

CEMENT AND CONCRETE



2.2 CEMENT

2.2.1 DETERMINATION OF STRENGTH PAGE 208

2.2.2 SAMPLE PREPARATION PAGE 219

2.2.3 TESTS ON CEMENT AND MORTAR PAGE 228

ITEMS	PAGE	ITEMS	PAGE
Air Content	233	Le Chatelier Mould and Bath	231
Air Entrainment Meter	218	Length Comparator	233
Blaine	227	Marsh Cone	233
Calorimeter	231	Marsh Viscometer	235
Chattaway (spatula)	233	Mixers	219-221
Compression/Flexure Testers	213-218	Monotronic	208
Curing Cabinet	224-226	Moulds	222-223
Density (Bulk)	233	Mud balance	235
Dietrich Frühling Gasometer	227	Penetration Value	234
Eurotronic	209-212	Samplers	234
Filter Press	234	Sand Content	235
Flow Tables	232	Thermostatic Baths	223
Gillmore Test	227	Vicat Apparatus	228-230
Jolting Table	223	Volumeasure	235
Le Chatelier Flask	233	Water Vapour Bath	234

2.2.1 DETERMINATION OF STRENGTH

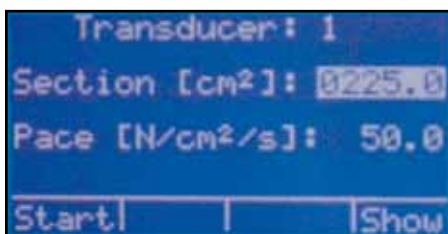
TECNOTEST

MONOTRONIC READOUT/CONTROL UNIT AD 001

This microprocessor-based unit offers a series of auxiliary functions which make it both practical and easy to use: the initial settings are menu guided and the way in which pace is displayed during the loading phase is clearly indicated, while a full range of choices is presented at the end of the test. There is a graphic display measuring 60 x 32 mm lit from behind that acts as user interface. Data is input via a practical numeric key pad and by means of a set of function keys illustrated on the display. When used with the optional printer AD 013/B02, the Monotronic allows a hard copy of the test parameters to be obtained in five different languages (Italian, English, French, Spanish and German). Besides the socket for the transducer, the unit also has a serial port for connection to a printer or, alternatively, to a PC. The unit has two working modes:



AD 001



TEST when the unit is turned on for the following settings and functions:

- Peak value memorisation (may be activated or deactivated)
- Specimen section
- Load rate for pacing - Calibration zeroing
- Printout of results (with optional printer AD 013/B02)
- Re-start with the same settings or reset

CALIBRATION with a special code for the following functions:

- Testing of output devices for malfunctions
- Testing of non-volatile memory for malfunctions
- Testing of analog-digital converter for malfunctions
- Testing of display and keypads for malfunctions
- Machine set-up
- Keypad input of calibration parameters
- Procedure for semi-automatic calibration on 11 points equally divided over the full scale
- Printout of set-up and set parameters (with optional printer AD 013/B02)

Technical specifications of Monotronic:

- Unit of measurement : kN
- ± 30000 divisions
- Power supply : 12 Vdc 220 V, 50 - 60 Hz, single phase via external adaptor
- Serial line : 4800 baud, 8 bit, no parity, 1 stop bit
- Archive for 200 tests - Clock - calendar

The micro-printer (AD 013/B02) which uses ordinary paper can be connected to the MONOTRONIC control unit. This provides a hard copy of the test (indicating input data and results), or a list of calibration parameters, or current load/time values. MONOTRONIC can be connected to a PC while, with AD 050/001 optional software, a certificate of the test can be made using Windows applications such as Excel etc.



AD 013/B02

EUROTRONIC READOUT/CONTROL UNIT AD 200

HARDWARE FEATURES

- 24 VDC power (supplied with mains adaptor 110/220 V)
- 320 x 240 pixel backlit display complete with energy save feature
- 4 Channels which may be set at 2 mV/V, 3 mV/V, 7 mV/V or 10 VDC: each channel has a resolution of 500000 points
- 24 Button keyboard, including a numeric keypad, for quick test selection and easy data input, more practical than the minimalistic models with fewer buttons
- 8 Digital inputs
- 8 Digital outputs
- 2 Pulse width modulation output (PWM) for stepper or brushless motor control
- 2 Analog outputs (12 bits – 0/10 Volts) for closed-loop feedback control
- 1 Serial RS-232 port and 2 serial RS-485 ports for transmitting data to a PC in real time or at the end of test
- 1 Slave USB port for transmitting data to a PC or for uploading software upgrades or custom modifications to software in use
- 1 Master USB port for connecting to a USB data stick
- 1 Ethernet port or Wi-Fi port for data transmission or remote control

The Eurotronic is one of the few instruments (if not the only one) in the market to have a numeric keypad for data input. To enter a number there is no need to call up the number required by first scrolling up or down using arrow keys, as it is sufficient to input it via the numeric keypad.

SOFTWARE FEATURES

- Selectable languages: Italian, English, Spanish, French, Portuguese, Russian (Cyrillic alphabet), Polish and Rumanian. All test pages are translated, including those sent to PC or printer
- Selectable units of measurement: kN, N, lbf, tonnes, kgf, mm, in. The instrument automatically converts values in one unit of measurement to another without any need for recalibration
- Display of test graph in real time
- Transmission to PC to test data in real time with data time scan selection (1 datum per second, 2 data per second, 5 data per second, 10 data per second, 1 datum every 10 seconds)
- Tests performed are stored in an archive
- Archive with scroll index for tests performed: it is possible to send to a PC test results only or all test data foreseen, time/load/displacement, for subsequent processing in graph format
- Clock and calendar with daylight saving hour foreseen
- Memorizes for each test: time, user ID, sample parameters and serial number, test results
- Special functions, protected by password, for verification of functioning of keyboard, A/D inputs, inputs and outputs

CALIBRATION

Tecnotest has taken special care as usual to ensure that maximum readout accuracy of its calibration function is guaranteed. The calibration function is obviously protected by a password. Calibration is performed over 11 programmable points from zero to full scale of the instrument under calibration.

The procedure is particularly simple and designed so that there is no need for calculation of coefficients, to enter them by hand or to repeat procedures on a trial and error basis.

In practice, the user is invited to explore the entire readout scale, then to press a key when the sample dynamometer indicates exactly 0, 10%, 20%.....90%, 100% relative to full potential of the machine.

The instruments suggests memorizing 11 points equally distributed along the readout scale, but these may be modified as desired : for example, it may be decided to memorize points 0, 1%, 5%, 10%, 20%.....80%, 100% of full scale thus guaranteeing, thanks to the 500000 divisions available, high precision even at very low loads. All these operations are extremely simple and quick to perform thanks to the unit's function keys and numeric keypad.



AD 200

ACCESSORIES

AD 200/ETH	Ethernet port
AD 200/WFI	Wi-Fi port

NB: Implementation of any one of the optional ports (not both) is possible only at the time the AD 200 is ordered, not once delivered, so choice of port must be specified, if required, on ordering.

2.2.1 DETERMINATION OF STRENGTH

TECNOTEST

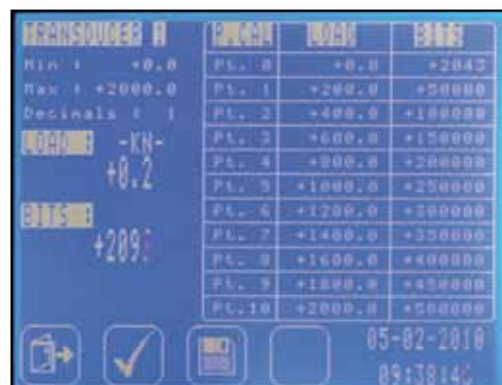


TEST SCREENS

Eurotronic has the following test routines:

- Manual mode
- Compression test on cubes, cylinders, blocks
- Flexural tests with 3 or 4 point loading
- Tensile test
- Block pavers test
- Marshall test
- CBR test
- Indirect tensile test for asphalt
- Unconfined test
- Failure under controlled loading
- Failure under controlled test speed

For each test previous considerations are valid (see software features).



Compression test:

Graph display in real time, automatic calculation of sample strength at end of test. In automatic machines test start, test speed management and test stop with calculation of results are all, obviously, completely automatic. If a number tests are to be performed on samples of equal shapes and sizes, a simple touch of a key allows other tests to be performed again and again without having to repeat input of sample parameters.



Examples of test pages displayed during tests on 15 cm/side cubes



PRESS F4 TO SELECT "TEST RUN"



PRESS F4 TO SELECT "COMPRESSION"



PRESS F4 TO SELECT "START TEST"

If test is to be performed on cylinders rather than cubes, select "sample description" and press F4

Input sample parameters and, on re-starting Eurotronic, latest data to be input are memorised



AUTOMATIC TESTING MACHINES: THE EUROTRONIC STARTS TEST AND STOPS IT ON SAMPLE FAILURE. SEMI-AUTOMATIC TESTING MACHINES: OPERATOR STARTS TEST AND WAITS FOR THE EUROTRONIC TO SIGNAL SAMPLE FAILURE



READOUT OF TEST RESULTS: PRESS F4 TO PERFORM ANOTHER TEST

TEST PERFORMED USING F4 KEY ONLY

2.2.1 DETERMINATION OF STRENGTH

TECNOTEST



Flexural test:

Four types of flexural tests may be selected. Centre point or two point loading by inputting parameters for base and height of specimen or also section.



Archive:

Data may also be saved in an archive for subsequent transmission to a PC or printer.

Test data do not have to be saved but may be transmitted directly to a PC or printer at the conclusion of each test.



Paving blocks:

Test function according to EN 1338 standard for paving block testing.

Automatic calculation of correction coefficient and test results.



Failure under load speed control:

Test function which foresees readout of a load and deformation. It is possible to display load and deformation speeds.

It is possible to perform tests under load speed control or under deformation speed control



Manual mode:

Generic routine for displaying one, two, three or four channels and allowing memorization of peak value. This routine is particularly useful for checking calibration.

250 kN MACHINES FOR MEASURING THE STRENGTH OF CEMENT SAMPLES

EN 196 ASTM C 109 BS 1610 BS 1881

In addition to cement samples these machines can also be used to determine the strength of materials such as mortars, rocks, bricks, refractory materials etc., provided that the span of the testing bay is suitable for the sample to be tested. The structure is in steel so as to strike the right balance between rigidity and weight.

Assembled structure has high precision mechanical finishing thus assuring that thrust and reaction devices are perfectly centred and parallel. Testing platens are made in steel while flatness, roughness and hardness are all as prescribed by the latest Standards.

Electro-hydraulic control unit for rapid approach and for testing. Micrometric adjustable testing speed.

All the models are supplied complete with safety guard in conformity with CE directives.

Upon request the digital version can be supplied with double scale: 5-100 kN and 25-250 kN. Double calibration guarantees a precision of 1% from 5 to 250 kN, thus allowing tests such as flexure tests on cement prisms according to EN 196 to be performed and for which very low loads are foreseen.

For increasing the precision of load measurements at low loads:

AD 159 DEVICE WITH TRANSDUCER (25 kN), 0-35 bar

N.B. COMPRESSION AND FLEXURE TESTING DEVICES ARE NOT SUPPLIED AND HAVE TO BE ORDERED.

COMPRESSION MACHINE WITH DIGITAL READOUT UNIT

C 050

Specifications:

- Load capacity : 250 kN
- Max. vertical span: 270 mm
- Max. horizontal span: 215 mm
- Testing platens: diameter 155 mm
- Distance platen: diameter 150 x 100 (h) mm
- Monotronic digital readout unit with RS 232
- Load sensor: extensometric transducer
- Safety guard in conformity with CE directive

POWER SUPPLY: 220 V, 50 Hz, single phase, 1200 W

DIMENSIONS: 530 x 380 x 840 (h) mm

WEIGHT: 190 kg

TESTING FRAME

C 050/T

For connection to a concrete compression machine equipped with EUROTRONIC readout unit, by means of a hydraulic connection kit (KR 065/3 or KR 065/5). For compression machine setup see pages 158 (section 2.1.1).

The frame is supplied complete with hydraulic connection devices and extensometric pressure transducer, and must be ordered together with the compression machine to which it is to be combined.



**C 050
C 050/V
AD 013/B02**



**KD 200/R
KR 065/3
C 050/T
C 050/B01**

300/20 kN AUTOMATIC TESTING MACHINE FOR COMPRESSION AND FLEXURAL TESTS ON CEMENT SPECIMENS

C 030/2A

EN 196-1



C 030/2A



C 030/2T

This automatic, hydraulic, "Multitest" machine, has a capacity of 300/20 kN. When used with compression and flexural devices C 362/N and C 362/F (supplied optionally), tests on cement samples can be performing according to EN 196. Standard (supplied) accessories include loading platens and distance pieces for reducing the vertical span, as well as the ball seating, so that the machine can be used for tests on cellular concrete, rock cores, soil-cement samples and similar materials. Its structure has a single testing bay equipped with two, coaxial load cells having, respectively, capacities of 20 kN and 300 kN; the load cell with lower capacity is safeguarded from overloading by means of an automatic deformation arrest so, thanks to this device, the choice of dynamometer is made simply at the touch of a key. The frame's two columns are assembled on the crossbeams by pre-tensioned joints. Worthy of attention is the refined ball seating in oil bath which is characterized by its capacity to settle effortlessly and then lock when the load increases. A practical guard in transparent polycarbonate is supplied complete with relevant safety switches for user comfort and safety. The control console houses a motor pump, electric devices and the EUROTRONIC digital control and readout unit which acts as both user interface and feedback controller for the machine. The power pack uses the SC "Silent and Cold Power" technology, patented by Tecnotest, which is characterized by the extremely low heat or noise generated during use, rendering it suitable for continuous use.

SPECIFICATIONS:

Capacity: **300 kN**. Useful piston stroke: **50 mm**

Maximum vertical span between loading platens: **320 mm**

Maximum horizontal span between columns: **240 mm**

Diameter of loading platens: **166 mm**

Thickness of loading platens: **30 mm**

Distance pieces supplied with the machine:

1 of 100 (h) mm, 1 of 30 (h) mm, 1 of 20 (h) mm

Dynamometer A: extensometric load cell **25 kN** linearity – hysteresis <0.03% F.S.

Dynamometer B: extensometric load cell **300 kN** linearity – hysteresis <0.03% F.S.

Ball seating in oil bath.

POWER SUPPLY: 220V, 50 Hz, 1 ph – 800 W.

STRUCTURE DIMENSIONS: 600 x 600 x 1650 (h) mm

WEIGHT: 290 kg.

CONSOLE DIMENSIONS: 400 x 600 x 1200 (h) mm

WEIGHT: 110 kg.

300/20 kN FRAME FOR COMPRESSION

FLEXURAL TESTS

C 030/2T

EN 196-1

This frame is intended for combination to automatic and computerized testing machines for concrete of the SC "Silent and Cold Power" series. It is basically the model C 030/A2 without the control console and with exactly the same technical specifications. See some examples of combinations on pages 151-159.

DIMENSIONS: 600 x 600 x 1650 (h) mm.

WEIGHT: 290 kg.

250 kN / 15 kN COMPUTERIZED TESTING MACHINE WITH FEEDBACK SYSTEM FOR COMPRESSION AND FLEXURAL TESTS ON CEMENT SPECIMENS

C 025/C

EN 196-1

Our solution represents an innovation in testing machine design and ensures excellent working accuracy irrespective of whether loading or unloading ramps are being controlled or constant loads maintained.

Where constant loads are involved the motor makes few adjustments in feedback so that there is effectively no overheating of hydraulic fluid or any related consequences in terms of overall machine response.

The structure has a single testing bay, with two loads cells of different capacity in full function: up to 15 kN the machine reads the dynamometer with the lower full scale, then passes automatically to the dynamometer with full scale of 250 kN, deformation of the former being prevented by a mechanical checking device.

This special feature effectively overcomes the usual limit posed by the dual-bay machines where specimens having intermediate strengths are involved, or in cases where a range of strengths must be explored, such as when elastic modulus is determined.

The frame has two columns fitted to the cross-pieces by means of pre-loaded connections.

Housed in the testing bay is a sophisticated ball seating in oil bath which settles effortlessly and then self-locks as load increases.

A practical safety guard in transparent polycarbonate with relevant electrical safety devices completes the machine. The computer, besides managing operations and high-level controls, is also the user interface. Cycle routines are managed by electronic cards housed in the console.

The main software is designed for use with Microsoft Access so allows users familiar with this application to customize masks and printouts, as well as to access data bases via a network. The standard software includes facilities for compression and flexural testing as well as, for obvious reasons, those involving load cell calibration and general machine setup. A facility is also provided for obtaining positive, negative and nil load ramps with rates and timing defined by the user.

In the versions set up for measuring the elastic modulus (page 216), there are four inputs for up to four displacement transducers and they are supplied complete with software for performing tests to ASTM C 469, UNI EN 13412, UNI 6556. Other facilities for other tests may be provided upon request.

During the test the monitor displays in real time measurements of significance and relevant graph.

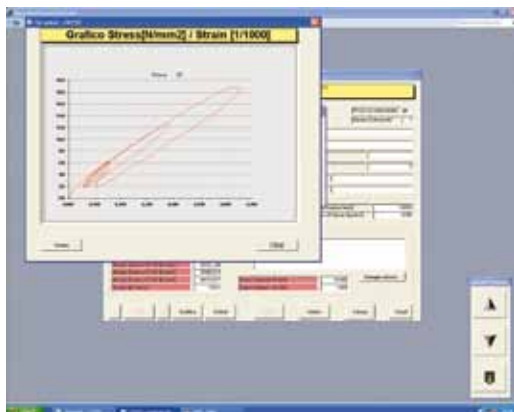
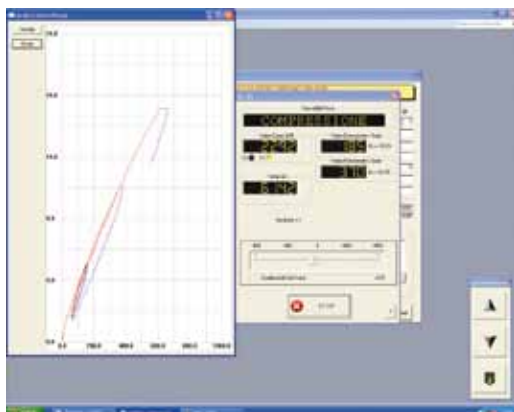
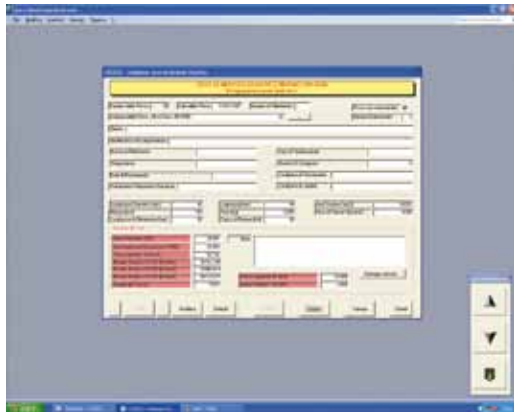


C 025/C - C 362/N



2.2.1 DETERMINATION OF STRENGTH

TECNOTEST



The standard machine configuration is for testing cement specimens to EN 196 as well as related specimens (provided that the necessary accessory for compression testing C 362/N and for flexural testing C 362/F are added).

Obviously, compression tests are possible on other materials provided they are of a rigid nature, fit in the testing bay or compression device and have an expected specific strength that falls within the maximum limit that the machine is capable of developing.

Specifications:

MAXIMUM CAPACITY: 250 kN

MAXIMUM RAM STROKE: 50 mm

USEFUL RAM STROKE DURING TEST: 20 mm

MAXIMUM RAM WITHDRAWAL SPEED DURING TEST: 5 mm/minute

RAM WITHDRAWAL SPEED DURING "RAPID" PHASE AT ZERO LOAD: 2 mm/second

VERTICAL SPAN BETWEEN LOADING PLATENS: 200 mm

HORIZONTAL SPAN BETWEEN COLOUMNS: 186 mm

DIAMETER OF LOADING PLATENS: 166 mm

THICKNESS OF LOADING PLATENS: 30 mm

DYNAMOMETER A:

25 kN extensometric load cell, linearity-hysteresis < 0.03% F.S.

DYNAMOMETER B:

300 kN extensometric load cell, linearity-hysteresis < 0.05% F.S.

Ball seating in oil bath.

Internationally renowned brand computer, monitor, keyboard, mouse and ink-jet printer.

Operating system: Microsoft Windows XP.

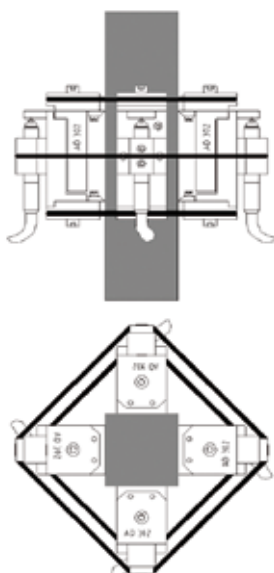
DIMENSIONS (computer excluded): 700 x 750 x 1730 (h) mm.

WEIGHT: 250 kg.

POWER SUPPLY: 220V, 50 Hz, single phase.

Accessories for measurement of elastic modulus:

AD 301	Software and hardware for measuring elastic modulus
AD 302	Electronic extensometer for measuring axial deformation. This instruments also allows tests to be performed under deformation control. Resolution of 0.1 μ m and 2 mm stroke
C 025/P	Spacing platen diameter 166 x 30 (h) mm



AD 302

AD 302 electronic extensometers may be applied to the sample in quantities from 1 to 4 by means of simple rubber O-Rings.

ACCESSORIES FOR ALL MODELS:

AD 013/B02	Printer, 24 columns for hard copy of test results
AD 050/001	Software package for transmission of test data to a PC

ACCESSORIES FOR C 025/C AND C 030/2A

C 050/V	Supporting frame for testing machine 40 cm high
C 050/B01	Supporting frame for testing frame 40 cm high
KR 11	Distance piece dia. 150 x 50 (h) mm For reducing vertical span (enables introduction of KR 023 device for example)
C 025/P	Distance piece dia. 166 x 30 (h) mm
C 025/L	Distance piece dia. 166 x 90 (h) mm

COMPRESSION TESTING DEVICES

For testing pieces of prisms broken in flexure.
Hardened steel platens and upper ball seating.

DIMENSIONS: 150 x 150 x 180 (h) mm.

WEIGHT: 10 kg.

C 362/N	Model for 40 x 40 mm section specimens (EN 196, ASTM C 349)
C 362/SN	Model for 2" and 50 mm section specimens (ASTM C 109)

FLEXURAL TESTING DEVICE C 362/F

EN 196-1

For flexural testing on 40 x 40 x 160 mm specimens.
Two lower bearers with 100 mm span, upper longitudinal self-aligning bearer.

DIMENSIONS: 140 x 110 x 185 mm.

WEIGHT: 7.8 kg.

FLEXURAL TESTING DEVICE C 362/A

ASTM C 348

Identical to C 362/F but provided with lower bearers having a 119 mm span.

ADHESIVE STRENGTH DEVICE C 362/T

Indirect tensile test for verifying the adhesive strength of bonding agents for building mortar.

Suitable for 40 x 40 x 160 mm specimens.

DIMENSIONS: 100 x 100 x 120 (h) mm.

WEIGHT: 3 kg.

SHEAR TESTING DEVICE C 362/C

EN 1324 EN 12003

For testing shear strength of bonding agents for building mortar.
Two tiles are bonded with ends unevenly matched and pressure is exerted on the side so as to cause the bond to rupture. Suitable for specimens up to 100 x 100 mm.

INDIRECT TENSILE STRESS TESTING**DEVICE ON SOIL-CEMENT SAMPLES KR 023**

For samples measuring 6" x 7" - 152.4 x 177.8 (h) mm.

DIMENSIONS: 165 x 285 x 215 (h) mm.

WEIGHT: 9.2 kg.

KR 024/C	Hard board packing strips (pack of 100): 4 x 16 x 240 mm
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AD 013/B02



C 362/N



C 362/SN



C 362/F



C 362/T



KR 023



C 362/C

2.2.1 DETERMINATION OF STRENGTH



P 421

TECNOTEST

MACHINE FOR FLEXURAL TESTING OF CERAMIC TILE ADHESIVES

P 421

EN 12002

The machine is provided with a dynamometer for determining and displaying the load. A 5 Kg load cell (accuracy 1 g) is coupled with a Monotronic display (see on page 115 for details). A gear transmission discharge device enables quick positioning and return of load device.

Deformation measurement is obtained via a 30 mm travel dial gauge (0.01 mm). Standard equipment obviously includes a power/control pack and test piece bearer with relevant rollers and mirror for observing failure.

SPECIFICATIONS:

- max. strength 10 N, with load limit device;
- structure in anodized aluminium;
- 12 V DC , 1 W motor; reduction gear ratio 1:54,000;
- displacement speed pre-regulated at 2 mm/minute;
- load device R = 50 mm, 40 mm height, depth 60 mm;
- bearer roller diameter 10 mm, 200 mm interaxis;
- inserts for balances 10 cm high;

POWER SUPPLY: 220 V, 50 Hz, 1ph

DIMENSIONS: 400 x 300 x 580 (h) mm

WEIGHT: 12.5 kg

Accessories (to be ordered with the machine):

P 420/1	Template for test pieces 280 x 45 x 3 mm
P 420/2	Metal frame: 280 x 45 x 5 mm (A shape) - EN 12002
P 420/3	Stainless steel mould: 300 x 45 mm (B shape) - EN 12002
P 420/4	Steel weight: 10.197 kg \pm 10 g Capable of exerting a force of 100 N \pm 0.1 N

LENGTH COMPARATOR

C 385

ASTM C 151 ASTM C 490 BS 1881 EN 1367-4 EN 12617-4

Precision apparatus used for measuring length changes. Consists of aluminium alloy base with levelling feet, chrome plated columns with support for 0.001 dial gauge (5 mm travel), as required by Standards, and two stainless steel contact points. Reference rod with negligible thermal expansion coefficient, 300 mm long (C 385/A) is supplied as standard.

DIMENSIONS: 260 x 240 x 500 mm.

WEIGHT: 8 kg.

LENGTH COMPARATOR

C 385/1

Identical to C 385 model but with digital dial gauge 0.001 (12.5 mm travel), battery operated. RS 232.

Accessories:

Invar type steel rods

C 385/A	300 mm reference rod (ASTM)
C 385/B	170 mm reference rod (ASTM)
C 385/C	205 mm reference rod (BS 1881 - EN 1367-4)
C 385/D	230 mm reference rod (BS 6073)
C 385/E	298.5 mm reference rod (BS)
C 385/F	305 mm reference rod (BS 6073)
C 385/G	160 mm reference rod (AFNOR P 15-413 - EN 12617-4)
C 385/H	280 mm reference rod (UNI 8148)
C 385/M	295 mm reference rod
C 385/N	190 mm reference rod (ASTM-UNI)



C 385/1



C 385

5 LITRE MORTAR MIXER**C 371**

EN 196-1 EN 196-3 EN 413-2 EN 459-2

Used for preparing cement mortars to relevant specifications.
Built entirely in stainless steel.

Planetary speeds: 62 and 125 r.p.m. (clockwise)

Beater speeds: 140 and 285 r.p.m. (anticlockwise)

The stainless bowl has a 5 litre capacity and quickly engaging clasps ensure that it is easy to secure to or remove from the mixer. The beater is in polished stainless steel.

Equipped with double safety devices as required by CE directives: one on the bowl lowering assembly and one on the upper safety screen.

POWER SUPPLY: 220 V, 50 Hz, single phase, 400 W

DIMENSIONS: 370 x 500 x 540 (h) mm

WEIGHT: 33 kg

**C 371****5 LITRE MORTAR MIXER AUTOMATIC MODEL WITH SAND DISPENSER****C 371/A**

EN 196-1 EN 196-3 EN 413-2 EN 459-2 EN 1015-2

Same as C 371 but with automatic sand dispenser and supplementary dispenser for manual addition of admixtures or water during the mixing cycle.

Electronic programming of mixing cycle.

Structure, bowl and beater are in stainless steel.

By selecting automatic programming, the mixer performs the following mixing cycles as prescribed in the relevant specifications. Bowl and beater included.

The unit is supplied with a hand dispenser for tests in compliance with EN 1015-2.

Automatic cycle 1, 240 seconds duration (EN 196-1)

PHASE 1: Low-speed mixing of water / cement per 30 seconds (V1 speed – 62 rpm / planetary – 140 rpm / beater)

PHASE 2: Automatic dispensing of prescribed quantity of sand (1350 g) for subsequent 30 seconds of mixing

PHASE 3: Change of speed from V1 (62 rpm – 140 rpm) to V2 (125 rpm / planetary – 285 rpm / beater) and 30 second of mixing

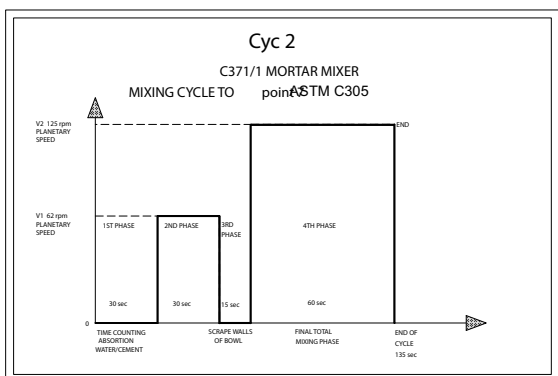
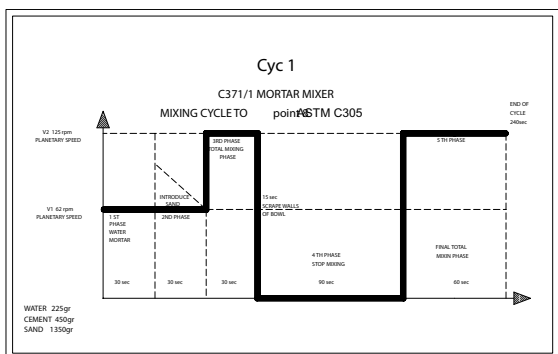
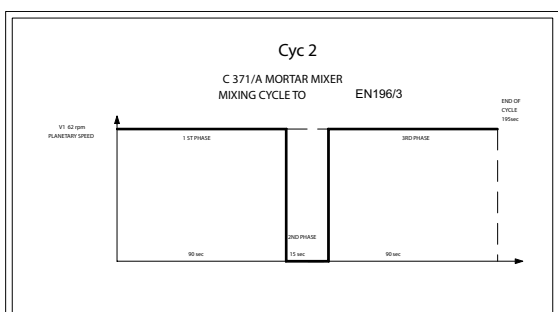
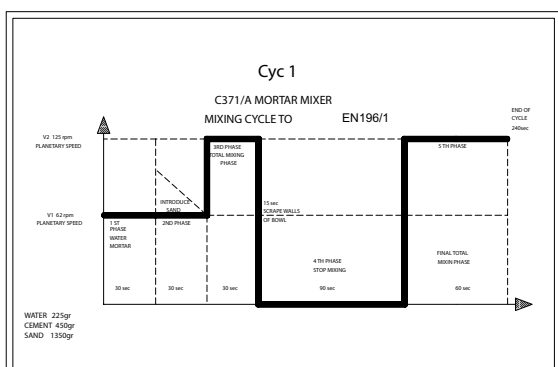
PHASE 4: 90 second stop.
During this phase the inner perimeter of the bowl should be scraped using rubber spatula with mortar positioned in the centre

PHASE 5: Final mixing cycle of 60 second duration at V2 speed. (125 rpm – 285 rpm)

**C 371/A**

2.2.2 SAMPLE PREPARATION

TECNOTEST



Automatic cycle 2, 195 seconds duration (EN 196-3)

PHASE 1: Low-speed mixing for 90 seconds (V1 speed – 62 rpm / planetary – 140 rpm / beater)

PHASE 2: 15 second stop. During this phase the inner perimeter of the bowl should be scraped using rubber spatula with mortar positioned in the centre.

PHASE 3: Final mixing cycle of 90 second duration at V1 speed (62 rpm – 140 rpm)

On the programming unit are displayed: mixing phase (F1.. F5), time, speed (V1, V2), status of automatic dispenser (D) and any alarms (!). At the end of mixing cycles the mixer stops automatically, activating safety devices and displaying “END”. The unit is also able to perform a completely manual cycle (MAN).

POWER SUPPLY: 220 V, 50 Hz, single phase, 500 W

DIMENSIONS: 500 x 500 x 540 (h) mm.

WEIGHT: 38 kg



AUTOMATIC MORTAR MIXER

C 371/1

Same as C 371/A but preset for ASTM C 305 cycles.

ACCESSORIES AND SPARE PARTS:

C 371/T Spatula, plastic

C 371/B Bowl, stainless steel, 5 litre capacity

C 371/P Beater, polished stainless steel to EN 196-1

C 364/S1 Reference sand to EN 196-1 (1350 g pack)



C 371/P



C 371/T



C 371/B



C 364/S1

**UNIVERSAL PLANETARY MIXER FOR ASPHALT
AND CEMENT 5 LITRES - 6 SPEEDS B 205/X5**

Structure and bowl built entirely in stainless steel.

The mixing bowl is supplied and provided with special couplings for rapid attachment to mixer. The beaters for cement or asphalt, are not supplied and are to be chosen from the accessories. Made in special nickel-plated steel for use with bituminous mixtures and in polished stainless steel for cement, they can be quickly and easily removed and repositioned.

Double safety devices as required by "CE" directives: on the bowl lowering assembly and on the upper safety guard. Synchronized rotation and revolution movements. The PLANETARY/BEATER six speeds, make the machine a UNIVERSAL MODEL. Ideal for special mortars, masonry cement, soil and asphalt.

	V ₁	V ₂	V ₃	V ₄	V ₅	V ₆
PLANETARY SPEED rpm (clockwise)	28	35	44	51	62	125
BEATER SPEED rpm (anticlockwise)	64	80	100	116	140	285
	ASPHALT SOILS			CEMENT MORTAR HYDRAULIC LIME		

Heating and beaters excluded

POWER SUPPLY: 220 V, 50 Hz, 1 ph, 600 W

DIMENSIONS: 390 x 500 x 690 (h) mm.

WEIGHT: 35 kg

Required accessories for asphalt (EN 12697-35)

B 205/H Electric heating device
with stainless steel lifter

B 205/B Beater FOR ASPHALT
in special nickel-plated steel

**Required accessories for cement and mortars
(EN 196-1, 196-3, 1015-2, 413-2, 459-2, ASTM C 305)**

C 371/B 5 litre stainless steel bowl

C 371/P Beater FOR CEMENT
in polished stainless steel

C 371/T Plastic spatula



B 205/X5



B 205/X5 - B 205/H



B 205/B



B 205/H



C 365/R



C 365



C 365/A



C 365/F1



C 366



C 368



C 368/S

SHRINKAGE MOULDS (HARDENED STEEL)

Three-gang mould for beams 40 x 40 x 160 mm, with 6 special plugs in heads. Minimum hardness HV 400.

DIMENSIONS: 250 x 430 x 60 (h) mm.

WEIGHT: 13 kg.

C 365/R Mould: UNI 6687/73, ASTM C 348

C 365/P Set of 12 plugs UNI/ASTM (spare)

C 365/N Mould: EN 12617-4

C 365/NN Set of 12 plugs EN (spare)

THREE-PLACE MOULDS (HARDENED STEEL)

EN 196-1 EN 1015-11 UNI 6009

For beams 40 x 40 x 160 mm. All parts marked.

C 365 Mould minimum hardness 400 HV

DIMENSIONS: 250 x 430 x 60 (h) mm. **WEIGHT:** 13 kg

C 365/A Mould hardness 400 HV

DIMENSIONS: 245 x 300 x 55 (h) mm. **WEIGHT:** 12 kg

C 365/C Mould hardness 200 HV

DIMENSIONS: 245 x 300 x 55 (h) mm. **WEIGHT:** 12 kg

THREE-PLACE MOULD

C 382/T

BS 3892

For beams, 25 x 25 x 320 mm.

DIMENSIONS: 100 x 380 x 60 (h) mm

WEIGHT: 14.5 kg

HOPPER FOR 40 x 40 x 160 mm moulds

C 366

ACCESSORIES:

C 211/P Aluminium tamper: 12 x 12 x 130 mm
(EN 1015-11)

C 365/P1 Large scraper (EN 196-1)

C 365/PP Small scraper (EN 196-1)

STEEL MOULDS FOR CUBES

For C 365 series moulds, testing laboratory check with traceable measuring instruments and marking with serial number.

C 368 For 3 cubes: 2" sides (ASTM C 109)

C 368/1 For 3 cubes: 50 mm (ASTM C 109)

C 368/2 For 3 cubes: 50 mm

C 368/4 For 3 cubes: 40 mm sides (UNI 6009)

C 368/S For 3 cubes: 70 mm sides

C 365/F1 For 1 cube: 70 mm sides

MOULD FOR EXPANSION TEST C 382/S

ASTM C 151 ASTM C 227 ASTM C 490

Two-plate 25 x 25 x 285 mm prism mould. Made of steel with housing for inserts. Supplied without contact points.

DIMENSIONS: 295 x 90 x 30 (h) mm.

WEIGHT: 3.9 kg.

ACCESSORIES:**C 382/P** Contact points for C 382/S (pack of 100 pcs)**C 382/PP** Contact points for C 382/S (pack of 10 pcs)

C 382/S

THREE-GANG MOULDS FOR RESTRAINED EXPANSION TESTS**C 380/A** Beams 50 x 50 x 250 mm (UNI 8147)
Dimensions: 320 x 180 x 60 mm, 15 kg**C 380/B** Beams 80 x 80 x 240 mm (UNI 8148)
Dimensions: 320 x 280 x 90 mm, 18 kg

C 380/A

JOLTING TABLE

AFNOR P 15 AFNOR P 412 EN 196-1

Structure in two parts: fixed and oscillating. Made in stainless steel with quick locking device for sample. Cover for safety included. Drop height of 15 mm with a 60 drops per minute cycle. Control panel with mains switch, mains neon, start/stop buttons and three digit selector to select number of cycles after which the machine will automatically stop. Electric motor: 0.25 hp

DIMENSIONS: 1000 x 310 x 430 (h) mm.

WEIGHT: 50 kg

C 363/01 Model 220 V, 50 Hz, single phase**C 363/02** Model 110 V, 60 Hz, single phase

C 363/01

THERMOSTATIC CURING TANK (20°C) 200 litres C 387/01

200 litre tank made of stainless steel, supplied complete with lid. Temperature settings are made on a digital selector, whilst actual temperature is displayed on a 3 digit LED display.

Temperature from ambient to 20° C.

The electronic PD circuit controls the temperature with a high precision probe (20 ± 2° C).

No refrigerator.

POWER SUPPLY: 220 V, 50 Hz, single phase, 1000 W

INSIDE DIMENSIONS: 900 x 600 x 360 (h) mm

OVERALL DIMENSIONS: 1050 x 680 x 480 (h) mm

WEIGHT: 49 kg

THERMOSTATIC CURING TANK (100°C) 200 litres C 388/01

Same as C 387. Manufactured in stainless steel.

Insulated double-wall with cover.

Electrical immersion-type heating element. 2400 W.

Digital thermostat and controls.

Maximum temperature 100°C (± 2°C).

POWER SUPPLY: 220 V, 50 Hz, single phase

INNER DIMENSIONS: 900 x 600 x 360 (h) mm

OUTER DIMENSIONS: 1050 x 680 x 430 (h) mm

WEIGHT: 55 kg.



C 388/01

CURING CABINET: 550 LITRE CAPACITY

AT 298/4

EN 196 ASTM C 31 ASTM C 191 ASTM C 192



AT 298/4



AT 297/TU

Capacity 550 litres. Digital control unit (0.1 resolution).

Temperature (e.g. 20.0°C) and relative humidity (e.g. 95.0% RH) are displayed at all times as well as all the other phases (cooling-heating-ventilation-humidification, etc.).

Temperature range: from +10°C to +40°C ($\pm 1^\circ\text{C}$).

Humidity range: from 80% to 100% (saturation).

Humidifier: automatically-generated humidity by vaporization

Inner/outer structure: entirely in AISI 304 stainless steel. Grid shelves.

The cabinet top can be used as a work bench.

Thermal insulation: in 60 mm thick self-extinguishing polyurethane (CFC-free) foam.

Doors: mounted on special hinges for automatic closure. Four doors and eight (plasticized steel) shelves, supplied as standard.

Up to six extra shelves can be added.

Refrigerating system: airtight type with air condensation and R 404a ecological (CFC-free) gas.

Heating: thermostatically-controlled heating element with low thermal inertia.

POWER SUPPLY: 220 V, 50 Hz, single phase, 1050 W

DIMENSIONS: 2260 x 700 x 850 (h) mm.

WEIGHT: 205 kg.

ACCESSORIES:

AT 298/P Shelf (complete with guides), in plasticized steel: 325 x 530 mm

AT 298/S Shelf (complete with guides), in stainless steel: 325 x 530 mm

AT 297/T Temperature recorder with printer (printout intervals are selectable, ranging from every 5 to every 180 minutes)
Technical data on page 371 - section 5.3.3

AT 297/TU Temperature/humidity recorder with printer (printout intervals are selectable, ranging from every 5 to every 180 minutes). Technical data on page 371 - section 5.3.3

AT 297/S Spare parts kit: 1 printer ribbon and 10 rolls of printer paper

CLIMATIC CABINET FOR CURING: 750 LITRE CAPACITY**AT 299/A**

EN 196 ASTM C 31 ASTM C 191 ASTM C 192 EN 1015-9 EN 1015-12

Inner and outer structure made entirely in AISI 304 stainless steel.

Up to six extractable shelves (600 x 800 mm, 40 kg max. load) can be fitted. Four shelves are supplied as standard, made of plasticized steel. With 6 shelves it may contain up to 24 moulds.

Digital control unit (0.1 resolution)

Temperature (e.g. 20.0°C) and relative humidity (e.g. 95.0% RH) are displayed at all times as well as all the other phases (cooling-heating-ventilation-humidification, etc.).

Temperature range: from +15°C to +30°C ($\pm 1^\circ\text{C}$).

Humidity range: from 80% to 100% (saturation).

Humidifier: automatically-generated humidity by vaporization

Thermal insulation: in 60 mm thick self-extinguishing polyurethane (CFC-free) foam.

Service door: at the front with magnetic sealing gasket. Safety key closure.

Refrigerating system: airtight type with air condensation and R 404a ecological (CFC-free) gas.

Heating: thermostatically-controlled heating element with low thermal inertia.

POWER SUPPLY: 220 V, 50 Hz, single phase, 1600 W

INNER DIMENSIONS: 660 x 830 x 1370 (h) mm

OUTER DIMENSIONS: 780 x 1000 x 2150 (h) mm

WEIGHT: 185 Kg

ACCESSORIES:

AT 299/P Shelf 600 x 800 mm



Digital Control Panel



UNI EN 196



ASTM C 191



UNI EN 1015-12



AT 299/A + 4 pieces AT 299/P

**CLIMATIC CABINET FOR "FREEZING AND THAWING"****CYCLES WITH HUMIDITY CONTROL****AT 296/01**

EN 1367-1

Specifications:

Temperature Range: from -20 to +60°C ±1°.

Humidity Range: 10/90% RH tolerance ± 5% dew point limit + 2°C.

Inside Frame: totally in stainless steel AISI 304.

Outside Frame: totally glazed stainless steel AISI 304.

Insulation: self-extinguishing expanded polyurethane.

Service Door: at the front with magnetic sealing gasket.

Cooling: airtight compressor with air condenser.

Heating: electric heater with low thermal inertia complete with max. temperature control protection.

Dehumidification: direct expansion of FREON.

Humidification: steam generator.

Internal Ventilation: forced circulation.

Regulation: digital electronic temperature controls with proportional band, 0.5°C class with three figures display.

PT 100 platinum probes. 3 shelves of adjustable height, max load capacity 70 kg each.

Capacity: 520 liters.

POWER SUPPLY: 220 V, 50 Hz, single phase, 3000 W**OUTER DIMENSIONS:** 730 x 920 x 2090 (h) mm**INNER DIMENSIONS:** 560 x 620 x 1515 (h) mm**WEIGHT:** 150 kg.**ACCESSORIES:**

AT 296/A	Extra shelf
AT 296/C	Two curves graph recorder
AT 296/E	Microprocessor-based programmer (temperature/humidity)

THERMOSTATIC CHAMBER FOR "FREEZING AND THAWING" CYCLES**AT 297**

Identical to AT 296/01 one but without humidity control.

DIMENSIONS: 730 x 690 x 2020 (h) mm**WEIGHT:** 150 kg**ACCESSORI:**

AT 297/E	Microprocessor-based programmer (temperature)
AT 297/A	Extra shelf

BLAINE FINENESS APPARATUS C 378

ASTM C 204 AASHTO T 153 BS 4359 AFNOR P 15
AFNOR P 442 BS 4550 EN 196-6

For determining the fineness of Portland cement in terms of a specific surface expressed as total area in cm^2/g of cement. Complete with cell, disk and accessories (thermometer, 1000 filter disks, 100 cc of manometer liquid, silica grease, funnel and brush).

DIMENSIONS: 200 x 160 x 400 mm.

WEIGHT: 9 kg.

ACCESSORIES AND SPARE PARTS:

Z 42	Silica gel: 150 g
C 378/L	Manometer liquid: 100 cc
C 378/F	Filter disks (pack of 1000)
C 378/H	Glass manometric tube
C 378/C	Reference cement (EN 196/6) 5 g pouch
C 378/T	Thermometer (-10° + 50°C)
C 378/Z	Blaine cell (complete with piston, cell and perforated disk)



C 378

DIETRICH-FRÜHLING GASOMETER D 520

For determining the CaCO_3 in limestone and lime marl. Comprising a glass container and connected gas-holder. A reaction in the glass container between the sample calcium carbonate and a solution of diluted hydrochloric acid produces carbon dioxide which is subsequently measured in the gas-holder. This volume can be used to calculate the CaCO_3 content of the sample.

DIMENSIONS: 275 x 200 x 1100 (h) mm.

WEIGHT: 12 kg.

ACCESSORIES:

D 520/F	Glass bottle: 292 cc, \varnothing 34 mm, 242 g
D 520/P	Pipette: 10 cc



D 520

GILLMORE APPARATUS C 352

ASTM C 91 ASTM C 141 ASTM C 266 AASHTO T 154

Used to determine the setting time of cement. Consists of base and rod supporting 2 horizontal arms with 2 weighted needles with stainless steel points.

DIMENSIONS: 200 x 100 x 200 (h) mm.

WEIGHT: 2.5 kg.

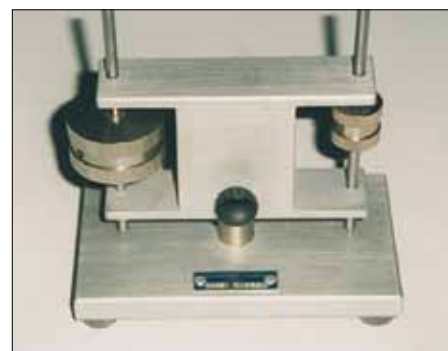
“WATER RETENTION” MOULD C 370

EN 413-2

For determining the water retention of masonry and cement.

DIMENSIONS: 100 x 25 mm.

WEIGHT: 0.1 kg.



C 352



C 370

AUTOMATIC VICAT APPARATUS

C 360

ASTM C 187 ASTM C 191-01 AASHTO T 129 AASHTO T 131 EN 196-3



C 360



Cement and mortar setting times are determined by means of a needle which performs a series of penetrations in a hydrated cement sample. As consistency increases, depth of penetration decreases, hence the diagram relevant to the latter describes the physical effect of setting process over a given time. Specific Standards prescribe the procedure to follow for the test as well as the form the instrument should take. The instrument is not only built in compliance with these Standards but also enables the test to be carried out automatically. The apparatus is basically a **Cartesian robot** powered by stepper motors which cause the needle to move along three axes so that it can be positioned anywhere in the area being tested. A fourth servomotor causes the gripper to **open to release the penetration device and to close for its recovery**. This function can be cancelled so as to enable the needle to drop by being driven rather than in free-fall. Penetration measurement is made during recovery of penetration device and is given in tenths of a millimetre, thus allowing final setting time to be recorded using the normal initial setting time needle and so avoiding having to replace the needle during the test. After each test the **needle is brought to the brushes for cleaning** where it is kept until the next stage of the process. Once the cycle is over, the apparatus automatically stops and stores measurements obtained in a file. The program can be repeated without interrupting the time scan; this enables the test to be subdivided into stages, which is convenient when an interval is necessary for turning the sample upside down. The needle-holding device may be installed in such a way as to be used as plunger for determining initial consistency in accordance with Standards. A special container (**optional item C 360/T**) may be installed as a thermostatic bath for the sample and which is capable of maintaining water at a temperature of $20^{\circ}\text{C} \pm 1^{\circ}\text{C}$. The display guides the user during data input and shows penetration diagrams and test results. **A thermal printer enables a final report, with relevant graph, to be printed**. Data generated in print file are also sent to the **RS 232 serial port** so that they can be **downloaded to a PC using a standard data reception program** (such as Hyperterminal in Windows environment). **Up to 30 different test configurations and up to 50 complete tests can be stored**. The user is allowed to **program various parameters** such as:

- mould diameter
- distances between penetration points
- start time interval
- time lapse between successive penetrations

Setup parameters are protected by a password.

Mechanisms are housed inside a stainless steel cabinet.

Supplied as standard: ASTM needle holder, EN needle holder, EN needle diameter 1.13 mm, glass plate, paper roll. **Moulds and further needles have to be ordered separately, according to the various standards.**

The transparent dust cover is not included.

POWER SUPPLY: 220 V, 50 Hz, single phase

DIMENSIONS: 355 x 620 x 580 mm.

WEIGHT: 40 kg

Automatic test cycles.

Initial and final setting time (in 0.1 mm).

Automatic cleaning of the needle.

Automatic stop and storage of measurements for up to 50 tests.

Plunger for initial consistency.

Thermostatic baths (optional).

Display for data input and diagram/test report.

Printer for final test report and diagram.

RS 232 serial port for PC connection.

THERMOSTATIC BATH:**TEMPERATURE 20°C****C 360/T**

EN 196

Double-walled container fitted with a digital thermostat for heating or cooling the water as needed to maintain a temperature of $20^{\circ}\text{C} \pm 1^{\circ}\text{C}$. The bath is simply connected to the C 360 which has a series of electric power devices, the software for setup as well as the routines necessary for input of control parameters. Outer wall is built in stainless steel while inner wall is in copper. Accommodates 40 mm high moulds having diameters of 70 and 80 mm. Enables tests to be performed to EN 196 without any need for a climatic chamber to guarantee controlled temperature and humidity.

DIMENSIONS: 255 x 150 x 70.**WEIGHT:** 2 kg.**THERMOSTATIC BATH:****TEMPERATURE 5°C****C 360/T5**

EN 480-2

Same as C 360/T but with devices for heating or cooling the water and maintaining a temperature of $5^{\circ}\text{C} \pm 1^{\circ}\text{C}$.

Thermostatic range is between 5°C and 40°C .

Enables tests to be performed to EN 480-2 and EN 196. To be ordered together with C 360.

DIMENSIONS: 308 x 150 x 75 (h) mm.**WEIGHT:** 1.5 kg.

C 360/W STAINLESS STEEL WEIGHT 761 g
for the probe to reach 1000 g (EN 480-2)

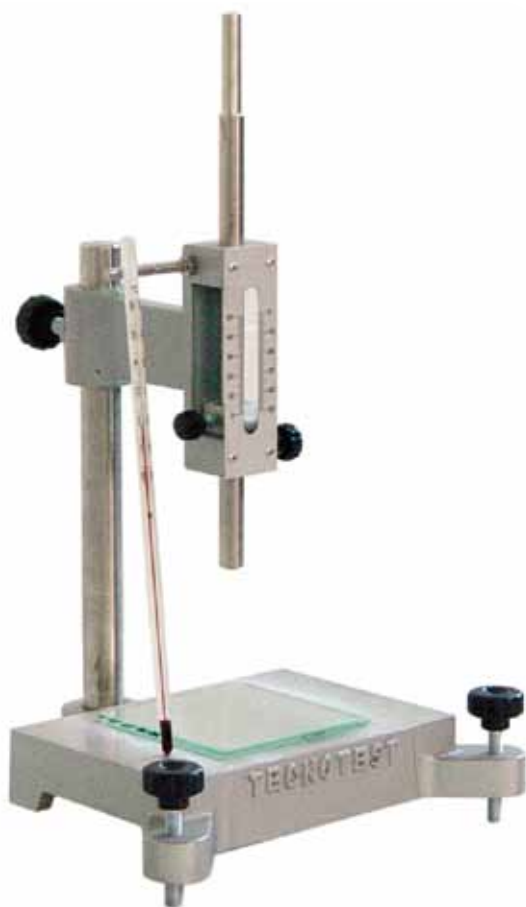
KIT OF ACCESSORIES FOR GYPSUM**C 360/G**

EN 13279-2

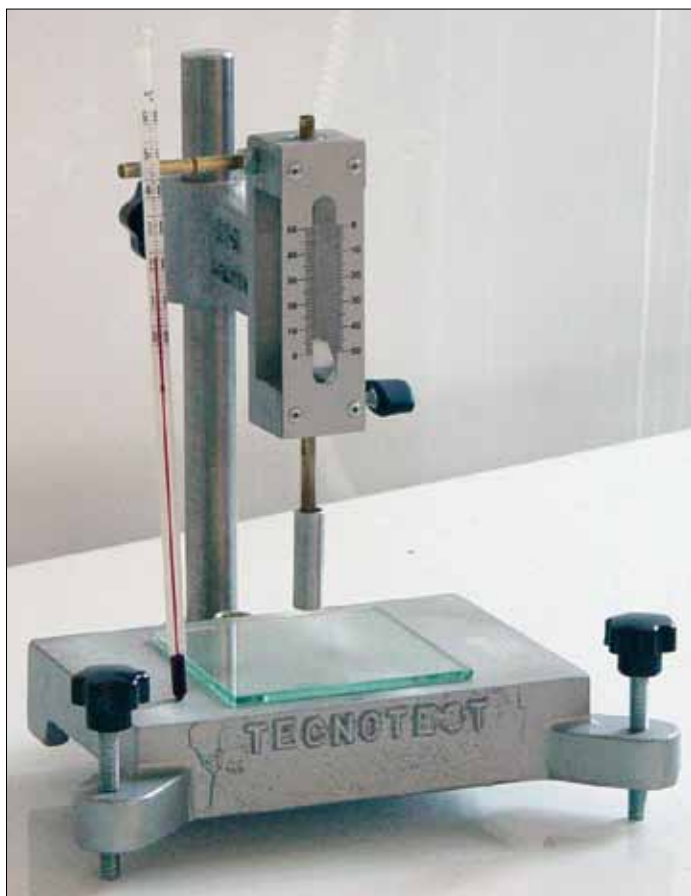
Conical probe (upper dia. 8 mm, lower dia. 1 mm, height 50 mm); rod, brushes for cleaning and support.

ACCESSORIES AND SPARE PARTS:**C 360/A6** ASTM/AASHTO needle dia. 1 mm (set of 6)**C 360/B6** BS/EN needle dia. 1.13 mm (set of 6)**C 361/E** EN cone shaped mould in plastic diameter 80 and 70 x 40 (h) mm**C 361/F** ASTM/AASHTO cone shaped mould in plastic diameter 70 and 60 x 40 (h) mm**C 361/H** BS mould complete with bronze ring diameter 80 x 40 mm**C 360/R** Thermal printer paper (10 rolls)**C 360/V** Glass plate: diameter 96 x 4 mm**C 360/P** Transparent dust cover**C 360/T5****C 360/T****C 360****C 360/G**

2.2.3 TESTS ON CEMENT AND MORTAR



C 361



C 361/1

TECNOTEST

VICAT NEEDLE APPARATUS

C 361

ASTM C 187 ASTM C 191 AASHTO T 129 AASHTO T 131 BS 4550
BS 4550 AFNOR P 15 AFNOR P 414 EN 196-3

Used to determine the amount of water required to produce a cement paste of standard consistency and the setting time. The frame is supplied complete with a 300 g consistency plunger (dia. 10 mm).

The measurement of the movement is given by an indicator which moves along a scale graduated in millimetres.

The apparatus is supplied complete with glass plate and thermometer (-10 + 50°C). Needles and moulds conforming to relevant Standards must be ordered separately.

DIMENSIONS: 260 x 250 x 450 (h) mm.

WEIGHT: 4 kg.

ACCESSORIES AND SPARE PARTS:

C 361/A6	ASTM/AASHTO needle dia. 1 mm (set of 6)
C 361/B6	BS/EN/UNI needle dia. 1.13 mm (set of 6)
C 361/C2	BS/EN final needle with special foot (set of 2)
C 361/E	EN cone shaped mould in plastic diameter 80 and 70 mm
C 361/F	ASTM/AASHTO cone shaped mould in plastic diameter 70 and 60 mm x 40 (h) mm
C 361/G	UNI cone shaped mould in plastic, dia. 90 and 80 mm
C 361/H	BS 4550 mould complete with bronze ring diameter 80x40 mm
C 361/L	DIN cone shaped mould in plastic, 75x65 mm
C 361/700	700 g weight
C 361/T	Thermometer (-10 + 50°C)
C 361/V	Glass plate, 10 x 10 cm
C 361/A	Consistency plunger, dia. 10 mm

MODIFIED VICAT NEEDLE APPARATUS

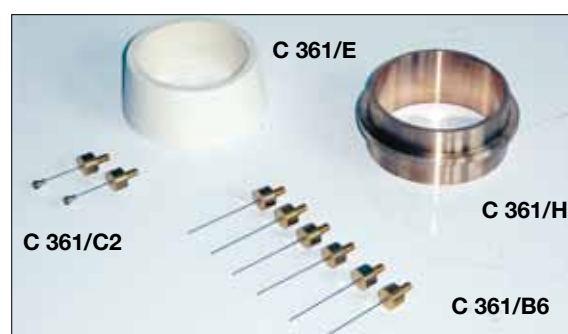
FOR TESTS ON GYPSUM

C 361/1

ASTM C 110

Used to determine the consistency of gypsum. The frame is the same as that used for the standard Vicat apparatus and is supplied complete with a 30 g consistency plunger, a glass plate and a thermometer (-10 + 50°C). To complete the apparatus, a cone-shaped mould is required.

C 361/F ASTM/AASHTO cone shaped mould in plastic diameter 70 and 60 mm



LE CHATELIER MOULD C 374

AFNOR P 15 AFNOR P 432 EN 196-3 BS 890 BS 4550

Made of chrome plated brass with split cylinder diameter 30 mm x 30 mm high and two needles 150 mm long.
Three moulds required for each test.

DIMENSIONS: 30 x 30 x 180 (h) mm.

WEIGHT: 30 g.

ACCESSORIES:

C 374/V Glass plates, set of 2 (50 x 50 mm)

C 374/P Weight for glass plate

C 374/T Tamping rod, dia. 17 mm, weight 70 g

C 374/D Extensibility of mould set

C 374
C 374/V
C 374/P
C 374/T
C 374/D**THERMOSTATIC WATER BATH FOR SOUNDNESS TEST** C 373

EN 196-3

Made of stainless steel with bath dimensions 300 x 150 x 190 (h) mm supplied with cover.

Control switch, timer (0 ÷ 60 min.) are in the front panel.

Temperature: 100°C. Two heating elements, 1350 W and 200 W, guarantee that the water reaches boiling point within approx. 30 minutes, after which a timer cuts out the more powerful element so that the task of maintaining the water temperature is left to the second heating element. Removable rack for 12 moulds.

POWER SUPPLY: 220 V, 50 Hz, single phase

DIMENSIONS: 390 x 180 x 320 (h) mm.

WEIGHT: 7 kg.

THERMOSTATIC WATER BATH: 100°C C 384/01

Stainless steel made. Complete with cover.

Inside dimensions 300 x 150 x 190 mm.

Control switch and thermostat.

Max temperature 100°C

POWER SUPPLY: 220 V, 50 Hz, single phase, 800 W.

DIMENSIONS: 440 x 220 x 290 (h) mm.

WEIGHT: 7 kg.

CALORIMETER (NON CALIBRATED) C 390

ASTM C 186 BS 4550 BS 1370 EN 196-8

Composed of a Dewar flask housed in a thermally insulated case, a constant speed stirrer, a Beckman thermometer and a filling funnel.

Dewar flask is easily removable from the wooden container.

POWER SUPPLY: 220 V, 50 Hz, single phase - 150 W

DIMENSIONS: 350 x 250 x 650 (h) mm.

WEIGHT: 15 kg.

ACCESSORIES AND SPARE PARTS:

Z 80 Paraffin wax: 5 kg (melting point 54°C)

Z 79 Paraffin wax: 1 kg (melting point 54°C)

C 390/D Dewar flask

C 390/F Funnel

C 390/T Beckman thermometer



C 373



C 390

2.2.3 TESTS ON CEMENT AND MORTAR



C 377/01



C 377



C 372/C



C 376/A1

TECNOTEST

ELECTRIC FLOW TABLE

C 377/01

EN 413-2 EN 459-2 EN 1015-3

Used for determining the flow of mortar and building lime. The cam system driven by a motor speed reducer, the control panel with digital selector switch for preselecting counter, automatically stops the apparatus at the end of the test cycle. The table, the mould and relevant hopper, the cam as well as the tamper coating, are all in stainless steel.

Specifications:

Table: 300 mm dia. x 4 mm thick

Drop height: 10 mm

Cycles: one revolution per second

Flow mould: 100 mm and 70 mm dia. x 60 mm deep

Tampers: 40 mm dia., 200 mm long

POWER SUPPLY: 220 V 50 Hz single phase

DIMENSIONS: 780 x 260 x 340 (h) mm.

WEIGHT: 25 kg

HAND OPERATED FLOW TABLE

C 377

Similar to the previous one, but hand operated. Handwheel instead of motor and electric panel.

DIMENSIONS: 250 x 400 x 340 (h) mm.

WEIGHT: 10 kg.

ACCESSORIES AND SPARE PARTS:

C 372/P Tamper/scraper

C 372/C Flow caliper (500 mm usable)

C 372/R Mould and hopper

ELECTRIC FLOW TABLE

C 376/A1

ASTM C 230 BS 4551

Both the apparatus and the test are similar to those described for article C 377/01.

Base, table, drop height and cycles are different.

Specifications:

Table: 254 mm dia. (10")

Drop height: 12.7 mm (0.5")

Cycles: 25 rev. per 15 seconds

Flow mould: dia. 101.6 mm (4"), 69.8 mm (2.75"),

50.8 mm (2") height, bronze made

Hard wood tamper/scraper

POWER SUPPLY: 220 V, 50 Hz, single phase

DIMENSIONS: 780 x 260 x 340 (h) mm.

WEIGHT: 25 kg.

HAND OPERATED FLOW TABLE

C 375/A

Similar to C 376/A1, but with a handwheel for manual operation, instead of electric motor and control panel.

DIMENSIONS: 250 x 400 x 340 (h) mm.

WEIGHT: 10 kg

ACCESSORIES AND SPARE PARTS:

C 376/S Flow caliper

C 211 Tamper/scraper

C 376/R Bronze mould

MARSH FLOW CONE C 356/S

EN 445

Used to determine the fluidity of mortar flowing through the spout of a standard cone.

2 litre plastic container, base stand, 10 and 152 mm diameter stainless steel cone (28° angle), height 280 mm.

Stainless steel sieve diameter 150 mm with 1.5 mm mesh.

Supplied with four interchangeable stainless steel spouts dia. 8, 9, 10 and 11 mm.

DIMENSIONS: 220 x 260 x 620 (h) mm.

WEIGHT: 7 kg.

AIR CONTENT OF MORTAR MIX

ASTM C 185-85 AASHTO T 137

C 340 Steel beaker. Internal dia. 76.2 x 88.1 mm
400 cc capacity. Weight 850 g

C 407 Chattaway spatula
Made of nikel, 120 mm long

LE CHATELIER FLASK C 754

ASTM C 188 AASHTO T 133 EN 196-6

Used to determine the specific gravity of sands and cement.
Made in glass, 250 cc capacity.

Graduated from 0 to 1 cc and from 18 to 24 cc (0.1 cc graduations).

Ground glass stopper.

DIMENSIONS: dia. 90 mm x 250 (h) mm.

WEIGHT: 0.5 kg.

BULK DENSITY OF MORTAR APPARATUS C 358

ASTM C 91 ASTM C 110

Consists of 1 litre bulk density measure, filling scoop, straight edge, spatula, stand and funnel complete with rotating shutter. A sieve is incorporated at the top of the funnel.

DIMENSIONS: 350 x 350 x 550 (h) mm.

WEIGHT: 2 kg.

AIR ENTRAINMENT METER FOR MORTAR C 354

EN 413-2 EN 459-2 EN 1015-7

Made of cast aluminium, the 1 litre pot is held in position by two quick action clamps. Two valves, one for water inlet and one for air vent. Integral hand pump and TEST and CORRECTION push-buttons. The built-in gauge is calibrated from 0 to 50 volumetric percentage with following scale divisions:

0 - 5 volumetric %, 0.1% divisions

5 - 10 volumetric %, 0.2% divisions

10 - 50 volumetric %, 0.5% divisions

DIMENSIONS: 520 x 420 x 320 (h) mm.

WEIGHT: 8 kg.



C 356/S



C 340



C 407



C 754



C 358



C 354

2.2.3 TESTS ON CEMENT AND MORTAR

TECNOTEST



C 392
C 393



C 383



C 369



C 359

CEMENT SAMPLERS

EN 196-7 ASTM C 183

C 392 Packaged cement sampler
Brass, diameter 32 x 700 mm.
Weight: 2 kg

C 393 Bulk cement sampler
Brass (concentric tubes)
Diameter 40 x 1500 mm.
Weight: 5 kg

WATER VAPOUR BATH:

BUILDING LIME STABILITY TEST

C 383

EN 459-2

In stainless steel, it contains up to 12 moulds which are maintained at a height of approx. 50 mm above water level. A device located beneath the lid prevents condensation from falling onto specimens. Two heating elements, 800 W and 200 W, guarantee that the water reaches boiling point within approx. 30 minutes, after which a timer cuts out the more powerful element so that the task of maintaining the water temperature is left to the second heating element.

POWER SUPPLY: 220V 50 Hz single phase

DIMENSIONS: 390 x 180 x 350 mm.

WEIGHT: 10 kg

N.B.: moulds and accessories on page 231

PENETRATION VALUE

MEASUREMENT APPARATUS

C 369

EN 413-2 EN 459-2 EN 1015-4

This apparatus consists in a base, a vertical support, a graduated rod with 25 mm dia. plunger, a test cup 80 mm dia. x 70 mm deep and a 40 mm dia. tamper. Drop height 100 mm. Overall weight of plunger assembly is 90 g.

DIMENSIONS: 260 x 250 x 450 (h) mm.

WEIGHT: 5 kg

FILTER PRESS APPARATUS FOR MUDS

C 359

This apparatus is the most effective means of determining the filtration properties of drilling muds and cement slurries. Mud reservoir mounted in a frame, a pressure source, a filtering medium and a graduated cylinder for receiving and measuring filtrate. Supplied complete with filter paper (pack of 100 pcs) and CO₂ cartridges (pack of 10 pcs).

OVERALL DIMENSIONS: 200 x 230 x 480 mm.

WEIGHT APPROX.: 10 kg

C 359/1 CO₂ cartridges (pack of 10 pcs)

BULK DENSITY OF LIME APPARATUS C 201

EN 459-2

Consists of a 1 litre capacity cylindrical container, filling ring with opening and hopper with spring-loaded trap.

DIMENSIONS: 150 x 150 x 400 mm.

WEIGHT: 5.5 kg.



C 201

MUD BALANCE C 357/E

It provides a simple method for the accurate determination of mud density.

An outstanding advantage of this balance is the fact that the temperature of the drilling mud does not materially affect the accuracy of readings.

Ideal for field use. Base and graduated arm with cup, lid, knife edge, rider, built-in spirit level, and counter-weight.

A plastic carrying case holds the balance intact and in working position.

WEIGHT: 5 kg.



C 357/E

MARSH FUNNEL VISCOMETER C 356/E

Made of rugged, shockproof plastic that resists temperature change deformation. Volumetric accuracy is assured.

Metal orifice (4.7 mm). For routine viscosity determinations on drilling mud.

Graduated measuring cup: 1 litre.

WEIGHT: kg 1.



C 356/E

“SAND CONTENT” KIT C 355

The Sand Content Kit is a simple and accurate sieve analysis apparatus for the determination of the sand content of drilling muds. The kit consists of:

- 200-mesh polyethylene sieve 2½ inches in diameter
- polyethylene funnel
- 500 ml polyethylene wash bottle
- 10 ml glass measuring tube

Plastic case dim. mm 320 x 290 x 120.

WEIGHT: kg 1.



C 355

