



Hashemite University
Faculty of Engineering
Civil Engineering Department

Building Materials Lab

List of Experiments

- 1 Introduction to building materials testing and evaluation
- 2 Normal consistency of cement paste/ Initial and final setting time of cement using Vicat and Gillmore methods
- 3 Compressive strength of cement mortar using 50 mm cubes
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Specific gravity and absorption of fine aggregates
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Device Name:
Manual Vicat Apparatus

Used for:
To measure the Consistency, Initial and Final Setting Time of Cement Mortar.

Experiment associated with it:
Consistency and setting time of cement

Courses associated with it:
Building Materials



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Machine Identification Card

Name

Vicat Apparatus

Manufacturer

MATEST - ITALY

Machine Description

Model No.

E55

the vicat apparatus consists of a frame bearing a movable rod, weighing 300g, the plunger (10mm in diameter), removable needle (1mm in diameter), and scale (graduated in mm). The paste is held in a rigid conical ring, resting on a plane nonabsorptive square base plate.

Safety Instruction

- This apparatus is Safe
- This apparatus has no electrical connection (Working without electricity)
- Always wear non-slip gloves that fit properly to protect your hands and to help you grip the tool.

Maintenance Record

Running

The experiments conducted on this machine

- Normal Consistency of Hydraulic Cement
- Time of setting of Hydraulic Cement

The experiments summary

This test is used to find out the percentage of amount of water at which the standard consistency is achieved, the amount of water is then used in making the cement paste for the other cement acceptance quality tests. Also, this test method is used to determine the time of setting of the hydraulic cement by VICAT needle apparatus. The knowledge of the setting time of the cement is always helpful in deciding the time duration to mix, transport, place and compact the concrete effectively.

Vicat Apparatus apparatus

- 1- Weigh (650) gm cement.
- 2- Prepare amount of water as to that calculated in normal consistency test. Prepare a cement paste following same steps mentioned in the previous test (Normal consistency). Place in Vicat conical ring like the previous test. Don't forget to record the time since the cement is added to the water.
- 3- Allow the time of setting specimen to remain in the moist cabinet for 30 minutes after molding without being disturbed. Determine the Penetration of the 1mm needle at this time and every (15) minutes until a penetration of 25mm or more is obtained.
- 4- To read the penetration, lower the needle of Vicat Apparatus until it touches the surface of the cement paste. Tighten the screw and take an initial reading. Release the set screw and allow the needle to settle for 30 seconds, and then take the reading to determine the penetration.
- 5- Note that no penetration shall be made closer than (6mm) from any previous penetration and no penetration shall be made closer than (9.5mm) from the inside of the mold. Record the results of all penetration, then by drawing a curve determine the time when a penetration of 25 mm is obtained. This is the initial setting time.
- 6- The final setting time is when the needle does not sink visibly into the paste.



Device Name: Gilmore Apparatus

Used for:

To measure the Consistency, Initial and Final Setting Time of Cement Mortar.

Experiment associated with it:

Consistency and setting time of cement

Courses associated with it:

Building Materials



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Machine Identification Card

Name

GILLMORE APPARATUS

Manufacturer

MATEST - ITALY

Machine Description

The apparatus consists of two horizontal arms which carry two weighted steel needles precisely machined to meet the requirement. The initial needle 2.12 mm dia., weighs 113 g and the final needle 1.06 mm dia., weighs 453,6 g.

Model No.

E58

Safety Instruction

- This apparatus is Safe
- This apparatus has no electrical connection (Working without electricity)
- Always wear non-slip gloves that fit properly to protect your hands and to help you grip the tool.

Maintenance Record

Running

The experiments conducted on this machine

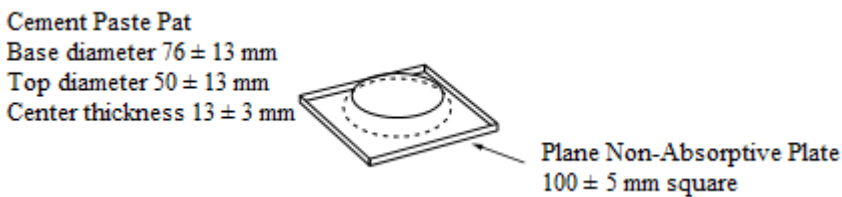
- Time of setting of Hydraulic Cement

The experiments summary

This test method is used to determine the time of setting of the hydraulic cement. The knowledge of the setting time of the cement is always helpful in deciding the time duration to mix, transport, place and compact the concrete effectively.

Gillmore Apparatus procedure

- 1- Mix 650g of cement with the percentage of mixing water required for normal consistency (follow same steps mentioned in normal consistency test).
- 2- From the cement paste prepare a pat (autoclave cone) on a plane non-absorptive plate, the specified dimensions shown on figure 3.2:



- 3- Leave the sample for 30 minutes.
- 4- After 30 min, the sample is ready for testing.
- 5- The lower point of the initial needle (shown on figure 3.3) should touch the surface before releasing.



- 6- In order to know the initial setting time, the upper point of initial needle (shown on figure 2) should not touch the sample.
- 7- If the upper point touched or penetrated the sample; wait for another 15 min, then test the sample again.
- 8- Repeat the test every 15 min until the upper point of initial needle no longer reaches the surface of the sample. Record the initial setting time at this moment.
- 9- Place the sample under the final needle and repeat the procedure until the upper point no longer reaches the surface of the sample. At this moment record the final setting time

Device Name: Compression Testing Machine



Used For: To determine the compressive and splitting strength of different sizes and shapes of concrete.

Experiment associated with it: Destructive tests of concrete

Courses associated with it: Building Materials



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Machine Identification Card

Name

**MOTORIZED
COMPRESSION TESTING**

Manufacturer

MATEST - ITALY

Machine Description

The apparatus consists of hydraulic jack, 2 plates, seat ball, a hydraulic unit and a unit taking the load applied to the specimen through a pressure transducer.

Model No.

C8/4

Safety Instruction

- Use the machine always wearing glasses.
- Be careful that any dangerous situations won't happen during the working; stop immediately the machine in the event that it will not work properly.
- Always wear non-slip gloves that fit properly to protect your hands and to help you grip the tool.

Maintenance Record

Running

The experiments conducted on this machine

- destructive tests of concrete (compression, splitting and flexural)

The experiments summary

Compression test: The test method covers determination of compressive strength of cubic and cylindrical concrete specimens. It consists of applying a compressive axial load to molded specimen at a rate which is within a prescribed range until failure occurs. The compressive strength is calculated by dividing the maximum load attained during the test by the cross sectional area of the specimen.

Splitting test: a standard test cylinder of concrete specimen is placed horizontally between the loading surfaces of compression testing machine. The compression load is applied diametrically and uniformly along the length of cylinder until the failure of the cylinder along the vertical diameter.



COMPRESSION TESTING MACHINE Procedure

- OPEN THE LOAD - UNLOAD HANDLE TURNING IT COUNTER-CLOCKWISE.
- POSITION THE MAIN SWITCH ON 1.
- AFTER SOME SECONDS THE MAIN MENU WILL APPEAR ON THE ELECTRONIC DIGITAL DISPLAY.
- SELECT THE MENU FOR THE KIND OF TEST TO CARRY OUT.
- RECALL FROM THE FILE THE DATA CONCERNING THE SPECIMEN TO TEST.
- CONFIRM THE DATA SUGGESTED FOR THE SPECIMEN, PUSHING THE KEY OK, OR MODIFY THEM AND PUSH THE KEY OK.
- CHECK THE DISTANCE BETWEEN LOWER AND UPPER PLATE; IF IT HAS TO BE MAXIMUM 30MM HIGHER THE SPECIMEN TO TEST. EVENTUALLY USE THE DISTANCE PIECES INSTALLING THEM UNDER THE LOWER PLATEN.
- PUT THE SPECIMEN ON THE LOWER PLATEN AND PAY ATTENTION TO POSITION IT PERFECTLY IN THE CENTER.
- PUSH THE KEY OK TO START THE WORKING OF THE MOTOR.
- CLOSE THOROUGHLY THE LOAD-UNLOAD HANDLE, TURNING IT CLOCKWISE.
- PUSH DOWNWARDS THE PACE RATE SETTING DEVICE.
- ONCE THE SPECIMEN IS BROKEN, OPEN THE LOAD-UNLOAD HANDLE.



Device Name: Hand Operating Testing Machine

Used For: To determine the comp. strength of specific cubic and cylindrical concrete specimens.

Experiment associated with it: Destructive tests of concrete

Courses associated with it: Building Materials



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Machine Identification Card

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**HAND OPERATING
TESTING MACHINE 1500 KN**

Manufacturer

MATEST - ITALY

Machine Description

COMPRESSION TESTING MACHINES 1500 kN capacity to test cubes up to 150 mm side and cylinders up to dia. 160x320 mm.

Model No.

C6

Safety Instruction

- Use the machine always wearing glasses.
- Be careful that any dangerous situations won't happen during the working; stop immediately the machine in the event that it will not work properly.
- Always wear non-slip gloves that fit properly to protect your hands and to help you grip the tool.

Maintenance Record

Running

The experiments conducted on this machine

- destructive tests of concrete (compression, splitting and flexural)

The experiments summary

Compression test: The test method covers determination of compressive strength of cubic and cylindrical concrete specimens. It consists of applying a compressive axial load to molded specimen at a rate which is within a prescribed range until failure occurs. The compressive strength is calculated by dividing the maximum load attained during the test by the cross sectional area of the specimen.

Splitting test: a standard test cylinder of concrete specimen is placed horizontally between the loading surfaces of compression testing machine. The compression load is applied diametrically and uniformly along the length of cylinder until the failure of the cylinder along the vertical diameter.



HAND OPERATED COMPRESSION MACHINES

Procedure

- OPEN COUNTERCLOCKWISE THE HANDLE LOAD - UNLOAD
- VERIFY THAT THE DISTANCE BETWEEN THE LOWER AND THE UPPER PLATES IS NOT 40 MM HIGHER THAN THE SPECIMEN.
- PLACE THE SPECIMEN ON THE LOWER PLATE, CENTERING IT PERFECTLY.
- CLOSE COMPLETELY THE HANDLE LOAD - UNLOAD, TURN IT CLOCKWISE
- PUMP BY THE LEVER TILL THE PISTON GOES UP FOR SOME MILLIMETERS
- POSITION THE RED HAND OF THE GAUGES ON ZERO
- PUMP BY THE LEVER TILL THE CRUSHING OF SPECIMEN, PROPORTIONALLY TO THE LOAD
- AFTER CRUSHING THE SPECIMEN, TURN THE HANDLE LOAD-UNLOAD COUNTERCLOCKWISE
- READ ON THE GAUGE THE BREAKING LOAD INDICATED BY THE RED HAND



Device Name: Flexural Tension Machine

Used For: To determine the tensile strength of Cement Mortar briquettes.

Experiment associated with it:
Tensile Strength of Mortar

Courses associated with it:
Building Materials



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**AUOTOMATIC FLEXURE
TENSION MACHINE**

Manufacturer

CONTROL - ITALY

Machine Description

This machine is used for the flexural strength determination of cement specimens 40.1x40x160 mm and tensile tests on cement briquettes. It consists of a beam loading system with a travelling weight driven by an electric motor providing a constant increase in load throughout the test. The machine is designed to accept either flexural or tensile attachments which have to be ordered separately as accessories.

Model No.

65-L15/A

Safety Instruction

- Use the machine always wearing glasses.
- Be careful that any dangerous situations won't happen during the working; stop immediately the machine in the event that it will not work properly.
- This machine operates on electric current. Improper operation could result in electric shock, electrocution, or an explosion!
- Keep all parts of your body away from moving parts of the machine while it is operating.

The experiments conducted on this machine

- Tensile Strength of Hydraulic Cement Mortars

The experiments summary

This test method covers determination of the tensile strength using Briquette specimens.

At each testing age (3, 7, and 28days) remove the required number of specimens from water, then Wipe each briquette to a surface dry condition and Carefully center the first briquette in the clips and apply the load continuously at rate of $(2.67 \pm 0.11 \text{KN/min})$. Repeat for the remaining briquettes for each age. Then convert the load to tensile strength



AUTOMATIC FLEXURE/ TENSION MACHINE

Procedure

- 1.SELECT THE SCALE ACCORDING TO THE RESISTANCE RANGE OF THE SPECIMEN.**
- 2.CONNECT THE SELECTED TEST ACCESSORY BY OPERATING ON THE PINS.**
- 3.SWITCH THE GENERAL SWITCH ON**
- 4.BY PUSHING THE PUSHBUTTON BRING THE POINTER OF THE SLIDING WEIGHT ON THE 0 POSITION OF THE SCALE**
- 5.BALANCE TO HORIZONTAL POSITION THE LEVER**
- 6.POSITION THE SPECIMEN ON THE TEST ACCESSORY**
- 7.PRELOAD THE SAMPLE ACCESSORY**
- 8.THE MACHINE IS READY FOR TEST; PUSH THE PUSHBUTTON**

Device Name: Sieve Shaker



Used For: To determine the Aggregate size distribution.

Experiment associated with it:
Sieve Analysis

Courses associated with it:
Building Materials



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Machine Identification Card

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SIEVE SHAKER

Manufacturer

MATEST - ITALY

Machine Description

Model No.

A059-02

It accepts Sieves having dia. 200 - 250 - 300 - 315 mm, and 8" - 12."

This simple and low cost Sieve Shaker is activated by an electric motor and can hold up to 8 Sieves dia. 200 mm or 7 Sieves dia. 300 mm plus pan and lid.

Provided of timer 0 - 60 minutes, Power supply: 230V 1ph 50Hz 110W, and Dimensions: 350x400x950 mm

Safety Instruction

- This machine operates on electric current. Improper operation could result in electric shock, electrocution, or an explosion!
- Keep all parts of your body away from moving parts of the machine while it is operating.
- Be careful that any dangerous situations won't happen during the working; stop immediately the machine in the event that it will not work properly.
- Don't operate the machine without having all covers and case in place.
- Wear safety glasses when operating, maintaining, or repairing this machine.

Maintenance Record

Running

The experiments conducted on this machine

- Sieve Analysis of fine and coarse aggregates

The experiments summary

Sieve analysis helps to determine the particle size distribution of the coarse and fine aggregates. This is done by sieving the aggregates using sieves with suitable openings depending on the material to be tested, then pass aggregates through them and thus collect different sized particles left over different sieves



SIEVES SHAKER

Procedure

- WEIGH THE PAN AND ALL OF THE SIEVES SEPARATELY.**
- POUR THE SOIL FROM ABOVE INTO THE STACK OF SIEVES AND PLACE THE COVER ON IT.**
- PUT THE STACK IN THE SIEVE SHAKER, AFFIX THE CLAMPS, SET A TIMER FOR 10 TO 15 MINUTES, AND START THE SHAKER.**
- STOP THE SIEVE SHAKER AND MEASURE THE MASS OF EACH SIEVE AND RETAINED SOIL.**



Device Name: Los Angeles Testing Machine

Used For: To determine the abrasion loss percent (wearing percent) of coarse aggregates (indication of the hardness).

Experiment associated with it: L.A. Abrasion test

Courses associated with it: Building Materials



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Name

LOS ANGELES MACHINE

Manufacturer

MATEST - ITALY

Machine Description

Model No.

A075-01

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

Safety Instruction

- Use the machine always wearing glasses.
- Be careful that any dangerous situations won't happen during the working; stop immediately the machine in the event that it will not work properly.

The experiments conducted on this machine

- Resistance to Degradation of Small-size coarse Aggregate

The experiments summary

The Los Angeles test is a measure of degradation of mineral aggregates of standard grading resulting from a combination of actions including abrasion or attrition, impact, and grinding in a rotating steel drum containing a specified number of steel spheres, the number depending upon the grading of the test sample. As the drum rotates a shelf plate picks up the sample and the steel spheres, carrying them around until they are dropped to the opposite side of the drum, creating an impact-crushing effect. The contents then roll within the drum with an abrading and grinding action until the shelf plate impacts and the cycle is repeated. After the prescribed number of revolutions, the content is removed from the drum and the aggregate portion is sieved to measure the degradation as percent loss.



LOS-ANGELES MACHINE

Procedure

1. THE TEST SAMPLE SHALL CONSIST OF CLEAN AGGREGATE WHICH HAS BEEN DRIED IN AN OVEN AT 105 TO 110°C TO SUBSTANTIALLY CONSTANT WEIGHT AND SHALL CONFORM TO ONE OF THE GRADING (A TO D). THE GRADING USED SHALL BE THE MOST NEARLY REPRESENTING THE AGGREGATE FURNISHED FOR THE WORK.

2. THE TEST SAMPLE AND THE ABRASIVE CHARGE (ACCORDING TO TABLE 10.2) SHALL BE PLACED IN THE LOS ANGELES ABRASION TESTING MACHINE AND THE MACHINE ROTATED AT A SPEED OF 30 TO 33 REV/MIN. FOR GRADING A, B, C AND D, THE MACHINE SHALL BE ROTATED FOR 500 REVOLUTIONS.

4. AT THE COMPLETION OF THE TEST, THE MATERIAL SHALL BE DISCHARGED FROM THE MACHINE AND SIEVED ON SIEVE NO.12 (1.7 MM).

5. THE MATERIAL RETAINED ON 1.70 MM IS SIEVE (NO.12) SHALL BE WASHED AND DRIED IN AN OVEN AT 105 TO 110°C TO A SUBSTANTIALLY CONSTANT WEIGHT, AND ACCURATELY WEIGHED TO THE NEAREST GRAM.



Device Name: Universal Testing Machine

Used For: To determine the tensile strength of steel and the flexural tension of concrete

Experiment associated with it:

1. Tensile test of steel
2. Destructive tests of concrete (Flexural test)

Courses associated with it:
Building Materials



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Machine Identification Card

Name

**UNIT WEIGHT
MEASURES**

Manufacturer

MATEST - ITALY

Machine Description

Model No.

5100 54-C166 / 101, 54-C167

Measure: A cylindrical metal measure preferably provided with handles.
Tamping Rod: A round, straight steel rod (16mm) in diameter and
Approximately 600mm in length with a rounded to a hemispherical tip.

Safety Instruction

- This apparatus is Safe
- This apparatus has no electrical connection (Working without electricity)
- Always wear non-slip gloves that fit properly to protect your hands and to help you grip the tool.
- Always wear sturdy clothing with long sleeves and long pants .
- Always wear non-slip safety boots to prevent foot injuries and slipping that could cause loss of control of the tool.

Maintenance Record

Running

The experiments conducted on this machine

- Time of setting of Hydraulic Cement

The experiments summary

This test method covers the determination of unit weight in a compacted or loose condition and calculation of voids in fine and coarse aggregates.



UNIVERSAL TESTING MACHINE Procedure

TENSILE TEST OF STEEL

1. CHECK THE SPECIMEN DIMENSIONS, MEASURE THE DIAMETER OR WIDTH, THICKNESS OF THE SPECIMEN AND COMPUTE THE CROSS-SECTIONAL AREA AND MEASURE THE GAUGE LENGTH.
2. TIGHT THE SPECIMEN AT THE GRIPPES LOCATED AT THE MACHINE.
3. CALIBRATE THE MACHINE IN SUCH A MANNER THAT THE EXTENSION AND LOAD ARE SET TO ZERO.
4. CHOOSE A SUITABLE LOADING RATE.
5. APPLY THE TENSION LOAD ON THE SPECIMEN UNTIL FAILURE.
6. OBTAIN THE LOAD-DEFORMATION CURVE FROM THE MACHINE.

FLEXURAL TEST OF CONCRETE

1. THE BEARING SURFACES OF THE SUPPORTING AND LOADING ROLLERS SHALL BE WIPED CLEAN, AND ANY LOOSE SAND OR OTHER MATERIAL REMOVED FROM THE SURFACES OF THE SPECIMEN WHERE THEY ARE TO MAKE CONTACT WITH THE ROLLERS.

NOTE FLEXURAL TESTS OF MOIST-CURED SPECIMENS SHALL BE MADE DIRECTLY AFTER REMOVAL FROM MOIST STORAGE. SURFACE DRYING OF THE SPECIMEN RESULTS IN A REDUCTION IN THE MEASURED FLEXURAL STRENGTH.

2. CENTER THE SPECIMEN ON THE SUPPORT BLOCKS IN SUCH A MANNER THAT THE LOAD SHALL BE APPLIED TO THE UPPERMOST SURFACE AS CAST IN THE MOULD. NO PACKING SHALL BE USED BETWEEN THE BEARING SURFACES OF THE SPECIMEN AND THE ROLLERS.

3. BRING THE LOAD-APPLYING BLOCKS IN CONTACT WITH THE SURFACE OF THE SPECIMEN AND APPLY THE LOAD CONTINUOUSLY WITHOUT SHOCK. THE LOAD SHALL BE APPLIED AT A CONSTANT RATE OF LOADING OF (3070 - 5445 MN/MIN) FOR 150MM SPECIMEN AND (1720 - 2420 MN/MIN) FOR 100MM SPECIMENS UNTIL RUPTURE OCCURS.

4. RECORD THE MAXIMUM LOAD APPLIED TO THE SPECIMEN DURING THE TEST.

5. NOTE THE APPEARANCE OF THE FRACTURED FACES OF CONCRETE AND ANY UNUSUAL FEATURES IN THE TYPE OF FAILURE.



Device Name: Rebound Hammer

Used For: Non-destructive method;
To determine the
compressive strength of
cubic concrete
specimens.

Experiment associated with it:
Non-Destructive tests of concrete

Courses associated with it: Building
Materials



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Machine Identification Card

Name

**DIGITAL CONCRETE
HAMMER (REBOUND)**

Manufacturer

MATEST - ITALY

Machine Description

Rebound hammer, consisting of a spring-loaded steel hammer which when released strikes a steel plunger in contact with the concrete surface. The spring-loaded hammer must travel with a consistent and reproducible velocity. The rebound distance of the steel hammer from the steel plunger is measured on a linear scale attached to the frame of the instrument.

Model No.

C380/1,C390

Safety Instruction

- This apparatus is safe
- This apparatus has no electrical connection (Working without electricity)
- Always wear non-slip gloves that fit properly to protect your hands and to help you grip the tool.
- Always wear non-slip safety boots to prevent foot injuries and slipping that could cause loss of control of the tool.

Maintenance Record

Running

The experiments conducted on this machine

- nondestructive compressive strength of concrete

The experiments summary

A steel hammer impacts with a predetermined amount of energy, a steel plunger in contact with a surface of concrete, and the distance that the hammer rebounds is measured. Then this value will be converted to compressive strength using a specified curve.

Rebound Hammer procedure

1. Use the abrasive stone to ground heavily textured, soft, or surfaces with loose mortar.
2. Firmly hold the instrument in a position that allows the plunger to strike perpendicularly to the surface tested. Gradually increase the pressure on the plunger until the hammer.
3. After impact, record the rebound number.
4. Take ten readings from each test area. No two impact tests shall be closer together than 25 mm.



Device Name: Ultrasonic Concrete Tester

Used For: Non-destructive method;
To determine the compressive strength of cubic concrete specimens.

Experiment associated with it:
Non-Destructive tests of concrete

Courses associated with it: Building Materials



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Machine Identification Card

Name

**ULTRASONIC
CONCRETE TESTER**

Manufacturer

MATEST - ITALY

Machine Description

Model No.

C370

The testing apparatus consists of a pulse generator, a pair of transducers (transmitter and receiver), an amplifier, a time measuring circuit, a time display unit, and connecting cables.

Safety Instruction

- This apparatus is Safe
- This apparatus has no electrical connection (Working without electricity)
- Always wear non-slip gloves that fit properly to protect your hands and to help you grip the tool.

Maintenance Record

Running

The experiments conducted on this machine

- nondestructive compressive strength of concrete

The experiments summary

Pulses of compressional waves are generated by an electro-acoustical transducer that is held in contact with one surface of the concrete under test. After traversing through the concrete, the pulses are received and converted into electrical energy by a second transducer located a distance L from the transmitting transducer. The transit time T is measured electronically. The pulse velocity V is calculated by dividing L by T . Then the velocity will be converted to compressive strength using a specified curve.

Pulse Velocity Apparatus procedure

1. Connect the cables of the transmitting and receiving transducers to the UPV apparatus and turn it on.
2. Check the accuracy of measurement using the reference bar, by applying coupling agent (petroleum jelly, grease, soft soap or kaolin/glycerol paste) to the ends of the reference bar, and press the transducers firmly against the ends of the bar until a stable transit time is displayed. Adjust the zero reference until the displayed transit time agrees with the value marked on the bar.
3. Grease the surfaces of the transducers with a thin layer of the coupling agent.
4. Press the transducers firmly against the surfaces of the structure (cube); locate the transducers directly opposite each other. Continue pressing until the time indicator gives a constant reading.
5. Record the reading in microseconds, t .
6. Measure the direct distance between the centers of the transducers locations.



Device Name: Flow Table

Used For: To measure the workability and the degree of segregation of Concrete

Experiment associated with it:
Workability of Concrete

Courses associated with it:
Building Materials



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Machine Identification Card

Name

FLOW TABLE

Manufacturer

CONTROLS - ITALY

Machine Description

Model No.

54-C151/A

The apparatus consists of a double wooden table measuring 700x700 mm hinged at one side. The top table is covered with an inscribed metal plate 2 mm thick: The steel cone, part of the apparatus, has a top dia. of 130 mm a base dia. of 200 mm and is 200 mm high. Complete with wooden tamping rod. All metal parts are protected against corrosion. Weight approx.: 30 kg

Safety Instruction

- This apparatus is Safe
- This apparatus has no electrical connection (Working without electricity)
- Always wear non-slip gloves that fit properly to protect your hands and to help you grip the tool.
- Always wear sturdy clothing with long sleeves and long pants .
- Always wear non-slip safety boots to prevent foot injuries and slipping that could cause loss of control of the tool.

Maintenance Record

Running

The experiments conducted on this machine

- Workability test of concrete

The experiments summary

The **flow table test** is a method to determine consistency of fresh concrete. It is used primarily for assessing concrete that is too fluid (workable) to be measured using the slump test, because the concrete will not retain its shape when the cone is removed. The test determines the flow index as a mean measurement of the diameter of the specimen after working on the flow table.

Flow Table procedure

1. Prepare a concrete mix as in slump test.
2. Moist the table top and the frustum of the cone.
3. Try lifting and dropping the table then, keep the table horizontal.
4. Hold the mold firmly in place and fill in two layers, each approximately one half the volume of the mold. Rod each layer with 15 strokes with the wooden tamper.
5. Before lifting the mould, excess concrete is removed, the surrounding table top is cleaned.
6. After an interval of 30 seconds, the mould is vertically, slowly removed within 3-6seconds.
7. The table top is lifted slowly and allowed to drop, avoiding a significant force against the stop, 15 times, each cycle taking not less than 3.5 and not more than 5 sec.
8. In consequence, the concrete spreads and the maximum spread parallel to the two edges of the table is measured.



Device Name: Compacting Factor Apparatus

Used For: To measure the workability of Concrete.

Experiment associated with it:
Workability of Concrete

Courses associated with it: Building Materials



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Machine Identification Card

Name

COMPACTING FACTOR

Manufacturer

MATEST - ITALY

Machine Description

The apparatus consists of two conical hoppers having a hinged trap door attached to the lower end of each hopper, allowing the concrete sample to flow freely into the cylindrical mould. The hoppers and the mould are mounted onto a rigid steel frame and are easily removable for cleaning. The complete apparatus is protected against corrosion.

Model No.

C185

Safety Instruction

- This apparatus is Safe
- This apparatus has no electrical connection (Working without electricity)
- Always wear non-slip gloves that fit properly to protect your hands and to help you grip the tool.
- Always wear sturdy clothing with long sleeves and long pants .
- Always wear non-slip safety boots to prevent foot injuries and slipping that could cause loss of control of the tool.

Maintenance Record

Running

The experiments conducted on this machine

- Workability test of concrete

The experiments summary

This test is generally carried out in laboratory but can be used in site also. It measures the workability using the principle of determining the degree of compaction achieved by a standard amount of work done by allowing the concrete to fall through a standard height.

compacting factor apparatus procedure

1. Prepare a concrete mix as in slump test.
2. The internal surface of the hoppers and cylinder shall be thoroughly clean and free from superfluous moisture and any set of concrete commencing the test.
3. The sample of concrete to be tested shall be placed gently in the upper hopper using the scoop. The trap door shall be opened immediately after filling or approximately 6 min after water is added so that the concrete falls into the lower hopper. During this process the cylinder shall be covered.
4. Immediately after the concrete has come to the rest the cylinder shall be uncovered, the trap door of the lower hopper opened and the concrete allowed falling to into the cylinder.
5. For some mixes have a tendency to stick in one or both of the hoppers. If this occurs the concrete shall be helped through by pushing the tamping rod gently into the concrete from the top.
6. The excess of concrete remaining above the level of the top of the cylinder shall then be cut off by holding a trowel in each hand, with the plane of the blades horizontal, and moving them simultaneously one from each side across the top of the cylinder, at the same time keeping them pressed on the top edge of the cylinder. The outside of the cylinder shall then be wiped clean. This entire process shall be carried out at a place free from vibration or shock.
7. Determine the weight of concrete to the nearest 10 g. This is known as "weight of partially compacted concrete".
8. Refill the cylinder with concrete from the same sample in layers approximately 50 mm depth. The layers being heavily rammed with the compacting rod or vibrated to obtain full compaction. The top surface of the fully compacted concrete shall be carefully struck off and finished level with the top of the cylinder. Clean up the outside of the cylinder.
9. Determine the weight of concrete to the nearest 10 g. This is known as "weight of fully compacted concrete".



Device Name: Vebe Consistometer

Used For: To measure the workability of Concrete

Experiment associated with it: Workability of Concrete

Courses associated with it: Building Materials



The Hashemite University
Engineering College
Department of Civil Engineering

الجامعة الهاشمية
كلية الهندسة
قسم الهندسة المدنية

Machine Identification Card

Name

VEBE CONSISTOMETER

Manufacturer

MATEST - ITALY

Machine Description

The set consists of vibrating table, slump cone, graduated rod with transparent plate, filling cone and tamping rod. The assembly is mounted upon a small vibrating table operating at a fixed amplitude and frequency. The time to complete the required vibration gives an indication of the concrete workability.

Model No.

C183

Safety Instruction

- This apparatus is Safe
- Always wear non-slip gloves that fit properly to protect your hands and to help you grip the tool.
- Always wear sturdy clothing with long sleeves and long pants .
- Always wear non-slip safety boots to prevent foot injuries and slipping that could cause loss of control of the tool.

The experiments conducted on this machine

- Workability test of concrete

The experiments summary

The VEBE apparatus is placed on top of a vibrating table. The fresh concrete is compacted into a conical slump mould. The mould is removed and a clear plastic disc is placed on the top of the concrete. The vibrating table is started and the time taken for the transparent disc to be fully in contact with the concrete (the Vebe time), is measured.

The main advantage of this test is that it is a dynamic test and can be used on concretes that are too stiff for a slump test.

Vebe Consistometer procedure

1. Prepare a concrete mix as in slump test.
2. Slump test as described earlier is performed, placing the slump cone inside the sheet metal cylindrical pot of the Consistometer.
3. The glass disc attached to the swivel arm is turned and placed on the top of the concrete in the pot. The electrical vibrator is then switched on and simultaneously a stop watch started.
4. The vibration is continued till such a time as the conical shape of the concrete disappears and the concrete assumes a cylindrical shape. This can be judged by observing the glass disc from the top for disappearance of transparency.
5. Immediately when the concrete fully assumes a cylindrical shape, the stop watch is switched off. The time required for the shape of concrete to change from slump cone shape to cylindrical shape in seconds is known as VeBe Degree.