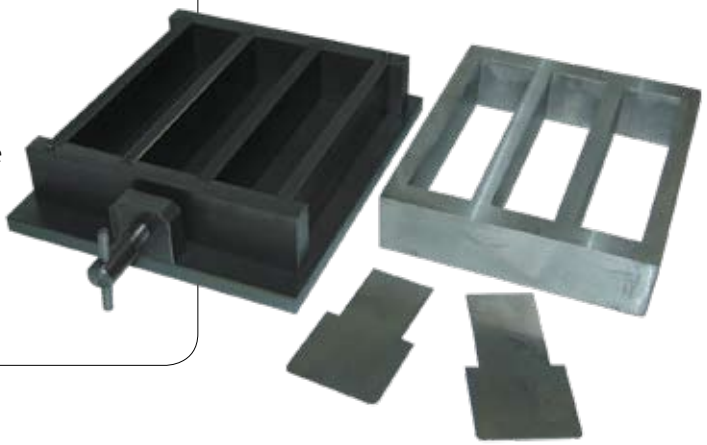
Made of treated and ground steel, fully dismountable, with hardness in excess of 400 HV. All components are marked with an identification number to facilitate assembly. Each mold is individually verified with calibrated instruments to certify
hardness, perpendicularity, flatness and roughness, and are engraved with a unique serial number.
Dimensions: 290 x 195 x 50 mm.
Weight: 8 kg.



C0090 Triple mold for 40 x 40 x 160 mm specimens

Made of treated and ground steel, fully dismountable, with hardness in excess of 200 HV. All components are marked with an identification number to facilitate assembly. The surfaces are polished to fulfil a tolerance of 0.1mm as specified in the standard.
Dimensions: 290 x 195 x 50 mm.
Weight: 8 kg.

Accessories:
C0089/1 Glass sheet measuring 200 x 200 mm to cover the mold.
C0091 Aluminium filling hopper.
C0092 Set of EN 196/1 spatulas for levelling the molds.
C0092/1 300mm Leveller.



Standards ASTM C109; AASHTO T132

C0095 Triple mold for 50x50x50 mm samples

Made of treated and ground steel, fully dismountable, with hardness in excess of 200 HV. All components are marked with an identification number to facilitate assembly.
Dimensions: 120 x 215 x 60 mm.
Weight: 5.5 kg.

Standards NF P18-401

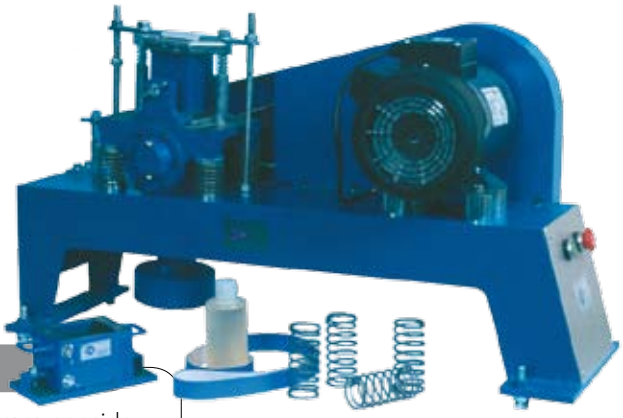
C0097 Triple mold for 70 x 70 x 280 mm specimens

Made of treated and ground steel, fully dismountable, with hardness in excess of 200 HV.
Weight: 5.5 kg

Standards BS 4550

C0096 Cubic mold for 70.7mm samples

Made of treated and ground steel, fully dismountable, with hardness in excess of 200 HV.
Dimensions: 100 x 100 x 90 mm.
Weight: 3 kg.

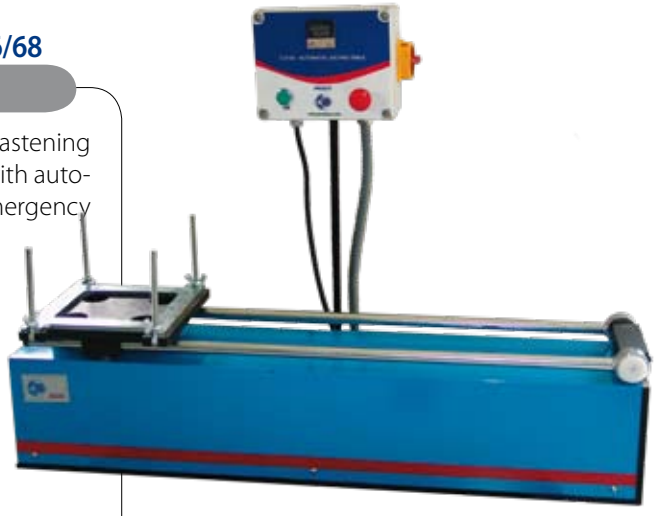


C0098 Vibrating machine for 70.7 mm molds

Designed to prepare cubic mortar specimens measuring 70.7 mm per side. The mold platform is mounted on four springs joined to an eccentric shaft that vibrates the samples at 12000 cycles/min according to technical specifications.
Power supply: 1x 220-240 V. / 50 Hz. 250 W.
Dimensions: 950 x 330 x 550 mm.
Weight: 95 kg.

Standards EN 196/1; NF P15-413; ISO 679; BS 3892; D.M. 3/6/68

C0100 Automatic mortar compactor



Automatic compactor for samples measuring 40 x 40 x 160 mm. Fastening system for easy mold placement and removal. Supplied complete with automatic preselector and digital display of the number of impacts, emergency stop button and connection cable.
Power supply: 1 x 220/240 V. 50 Hz.
Dimensions: 980 x 280 x 400 mm.
Weight: 60 kg.

Accessories:
C0090 Triple mold for 40 x 40 x 160 mm mortar specimens.
C0091 Aluminium filling hopper, 40 x 40 x 160 mm.
C0092 Set of spatulas (2), to level the mold.

Sample curing

Standards EN 196/1; ISO 679

Standard EN 196 states that prior to the test, the specimens must be cured for at least 24 hours at 20 ± 1° C and 90% RH. The specimens must then be removed from the molds and submerged in water for the required curing time, generally 48 hours, 72 hours, 7 and 28 days.

C0105 Water bath for curing mortar specimens

Made of metal with a double body. Includes an immersion thermostat and resistance elements shielded in stainless steel, an electronic temperature control system, programming, digital display and visible alarm in the event of overtemperature. Supplied complete with rack with capacity for 40 specimens measuring 40 x 40 x 160 mm.
Temperature control range: ambient to 100ºC.
Power: 220 V. / 50 Hz.
Dimensions: 300 x 500 x 200 mm.

Accessories:
C0105/1 Immersion cooler of up –10ºC.

Standards EN 196/1; ASTM C87, C109, C190, C191; UNE 80102

C0106 Large curing cabinet

Designed to cure large amounts of mortar and concrete samples. Made of aluminium and polycarbonate, complete with a resistance element heating system, digital precision thermostat and four sample trays. Saturated humidity conditions are achieved inside the chamber by water nebulisers activated by an air compressor (optional).
Range of humidity: 95% to saturation.
Range of temperature: ambient to +30° C.
Accuracy: ±1º C.
Internal dimensions: 1090 x 470 x 1200 mm.
External dimensions: 1370 x 540 x 1490 mm.
Power supply: 1x220-240 V / 50 Hz. 2000 W.
Weight: 100 kg.

Accessories:
C0105/1 Immersion cooler, for temperatures between ambient temperature and –10ºC.
C0105/3 Air compressor.

Determining cement strength

Standards EN 196/1; ASTM C109; BS 3892; DIN 1164; NF P18-411; AS 2350

These machines have been studied and designed to test cement prisms measuring 40 x 40 x 160 mm for both bending and compression strength.
Proeti offers several versions, depending on the capacity and degree of sophistication of the machine required. All the machines include an electrical cutoff system that stops the test automatically when rupture is detected.
Semi-automatic versions require little operator intervention in order to perform the test. These models are equipped with a hydraulic motor pump to operate at low pressures with highly accurate results. They also include a manual two-stroke valve for fast piston approach and automatic change to ensure the required pressure for the test, thus avoiding time losses.
Automatic servo-hydraulic version: These machines perform the test automatically at the touch of a button. This range includes an extremely silent servo-controlled hydraulic unit, which contains a pump that accurately regulates the oil flow that activates the piston, thus controlling the rotation speed of the motor pump unit. This system guarantees reliability, accurate results and high levels of precision.
Multi-test electro-mechanical servo-controlled version: These models are equipped with a direct current servo-motor, a gearbox, transmission belt, ball screws, stroke transducer, speed setting and various electrical control and safety mechanisms. They are so versatile that they are used in most standard tests at restricted speeds, for bending, compression and tensile strength (see soil section).
Fulfilling safety requirements and in compliance with standard EC 89/392, the test area includes a protection system that protects the operator against possible pieces of specimen which may be ejected during the test.

General Characteristics

Test frame that guarantees high level of stability.
Easy to use and maintain, designed for continuous use.
Designed in accordance with the specifications of International Standards EN, ASTM, AASHTO, BS, UNE, DIN, NF.
Single or double chassis versions.
Round, tempered and ground compression plates in compliance with ISO 6507-1, the top plate has a hinge joint for perfect positioning.
250 kN and 300/15 kN capacity.
Measuring systems with digital display, with a microprocessor or computerised.
Versions with a motor pump with manual load adjustment or automatic servo-control.
All versions are supplied with ENAC Official Calibration Certificate, in compliance with ISO-EN 7500-1.

Models:

C0110 Motor-driven press with 250 kN capacity and H0206/1 digital display

Single body test area, designed to house the corresponding test devices (not included, see accessories).
Maximum compression load capacity: 250 kN.
Force sensor 700 bar, output 2 m/V.

Piston activation via hydraulic motor pump unit with a manual flow or test speed adjustment valve that guarantees superior precision and handling.
H0206/1 digital measurement unit with two-channel microprocessor, including memory, load speed indicator, rupture detector with automatic stop and RS232C output. H0206/1 test software for data collection, data transfer for processing to PC and data viewing on screen in real time.
Accuracy and repeatability: ±1%.
Power supply: 220-240 V 1ph 50 Hz 750 W.
Piston stroke: 110 mm.
Bottom plate diameter: 145 mm.
Top plate diameter: 80 mm.
Dimensions: 650 x 430 x 940 mm.
Weight: approx. 190 kg.

C0117 Motor-driven press with double piston test frame of 300/15 kN capacity for compression and bending strength tests.

Double test area for compression and bending strength tests
Maximum compression load capacity: 300 kN with force sensor.
Maximum bending strength capacity: 15 kN, with load cell.
C0116 Bending and C0115 compression devices included.
Top plates with hinged joint seating.
Piston stroke: 110 mm.
Double load range 300 and 15 kN.

Piston activation via hydraulic motor pump unit with a manual flow or test speed adjustment valve that guarantees superior precision and handling. H0206/1 digital measurement unit with microprocessor, including memory, load speed indicator, rupture detector with automatic stop, RS232C output and two selectable measurement channels. H0206/1 test software for data collection, data transfer for processing to PC and data viewing on screen in real time.
Accuracy and repeatability: ±1%.
Power supply: 220-240 V 1ph 50 Hz 750 W.
Bottom plate diameters: 145 mm.
Top plate diameters: 80 mm.
Dimensions: 820 x 430 x 940 mm.
Weight: approx. 210 kg.

C0123 Automatic servo-controlled press with double piston test frame of 300/15 kN capacity for compression and bending strength tests.

Double test area for compression and bending strength tests
Maximum compression load capacity: 300 kN with force sensor.
Maximum bending strength capacity: 15 kN, with load cell.
C0116 Bending and C0115 compression devices included.
Top plates with hinged joint seating.
Piston stroke: 110 mm.
Double load range 300 and 15 kN.

Piston activated via servo-controlled hydraulic unit by means of a H0206/PLUS module. This unit is designed to control the machine completely and perform compression and bending strength tests adapted to any standard.
H0206/PLUS digital measuring unit with microprocessor, including memory, load speed indicator, rupture detector with automatic stop, RS232C outputs, four selectable measurement channels and multi-language servo-control software.
Accuracy and repeatability: ±1%.
Power supply: 220-240 V 1ph 50 Hz 750 W.
Bottom plate diameters: 145 mm.
Top plate diameters: 80 mm.
Dimensions: 850x460x940 mm.
Weight: approx. 255 kg.

H0206/1 Digital Display Module UDI 14/2

14-bit Microprocessor board.
Backlit alphanumeric LCD display with 9 mm characters.
Two data collection channels for connection to force, pressure or displacement transducers.
Two RS232C outputs for connection to a printer or PC.
Stores data in Excel format. (*.xls)
Measurement units available: N; daN; KN; Kgf; Nm; g; Kg; bar; mbar; Mpa; atm; V; mV; mV/V; mm; µm.
Menu available in 4 languages (Spanish, English, Portuguese and Italian).
Auto tare key (zero).
Peak activation key.
Key to transfer data in real time to a PC or printer.
PROETI UDI16/4 software for test data collection and transfer to a PC for printing or saving.
Power supply: 1X220-240V AC 50/60 Hz 30VA.
Dimensions: 200 x 80 x 130 mm.
Weight: 1 kg.

H0208 Software PROETI UDI16/4

This software can be used to perform the test and view the characteristic test curve for load/time or load/deformation (depending on the configuration of the H0206/1 module) in real time on a PC at the same time. The curve data can be saved in Excel format. The software is supplied separately and only runs on the H0206/1 module.

H0206/PLUS Digital Force Display Module with Microprocessor UDI 16/4 PLUS

16-bit microprocessor board.
Back-lit LCD display with 240 x 128 pixel.
Four programmable data collection channels for connection to force, pressure or displacement transducers.
Two RS232C outputs for connection to a printer or PC.
Stores data in Excel format. (*.xls).
Measurement units available: N; daN; KN; Kgf; Nm; g; Kg; bar; mbar; Mpa; atm; V; mV; mV/V; mm; µm.
Menu available in 4 languages (Spanish, English, Portuguese and Italian).
PROETI UDI16/4PLUS software for data/curve collection in real time.
Choice of the specimen area to test.
Choice of degree of load (N/s; Mpa/s; kg/cm²*s) and tolerance ± % of value entered
User selectable measurement channels.
Automatic calculation of maximum force (Fm), Load Unitary (Rm), Mean Degree.
Memorisation of data in format
Allows memorised data to be uploaded to a PC in Excel format (.xls)**.**
Power supply: 1X220-240V AC 50/60 Hz 30VA.
Power supply: 220 V. 50/60 Hz.
Dimensions: 230 x 145 x 180 mm.
Weight: 2 kg.

H0209 Software Proeti TCSoft2004Plus

Developed in the Windows XP environment to perform concrete and cement tests on servo-controlled machinery (test performance, calibration, diagnosis, management and data files). Open, interactive design to satisfy a variety of requirements for material testing laboratories in order to perform mechanical strength tests on composite samples, cement, ceramics, etc. in complete compliance with International Standards (EN, UNI, ASTM, ISO). Thanks to its flexibility, the operator can enter a wide range of methods and calculations (even personalised) to perform compression and bending strength tests. The software also provides control diagnostics and direct remote connection with Proeti's Technical Service.

Main characteristics:

Test selection (Compression/Bending).
Automatic or manual setting of the top press bridge using the up/down pushbuttons.
Performs the test according to the selected standard, automatic adjustment of the graphic area during the test performance phase.
Real time display of loads, stroke, extensometer displacement, load/deformation curve with or without the extensometer. Data entry (calculation system, preload, load limits, extensometer stroke, displacement speed, test performance speed, load maintenance, etc).
Speed selection in mm/min, load gradient in N/s.
Selection of automatic piston return at the end of the test and initial test parameter reset.
Limit switch safety management for automatic stopping of movement actuators.
Data file for each curve in .mdb format with ACCESS SQL engine for external preparation.
Create folders.
Search for data using filters.
Create personalised reports.
Print a report at the end of the test with the customer logo, specimen data, notes, results, curve graphs.
Choice of printing the test report three different ways:

a) A report of all the tests performed, including customer data, specimen data, notes, results and curve graphs.
b) List of test results selected by the operator.
c) Report of the test curve graphs selected by the operator in a single graphic area
d) Zoom function to analyse the curve when the test is complete and print the area selected on the report.
e) Customer logo and information input as the header on test reports

Standards EN 12390-1; EN 196-1

Servo-controlled unit

A hydraulic unit that is servo-controlled by module H0206 Plus or by PC software. This unit was designed to control the machine and the tests completely. The system is capable of performing compression and bending strength tests adapted to any standard. The standard version consists of a unit connected to the loading piston. The machine is controlled by software that manages the tests, prepares graphs and presents the results. The load control system is completely new and emulates a servo-valve using a pump that accurately controls oil flow to the piston, controlling the rpms of the pump motor. This new system developed by Proeti guarantees reliability and productivity, accurate results, repeatability and extreme precision. Another very significant characteristic of this new system is its low level of noise. The unit is extremely quiet.

The complete unit consists of:
PC with Windows XP and 19"TFT monitor or higher.
HP deskjet printer (optional).
High pressure connection tube from the unit to the test frame/piston.
Multilingual servo-control software to perform tests in compliance with EN 12390-3, EN 12390-5 and EN 196-1.

All test data and the rupture curves are saved in *.mdb format to facilitate export to databases (Access, Excel) for custom management by the client.

C0124 Servo-controlled unit.
H0235/6 Compatible PC.
H0209 Control software EN 12390-3, EN 12390-5, EN 196-1.

Accessories:
Devices for compression/bending tests. Placed between the machine plates without the need to use spacer plates to perform the tests.

Standards EN 196/1; ASTM C349; NF P15-451; PR EN/ISO 679

C0115 Devices for compression tests on specimens measuring 40 x 40 x 160 mm

Adapted for compression tests on specimens measuring 40 x 40 x 160 mm. The compression plates are made of special high-strength, ground steel; the top plate has a hinged joint seating.
Dimensions: 140 x 220 mm.
Weight: 8 kg.

Standards ASTM C109

C0115/3 Device for compression tests on cubes measuring 50 mm with 2" sides

Adapted for compression tests on mortar cubes measuring 50 mm with 2" sides.
Weight: 8 kg

C0116 Device for bending tests

Adapted for compression tests on specimens measuring 40 x 40 x 160 mm. The device is placed between the press plates.
Dimensions: 140 x 220 mm
Weight: 8 kg

H0205/4 Stand for Compression/Bending Test Machines

For both concrete or cement at the required working height. Made of painted sheet metal.

H0206/2 Lightweight, small thermal printer.

Paper width: 58 mm.
Printing width: 48 mm.
Interface: RS232.
Dimensions: 147 x 108 x 72 mm.
Weight: 610 g (with battery).
Operating temperature: 0° to 50°C.
Replaceable batteries: NiCd or NiMH.

Standards EN 196; ASTM C190, C348, C349; DIN 1164.

C0120 Motor-driven bending strength scale

Designed to determine the bending strength of mortar specimens measuring 40 x 40 x 160 mm or for bending tests on octoform specimens. The machine is shaped somewhat like a Roman scale; it consists of a solid aluminium body with a graduated horizontal arm, weights and counterweights. Three scales are engraved on the graduated arm. The machine is powered by a motor and ensures a constant load increase of 50 ±10 N/sec; it can operate automatically without interruption or be controlled by the operator. The machine stops automatically once the specimen is broken, although it includes a limit switch. Accessories must be ordered separately.
Accuracy: ± 1%.
Power supply: 220-240 V. 50 Hz.
Dimensions: 1000 x 460 x 720 mm.
Weight: 52 kg.

Accessories to use with the C0120:
C0120/1 Clamp for bending strength tests, as per ISO.
C0120/2 Clamp for bending strength tests, as per AFNOR, articulated at four points.
C0120/3 Clamp for bending strength tests as per DIN.
C0120/4 Clamp for bending strength tests as per ASTM.
C0120/5 Clamp for tensile strength tests as per BS and ASTM.
C0120/6 Clamp for tensile strength tests, as per ISO.
C0121 Simple mold, designed for manufacture of octoform specimens (ingots), as per ASTM. Dimensions: 320 x 110 x 400 mm.
Weight: 7 kg.
C0122 Triple mold, designed for producing octoform specimens (ingots), as per ASTM.
Weight: 3 kg.