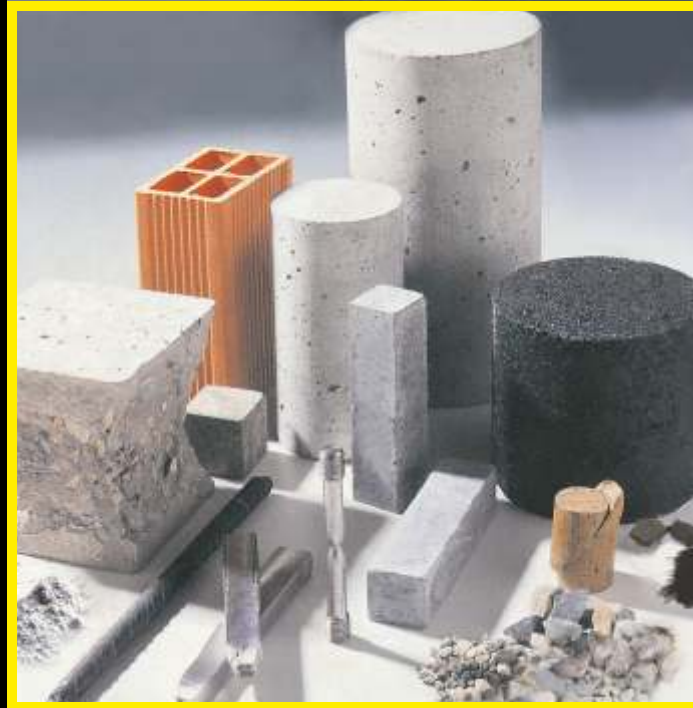


**10<sup>TH</sup>**  
Catalogue  
Edition



# LABTEST

 Lifeline of Construction Industry

**MATERIAL TESTING EQUIPMENTS**

Certificate No.: 1N/12024

# Certificate of Approval

This is to certify that the Quality Management System  
at  
**Zeal International**  
1, Netaji Subhash Marg, Darya Ganj,  
New Delhi – 110 002, India

has been examined by Assessors of QMS Certification Services Pvt.Ltd.  
and found to be conforming to the requirements of

## ISO 9001:2008

In respect of the following activities:

Manufacturing & Export of Material Testing and Laboratory Testing Equipments for Oil, Cement, Concrete, Bitumen, Asphalt, Aggregate, Steel, Oil and Petroleum, PVC Cable and Rubber Testing, Paper and Wood Testing, Textile and Fabric Testing, Paint Testing, Surveying Equipment, General Lab Equipments, Non Destructive Testing Equipment For Concrete & Steel.

This certificate is valid from 07/03/2015 to 06/03/2018\*  
Original Certification 05/05/2003

*Sanjay Kaushik*  
**Sanjay Kaushik**  
Managing Director

\* Subject to compliance with requirements specified in Service Specification & Agreement  
\* To check the validity of this certificate please visit [www.qmcertification.com](http://www.qmcertification.com)

**ZEAL INTERNATIONAL**

Delivering World Class

Material Testing Equipments

Globally...



Certification & Inspection

## Certificate of Compliance

# CE

We hereby declare that the enclosed list of the product conforms with the requirements of  
Manufacturing Instruction Directive 2004/22/CE & CE-Markings as per the Regulation 2014/53/CE

Certificate No.: CE-2895

<b>Manufacturer Name</b>	: Zeal International
<b>Address</b>	: 1, Netaji Subhash Marg, Darya Ganj, New Delhi 110002, India
<b>Product Name</b>	: Compression Testing Machine Model:- Semi Automatic, Fully Automatic, Digital & Manual Hand operated Flexural Testing Machine
<b>Capacity</b>	: 200kN to 5000kN
<b>Brand</b>	: Labtest

The Certification body has performed an audit of the above product quality system covering the design, manufacture and final inspection of the certified product. The quality system has been assessed, approved and is subject to continuous surveillance according to Directive 2004/22/CE /Manufacturing Instruction Directive & 2014/53/CE. (Electromagnetic Compatibility Directive).

**This certificate is issued under the following conditions:**

1. It applies only to the quality system mentioned in the manufacturer of above referenced models and it does not substitute the design or type-approval certificate, if required.
2. The conditions remain valid under the manufacturing conditions in the quality system are changed.
3. The conditions validity is conditioned by quality control or surveillance system.

The CE mark as shown above can be used under the responsibility of the manufacturer after completion of an EU Declaration of conformity and compliance with all relevant EU Directives. The statement is based on a single evaluation of one sample of above mentioned product. It does not imply an assessment of the whole production.

Validity of this certificate can be verified at [www.ukcertification.com/ukcertivity](http://www.ukcertification.com/ukcertivity)

<b>Date of initial registration</b>	15 <sup>th</sup> July 2016
<b>Date of this certificate</b>	15 <sup>th</sup> July 2016
<b>Certificate expiry</b>	14 <sup>th</sup> July 2017
<b>Recertification due</b> (subject to the company maintaining its system to the required standard)	14 <sup>th</sup> July 2019

*David...*  
Authorized Signatory

This certificate is the property of UK Certification & Inspection Limited and shall be immediately returned to: Upper House, Colindale Park, Aldenham, Uxbridge, Middlesex, Uxbridge, UB7 5SN, UK. Website: [www.ukcertification.com](http://www.ukcertification.com)

**Zeal International** is a leading pioneer for manufacturing & supply of Testing Equipment for construction building material since 1996. Always having a wide vision to Develop & Design equipments with modern technique a team of engineers are on continual endeavor & innovation. Zeal is exporting its equipment in the brand name "LABTEST" to around 42 countries directly & also through authorize dealers and representatives. We also supply Special purpose machine adhering to International Specification such as (BS En, ASTM, AASHTO, DIN, NF, IP ,BIS). Apart from our wide range of equipments such as Soil Testing in the Field; Lab Tests for Soil; Geo-technical testing; Fresh Concrete Testing or Strength Testing; NDT for Concrete; Cement Testing; Asphalt Testing; Testing Aggregate properties, Steel Testing & General Laboratory Equipment. The Company follows the Standard Quality Management System as mandated for its registration with ISO 9001:2008 certificate. Our main clientele consist of major Construction companies carrying our Road & Highway construction, commercial buildings & high scrapers, Rail Infrastructure & Bridges, Oil & Gas, Dams & Hydro Projects, Civil Engineering Colleges, Mining Industry & Irrigation sectors.

Zeal International is always engrossed to give its clients continuous sales and service support as this had always been an investment to build a brand value in both domestic and international markets. All products are carefully handled through our quality management system to meet it as per standard specifications. Testing and calibration at each step is performed before final packing and dispatch from our warehouse to the designated consignees. Since inception, what has changed, is the diversification of our Product Range. What hasn't changed, however is our commitment to precision and quality, because every micron counts in our business! We hereby proudly present the 10th Edition of detailed user-friendly Catalogue including New Sections with Additional Products.

#### **ZEAL INTERNATIONAL – Commitment To Its Customers**

The name Zeal International is recognized throughout the World for its pioneering work in the range of Material Test Equipments.

#### **Our Unique Services Include**

Advanced Design and Development to the Highest Quality, full Technical Advice and Support on Customer's Requirements, Equipment Quality and Timely Deliveries at an Affordable Price.

#### **Delivery**

With heavy Inventory & readily available stock, it makes it easier for our Clients to order at the time of urgencies, breakdowns at their sites / Laboratories. We maintain large Inventory on most Products listed in the Catalogue...and that means that, in most cases, we can Ship as we get Your Order.

#### **QUALITY POLICY**

Zeal International is committed to provide Quality Equipments as per the International Standards and also the requirements of its customers and shall ensure their satisfaction at all times through continual improvement with the effectiveness of Quality Management System.

#### **MISSION**

To provide a Standardized & Environment Friendly Equipment with the Perfect Blend of Quality, Pricing, Packaging, Delivery & its After Sales Support.

#### **OBJECTIVE & MOTTO**

Zeal International's Dedication towards its Customers is the Rich Heritage of the Company which continues today and will be fostered in future as well.

#### **VISION & MISSION**

Both Customer & Vendor Satisfaction makes an equilibrium in the market

Expand clientele base & dealer / representative network in both domestic & international markets

To be in the Top 5 companies in Material Testing Industry In India in next 5 years

# LABTEST

**Lifeline of Construction Industry**

01	CEMENT	ZI 1000
15	CONCRETE	ZI 2000
47	SOIL	ZI 3000
87	BITUMEN / ASPHALT	ZI 4000
105	AGGREGATE	ZI 5000
115	ROCK	ZI 6000
123	STEEL	ZI 7000
133	SECURITY & SURVEY EQUIPMENT	ZI 8000
143	GENERAL LABORATORY EQUIPMENT	ZI 9000



# CEMENT TESTING EQUIPMENTS

Cement is the binder used to create concrete and mortar. The manufacture of cement requires stringent control and a number of tests are performed in cement plant laboratories to ensure that the cement is of the desired quality that conforms to the requirements of the relevant standards.

The most important use of cement is the production of concrete and mortar, which are the combination of cement and an aggregate to form a strong building material that is durable in the face of normal environmental effects. The current Standards have drawn on the know-how of the various national bodies in order to arrive at a unified Standard. We propose a vast range of machines that satisfy, practically all requirements.

- 02 Sampler
- 02 Fineness
- 03 Consistency & Setting-Time
- 03 Flow and Workability of Mortar and Lime
- 04 Soundness of Cement and Hydrated Lime

- 07 Tensile and Flexural Strength
- 08 Moulding & Sample Preparation
- 10 Building Lime, Grout & Mud Testing
- 12 Cement Compression / Flexure

**ZI 1001 CEMENT SAMPLER**

IS 7535 1986, ASTM C 183, AASHTO T 127

**Specification:**

This is a brass tube approximately 53cm long and 2.8cm I.D. with a wooden handle. Total length approximately 73cm. The tube has the sharp angular edge which conveniently pierces cement bags. An air hole of approximately 3mm dia is drilled on the tube near handle. Total sample collected at one time is 300 cm approximately.



ZI 1001

**Fineness**

**ZI 1002 BLAINE'S AIR PERMEABILITY APPARATUS**

IS 4031, 5516, 1727 & 4828, ASTM C-204, BS 4359-2

**Specification:**

Designed to find out specific gravities of semi liquids like mud and other liquids having densities in the range 0.8 to 2.5. It has a stainless steel beam calibrated specific gravities from 0.8 to 2.5. A stainless steel cup with lid and overflow vent is fitted on one side of the beam. A counter weights with cursor slides over the graduated scale. The beam has a knife-edge at centre which rests in a fulcrum fitted in the stand. Leveling screws and spirit level are fitted to the stand.

**Spares & Accessories (On Extra Cost) :**

Punch to cut filter paper discs. Non-perforated disc. Suction bulb, Mercury.



ZI 1002

**ZI 1003 DIGITAL BLAINE AIR PERMEABILITY APPARATUS**

For the Air Permeability measuring of cement specimen. The testing conforms with the requirements of ASTM C204, BS 4359-2

**Specifications:**

Inside diameter of permeability cell	φ12.7mm
Height of sample in the cell	15mm
Perforated disk	35
Diameter of the hole	φ1.0mm
Thickness of disk	1.0mm
Power	220v 50Hz 25w



ZI 1003

**ZI 1004 VICAT NEEDLE APPARATUS WITH DASHPOT**

IS 4031, 2645, 2542 ( PART-1), 1727, 5513 & 712. BS 12, 146, 915, 1370, 4027, 4246, 4248, AASHTO T 129, E 131.

This instrument is used for determining the normal consistency and setting times of cement and 'A' class limes.

**Specification:**

The apparatus consists of a metallic frame bearing a freely movable and with a cap at top, one vicat mould and glass base plate and one set of needles one each initial needle, final needle and consistency plunger. It comes with a dashpot which facilitates gentle lowering of the needles.

**Accessories :**

Mild steel base plate 5 inches x 5 inches.

Fulcrum mould , brass , 80 mm i.d. base dia x 70 mm i.d. top dia , 40 mm height.

- Note:**
- 1) Normally set of needles and mould which meet is requirements as per I.S. 5513 are supplied. While ordering please specify the specification code of the instrument required.
  - 2) Vicat needle apparatus for determining consistency of hydraulic cement. Gypsum plaster, lime etc. As per ASTM C 187-58 C 472-62 C 110-58, IS 2542 (Part-1) can also be supplied.



ZI 1004

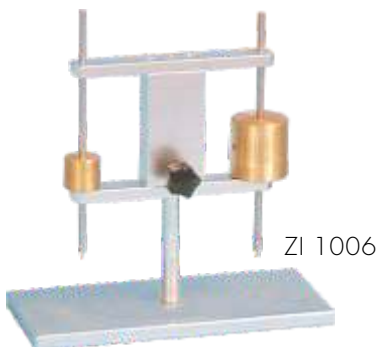


ZI 1005

**ZI 1005 RING MOULD**

IS 712 1956, ASTM C 187

Consists of mould 100 mm x 5mm. Deep and a glass base plates. Used to determine soundness of hydrated lime



ZI 1006

**ZI 1006 GILLMORE NEEDLE APPARATUS**

ASTM C 266

This instrument is used for determining the time setting of hydraulic cement.

**Specification:**

A base with a Vertical shaft and Two horizontal arms. The lower arms is adjustable for height. 1 no. Initial needle 1/12-inch dia ¼ lb. Wt. 1 no. Final needle 1/24 inch dia. ¼ lb. Wt. 1 no. Glass base plate. Complete as above.

**Flow and Workability of Mortar & Lime**

ZI 1007

**ZI 1007 FLOW TABLE**

IS:6932 (PART VIII), ASTM C 230, BS 4551:1

Flow Table is used for determining the work-ability of building limes.

**Specification:**

The flow table consists of a 30 cm dia polish steel plate with 3 engraved annular circles 7, 11 and 19cm dia. The table top is arranged for a free fall of 12.5mm by a cam action. Supplied complete with one brass conical mould, 65mm i.d. at base and 40mm i.d. at top, height of the mould 90mm.

**ZI 1008 FLOW TABLE (MOTORISED)**

IS 1199-1959, ASTM C-124, AASHTO-T-120.

It is used for determining the flow of cement concrete.

**Specification:**

Consists of a steel table top 76.2cm ( 30 inch. Dia) Finely machined. The integral cast ribs are designed for support and strength. The stand is fabricated out of cast iron and is of sturdy construction. Holes for mounting in foundations are drilled in the base plate. The ground and hardened steel cam is designed to fit and drop the table by 12.5mm. Electrically operated to raise and drop the table top, approx. 15 times in 15 seconds, Suitable for operation on 230 Volts, 50 cycles, A.C. supply. Supplied with one conical mould with two handles, 12cm height, having 17cm. Inside Dia. at the Top and 25cm inner dia. at the base. Complete with a tamping rod 16mm dia x 600mm long one end rounded.



ZI 1008

**ZI 1009 FLOW TABLE**

IS 5512 & BS 4551-1

This used for measuring the consistency of pozzolana and also cement mortar and hydrated lime.

**Specification:**

It consists of a machined brass table top 250+/- 2.5mm dia. Mounted on a rigid stand. The table top is reinforced with equally disposed ribs and allowed to conical brass mould 100mm i.d. top dia and 50mm high.

**Accessories:**

Mild steel plate 25mm thick & 250mm square for fixing to underside of the base.



ZI 1009

**ZI 1010 FLOW TABLE (MOTORISED)**

IS 5512 & BS 4551-1

**Specification :**

Same as ZI 1009 but electrically operated. Fitted with a motor, connected to the cam shaft through a reduction gear to give approximately 100 R.P.M. Suitable for operation in Single Phase 230 V A.C. 50 Cycles, Supply.



ZI 1010

**Soundness of Cement and Hydrated Lime**

**ZI 1011 LE CHATELIER MOULD**

IS 269, 712, 5514, 1727, 2645, 6932 (PART IX) BS 6463

It is used for the determination of soundness by expansion method of ordinary and rapid hardening Portland cement, low heat Portland cement and class 'A' Limes.

**Specification:**

It consists of a small split cylinder forming a mould. On either side of the split cylinder. Two parallel indicating arms with pointed ends are attached. Supplied complete with two glass plates and a lead weight.







ZI 1012

**ZI 1012 LE CHATELIER FLASK**

IS 4031 1968, ASTM C 188

**Specification:**

Used for finding specific gravity of hydraulic cement. Made from Borosilicate glass. The flask is 243mm in total height, having a bulb of 90mm dia of 250ml approximate capacity. The long neck of the flask has at top a funnel of 50mm dia in that fits a ground glass stopper. The neck has over-all 11 mm i.d. upper portion is graduated from 18ml to 24ml with 1 ml graduation. Just at the bottom of the neck 1 ml capacity is marked in between there is 17 ml capacity bulb.

**ZI 1013 SHRINKAGE BAR MOULD**

IS 4031, 10086, ASTM C 227. &amp; BS 1881.

The mould is used for casting specimens of cement & aggregate combinations for measuring the potential expansive alkali reactivity. Size of the mould is 25 x 25 x 282 mm and effective size is 25 x 25 x 250 mm.

**Available Models:****ZI 1013-A :** Shrinkage Bar Mould - One Gang (One Compartment)**ZI 1013-B :** Shrinkage Bar Mould - Two Gang (Two Compartment)**ZI 1013-C :** Shrinkage Bar Mould - Three Gang (Three Compartment)**ZI 1013-D :** Shrinkage Bar Mould - Four Gang (Four Compartment)

**Spares:** Stainless steel smooth or knurled and threaded reference pins as required. Supplied in Packs of one dozen.

**ZI 1014 LENGTH COMPARATOR**

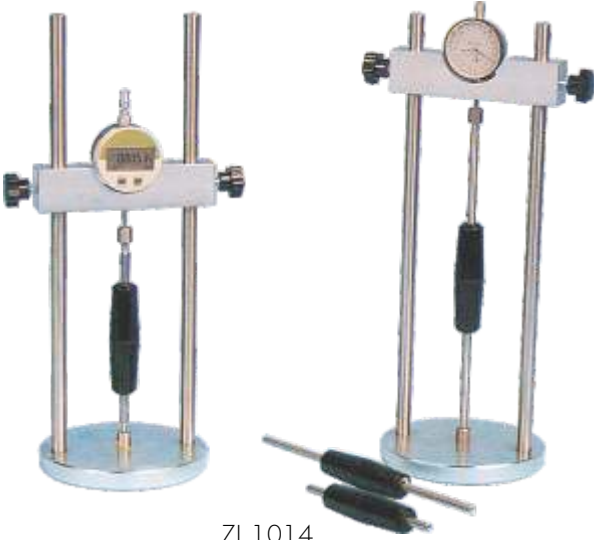
IS 1199-1959, IS 4031 1968 BS 1881, ASTM C 151, C490.

It is used to measure the drying shrinkage of concrete autoclave expansion of Portland cement and potential expansive reactivity of cement aggregate combinations in mortar bars during storage, on self drying.

**Specification:**

The instrument consists of a channeled or a round base over which two vertical pillars are fixed. An adjustable cross plate is at the top. A dial gauge, reading to .002mm x 5mm. Can be located upon a 6.5mm. dia ball or other reference point cemented in the specimen. On the base there is similar recessed seating in which can be placed a second ball or reference point in the specimen.

Complete with a stainless steel standardization bar with insulated grip and with 6.5mm dia. Balls mounted in the ends. The unit can be supplied with an Electronic Dial Gauge at extra cost if indicated at the time of placing the order.



ZI 1014

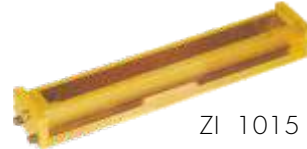
**ZI 1015 VOLUME CHANGE APPARATUS**

ASTM C 490, IS 4031 & BS 1881.

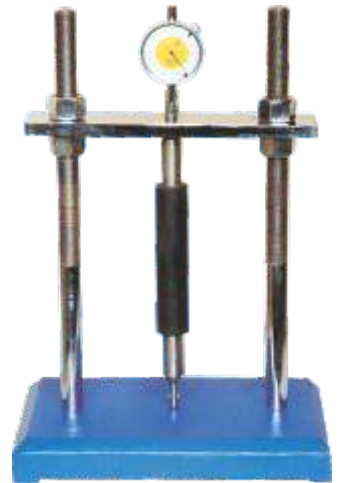
The instrument is used for determining the volume change of cement concrete.

**Specification:**

The apparatus comprises of one mould effective gauge length complete with base plate, four reference pins, one length comparator frame, one stainless reference bar with insulated grip, and one dial gauge, 0.002mm x 5mm



ZI 1015



**ZI 1016 LABORATORY CEMENT AUTOCLAVE**

IS 4031-1968, IS 1624-1960 & ASTM C 151, C 141

**Specification :**

The autoclave is suitable for conducting accelerated soundness tests on cements or the autoclave expansion test requiring constant steam pressure with the correspondent constant pressure. It consists of a stainless steel cylinder with a welded heat insulated metal housing attractively finished. The attached control unit encloses a sensitive pressure regulator and pressure gauge. Power switches and pilot lights for controlling the electric heating units. Inside chamber dimensions 10.5 cm diameter x 40.5cm height suitable for operation on 230 V, 50 Hz Single Phase A. C. supply. Supplied complete with test bar holder, special rack to hold specimens above water level in the autoclave and in a vertical position to expose them in the same manner. A Digital PID Controller is fitted for controlling the desired temperature.

**Note:** Ordinary laboratory cement autoclave with mild steel chambers are also available.



ZI 1016

**ZI 1017 HEAT OF HYDRATION APPARATUS**

IS 11262-1985, ASTM C 186

**Specification:**

This equipment is required to determine the heat of hydration of cement as expressed in calories per gram.

The equipment comprises of the following:

1. A wide mounted double walled vacuum flask with a stop cock 38 mm & a insulating container for the flask
2. A Beckman thermometer (Range 5° C) held tightly by the cock stopper in such a way as to avoid accidental contact with the stirrer blade & the reading lens. To facilitate the easy removal the cock stopper is in two halves.
3. A constant speed stirrer (double bladed propeller type) extended to within 38 mm from the bottom of the flask.
4. A funnel (Gooch type) with a stem of 6 mm inner dia & a body approx 25 mm long and 25 mm dia. is fitted to the cock stopper for introducing the sample.



ZI 1017

All the above to combine to form the calorimeter for the determination of heat of hydration of cement.

Suitable to operate on 230 V A.C. 50 Hz

## Tensile and Flexural Strength

### ZI 1018 TENSILE STRENGTH TESTER (ELECTRICALLY OPERATED)



ZI 1018

Bs12

The instrument employs a friction free, accurate, double lever system, the load being applied by means of sliding weight on the top lever. The capacity of the units is 900 kgs. After fixing the briquette in the jaws, the machine is switched on. The sliding weight slides over the calibrated lever thus applying tension to the specimen. A micro switch fitted instantly stop the machine on failure of the briquette and on failure the tensile load is accurately 0.5kg. By means of a marker provided on the sliding weight to its zero position. Suitable for operation on 230 V, 50 cycles, Single Phase, A.C. supply. Supplied complete with one brass briquette mould and one base plate.

### ZI 1019 BRIQUETTE MOULD (SINGLE)



ZI 1019

IS 269 1958, BS12

#### Specification:

For casting of cement briquettes for tensile strength tests. It is a two part split mould made of gun metal.

Two thumb screws facilitate easy and quick assembling and dismantling of the mould. The minimum cross section of the briquettes cast is 25.4 mm x 25.4 mm. Supplied complete with a steel base plate.

### ZI 1020 BRIQUETTE MOULD (THREE GANG)



ZI 1020

IS 269 1958, Bs12

#### Specification:

For casting three cement briquettes at a time for the tensile strength test on cement.

### ZI 1021 STANDARD SPATULA



ZI 1021

IS 4031, 269, BS 12

This is for use while casting a cement briquette.

#### Specification:

The standard spatula consists of a steel blade, of a special shape. A wooden handle is fixed to the stem of blade. The weight does not exceed 340 gms.

**ZI 1022 JOLTING APPARATUS**

IS 1727 1967, IS 4031 1968, ASTM C 394, C 64

For making standard rectangular specimens of 40 x 40 x 160mm. of Portland and pozzolana cement mortar for determining the transverse strength.

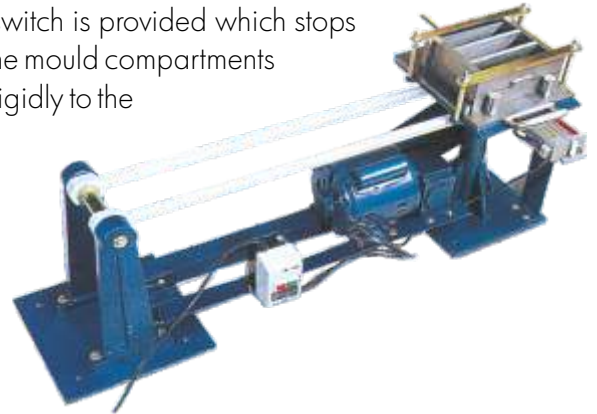
**Specification:**

The jolting apparatus consists of a rectangular table rigidly connected by two support arms to a spindle at a horizontal distance of 800 mm from the centre of the table. There is a projecting lug with a plane face on the upper face of the table beneath which is a stop with a rounded upper surface. The table can be raised and allowed to fall freely on the stop by a cam which is connected to a motor and gearbox through a V-belt and pulleys. The cam rotates at a rate of 60 Rev/Min. A stroke counter fitted with micro-switch is provided which stops the machine after 60 Jolts. Locating pins are provided for mounting the mould compartments on the table. The mould surmounted by the hopper can be clamped rigidly to the table. Supplied complete with mould and hopper. Suitable for operation on 230 Volts, Single Phase, A.C. Supply.

A Digital Preset Counter can be supplied at an extra cost.

**Spares and Accessories :**

- (1) Steel mould with base plate having three compartments each having 40 x 40 x 160 mm, internal dimensions.
- (2) Apparatus for de-moulding the specimen.



**ZI 1023 PRISM MOULD THREE GANG**

IS 1727 1967, IS 4031 1968, ASTM C 394, C 64

**Specification:**

It is supplied complete with base. All parts are marked with the identification number for correct assembly. Each mould is individually verified in the dimensional tolerances, hardness, squareness, flatness & roughness.

Size: 40.1 X 40 X 160 mm



ZI 1023

**ZI 1024 MORTOR MIXER**

IS 4031, 1727 & BS 3892

It is used for mixing cement pastes, mortars and pozzolana.

**Specification:**

The apparatus consists of an epicyclic type stainless steel paddle imparting both planetary and revolving motion, by means of gears. It has two speeds of 140 + 5 R.P.M. and 285 +10 R.P.M. With planetary motions of approximately 62 R.P.M, +5 R.P.M. and 125 R.P.M. +/- 10 R.P.M. Respectively. The stand of the mixer has arrangement to raise or lower the bowl. Complete with stainless steel bowl of about six liters capacity. Suitable for operation on 230 V, 50 cycles, Single Phase A.C, Supply.



ZI 1024

**ZI 1025 FULLY AUTOMATIC MORTAR MIXER**

EN 196-1, 196-3, 413-2, 459-2, 480-1, 1015-2, 12617-4; ASTM C187, C305; AASHTO T129, T131, T162

The mixer has been designed to mix mortars and cement pastes primarily to the requirements of standards. The mixing paddle has a planetary motion and is driven by a motor with a microprocessor based speed and preset



programs to meet all listed EN and ASTM standards, custom designed programs or manual mode. The mode button is used for the fast selection of different programs. The mixing paddle revolves at a rate of 140 rpm. with a planetary motion of 62 rpm. in low speed. In high speed, the paddle revolves at the rate of 285 rpm. with a planetary motion of 125 rpm. An automatic sand dispenser is supplied with the machine and the sand is automatically discharged. Custom design allows 6 programs to be set by the operator, where the motor speed, sand dispenser position and duration of the mix can be set. For the mix where the motor speed is selected as zero, the bowl can be lowered without interrupting the rest of the program. On the display the user can see the mix time and the machine is equipped with lamp in order to warn the user for critical time periods.

The Automatic Programmable Mortar Mixer is supplied complete with:

Bowl: 5 lt (approx.)

Beater

Dimensions: 300 x 555 x 610 mm

Weight (approx.): 56 kg

Power: 200 W

**ZI 1026 VIBRATING MACHINE**

IS 4031 1968, IS 1344 1959, BS 4550.

Concrete moulds are easily cast by using a tamping bar or a vibrating table. However air trapped in cement mortar paste can not be thus removed while casting cement mortar moulds. Easy method is to impart greater vibrating of lesser amplitude to the mould while casting This is achieved in a vibrating machine.

Vibrating machine is used for the preparing of mortar cubes for the determination of compression strength of ordinary and rapid hardened Portland cement, low heat Portland cement, Portland blast furnace cement and high alumina cements.

**Specification :**

The machine consists of a vibrating frame assembly and an electric motor mounted on a sturdy base.

The complete frame assembly consists of a vice to hold a 70.6 mm cube mould and two studs threaded at top and a hopper to feed the sample in the mould. This assembly is supported on four springs and has an in built rotating shaft which rotates eccentrically and thus imparts vibrations to the entire frame. A balance weight is an integral bottom part of the frame. The centre of gravity of the assembly is brought to the centre of the eccentric shaft within a distance of 25 mm below it. The electric motor drives the shaft of the frame and thus imparts required vibration to the moulds.

The frequency of vibration is 12000 +/- 400 Vibration Per Minute. Supplied complete with on 70.6 mm Cube Mould with loose base plate, a time switch 0-5mins x 1mm.

**Spares:** Set of springs, belt and belt guard.

**Optional:** Digital Preset Timer can be supplied at an extra cost.

**ZI 1027 GAUGING TROWEL**

BS 12, IS 4031

**Specification:**

Weight approximately 210 gms.. Best quality with hard wood handle blade length 200mm.



ZI 1027

**Building Lime, Grout and Mud Testing**

**ZI 1028 PLUNGER PENETRATION APPARATUS**

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

The plunger penetration apparatus is used to determine the consistency of fresh mortar, building lime and masonry cement. The test apparatus consists of a base to place the test cup and a vertical column holding the penetration plunger assembly. The drop default height is adjusted to 100 mm. The plunger assembly weight is 90 g. The plunger penetration apparatus is supplied complete with:

- Test Cup, Ø 80 mm X 70 mm
- Tamper



ZI 1028

**ZI 1029 APPARATUS FOR REACTIVITY OF QUICKLIME**

EN 459-2; NF P98-102

The reactivity of quicklime apparatus is used to determine the reactivity of ground quicklime on slaking.

The apparatus consists of a dewar flask of 1 liter capacity, thermometer, electric stirrer, base stand and the related accessories.



ZI 1029

**ZI 1030 SLAKING VESSEL**

Slaking Vessel is used to determine the yield of lime by leaving the lime sample to slake into. Stainless steel made and double walled insulated. The cylinder has inside dimensions dia. 113 mm by 140 mm deep. Supplied complete with cover.



ZI 1030

**ZI 1031 MARSH FUNNEL WITH MEASURING CUP**

ASTM D 2419, AASHTO T 176

This cone is used to find out viscosity of bentonite slurry and similar material. The marsh cone is 6 inch in diameter at the top and 12 inch long, and tapers to join a tube 2 inch long and 3/16 inch inside dia. The capacity of the funnel is 1500cc. Time in seconds required to flow out 1000cc of slurry from cone is measured as funnel viscosity of the material.



ZI 1031

**ZI 1032 SAND CONTENT KIT**

ASTM D 4381

One of the primary functions of a drilling fluid is to carry drilled solids from the well bore. These solids are a contaminant, and if left in the system, can lead to numerous problems. The ofite sand content kit determines the volume percent of sand-sized particles in the drilling fluid. Api defines sand-sized particles as any material larger than 74  $\mu\text{m}$  (200-mesh) in size. The test can be performed on low solids fluids as well as on weighted fluids. The kit consists of a glass tube graduated to read percent (%) by volume, a funnel, and a 200-mesh sieve contained in a cylindrical shaped holder.

Consists of sand content kit, complete, with sieve, funnel, graduated tube, wash bottle & carrying case



ZI 1032

**ZI 1033 BENTONITE SLURRY SAMPLER 50 METERS**

3.50 (3-1/2") white PVC, double check ball bailer, slurry sampler  
bailer diameter: 3-1/2"

overall length: 20"

chamber length: 12"

construction: PVC body and lifting bail

Fdot approved: yes, for drilling fluid slurry testing



ZI 1033

**ZI 1034 MUD BALANCE**



Designed to find out specific gravities of semi liquids like mud and other liquids having densities in the range 0.8 to 2.7. It has a stainless steel beam calibrated specific gravities from 0.8 to 2.7. A stainless steel cup with lid and overflow vent is fitted on one side of the beam. A counter weights with cursor slides over the graduated scale. The beam has a knife-edge at centre which rests in a

fulcrum fitted in the stand. Leveling screws and spirit level are fitted to the stand. Supplied complete with wooden box

**ZI 1035 FLOW CONE**

EN 445

Flow cone apparatus is used for determining the flow properties of grouts, mortars, muds and other fluid materials.

The flow cone apparatus is supplied complete with:

- Cone, Sieve : 1.5 mm
- Cup : 1 ltr
- Nozzle : 10 mm
- Fitting bush
- Stand

ZI 1035	Flow Cone Apparatus
ZI 1035-A	Flow Cone
ZI 1035-B	Ø:8 mm Nozzle
ZI 1035-C	Ø:9 mm Nozzle
ZI 1035-D	Ø:40 mm Nozzle
ZI 1035-E	Ø:11 mm Nozzle
ZI 1035-F	Ø:13 mm Nozzle



**ZI 1036 WET SIEVING APPARATUS**

EN 451-2

The wet sieving apparatus is used for determining the fineness of fly ash. The apparatus comprises of a special stainless steel sieve, 0.045 mm opening, a spray nozzle  $\varnothing$  17.5 mm with 17 holes  $\varnothing$  0.5 mm oriented and spaced to conform to the standards. Supplied complete with a pressure gauge  $\varnothing$  80 mm and fittings for connection to the water supply.

**ZI 1037 AUTOMATIC CEMENT COMPRESSION & FLEXURE TESTING MACHINES**

EN 196-1, 459-2, 1015-11, 13454-2; ASTM C109, C348, C349; BS 3892-1, 4551-1

The Automatic range of single testing chamber and double testing chamber compression and flexure testing machines have been designed for reliable and consistent testing of mortar samples. These compression and flexure testers are the results of continuous applications and research studies to upgrade the machines with the latest technologies and conform the current standards in terms of its technical properties taking into account client requirements by using suitable accessories. These machines also meet the requirements of CE norms for safety and health of the operator.

Compression and flexure jigs, distance pieces, and also removable transparent front-rear safety doors (should be factory installed) should be ordered separately.

The automatic cement compression and flexure testing machines allow less experienced operators to perform the tests. Once the machine has been switched on and the specimen is positioned and centered by the help of centering apparatus.

The automatic cement compression and flexure testing machines consist of very rigid two column single or double chamber frames, automatic hydraulic power pack with data acquisition and control system.

**Power Pack**

Automatic Hydraulic Power Pack, dual stage, controlled by control panel is designed to supply the required oil to the load frames for loading. Very silent power pack can load the specimen between 50 N/sec to 2.4 kN/sec with an accuracy of  $\pm 5\%$ . A Rapid approach pump is supplied as standard. Safety valve (maximum pressure valve) is used to avoid machine overloading.

**Motor**

The motor which drives the dual pump is an AC motor, 380 V, 50-60 Hz, 3 phase, 1 hp and 0.75 kW and it is controlled by motor inverter. The variation in the oil flow is executed with the variation of the rotation speed of the motor.

**Distribution Block**

A distribution block is used to control the oil flow direction supplied by the dual stage pump, the following parts are fitted to the distribution block;

- a - Solenoid valve
- b - Safety valve (maximum pressure valve)
- c - Transducer
- d - Low pressure gear pump
- e - High pressure radial piston pump

**Dual Stage Pump**

The dual stage pump is formed by two groups

**Low pressure gear pump**

High pressure radial piston pump.

On the dual stage pump, a high delivery, low pressure gear pump is used for rapid approach, while a low delivery, high pressure radial piston pump is used for test execution. The Rapid approach facility shortens the time interval from piston start until the upper platen touches to the specimen. This excellent feature helps to save a lot of time when a large number of specimens are going to be tested.



**Oil Tank**

The tank includes enough oil to fill the mechanism which pushes the ram during the test. The level and oil temperature can be seen on the indicator fitted to the tank. It has 20 L capacity. Hydraulic motor oil, number 46, must be used.

- Dimensions : 360 x 380 x 900 mm
- Weight (approx.) : 80 kg
- Power : 750 W

**Control Unit**

Control Unit is designed to control the machine and processing of data from load-cells and pressure transducers which are fitted to the machine. All the

operations of control unit are controlled from the front panel consisting of a 800x480 pixel 65535 color resistive touch screen display and function keys 2 analogue channels are provided for load-cells or pressure transducers.

Control unit has easy to use menu options. The control unit's digital graphic display is able to draw real-time "Load vs. Time", or "Stress vs. Time" graphics.

Control unit offers many addition unique features. You can save more than 10000 test results in its internal memory. Control unit has support for various off-the-shelf USB printers. Thanks to its built-in internet protocol suite, every aspect of control unit device can be controlled remotely from anywhere around the world.

Model	ZI 1037	ZI 1038	
Test Type	Compression	Flexure	Compression
Capacity	250 kN	15 kN	250 kN
Class 1 Measuring Range	2.5 to 250 kN	0.5 to 15 kN	2.5 to 250 kN
The roughness value for texture of loading and auxiliary platens	≤3.2 μm	≤3.2 μm	≤3.2 μm
Lower Platen Dimensions	165 mm	165 mm	165 mm
Upper Platen Dimensions	165 mm	165 mm	165 mm
Maximum Vertical Clearance Between Platens	263 mm	263 mm	263 mm
Piston Diameter	160 mm	80 mm	160 mm
Maximum Piston Movement	50 mm	50 mm	50 mm
Horizontal Clearance	300 mm	200 mm	300 mm
Power	750 W	750 W	
Oil Capacity	20 L	20 L	
Maximum Working Pressure	125 bar	30 bar	125 bar
Rapid Approach Rate	50 mm/min	80 mm/min	50 mm/min
Dimensions (WxLxH)	830x500x1650 mm	1050 x 500 x 1650 mm	
Weight	265 kg	410 kg	



Maximum horizontal clearance for placing sample is limited with the border of the platens. Sample must be placed such that its ends will not overlap the ends of platens and it must be centered perfectly. The suitable vertical clearance for specimen can be adjusted with distance pieces.

A large rectangular area with rounded corners, containing numerous horizontal dotted lines for writing notes.

# CONCRETE TESTING EQUIPMENTS



Concrete is a composite construction material made primarily from aggregate, cement, and water in order to obtain a robust stone like material. There are many formulations of concrete that provide various properties. Concrete is the most widely used man-made product in the world as the main building material. The quality of concrete is important in planning earthquake resistant structures that minimize damage, preventing injury and human loss. Due to this reason, concrete must be closely controlled according to the relevant standards in every stage of production by experienced people using quality test equipment.

Zeal also proposes a vast selection of NDT Instruments and apparatus with precise indications concerning the product use and the relative applications.

16	Consistency & Workability
19	Penetration
20	Mixing Equipment
23	Moulding Equipment
27	Capping
28	Curing
29	Concrete Compaction

30	Test on Hardened Concrete
31	Density of Concrete
32	Compression & Flexural Strength
40	Permeability
42	Air Entrainment
43	Non Destructive Testing

**ZI 2001 VEE BEE CONSISTOMETER**

IS 1199 & BS EN 12350

The instrument is used for workability as well as consistency of fresh concrete. A slump Cone and a graduated rod supplied with the instrument helps the operator to find out slump values and vibration table with container and acrylic disc is used to find out workability of concrete expressed in Vee Bee degrees, which is defined as the time in seconds to complete required vibrating at which the fresh concrete flows out sufficiently to come in contact of the entire face of acrylic disc.

Specification:

The equipment consists of : A vibrating table size 380 mm long and 260 mm wide, resting upon elastic support at a height of about 305 mm above the floor, complete with Start/Stop switch, cord and plug.

A holder is fixed to the base in to which a swivel arm is telescoped with funnel and guide swivel arm is also detachable from the vibrating table. The divisions of scale on the rod record the slump of the concrete in millimeters. Supplied complete with a sheet metal container with lifting handles which can easily be fixed to the vibrating table. A slump cone open at both ends with lifting handles and a tamping rod of size 16 mm dia and 600 mm long rounded at both ends.



ZI 2001

**ZI 2002 SLUMP TEST APPARATUS**

IS 7320 & BS 1881-102

It is used for the determination of the consistency of freshly mixed concrete, where the maximum size of the aggregate does not exceed 38 mm.

Specification:

The apparatus consists of one slump cone with handles and foot pieces. The slump cone has internal dimension 200 mm dia at base 100 mm top dia and 300 mm height foot pieces can be fixed to the clamps on the base plate. The base plate has lifting handle for easy transportation . One graduated steel rod 16 mm dia x 600 mm long rounded at both ends and graduated in mm is also supplied.



ZI 2002B

ZI 2002A

**ZI 2003 SLUMP CONE, PLASTIC**

ASTM C-143

More economical than metal cones, lightweight, will not rust or dent. Easy to clean and accepted by ASTM / BS Standards



ZI 2003

**ZI 2004 K-SLUMP TESTER**



ZI 2004

K-Slump Tester for in-place measurements indicates correlation to the slump test. The probe determines workability of concrete and the degree of compaction. Includes correlation chart and instructions.

**ZI 2005 CHASE AIR INDICATOR**



ZI 2005

Economical method of quickly estimating the air content of fresh concrete in the field using the isopropyl alcohol method. Does not replace conventional air meter method of air content testing.

**ZI 2006 KELLEY BALL PENETRATION APPARATUS**



ZI 2006

ASTM C-360

**Specification:**

The apparatus is used to determine the workability of Portland cement & concrete. The Kelly ball test is considered to be simple and much faster than the slump test. Twice the Kelly ball reading approximately equals the slump. It consists of a cylinder with a ball shaped bottom and handle, together weighing 1.5 kg. A strip frame, guides the handle and serves as a reference for measuring the depth of penetration. The handle is graduated in mm. Penetration can be recorded to the nearest 0.5 mm.

**ZI 2007 COMPACTION FACTOR APPARATUS**



ZI 2007

IS 1199, 5515. & BS 1881-103

The apparatus is used for determining the workability of fresh concrete, provided the maximum size of the aggregate does not exceed 38mm. The test is particularly useful for concrete mixes of very low workability where true slump values are not reliable.

**Specification:**

It consists of two rigid conical hoppers and a cylinder mounted on a rigid metal frame. The lower openings of the hoppers are fitted with hinged trapdoors having a quick release catches. A circular metal plate is provided to cover the top of the cylinder.

Supplied complete with one plaster's trowel and one tamping rod, 16 mm dia x 600 mm long, both ends rounded.

**ZI 2008 INITIAL SURFACE ABSORPTION TEST (ISAT) APPARATUS**



BS 1881 PART 208

This apparatus is used to assess the surface absorption characteristics of concrete. The rate of flow of water per unit area into a concrete surface when subjected to a constant head of 200mm is measured. The unit consists of a capillary tube mounted on a scale, a water reservoir & connecting tubes. Easy to use, mounted on a stand.

**ZI 2009 J-RING, NARROW GAP**

EN 12350-12

The J-Ring test is used for determining the passing ability, the flow spread and the flow time of self compacting concrete as the concrete flows through the J-Ring apparatus. The J-Ring narrow gap with  $\varnothing 18$  mm x 16 smooth bars is manufactured from stainless steel.

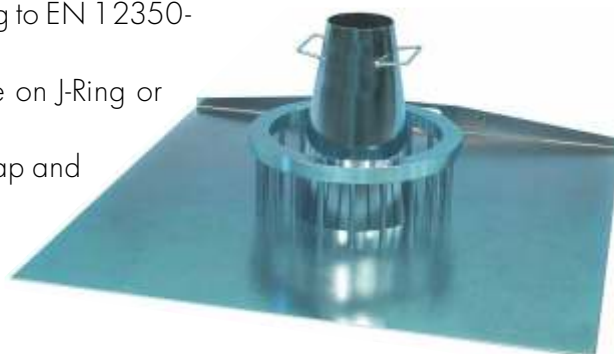
The Slump Cone is made from sheet steel protected against corrosion, with diameters; top 100 mm, base 200 mm and with a height of 300 mm.

The Base plate is 900x900x3 mm square, made of stainless steel with engraved circles of 200 mm and 500 mm diameter conforming to EN 12350-8.

The Steel weighted collar is used to stabilize the slump cone on J-Ring or slump flow tests.

Minimum apparatus for the J-Ring test are J-Ring with narrow gap and slump cone.

- ZI 2009** J-Ring, narrow gap
- ZI 2002** Slump cone for J-Ring
- ZI 2009-A** Base plate for J-Ring and slump-flow tests
- ZI 2009-B** Steel weighted collar, 9 kg
- ZI 2009-C** EN 12350-8 for slump cone on J-Ring or slump flow test



ZI 2009

**ZI 2010 CONCRETE FLOW TABLE TEST SET**

EN 12350-5

The test set is used for concrete mixes of high workability and determines flow index as an arithmetic mean of the diameter of the specimen after working on a flow table. The apparatus consists of a double steel table, an upper table measuring 700 x 700 mm and hinged at one side to the lower table. The top table is inscribed and all parts are protected against corrosion. The stainless steel cone has a  $130 \pm 2$  mm top diameter,  $200 \pm 2$  mm base diameter and  $200 \pm 2$  mm height and 1.5 mm thickness.

Dimensions: 700 x 850 x 300 mm, Weight (approx.) 40 kg

- ZI 2010** Concrete flow table test set
- ZI 2010-A** Flow cone for
- ZI 2010-B** Wooden tamper 40 x 40 x 335 mm



ZI 2010

**ZI 2011 V FUNNEL**

EN 12350-9

The V Funnel apparatus is used to evaluate the flow time of freshly mixed self-compacting concrete. The test is not suitable when the maximum size of the aggregate exceeds 22.4 mm.

The test set consists of a stainless steel funnel placed vertically on a supporting stand. The discharge orifice is equipped with a lid, which can be momentarily opened.

The I shape box apparatus is supplied complete with:

- Filling Hopper
- Base



ZI 2011

**ZI 2012 L SHAPE BOX APPARATUS**

EN 12350-9

The L Shape box is used for determining the passing ability rate of freshly mixed self compacting concrete. The distance between 12 mm diameter bars can be set between  $41 \pm 1$  mm or  $59 \pm 1$  mm. L Shape box is designed for ease of cleaning the vertical and horizontal hoppers.

The l shape box apparatus is supplied complete with:

- Filling Hopper
- Base

**ZI 2013 U SHAPE BOX APPARATUS**

The U Shape box apparatus is used to determine the filling and passing ability of self-compacting concrete (SCC). The U box is made of stainless steel consisting of three 12 mm dia. Rebars. The U box is mounted on a frame with a fixing mechanism.

**Penetration****ZI 2014 POCKET CONCRETE PENETROMETER**

ASTM C-403

For fast evaluation of the initial setting of concrete. It can be used on light weight concrete, special roof deck mixes and concrete additives.

**Specification:**

Consists of a needle having face area  $3/10$  sq. cm. and graduated at a distance of 25 cm. The needles point is an integral part of barrel which houses a calibrated spring. The spring is confined in a sleeve.

The resistance offered by the concrete mortar is shown on the direct reading scale with a marker ring which holds its position when released. Scale range is  $0-50 \text{ kg/cm}^2$  when the penetration resistance reaches a value of  $35 \text{ kg/cm}^2$  the concrete is assumed initially set.

Supplied complete in carrying case.



ZI 2014

**ZI 2015 MORTAR PENETROMETER**

ASTM C-403

It is used for finding out the rate of hardening of mortar sieved from concrete spring and a stem graduated from 0-70 kg x 1 kg. Six interchangeable penetration needles of areas 645, 323, 65 32 and 16 mm sq. is provided . The penetration resistance is measured by the force exerted to penetrate the mortar by 25 mm and is indicated by a sliding ring on the stem, which is graduated. Needle shanks are marked at every 12.5 mm. Supplied complete in a wooden carrying case.



ZI 2015

**Mixing Equipment**

**ZI 2016 BLEEDING OF FRESHLY MIXED CONCRETE**

ASTM C 232; EN 480-4

ZI 2016 is used for determination of the relative quantity of mixing water that will bleed from a sample of freshly mixed concrete.



ZI 2016

**ZI 2017 LABORATORY CONCRETE MIXER (MOTORISED)**

A Concrete and mortar mixer for light professional and DIY use. Designed to give reliable service with low maintenance requirements. The compact storage size makes the Mixer a convenient product for DIY users.

**Advantages:**

- Light and effective the Mixer mixes a full barrow load
- Compact enough to be transported in the boot of car
- Supplied complete with stand
- Direct drive for increased reliability
- Full thermal overload protection
- 230 V, AC Single Phase
- Drum capacity: 1 00 Ltrs.



ZI 2017

**ZI 2018 LABORATORY PAN MIXER (CAPACITY 40 LTRS.)**

The Concrete mixer has been designed for mixing small quantities of concrete used in preparation of concrete cubes, for testing in laboratories. The purpose of the mixer is to smear mechanically the aggregate surface with cement paste uniformly & produce a mix of uniform consistency. This in turn gives consistent quality of cubes specimens when casted in the moulds.

The Concrete Mixer developed is transportable on wheels. The design of mixing paddles ensure uniform & efficient mixing of cement & aggregate both in dry & wet conditions. This machine is suitable for



ZI 2018



aggregate size upto 20 mm. The equipment can also be put to use for mixing of any other material in dry / wet conditions. The arrangement helps the operators to access the pan contents conveniently & emptying the mixture after completion of the operation. The drum is driven off the ribbed base. The lid with mixing paddles clears off the top of the drum to provide maximum access to the operator.

**Specifications:**

- Mixing Capacity : 40 ltrs.
- Overall Dimension : 910 x 875 x 1250 mm
- Motor : 2 HP, 960 RPM
- Power supply : 440V, 50 Hz, 3 phase AC

**Features:**

- Portable, compact & easy to operate
- Adjustable blades
- Simple to clean & maintain



**ZI 2019 LABOMIX CONCRETE PAN MIXER**

The right choice for the demanding professional user. Here you get the best value for money without making any compromises on the well known Labtest virtues. Quality, durability and efficiency completely lives up to even the highest demands.

**Features:**

- Large motor with plenty of power
- High quality and finish
- Exchangeable mixer shovels
- Automatic emptying of the container
- Large transport wheels makes it easy to load the mixer
- Easy to clean
- Positioning bolt secures the cover during use/transport
- Can be operated by one man
- Maintenance free high quality gear

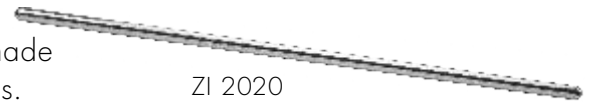
Model	ZI 2019A	ZI 2019B	ZI 2019C	ZI 2019D
Motor (KW)	1.1/1.1	1.5/1.5	2.2/1.8	4.0
Currency (V)	1x240	1x240	3x440	3x440
Gear/RPM	32	32	32	32
Container capacity (L)	90	120	200	300
Mixing capacity (L)	74	90	160	250
Mixing capacity (KG concrete)	174	211	376	587
Dimensions (W X D X H) (mm)	640 x 800 x 107	640 x 800 x 107	780 x 105 x 116	100 x 142 x 122
Weight (KG)	80	90	180	245

**ZI 2020 TAMPING ROD**

IS 516, ASTM C-29, C-31, C-57, C-138, C-192 AASHTO T-29 & T-23

**Specification:**

This is used for compacting concrete into cube moulds. This rod is made of steel it is 16 mm dia., 600 mm in length and rounded at both ends.



ZI 2020

**ZI 2021 TAMPING BAR**

**Specification:**

This is used for compacting concrete into cube moulds. This rod is made of steel bar it is 25 mm square x 380 mm long with handle.



ZI 2021

**ZI 2022 STRAIGHT EDGE**

Used to remove excess material when molding cube and cylinder specimens. Conduction slump cone and air meter tests. Flat bar made from steel.

**ZI 2022** 1" X 12" (2.5 X 30.4CM)



ZI 2022

**ZI 2023 VERIFICATION OF FLATNESS, PERPENDICULARITY, STRAIGHTNESS AND DIMENSION OF MOULDS AND SPECIMENS**

ISO 1101 EN 12390-1

The appendix of EN 12390-1 Standard calls for a set of instruments to be used for dimensional and tolerance verification of the mould and the specimens got from the same.



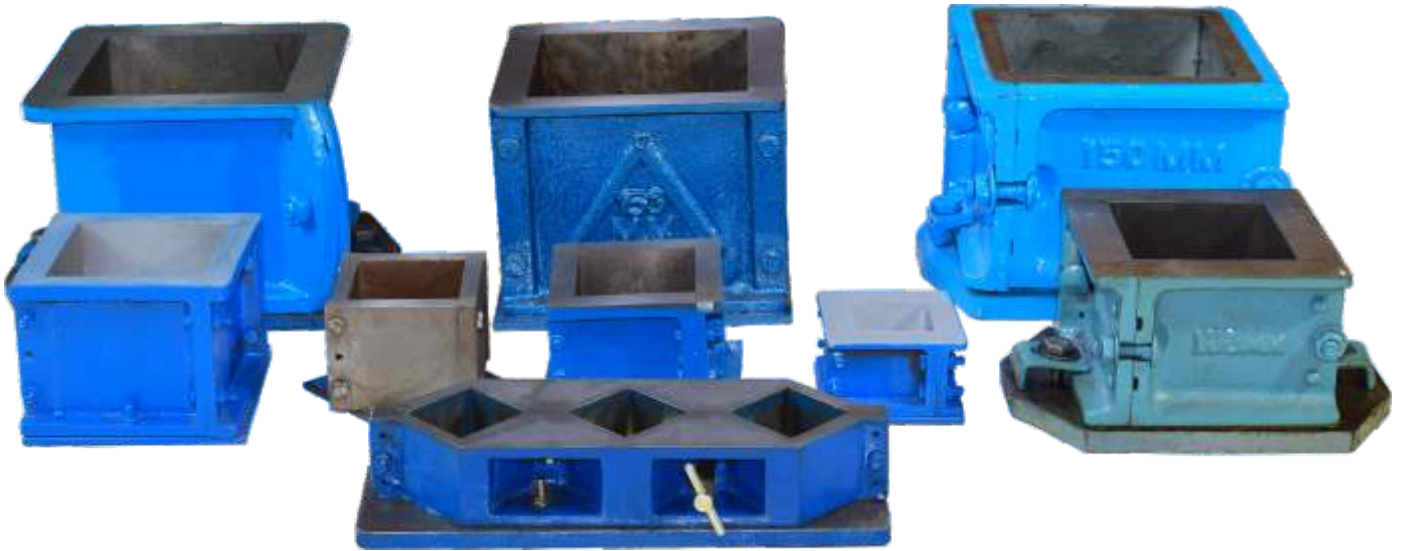
**ZI 2023A Go-Not Go Gauge**  
For 100 & 150 mm cube moulds

**ZI 2023B Rule**  
Rule straightedge, 300 mm long

**ZI 2023C Feeler Gauge**  
Comprising a set of strips from 0.05 to 0.50 mm, with blade 100 mm long

**ZI 2023D Rule Right Angle**  
Steel made, 150x100 mm, rectangular section

**ZI 2023E Digital Vernier Caliper**  
0-200 mm x 0.01 mm. Readings in mm and inches



### ZI 2024 CUBE MOULD (METAL)

These are available in different sizes and are made according to Indian and British standards . For the metric size cube mould, the faces are machined flat to  $\pm 0.2$ mm accuracy and finished to within 0.2mm. For the inch size moulds, the faces are machined flat to  $\pm 0.01$  inched to within 0.01 in. All moulds are supplied complete with base plate.

- ZI 2024A Cast Iron Mortar Cube Mould 50mm, Single Gang
- ZI 2024B Cast Iron Mortar Cube Mould 50mm, Three Gang
- ZI 2024C Mild Steel Cement Cube Mould 70.6mm, with Loose Base Plate
- ZI 2024D Cast Iron Concrete Mould 75mm Single Gang
- ZI 2024E Cast Iron Concrete Mould 100mm Light Weight
- ZI 2024F Cast Iron Concrete Mould 100mm Clamp Type (8.5 KG) Four Part
- ZI 2024G Cast Iron Concrete Mould 150mm Light Weight 8KG
- ZI 2024H Cast Iron Concrete Mould 150mm ISI Marked
- ZI 2024I Cast Iron Concrete Mould 150mm Clamp Type (18 KG) Four Part
- ZI 2024J Cast Iron Concrete Mould 150mm Clamp Type (16 KG) Two Part

### ZI 2025 CYLINDRICAL MOULD

For testing concrete cylinders for compressive strength tests.

**Specification:**

The moulds is split vertically into two parts. The mean internal diameter in within  $\pm 0.2$ mm and height is within  $\pm 1$ mm. The ends are machined to  $\pm 0.05$  . The base plate and top plate are machined flat to  $\pm 0.03$ mm.

- ZI 2025A Mould cylinder, cast iron, 150mm dia x 150mm height.
- ZI 2025B Mould cylinder, cast iron, 150mm dia x 300mm height.
- ZI 2025C Mould cylinder, cast iron, 160mm dia x 320mm height.
- ZI 2025D Mould cylinder, cast iron, 100mm dia x 200mm height.
- ZI 2025E Mould cylinder, cast iron, 300mm dia x 600mm height.



ZI 2025

**ZI 2026 BEAM MOULD**

BS 1881-108

For casting, concrete specimen for flexure tests.

**Specification:**

Made of Cast Iron / Mild Steel. The mould are made of 4 plates assembled together. Each mould is supplied complete with base plate. Faces are machined flat to  $\pm 0.2$ mm. And finished in size to 0.2mm.



<b>ZI 2026A</b>	100 mm x 100 mm x 500 mm
<b>ZI 2026B</b>	150 mm x 150 mm x 700 mm
<b>ZI 2026C</b>	150 mm x 150 mm x 750 mm
<b>ZI 2026D</b>	100 mm x 150 mm x 600 mm
<b>ZI 2026E</b>	150 mm x 150 mm x 600 mm

**PLASTIC MOULDS**

These one-piece moulds, very appreciated by the user, are made from hard plastic, strong, light, undeformable; resistant to vibrations shocks and wear. They do not require mounting and dismounting operations, thus saving time and labour. They just require a simple clean and demould oiling before being ready for use again for many times. The specimen is expelled from the mould by compressed air or water. The entire process of manufacturing the plastic moulds support greener and cleaner environment. This type of manufacturing is pollution free. The complete range of plastic products are 1/10 the weight compared to the metal substitute. This makes them easy to handle in transportation.

**ZI 2027 CUBE MOULD**

The cube moulds side can be supplied in different models, each one with different characteristics and weight. All the models have a reinforced band on the walls, and the inside surfaces are very smoothed getting easier the specimen's ejection. It grant an additional resistance, and foresee a "X" reinforced band on the base, improving the strength of the mould, and allowing the user to give small blows with a rubber heated hammer by easing the specimen's ejection.



- ZI 2027A** 150 mm Plastic ABS Cube Mould Heavy 1.2 KG
- ZI 2027B** 150 mm Polyurethane Cube Mould 1.4 KG
- ZI 2027C** 100 mm Plastic ABS Cube Mould Light 0.6 KG
- ZI 2027D** 100 mm Polyurethane Cube Mould Single Gang 0.6 KG
- ZI 2027E** 100 mm Polyurethane Cube Mould Two Gang 1.1 KG



ZI 2028

**ZI 2028 CYLINDRICAL MOULD**

- ZI 2028A 150 mm X 300 mm Polyurethane 1.65 KG
- ZI 2028B 100 mm X 200 mm Polyurethane 0.9 KG



ZI 2029

**ZI 2029 BEAM MOULD**

- ZI 2029A 100 x 100 x 500 mm Polyurethane 2.5 KG
- ZI 2029B 150 x 150 x 700 mm Polyurethane 4.8 KG
- ZI 2029C 150 x 150 x 750 mm Polyurethane 5.0 KG
- ZI 2029D 150 x 150 x 600 mm Polyurethane 4.4 KG



ZI 2030

**ZI 2030 GUN FOR MOULD**

Gun, to connect to a water or air pressure, to eject the specimen from the PU and ABS moulds.



ZI 2031

**ZI 2031 STOPPER FOR PLASTIC CUBE MOULD**

Stopper, plastic, to plug the hole of the moulds  
Pack of 10 pcs.



ZI 2032

**ZI 2032 FILLING HOPPER FOR MOULD**

Filling hopper, stainless steel made, for an easier filling of fresh concrete into the moulds:  
Supplied complete of clamping elastics

**ZI 2033 CUBE MOULD, PLASTIC**

This high-density polyethylene three-gang mold for 50 mm cubes strips and reassembles easily. Set comes complete with tamper and mold top. Offers substantial cost savings



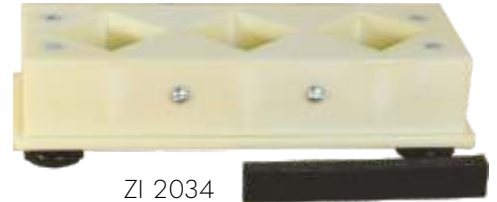
ZI 2033

**ZI 2034 CUBE MOULD (THREE GANG)**

This Cube Mould forms three cubes at one time in a diagonal arrangement. Mold and detachable base are held together by self-aligning thumbscrews, which ensure an even, tight fit.

**ZI 2034-A** 50mm x 50mm x 50mm

**ZI 2034-B** 70.6mm x 70.6mm x 70.6mm



ZI 2034

**ZI 2035 CONCRETE CURING RACKS**

These durable racks are manufactured from plastic compounds and recycled materials to resist moisture, abrasion, chemical and temperature variations. Each rack has built-in handles, making them easy to carry and safely stacked 12 tiers (58") high. The racks unique open frame design allows water vapor to flow through and saturate the surface of each individual cylinder, and also separates and prevents cylinder surfaces from touching each other for improved temperature control.

Each rack holds 4 pieces 100 x 200 mm cylinders and is 17-5/8" wide x 6-3/8" deep. The weight of one rack with 4 cylinders is approximately 17 KG. One base rack is required for each stack.



ZI 2035

**ZI 2036 CUBE AND CYLINDER LIFTING HANDLE**

Lifting handle can be used to remove cylinders from curing tanks safely.

**ZI 2036** 150mm X 300mm Cylinder Lifting Handle

**ZI 2037** Grasping Pliers Cube Lifting Handle



ZI 2036

**ZI 2038 TEST CYLINDER CARRYING CASE**

Holds (8) - 100 x 200 mm test cylinders for easier field to lab transfer with less specimen damage. Large reinforced molded handles for easier carrying 100mm Test Cylinder Carrying Case



ZI 2038



ZI 2037



ZI 2039

**ZI 2039 CYLINDER CARRIER**

Steel cylinder carrier is plated for rust resistance. Used for carrying 150 mm dia. x 300 mm high cylinders in the field or lab.



ZI 2040

**ZI 2040 GROUT SAMPLE BOX**

This grout sample box is an alternative method that follows the guidelines to ASTM C-1019 / UBC 21-18 and will save you money, time, labor, and space. Engineered-slotted corrugation retains moisture while simulating cmu absorption rate. Each box produces 4 specimens, 36.25 mm x 81.5 mm x 162.5 mm. Shipped 25 boxes per carton.

**Capping****ZI 2041 CONCRETE: PAD CAPS AND RETAINER RINGS**

Pad-cap retainer rings hold neoprene pads that fit onto the ends of concrete test cylinders. Made from plated high-alloy steel to resist rust and deformation fatigue. Bearing surfaces machine-planed to within 0.002". Supplied two per set. Neoprene pad inserts are made from a tough elastomeric material that evens out and fills irregularities in the ends of concrete cylinders to assure even distribution of test loads for consistent results.

**ZI 2042 CAPPING SET (HORIZONTAL)**

IS: 516 1959, BS 1881-120, ASTM C31, C 617

**Specification:**

The set comprises of a cylinder capper, a cylinder carrier and a ladle. The cylinder capper consists of a base on which two accurately machined plates are mounted vertically. One plate is firmly fixed and the other one is adjustable horizontally. Two plates are provided with holders for holding the cylinder in position. The holder are split and the bottom half of each holder is fixed firmly and the top half of each is removable and bolted down to the lower half. On the upper parts of the vertical plates 'V' s are provided for pouring the capping compound. Two spacers are also provided. Complete with cylinder carrier and ladle for molten compound.

**ZI 2042A** For 150 mm dia. x 300 mm length cylinders

**ZI 2042B** For 100 mm dia. x 200 mm length cylinders



ZI 2042

**ZI 2043 CAPPING SET (VERTICAL)**

IS : 516 1959, BS 1881-120

For capping compression cylinder specimens. This apparatus can be used both in the laboratory and in the field. The specimens capped in this apparatus have plane parallel faces.

**Specification:**

Mould for cylinders 150 mm dia. x 300 mm long, 100 mm x 200 mm

Consists of a base with an upright. The upright serves as a guide for

positioning the capping plate and cylinder. The 19mm thick capping plate is machined accurately. There is a recess in the plate for keeping the molten capping compound and to position cylinder. Complete with cylinder carrier and ladle.



**ZI 2044 MELTING POT**

Used to melt Capping compound this pot comprises a metal container in a well lagged steel jacket. A thermostatic control and stand by heat switch are fitted. Supplied complete with lift off cover.

**Warmer:** An electrically heated and thermostatically controlled bath for melting the capping compound. Supplied with cover and handle. Suitable for operation on 230 Volts A.C. Single Phase.

**Capping Compound:** Used for capping the ends of concrete cylinders to be tested. Available in packs of 5 kg.

**Bowl & Ladle:** Metallic bowl is used to carry the capping compound and ladle is used to pour molten capping compound in to the grooves between specimen and capping plate. Supplied as a set.



**Specification:**

Dimensions (Diameter x Depth):	:	140 x 150 mm (Internal), 250 x 165mm (External)
Capacity	:	2.4 litres
Rated Power	:	750 W
Temperature	:	40 to 340° C

**Curing**

**ZI 2045 CURING TANK**

**Features:**

- 24 Hour cycle from time of mixing.
- Controlled 35° C or 100° C ± 2° C Curing Temperature for concrete.
- Controlled 27° C ± 2° C Curing Temperature for grey cement.

The tank has been designed to accommodate 150mm / 70.6mm cube moulds upto 36/72 cube mould and fully insulated, complete with a hinged lid, heater, thermostat and re-circulated pump. Provision of two removable racks allowing free circulation of water around each mould. The pump, drain valves and electrical equipment are housed in a compartment located at one end of the tank. The Tank is heated by an immersion heater under normal conditions and refrigeration system for grey cement the temperature is controlled at 35° C or 100° C ± 2° C / 27° C +2° C,





ZI 2045

expect for the 15 minutes after immersion of the freshly made specimens.

**Note:** Accelerated curing tank with cooling arrangement is also available of request.

- ZI 2045A** Curing Tank for 6/12 moulds of 150 mm / 70.6 mm size
- ZI 2045B** Curing Tank for 12/24 moulds of 150 mm / 70.6 mm size
- ZI 2045C** Curing Tank for 24/48 moulds of 150 mm / 70.6 mm size
- ZI 2045D** Curing Tank for 36/72 moulds of 150 mm / 70.6 mm size

## Concrete Compaction

### **ZI 2046 POKER VIBRATOR (WITH VIBRATING TABLE)**

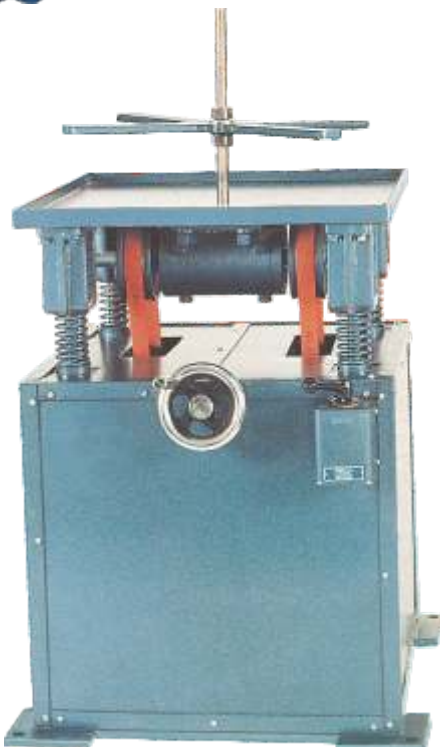
EN 12390-2; ASTM C31, C192; AASHTO T23, T126

Ø 22 mm hand-held, 220-240 V 50-60 hz

The poker vibrator is ideal for the internal compaction of concrete specimens and a good alternative to traditional tamping bar, especially when there are large numbers of specimens to be compacted. Flexible shaft length and tip diameter can be selected from the four available products.



ZI 2046



ZI 2047

### **ZI 2047 VIBRATING TABLE**

#### **Specification:**

It is designed to carry a load of 140 kg . The apparatus consists of a motor fitted with a variable pitch pulley housed in a cabinet. The vibrations are imparted by means off-balance masses rotating on a shaft of a vibrator clamped to the underside of the table top. The table top is 500 x 500 mm and has stops along its edges to prevent moulds from walking off the table during vibration . A crass arm adjustable on a vertical rod at the centre of the table is provided to hold the moulds while operating the between a maximum of 3600 vibrations down to 2600 vibration per minute. A speed regulation handle is provided for increasing or decreasing frequency. A switch is provided for starting the motor. Suitable for operator on 230 Volts, A.C. Single Phase, 50 Cycles.

**Note:** Table top size : 750 x 750 mm & 1000 x 1000 mm also available at an extra cost. Both models operates on 440 volts, A.C. Three Phase

**ZI 2048 DLC VIBRATING HAMMER FOR CONCRETE MOULDS**

ASTM C 232; EN 480-4

Used for the compaction of concrete samples in a mould. Generally the vibratory hammer is found to be a much faster & quicker method as compared to impact hammering. The vibratory hammers are supplied with 1 tamping feet & 1 shank.

Used for determination of the relative quantity of mixing water that will bleed from a sample of freshly mixed concrete.

Dimensions : 290 x 255 x 350 mm

Weight (approx.) : 6 kg



**Test on Hardened Concrete**

**ZI 2049 DE-MOUNTABLE MECHANICAL STRAIN GAUGE**

BS 1881-206.

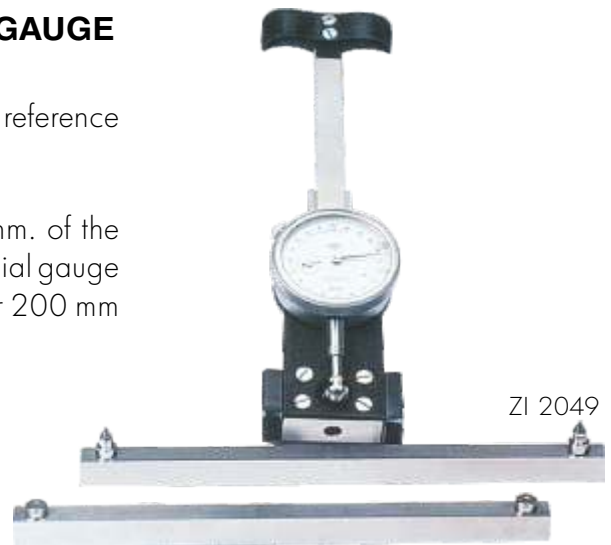
It is used for finding out the linear deformation caused on two reference points fixed on a loading member.

**Specification:**

This portable gauge is designed for a gauge length of 200 mm. of the reference pins. The deformation is indicated by a 0.002 x 5mm dial gauge attached to the instrument. Complete with two standard bars for 200 mm gauge length supplied in a wooden case.

**Accessories:**

Reference pins in packet of 100 nos. at an extra cost.



**ZI 2050 LATERAL EXTENSOMETER**

This is for determining the lateral extension of 150 mm dia x 300 mm high cement concrete cylinders while testing them under compression.

**Specification :**

The unit consists of two movable frames pivoted at one end. The extensometer is fixed to the specimen with the help of tightening screws. The lateral extension is indicated on a dial gauge of 0.002 mm x 5 mm is mounted on the upper ring and the tip of the dial gauge rests on an anvil. The zero on the dial gauge can be set by adjusting the anvil screw. Supplied in a wooden carrying case.



**ZI 2051 LONGITUDINAL COMPRESSOMETER**

ZI 2051

ASTM C 469

It is designed for finding out the deformation and strains on 150 mm. Diameter and 300 mm high cement and concrete cylinders when subjected to compressive loads.

**Specification:**

Consists of a frame with a bottom ring and a top ring with tightening screws to firmly clamp the compressometer over the cylinder. A dial gauge .002 mm x 5 mm is mounted on the upper ring and the tie of the dial gauge rests on an anvil. The zero on the dial gauge can be set by adjusting the anvil screw. Supplied in a wooden carrying case.

**Density of Concrete****ZI 2052 SAND ABSORPTION CONE AND TAMPER**

ASTM C 128 AASHTO-T-84

Used for determining the slump of fine aggregate in the determination of bulk and apparent specific gravity and absorption of fine aggregate.

**Specification:**

The equipment comprises of a conical metal mould 1.5 inch dia at top, 3.5 inch dia at base and 27/8 inch in height. A metal tamping rod weighting 12 ounces and having a flat circular tamping faces 1 inch in dia meter.

ZI 2052

**ZI 2053 DENSITY OF FRESH AND HARDENED CONCRETE**

The density of both fresh and hardened concrete is of interest to the engineer for numerous reasons including its effect on durability, Strength and resistance to permeability.

Hardened concrete density is determined either by simple dimensional checks, followed by weighing and calculation or by weight in air / water buoyancy methods.

**Density of Hardened Concrete:**

The density of hardened concrete specimens such as cubes and cylinders can be quickly and accurately determined using a Buoyancy Balance.

**Buoyancy Balance:**

The buoyancy balance system developed by us consists of a rigid support frame. Incorporating a water tank mounted on a platform.

A mechanical lifting device is used to raise the water tank through the frame height immersing the specimen suspended below the balance fixed on a cradle.

The balance supplied may also be used as a standard weighting device, thus providing a versatile and comprehensive weighing system in the laboratory. The sample is weighed in air and in water to calculate the density of fresh concrete.



ZI 2053

**COMPRESSIVE STRENGTH**

Concrete is a man-made material, essentially mixed at site. The properties of concrete depend on the properties of its ingredients and their proportion and it is likely to vary from mix to mix. Tests must be conducted, therefore, to ensure that the concrete used is in accordance with design specifications. A frequent test, is the test of compressive strength, in which concrete samples are tested to failure.

**Compression Testing Machines :**

Labtest series Compression Testing Machines are the finest of their types available. Their rugged construction and extreme simplicity makes it possible for even non-technical personnel to operate them with ease and complete dependability. In particular, the portable units, which are small in dimensions, sturdy and light in weight, make quality control testing possible in areas where commercial testing facilities are not available and where the transportation of larger and much heavier machines would be difficult.

LABTEST Compression Testing Machines conform to IS: 14858(2000) and calibrated with an accuracy of  $\pm 1\%$  as per the requirement of 1828(Class 1) . It can also be supplied as per BS : 1881 and BS EN 12390. These machines are available in 50kN, 100kN, 500kN, 1000kN, 2000kN, 3000kN & 5000kN Capacities.

**ZI 2054 COMPRESSION TESTING MACHINE (CHANNEL TYPE LOAD FRAME) HAND OPERATED**

IS 516, BS 1881

**Specification:**

In these load frames "C" channels are used, they are welded at the top as well as bottom and with stand high loads. A hydraulic jack is fitted at centre of the base of the load frame, over which can be fitted lower platen and spacer block with the help of centering pin. A lead screw passes through the top of the frame. To the lower end of this lead screw is fixed the upper platen with spherical seat for self alignment. The platens are accurately machined, hardened and polished. The lower platen grooves to correctly place the specimen.

**Note:** The platens are normally rectangular on shape, but no special request square platens or circular platens can be supplied at an extra cost.

**Ranges:** 50 kN to 2000 kN

**Compression Testing Machines Classification :**

- Analogue models.
- Motorized model gauge type / electronic
- Digital models with pace rate indicators.
- Semi-Automatic pace rate controlled
- Fully Automatic models

**Salient Features of CTM's are:**

- High stability Load Frames
- Self-aligning platen assembly.
- Load Gauges are calibrated in kN against certified Proving Rings, traceable to NPL / NCCBM / NABL Standards
- Suitable for testing cubes and cylinders of various sizes.
- Using special platens, bricks can also be tested.
- Logged data printing facility through a parallel port interface available in digital and micro controller and fully automatic version.
- Calibration process accredited by NABL (National Accreditation Board for Laboratories).
- Machines are CE marked from UKCERT, London (UK)
- Operator's safety features like metal door with a perspex window and overload tripping device are provided in all Semi/Fully automatic model



## ZI 2055 COMPRESSION TESTING MACHINE (Four Pillar) Hand Cum Electrical Operated

IS 516, BS 1881

### Specification:

The load frame is made up of high quality steel construction with a fixed. Upper lead carrying a ball seated platen. 4 pillars are fixed to the base and the top plate of the loading frame. The upper and lower plates are adjusted with the help of head screw on either side of the pillar. The ram dia of the machine varies from the requirements of the customer. The lower pattern are at the base of the frame above the ram and it is rectangular in shape. Sufficient clearance is provided between the platens to fit in the cylindrical/ cube moulds. Spacer provided to adjust cubes and cylinders. A 20 cm dia pressure gauge with maximum load induction pointer is fitted on the top panel and in turn is connected to the hydraulic pressure pipe. On the right hand a console is fitted within which the electrical motor is fitted alongwith its coupling which inturn is connected to the pumping unit. A slow / fast loading rate regulator fixed on the top of the console for adjusting the rate of loading. The machine is duly calibrated and passed after inspecting and analyzing it with a compression level indicator is provided as a dip stick.



### Optional:

1. Extra gauges can be attached to the machine (max. 3 nos. ), for better accuracy and results.
2. Electrical connection can either be Single Phase on 220 V A.C., or 3 Phase 440 V A.C.
3. Rectangular plates of various sizes on request.
4. Digital Load Indicator with pressure transducer can be supplied at an extra cost



ZI 2056

## ZI 2056 FLEXURE TESTING MACHINE

IS 516, BS 1881 .

The Flexure Strength Testing are designed to test flexural strength of concrete beams. The design provide maximum rigidity throughout their working range. The load is applied by the downward movement of the piston.

A spacer is for testing different size of beams.

The load is indicated on a calibrated bourdon tube type load gauge of range: 0 - 100 kN x 0.5 kN (0- 10,000 kgf x 50 kgf). The load gauge is calibrated against National Council for Cement and Building Materials Certified Proving Ring.

### Flexure Testing Machines

- Light weight, rugged high strength frame
- Double action hydraulic pump
- Self-aligning roller assembly
- Hydraulic jack provided with retraction spring
- For testing beams of 100 x 100 x 500mm and 150 x 150 x 700mm
- Conforms to IS 516, BS 1881 and ASTM C 78 Two Models are available

**ZI 2057 HAND OPERATED FLEXURAL TESTING MACHINE 250 KN**

**Specification**

1	Ram Diameter (mm)	82
2	Ram Travel (mm)	50
3	Pressure Gauge Diameter (mm)	200
4	Pressure Gauge (in kN)	100
5	Least Count (in kN)	0.5 Kn
6	Maximum Pressure (Kgs. /cm)	200
7	Platen Diameter (mm)	Nil
8	Horizontal Clearance (mm)	210
9	Vertical Day Light (mm)	160(adj)
10	Height Of Load Frame (mm)	850
11	Weight Of Load Frame (Kgs)	150
12	Lead Screw	Yes
	Specimen Size (can Be Tested)	0
13	Cube (mm)	Nil
14	Cylindrical	Nil
15	Flexural Test (size in mm)	100x100x500 150x150x700



ZI 2057

**ZI 2058 FLEXURAL FRAME 100 KN**

ASTM C 293, ASTM C 496, ASTM C 78, EN 12390-5, EN 12390-6, EN 1338, EN 1340  
Flexural frame for above machine connected to the automatic pump 100 kn capacity

**General Properties:**

The Labtest Automatic range of 100 kn capacity flexure testing machines have been designed to meet The need for reliable and consistent testing of flexural test on standard concrete beams, transverse Test on kerbs and flagstones, indirect tensile tests on concrete and interlocking pavers.

Labtest flexural machines consist of their main part; frame. Each part has been designed to manufacture Machines with a high degree of mechanical stability and complies with EN 12390-5, EN 12390-6, EN 1338, EN 1340, ASTM C78, C293 and C496 by choosing suitable accessories.

**Frame:**

The versatile load frame is designed for minimum deflection at maximum load resulting in very high accuracy. The load frame is welded steel fabrication carrying the ram fitted to the upper crosshead.

All frames have a single acting down stroking ram with over travel switch protection to shut the machine down should maximum ram travel be reached. The return of the ram is done by dead weight to get maximum accuracy on the load measurement. The load cell is

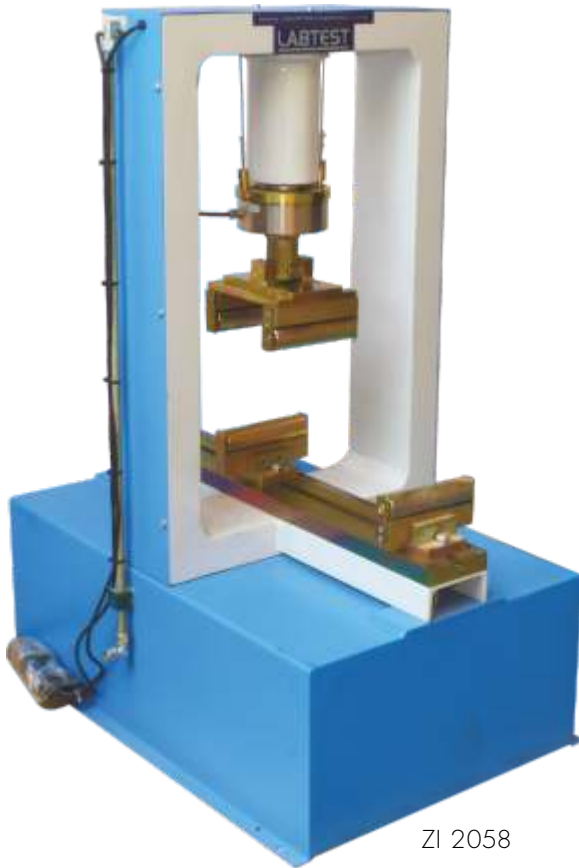
used for load measurements. All flexural frames have been designed to accept all the accessories for flexural and transverse tests. Both frames can be connected to any compression machine as a second frame.

**The main characteristics are:**

- Two capacity high stability welded assembly
- 75 and 100 mm piston stroke with safety limit switch
- Piston return by dead weight
- Can accept all required accessories for mentioned standards

**Data acquisition and control system (Optional Accessory)**

LCD graphics data acquisition and controls system is designed to control the machine and processing of data from load cells or pressure transducers installed on the compression machine frame. The easy to read lcd graphic display and touch-button data pad keys make the unit quick and straight forward to operate. All interaction with the measuring system is via the front control panel by using simple menu-driven procedures. The indicator is contained in light alloy housing and its



ZI 2058

design satisfies the ergonomic requirements for various use. The digital graphic display allows real time load vs time graph. At the end of the test cycle the results can be stored in the large memory or downloaded to a PC in Labtest software format. Dedicated software package is available for further online data processing, database management and certificate printing.

**Safety features all labtest flexural machines are fitted with:**

- Max pressure valve to avoid machine overloading
- Ram travel switch to prevent excessive piston travel

**Technical Specifications:**

- Capacity (kn) 100
- Class 1 range (kn) 10-100
- Resolution 1/65.000
- Ram travel (mm) 75
- Max. Vert. Test space (mm) 170
- Max. Horiz. Test space (mm) 450
- Power (w) 750
- Overall dimensions 600 x 830 x 1140 (only frame) (mm)
- Weight (kg) 180

**ZI 2059 SEMI AUTOMATIC COMPRESSION TESTING MACHINE**

ASTM C39; AASHTO T22; ISO EN 7500, EN 12390-4

The Labtest Semi-Automatic (Motorized) range of 2000 kN and 3000 kN capacity compression testing machines have been designed for reliable and consistent testing of a wide range of specimens. These compression testers are manufactured as a result of continuous research studies to upgrade the machines with the latest technologies to conform with the latest standards EN 12390-3, 12390-4, BS 1881 in terms of its technical properties taking into account the client requirements. These machines also meet the requirements of CE norms with respect to the health and safety of the operator. And their user-friendly design enable an inexperienced operator to perform the test.

**Technical Specifications:**

Model	ZI 2059A	ZI 2059B
Capacity	2000kN	3000 kN
Standard	EN	EN
The roughness value for texture of loading and auxiliary platens	≤ 3.2 μm	≤ 3.2 μm
Lower platens dimensions (dia.)	300 mm	300 mm
Upper platens dimensions (dia.)	300 mm	300 mm
Maximum vertical clearance between platens	340 mm	340 mm
Piston diameter	250 mm	300 mm
Maximum piston movement	50 mm	50 mm
Horizontal clearance	360 mm	425 mm
Power	550 W	550 W
Oil capacity	20 L	20 L
Maximum working pressure	410 Bar	410 Bar
Dimensions (W x L x H) (mm)	740x500 x970	805 x 540 x 1050
Weight	780 kg	1080 kg

Maximum horizontal clearance for placing sample is limited with the border of the platens. Sample must be placed such that its ends will not overflow from the ends of platens and it must be centered perfectly.

The suitable vertical clearance for specimen can be adjusted with distance pieces. Operated on 220 V, 50 Hz, Single Phase.



**ZI 2059-I DIGITAL LOAD INDICATOR**

**Features:**

- Large alphanumeric LCD display with backlight
- 10 Segment bar graph for display of variation in Pace Rate
- Sample Area digitally settable
- Stress at Peak load calculated & displayed
- Peak/Normal mode selectable
- Buzzer alarm for peak detection in Peak Mode
- Relay output for load limit detection
- Digital tare provided
- Non-volatile memory for saving configuration
- RS-232 serial output for logging on PC
- Configuration lock at rear to prevent tampering
- Aesthetically designed front panel with membrane switches

**Specifications:**

Display	:	2 Line alphanumeric display with back light illumination
Range	:	Load : 0.1 KN to 6000 KN
		Set Load (Limit) : 0.1 KN to 6000 KN
		Set Pace Rate : 0.1 KN/sec to 99.9 KN/sec
		Sample Area : 0.1 cm <sup>2</sup> to 999.9 cm <sup>2</sup>
Accuracy	:	± 0.1% of Full Scale ± 1 digit
Relay Logic	:	ON when Actual Load ≥ Set Load Limit
Normal / Peak Mode	:	Selectable from front panel with LED indication of current mode
Peak Detection	:	Buzzer alarm re-settable from front Reset switch / Rear external contact
Tare Facility (Zero)	:	Digital Tare using front panel Tare switch
Memory	:	Non-volatile EEPROM to save settings
Configuration Lock	:	Jumper on rear terminals to prevent alteration of configuration from front
Serial Output	:	RS-232 output to interface to PC
Supply	:	220 V AC ± 15% @ 50/60 Hz
Dimensions	:	Front Fascia: 96 x 192 mm      Cut Out: 92 x 188 mm



ZI 2059 - I



## ZI 2060 FULLY AUTOMATIC COMPRESSION TESTING MACHINE

Labtest make CE certified fully automatic compression testing machine 1000 kn / 2000 kn / 3000 kn capacity with all distance platens for 150 mm cube/100 mm cube 150 x 300 mm cylinders, software.

### General properties:

The automatic range of 3000 kn capacity compression testing machines has been designed to meet the need for reliable and consistent testing of concrete samples. All labtest machines feature the complete automatic test cycle with a closed loop digital readout. Once the specimen parameters have been introduced, it is sufficient to press the start button to complete the test.

**Labtest** compression machines consist of their main parts: frame, power pack and data acquisition & control system. Each part has been designed to manufacture machines with a high degree of mechanical stability and complies to **EN 12390-4, BS 1881 and ASTM C39** (with suitable platen set)

### Standards:

- Automatic test cycle with standard rapid approach
- Graphical-LCD data acquisition and control system
- Menu driven software for easy operation
- Load vs time plot and instantaneous load rate displayed
- Accurate load rate control within  $\pm 5$  from 1 kN/sec to 20 kN/sec
- Class 1 starting from % 10 of the full range
- Ready stress calculation for the standards of EN 12390-3, EN 12390-5, EN 12390-6, EN 1338, EN 1340, EN 196
- SI, Metric, Imperial units
- Data storage up to 256 tests
- RS 232 output for printer or PC
- Free of charge PC software for test control and advanced report printout

### Frame:

The load frame is a welded steel fabrication carrying the ball-seated upper platen. Positively located on the loading ram which is protected from debris by a cover, the lower platen is marked for the centering of cube and cylinder specimens. The dimensions of the frame allow the testing of concrete cylinders up to 320 mm long x 160 mm diameter; 100, 150 mm cubes. All machines are supplied complete with 30 mm, 50mm and 90 mm distance pieces. To test samples shorter than 150 mm extra distance pieces should be ordered. All machines are supplied with flexi glass front and rear removable safety doors. All frames have a single acting upstroking

ram with over travel protection to stop the motor when the maximum platen travel be reached.

### The Main Characteristics Are:

- High stability welded assembly
- 50 mm piston stroke with safety limit switch
- Platen hardness of min 55 HRC
- Distance pieces and safety door included
- Ball seating assembly and frame tested for stability

### Data Acquisition And Control System:

Lcd graphics data acquisition and controls system is designed to control the machine and processing of data from load cells or pressure transducers installed on the compression machine frame. The easy to read lcd graphic display and touch-button data pad keys make the unit quick and straight forward to operate. All interactions with the measuring system are via the front control panel by using simple menu-driven procedures. The bc100 is contained in light alloy housing and its design satisfies the ergonomic requirements for various use. The bc100 digital graphic display allows real time load vs time graph. At the end of the test cycle, the results can be stored in the large memory or downloaded to a PC in Labtest software format. Dedicated software package is available for further online data processing, database management and certificate printing.



ZI 2060

**The Main Characteristics are:**

- High resolution 65.000 points
- 240 x 120 pixel blue-white graphic lcd display
- Standalone full automatic testing capacity
- CPU card by microprocessor 32 bit arm risk architecture
- Can make manual tests if required
- Large permanent memory up to 256 test results
- Rs232c (optional ethernet) connection at 57600 band
- One RS232 serial port for connecting either PC or printer for data transmission
- Two analogical channels, use for load cell or pressure transduce
- A sample type and dimensions can be entered respect to the standard
- 
- 18 key touch membrane keyboard
- Easy to operate with 6 main function keys
- Language select: English
- Can control two frames (Compression & Flexural)

**Power Pack:**

Dual stage power pack which is controlled by is designed to supply required oil to the frames. Very silent Power pack can load a specimen between 1 kn/ sec to 20 kN/sec. On the dual stage pump high delivery low pressure pump is used for rapid approach and low delivery high pressure radial piston pump is used for test execution.

On all power packs maximum pressure valve is used to avoid machine overloading.

**The Main Characteristics are:**

- Dual stage pump
- 750 W power
- 25 liter oil capacity
- 60-100 mm/min fast approach speed

**Safety Features:**

All Labtest compression machines are fitted with:

- Max pressure valve to avoid machine overloading
- Ram travel switch to prevent excessive piston travel
- Front and rear gates with transparent durable flexiglass
- Emergency stop button
- Software controlled maximum load value



Pumping Unit



Indicator

**Technical Specifications:**

**Model**

	<b>ZI 2060A</b>	<b>ZI 2060B</b>
Capacity	2000kN	3000 kN
Standard	EN	EN
The roughness value for texture of loading and auxiliary platens	≤ 3.2 μm	≤ 3.2 μm
Lower platens dimensions (dia.)	300 mm	300 mm
Upper platens dimensions (dia.)	300 mm	300 mm
Maximum vertical clearance between platens	340 mm	340 mm
Piston diameter	250 mm	300 mm
Maximum piston movement	50 mm	50 mm
Horizontal clearance	360 mm	425 mm
Power	750 W	750 W
Oil capacity	20 L	20 L
Maximum working pressure	410 Bar	410 Bar
Dimensions (W x L x H) (mm)	810x500x970	810x500x970
Weight	795 kg	1095 kg

**ZI 2061 COMPRESSION AND FLEXURAL TESTING MACHINES  
SPLITTING TENSILE TEST DEVICE**

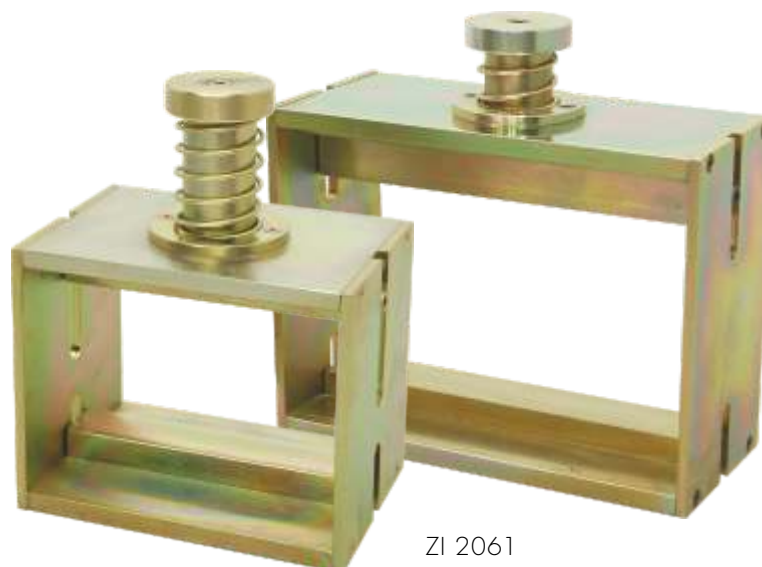
- ZI 2061A**     Splitting tensile test device  
For  $\varnothing 150 \times 300$  mm and  $\varnothing 160 \times 320$  mm  
Cylindrical specimens, ASTM/EN
- ZI 2061B**     Distance piece for ZI 2061A  
For  $\varnothing 100 \times 200$  mm, cylindrical specimens, EN
- ZI 2061C**     Splitting tensile test device  
For 60-150 mm height  $\times 220$  mm  
Length concrete block pavers, EN
- ZI 2061D**     Splitting tensile test device  
For 150x150 mm concrete cubes, EN
- ZI 2061E**     Distance piece for ZI 2061D  
For 100x100 mm concrete cubes, EN

**Standards:**

EN 1338, 12390-6; ASTM C496

The Labtest series Splitting Tensile Test Devices are accessories for compression machines for measuring the splitting tensile strengths of  $\varnothing 150 \times 300$  mm and  $\varnothing 160 \times 320$  mm cylindrical specimens, 150 mm cube concrete specimens and of 60-150 mm height  $\times 220$  mm length concrete block pavers according to the requirements of the related standards.

	<b>ZI 2061A</b>	<b>ZI 2061C</b>	<b>ZI 2061E</b>
Specimen	Cylindrical 150x300 mm 160x320 mm	Concrete Block Pavers 60-150 mm height 220 mm length	Concrete Cubes 150x150 mm
Related Standards	EN 12390-6; ASTM C496	EN 1338	EN 12390-6
Dimensions	340x150x330 mm	240x160x320 mm	180x150x320 mm
Weight (approx.)	25 kg	17.5 kg	15 kg



ZI 2061

**ZI 2062 HYDRAULIC JACKS**

Hydraulic Jacks have multipurpose utility, i.e. application of loads while engaged in field investigation, determination of load carrying capacity of piles in the field, tensioning of wires in pre-stressed structures, loading of members of any structure for deformation characteristics etc. The jacks are supplied complete with manually operated pumping units fitted with bourdon tube type load gauge and high pressure flexible hose pipe. All the jacks have a piston travel of 50 mm and jacks upto 1000 kN capacity are provided with retraction springs.

**Note:** Piston Travel upto 150 mm can be provided on request



Capacity (kN)	Model No.	Specs of Load Gauge		General Specs	
		Range (kN)	L.C. (kN)	Piston Dia. (mm)	Piston Stroke (mm)
50	<b>ZI 2062A</b>	50	0.2	50.0	50
100	<b>ZI 2062B</b>	100	0.5	78.7	50
250	<b>ZI 2062C</b>	250	1	78.7	50
500	<b>ZI 2062D</b>	500	2	111.2	50
1000	<b>ZI 2062E</b>	1000	5	157.0	50
2000	<b>ZI 2062F</b>	2000	10	222.2	50
3000	<b>ZI 2062G</b>	3000	10	272.2	50

**Permeability**

**ZI 2063 PERMEABILITY APPARTUS (THREE CELL MODEL)**

IS 3085, DIN 1048

One of the durability test of concrete is to determine permeability of water through specimen. Permeability apparatus is used for determining the permeability of cement mortar and concrete specimens of 150mm cubes/cylinders cast in the laboratory.

**Specification:**

The concrete permeability apparatus comprises of a mild steel cell of Square/Round cross-section mounted on a stand and a pressure chamber is connected to the cell through copper tubing and T-connector mounted on the stand with sleeve packed valve and rubber hose pipe with end connections. The cell assembly consists of one base plate and one top plate connected to nozzles.

The pressure chamber is fitted with a pressure regulator which helps in regulating the pressure from 0-15kg/cm sq. Gauge is for indicating the pressure in the cell. A foot pump and a pressure tube is supplied to develop pressure in the chamber. The apparatus is supplied with a measuring cylinder 500cc to measure percolated quantity to water.

- Note:**
1. Pressure can also be applied; by a pressure air line or by a compressor (2 HP capacity), can be supplied at an extra cost.
  2. Model available for 6, 9, 12, 18 cells permeability also.



**ZI 2064 RAPID CHLORIDE PERMEABILITY TESTER**

Labtest offers rapid chloride permeability test apparatus. Rapid Chloride Permeability Test equipment (RCPT) has multi-port testing facilities is designed to test concrete samples of 100mm diameter with 50mm thickness for concrete ion permeability test. All the easy connections are ready to use chloride ion permeability test instrument. Customer can test up to three samples at a time as per ASTM C1202 - electrical indication of concrete's ability to resist chloride ion penetration, AASHTO T 277 - electrical indication of concrete's ability to resist chloride ion penetration (Rapid Chloride Permeability Test) and ASTM C 1760 - standard test method for bulk electrical conductivity of hardened concrete

All the cells are provided with connecting rubber gasket and washers for achieving leak proof. Corrosion of reinforcing steel due to chloride ingress is one of the most common environmental attacks that lead to the deterioration of concrete structures. Concrete contains flying ash or silica fumes are less permeability are less permeable to deleterious elements and thus are more durable than conventional concretes. Corrosion-related damage to bridge deck overlays, parking garages, marine structures, and manufacturing plants results huge amount annually on repairs, this durability problem has received widespread attention in recent years because of its frequent occurrence and the associated high cost of repairs. Chlorides penetrate crack-free concrete by number of mechanisms: capillary absorption, hydrostatic pressure, diffusion, and evaporative transport. Mainly diffusion occurs when the concentration of chloride on the outside of the concrete member is greater than on the inside. This results in chloride ions moving through the concrete to the level of the rebar. When this occurs in combination with wetting and drying cycles and in the presence of oxygen, conditions are right for reinforcement corrosion. The rate of chloride ion ingress into concrete is primarily dependent on the internal pore structure.

The pore structure in turn depends on other factors such as the mix design, degree of hydration, curing conditions, use of supplementary cementitious materials, and construction practices. Therefore, wherever there is a potential risk of chloride induced corrosion, the concrete should be evaluated for chloride permeability. The rapid chloride-ion permeability test (rcpt) is designed to assess the resistance of concrete to the penetration of chloride ions, an indicator of its permeability. Complete with tools kit.

RCPT apparatus is a fully self-contained test device complete for Rebar manufacturers, civil engineering laboratories and R&D purpose as per ASTM C1202, AASHTO T277 and ASTM C 1760.

Rating of chloride permeability of concrete according to the rcpt test apparatus is as below:

Rating	Typical concrete type permeability coulombs
High	> 4000 high w-c ratio (> 0.6) conventional PC concrete
Moderate	2000 to 4000 moderate W-C ratio (0.40 to 0.50) conventional PC concrete
Low	1000 to 2000 low W-C ratio (< 0.40) conventional PC concrete
Very low	100 to 1000 latex-modified concrete, internally sealed concrete
Negligible	< 100 polymer-impregnated concrete, polymer concrete

Complete rapid chloride ion permeability tester includes the following items:

- RCPT test apparatus with 4 port (230~250 V AC power supply)
- Plexiglass chambers - 4 pairs
- 300mm vacuum desiccator
- Vacuum pump with gauge
- Moisture trap
- Temperature probe
- Tests sealant + gun acrylic sealer + brush



ZI 2064

**ZI 2065 B TYPE AIR ENTRAINMENT METER**

High-quality type B pressure meters measure concrete air content and include many value-added improvements. Our standard model now features the exclusive Gorilla gauge, and a new, more affordable model offers an American-made stainless steel gauge. Other features of the two units are identical. Long-lasting stainless steel clamps adjust quickly and are less expensive to replace. Pump with large, easy-grip handle builds pressure quickly and is shielded to keep dirt and water out of the piston area. Brass petcocks have stainless steel ball valves for accuracy and durability. Petcock handles are vinyl coated for more comfortable operation. dimensions and accuracy of the meters exceed ASTM requirements. Calibration vessel, calibration tubes, 24in (610mm) tamping rod, aluminum straightedge, syringe for water, carrying case and operating instructions are all included. Cast aluminum chamber volume is 1/4ft<sup>3</sup> and can also be used for unit weight and yield determinations. Sturdy plastic carrying case holds meter with all accessories securely in die-cut foam padding. Case Dimensions: 686 x 356 x 356 mm (W x D x H)



**ZI 2066 AIR ENTRAINMENT METER**

IS 1199 1959 & BS 1881-106

As entrainment of air in limited percentage improves durability of concrete and very low percentages deteriorate it, measurement of air entrapped in freshly mixed concrete becomes important. The use of chemical additives to increase workability of concrete in turn requires an air content check to be made. Air entrainment meters are used to determine air entrained in freshly mixed concrete by pressure method.

**Specification:**

The apparatus consists of a pressure tight flanged cylindrical measuring bowl. The bowl is fitted with a removable flanged conical cover assembly with the help of a seal. The conical cover has an air valve and a petcock for bleeding off the water. A transparent cylindrical stand pipe which is graduated in air content is fixed to the conical cover assembly. Pressure is applied to the specimen with the help of a pressure bulb and the pressure is recorded on the pressure gauge which is mounted on the stand pipe. The whole assembly is mounted on a flat base. The instrument is supplied complete with one each following accessories.

Calibration cylinder with spring clamp, trowel, tamping rod, straight edge. Rubber mallet and measure.

**Models:**

- ZI 2066A** Bowl Capacity: 0.005 cubic meter
- ZI 2066B** Bowl Capacity: 0.007 cubic meter
- ZI 2066C** Bowl Capacity: 0.01 cubic meter
- ZI 2066D** Bowl Capacity: 0.01 cubic meter



ZI 2066

**ZI 2067 CRACK WIDTH RULER**



ZI 2067

This simple gauge has been designed to provide inspectors with a low cost alternative to a graduated microscope for determining the width of a crack in a concrete or other building materials.

Similar in size to a standard credit card, this transparent gauge is marked with a range of graded lines. Each line is a specified width. To use, position the gauge over the crack and identify which line is a similar width to the crack. Read off the width value.

**ZI 2068 CONCRETE TEST HAMMER (SCHMIDT HAMMER) N TYPE**



ZI 2068

EN 12504-2, 13791, ASTM C 805, BS 1881:202, NFP18-417, DIN 1048, UNI 9189

The quality of concrete is mainly judged by its compressive strength directly affecting the load-bearing capacity and durability of concrete structures. ZI 2068 concrete test hammer (Schmidt Hammer N type) is used to measure the compressive strength characteristics of hardened concrete non-destructively, control uniform concrete quality and detect weak spots in the concrete. The test object should have a minimum thickness of 100 mm.

**ZI 2069 ELECTRONIC CONCRETE TEST HAMMER (SCHMIDT HAMMER)**

**Trait:**

- 1) Center rod is made from imported material, high accuracy and durable resistance.
- 2) The high polymer material in order to perfect protect instrument from damage and extend use life.
- 3) Pointer slider is outside structure, its friction can be balance well and easy to be adjusted so that we can make sure that the instrument is accurate. Compared with other suppliers in the line of business, the product is more accuracy, good quality, and best price and longer use life.

**Parameter:**

Test Range	: 10~60mpa
Standard Impact Energy	: 2.207J (0.225Kgf.m)
Stroke of Rebound Hammer	: 75mm
Friction of Pointer Slider	: 0.5n~0.8n
Sphere radius of rebound pole SR	: 25mm 1 mm
Average Rebound Value on Steel Anvil RM	: 802
Size	: 54 x 278 mm
Weight	: 1Kg



ZI 2069

**Specifications:**

Power	Electronic
Brand name	Labtest
Usage	Compression strength
DIY Supplies	Tiling
Test Range	10~60MPA
Standard Impact Energy	2.207j (0.225kgf.m)
Stroke of Rebound Hammer	75 mm
Friction of Pointer Slider	0.5n~0.8N
Shell	High Polymer Material



ZI 2070

**ZI 2070 TESTING ANVIL FOR MECHANICAL & ELECTRONIC HAMMER**

Accessory for calibration check in situ the mechanical and electronic hammer

**ZI 2071 ULTRASONIC PULSE VELOCITY TESTER**

The velocity of ultrasonic wave in concrete is affected by elastic property or strength. Ultrasonic applies high voltage and sends it to transit transducer to generate ultrasonic wave. This ultrasonic wave reaches to the receive transducer through concrete. When elastic property or strength of concrete is high, the transit time is short. On the other hand, when the materials are contrary, the velocity is low. Ultrasonic measures the ultrasonic transit time accurately so it makes possible to evaluate a material or find an elastic properties non-destructively to investigate uniformity, cavities, cracks, fire/frost damage, delaminating, deterioration and strength. We use 52 khz concrete transducers which was designed to send and receive ultrasonic signal effectively in highly extenuative materials, including concrete, wood, stone and plastic. This instrument was developed by cooperative research with research institute of standard & science, subsidized from the national coffers of ministry of science & technology. This is the 4th generation.



ZI 2071



**ZI 2072 DIGITAL PULL-OFF ADHESION TESTER**

In order to perform satisfactorily, coatings must adhere to the substrates on which they are applied. In practice, three different test procedures are used to assess the resistance of paints and coatings to separation from substrates

**Convenient to Use:**

- Portable design, can be used anywhere.
- Built-in rechargeable lithium battery, no need any external power source.
- Selectable directly four different sizes dolly for different resolution and testing range
- Get the testing results from lcd directly.
- Includes all tools needed for testing

**Precise:**

- Each one pressure system is calibrated to within 1% accuracy by NIST traceable load cells
- High-precise professional sensor ensures 0.01 mpa resolution
- Self-aligning dollies ensure to get a reliable testing results for smooth or uneven surfaces.

**Main Technical Parameters:**

- Dolly size: 20mm (standard); 10, 14, 50mm (optional)
- Resolution: 0.01 mpa (1 psi)
- Accuracy: ±1% full scale
- Max. Pull-off pressure:  
 Φ10mm dolly →0-80 MPA; φ14mm dolly→0-40 MPA  
 Φ20mm dolly→0-20 MPA; φ50mm dolly→0-3.5 MPA
- Power: built-in rechargeable lithium battery, and standard configuration charging adapter.
- Adhesion Tester Size: 360×75×115mm (LxWxH)
- Adhesion Tester Weight: 3 kg



Cutting tool for isolating test area



Bigger LCD screen is convenient to read test value and all check relative test information.

Special 3M Adhesive and guns

Rugged carrying case

**ZI 2073 CRACK MICROSCOPE**



ZI 2073

Crack microscope is a high definition device which is used for measuring crack widths both in concrete and other structures like masonry walls. Consists of an adjustable lamp unit and a knob for focusing the image. The 360° turning ability of the eyepiece enables the alignment with the direction of the crack or pitch subject to examination. The battery operated microscope has 40x magnification and 4 mm measuring range with 0.02 mm subdivisions.

**Specifications:**

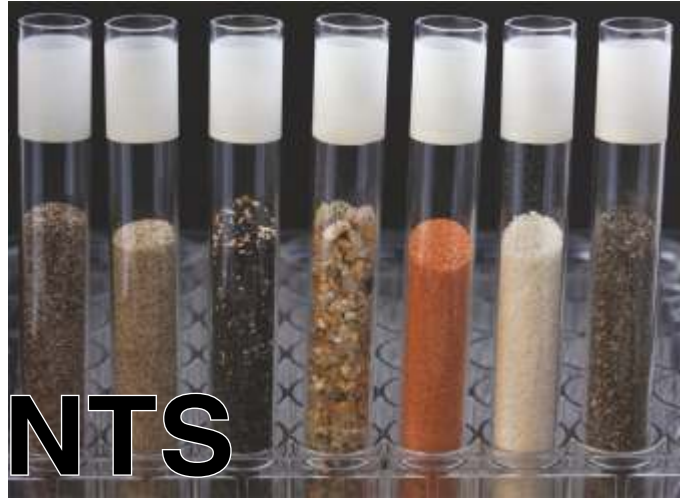
- Magnification : 40 X
- Measuring Range : 4 mm
- Subdivision : 0.02 mm
- Dimensions : 150 x 80 x 45 mm (packed)
- Weight (approx.) : 550 gm

# CONCRETE

## NOTES

A large rectangular area with rounded corners, outlined in blue, containing numerous horizontal dotted lines for writing notes.

# SOIL TESTING EQUIPMENTS



LABTEST Soil Testing Equipments are used for understanding and investigating the physical/mechanical properties, critical characteristic behaviors, performance of soil, unbound and hydraulically bound mixtures during compression, shear or inner liquid flow under dynamic and vibrating loading conditions. Soil characteristics are also used for deciding the most suitable method for excavating underground tunnels. The soil tests provide the engineering firms and construction companies with the ability to predict the mechanical behavior of soils in order to design foundations that ensure resistance to forces likely to act upon it, including any unusual / extreme events such as earthquakes or hurricanes, thus providing a safe environment for people in or around the structures.

48	Shrinkage Limit of Soil	66	Direct Shear Appratus
49	Index Properties of Soil	67	Unconfined Compression Testing
50	Grain Size Analysis	68	Triaxial Test (Cell & Setup)
53	Water Content & Dry Density of Soil	70	California Bearing Ratio
55	Soil Penetrometers	75	Sampling Augers
56	Soil Sampling	76	Sampling Tubes
57	Moisture Meter	76	Static Cone Penetration Test
58	Soil Permeability	77	Vane Shear
59	Field Density	78	Test Sieves
60	Specific Gravity	80	Sieve Shaker
61	Relative Density	81	Plate Load Test
62	Testing Kits	82	Light Weight Deflectometer
63	Extraction & Sample Preparation	83	Load Rings
64	Consolidation		

**ZI 3001 PLASTIC LIMIT SET**

IS 2720 (PART-VII) ASTM D-42, BS 1377 AASHTO T 90  
 Moisture contents at which soil has smallest plasticity is called limit. For determination purpose plastic limit is defined as the water content at which a soil will just begin to crumble when rolled in to a thread of 3mm dia.

**Specification:**

The complete set consists of one each :

1. Glass plate 20cm x 15cm having round ends
2. Brass or stainless steel rod 3mm dia x 150mm long
3. Flexible spatula 15 cm
4. Set of 6 moisture containers
5. Porcelain basin 150mm dia
6. Plastic wash bottle 500ml

**Note:** Glass Plate size 500 x 500 x 10mm can be supplied at an extra cost.



ZI 3001

**ZI 3002 SHRINKAGE LIMIT SET**

IS 2720 (PART-VII) ASTM D 427, BS 1377, AASHTO T 92.

Shrinkage limit is the maximum water content at which a reduction in water content does not cause an appreciable reduction in volume of the Soil Mass. At shrinkage limit, on further reduction in water, air enters in to the voids of soils and thus keeps the volume constant.

The apparatus can be used to determine shrinkage limit and to calculate other shrinkage ratio, shrinkage index and volumetric shrinkage.

**Set consists of one each:**

1. Porcelain evaporating dish
2. Shrinkage dish
3. Glass cup
4. Perspex plate with three metal prongs
5. Flexible spatula 100mm

6. Glass cylinder
7. 25ml x 1ml, supplied without mercury
6. Plastic wash bottle 500ml

**Optional Accessories:**

Mercury supplied in bottle of 500 gms. at an extra cost.



ZI 3002

**ZI 3003 LINEAR SHRINKAGE MOULD**

BS 1377-2

**Specification:**

A simple mould which is filled with the soil under test. This is then dried and the resulting decrease os length of the specimen measured is expressed as the linear shrinkage. It is 25mm Dia. x 12.5mm Height x 140mm Length.



ZI 3003

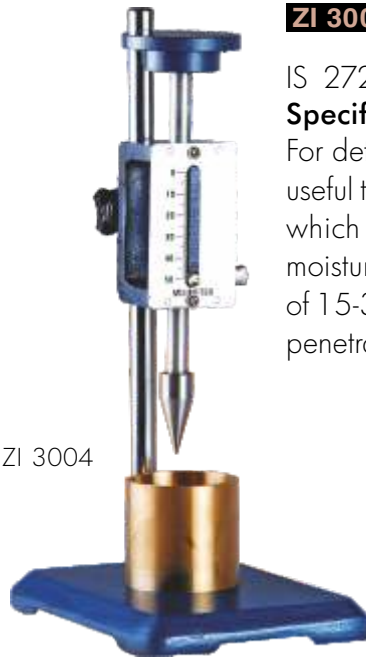
**ZI 3004 SOIL CONE PENETROMETER**

IS 2720 (PART IV)

**Specification:**

For determining the liquid limit of soils. This is specially useful to obtain reliable and accurate results of those soil which have low plasticity index. The percentage moisture contents determined when cone with half angle of 15-30 minutes under a total sliding weight of 148 gm penetrates 25mm gives the liquid limit.

ZI 3004



**ZI 3005 SEMI AUTOMATIC CONE PENETROMETER**

BS 1377:2

**Specification:**

Used to determine the moisture content at which clay soils pass from a plastic to a liquid state. Two Version are available. One the standard one & the other is semi-automatic with timer where the cone is allowed to free fall for a period of 5 seconds including one each of 50 gm. & 100 gm. weight, one penetration cone, preset counter & measuring cup.

ZI 3005



**ZI 3006 LIQUID LIMIT DEVICE WITH COUNTER**

IS 2720 (PART V), BS 1377-2, ASTM D 4318

**Specification:**

Casagrande method in mechanical form is known as liquid limit method and has been in use for soil mechanics for a number of decades. The liquid limit data of soils is useful to correlate mechanical properties of soil, such as compressibility and lower shear strength. Liquid limit is the water content at which soil passes from zero strength to an infinite strength, hence the true value of liquid limit cannot be determined.

For determination purpose liquid limit is that water content at which a part of soil, cut by a groove of standard dimensions, will flow together for a distance of 1.25cm under an impact of 25 blows in a standard liquid limit apparatus. The soil at the water content has some strength which is about 0.17N/cm. sq. (17gms/sq.cm.) . At this water content soil just passes from liquid state to plastic state.

It consists on a brass cup held on an adjustable bracket.

The cup can be adjusted for a fall of 1 cm and can be raised and dropped on a rubber base of standard hardness by cam action. Complete with one Casagrande grooving tool, one ASTM grooving tool and a height gauge block. A counter to register the number of blows.



**ZI 3007 LIQUID LIMIT DEVICE (MOTORISED)**

Same as ZI 3006 but fitted with a motor geared down to give approximately 120 rpm. Suitable for operation on 230 V A.C., Single Phase, 50 Cycles.

**Spares :**

Casagrande grooving tool. ASTM grooving tool, height block, 1 cm high.



ZI 3007

**Grain Size Analysis**

**ZI 3008 HIGH SPEED STIRRER**

IS 2720 (PART IV)

**Specification:**

This is for mechanical analysis and also other laboratory applications for stirring Speed approximately 4000 R.P.M. under load. A dispersion cup is supported on a rest on the stand of the stirrer and has a removable baffle. For operation on 230V A.C. supplied with dispersion cup or baffle cup.



ZI 3008

**ZI 3009 GRAIN SIZE ANALYSIS (PIPETTE METHOD)**

IS 2720 (PART IV) AND BS 1 377:2.

**Specification:**

This is for the determination of the sub sieve particle distribution in a soil sample by mechanical analysis. An analysis of this kind expresses quantity the proportions by weight of the various sizes of particles present in the soil. It is recommended as a standard procedure to use dispersion agent to avoid flocculation.

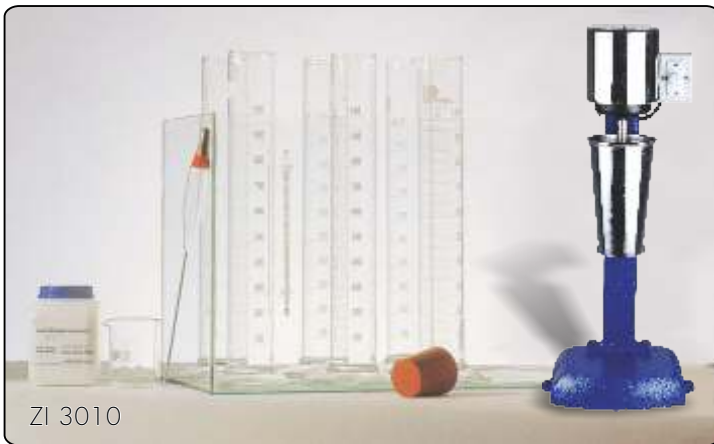
The apparatus consists of a sliding panel which moves up and down by means of a screw allowing Anderson pipette fixed to it to be raised or lowered vertically. A sedimentation tube is held by a laboratory clamp provided on the stand below the pipette. The depth of immersion is measured by a scale graduated in mm at the side of the sliding panel. Supplied complete with Anderson pipette 10ml. At the side capacity made from glass, and a sedimentation tube also of glass of 500ml capacity and 50nos. Test form pads.

**Accessories & Spares: (on extra cost)**

- 1) Sedimentation Pipette (Anderson pipette) 25ml.
- 2) Sedimentation tube 100ml
- 3) Sedimentation pipette 10ml
- 4) Sedimentation tube 500ml
- 5) Test forms pad of 50



ZI 3009

**ZI 3010 PARTICLE SIZE SEDIMENTATION (HYDROMETER METHOD)**

ZI 3010

ASTM D 422 AASHTO T 88, BS 1377-2.

**Specification:**

Particle size analysis of soils:

Hydrometer method

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

**The complete set comprises:**

- **Sedimentation Cylinder**, 1000 ml capacity (6 pieces) with rubber bungs.
- **Soil Hydrometer**, 151H, range 0.995 to 1.038 g/ml with div. 0.001

- **Glass Tank**, dimensions: 600x300x380 mm
- **Heater** complete with thermostat, circulation unit. 230V Single Phase 50Hz 1000W
- **Glass Thermometer**, range -10 to 50° C., Sub-div. 0.5° C.
- **Beaker**, Borosilicate Glass, 250 ml capacity
- **Sodium Hexametaphosphate**, 1000 g
- **High Speed Stirrer**, 4000 R.P.M, complete with baffle cup, for dispersing soil particles in water.

**ZI 3011 SOIL HYDROMETER**

IS 2720 (PART-VI), BS 1377-2

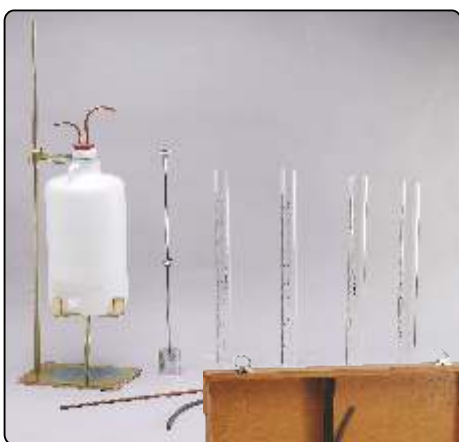
**Specification:**

Used for grain size analysis of soils where more than 10% of the material will pass through 75 microns B.S. sieve. Manufactured from clear transparent glass having uniform clarity throughout the upper end on which density scale is engraved. The scale range is 0.995 to 1.030 density (gms./cc) at 27°C smallest division on the scale is 0.0005.

**Note:** Hydrometer for other liquids also available.



ZI 3011



ZI 3012

**ZI 3012 SAND EQUIVALENT TEST SET**

ASTM D 2419, AASHTO T 176

**Specification:**

Used to determine the relevant proportions of clay-like or Plastic fines and dust in granular soils & fine aggregate

Consists of:

1. Acrylic graduated cylinder (4 nos.)
2. Rubber stopper for cylinder (4 nos.)
3. Graduated Steel rule 450 mm
4. Funnel 100 mm plastic
5. Aspirator bottle 5 lts plastic with rubber cock
6. Stand for the aspirator bottle with siphon assembly
7. Irrigation tube with stop pinch cock & weighted foot assembly

**Optional :** Stock solution can be supplied at an extra cost



**ZI 3013 METHYLENE BLUE TEST SET**

EN 933-9; NFP94-068; UNE 83 180; UNI 8520-15  
 The test set is used for determining the methylene blue value of 0/2 mm/ fraction in fine aggregates.

**ZI 3013A** Methylene Blue Test Set, 210-240 V 50-60 HZ

**ZI 3013B** 1 Filter Paper For Methylene Blue Test  
 Ø:125 mm, 100 Pcs./Pack

**Set consists of**

- High speed agitator motor, 400/600 r.p.m.
- Stirring propeller, ø 70 mm 4 flanks
- Glass burette, 50 ml x 0.1 ml
- Burette holder and stand
- Filter paper, 1 pack (100 pcs.), 125 mm dia, 95 g/m<sup>2</sup>, 0.20 mm thickness
- Glass rod, ø 8x300 mm
- Plastic beaker, 1000 ml
- Methylene blue, 100 g
- Kaolinite, 500 g



ZI 3013

**ZI 3014 MOTORISED SAND EQUIVALENT SHAKER**

ASTM D2419, AASHTO T 176

- Stroke Travel (EN) 200 mm ± 1 mm
- Stroke Travel (ASTM) 203.2 mm ± 1.02 mm
- Rate (EN) 180 mm ± 2/min
- Rate (ASTM) 175 mm ± 2/min
- Dimensions mm (w x l x h) 240 x 800 x 340
- Weight Kg 27.5



ZI 3014

**ZI 3015 PLUMMET BALANCE**

Conventionally particle size distribution analysis is carried out using pipette and hydrometer methods. Whereas in hydrometer method it is possible to determine particle sizes in the range 75 microns, the method involves computation and it is time consuming. The pipette method can be used for determining only the percentage of specific sizes less than 0.02, 0.006 and 0.002 mm as a percentage of total soil sample.

The plummet balance method to determine sub sieve particle size for the entire range is very rapid and only manipulation of height of the balance, so that plummet sinks to the right depth is required.

The percentage of soil in suspension is directly indicated by a pointer over a graduated scale.

A vertical rod is mounted on a sturdy base having leveling screws.

A pointer with steel pivots turns on a jewel bearing and moves over a graduated scale.

Scale graduations are marked 0-100% x 2



ZI 3015



To the other end of the pointer a plummet is hanged. Rack and pinion arrangement is provided on the vertical rod for adjusting the height. Supplied with a chart showing relationship between "K" and temperature of suspension of soils of varying specific gravity from 2.4 to 2.8 to help in solving stroke's equation. Supplied complete with one Perspex plummet one measuring jar and one rider weight for zero adjustment and rider weight for adjusting the pointer to 100%.



**ZI 3016 STANDARD COMPACTION TEST**

IS 2720, (PART-VII)

**Specification:**

The apparatus consists one each of compaction mould steel, 100 mm I.D. x 127.3mm height x 1000 cc. volume, complete with collar and base plate. Compaction Rammer is 2.6 kgs in weight x 310mm controlled fall.

**ZI 3017 STANDARD COMPACTION TEST**

BS 1377-4,1924-2

**Specification:**

The apparatus consists one each of compaction mould steel, 105mm I.D. x 115.5mm height x 1000 cc. volume, complete with collar and base plate. Compaction Rammer is 2.5 kgs. in weight x 300mm controlled fall. Face of the rammer is 50mm

**ZI 3018 STANDARD COMPACTION TEST**

ASTM D 558, D698

**Specification:**

The apparatus consists one each of compaction mould steel, 101.6mm I.D. x 116.4mm height x 944 cc. volume, complete with collar and base plate. Compaction Rammer is 2.5 kgs. in weight x 12" controlled fall. Face of the rammer is 2"

**ZI 3019 HEAVY COMPACTION TEST**

ASTM D 558, D698

**Specification:**

The apparatus consists one each of compaction mould steel, 152.4mm I.D. x 116.4mm height x 2124 cc. volume, complete with collar and base plate. Compaction Rammer is 4.5 kgs. in weight x 18" controlled fall. Face of the rammer is 2"

**ZI 3020 HEAVY COMPACTION TEST**

IS 2720 (PART-VIII)

**Specification:**

Instrument consists one each of compaction mould steel 150 mm I.D. x 127.3mm height volume 2250cc. Complete with collar and base plate. Compaction Rammer is 4.89 kgs. in weight x 450 mm controlled fall.

**Note :** Instead of steel moulds, gunmetal mould are also available.



ZI 3020



**ZI 3021 AUTOMATIC SOIL COMPACTOR**

BS 1377:4

Automatic Soil Compactor BS EN Rammer the automatic soil compactors is designed to provide a fully automatic uniform compaction of standard / modified and CBR specimens assuring conformity with the reference standard.

Compactor is equipped with programmable digital counter which allows machine to stop at the preset numbers of blows. The height and weight of the rammer is adjustable to suit test requirements. The drop weight is adjustable to 300 mm drop height and is also adjustable to 450 mm drop height. The rammer is circular faced with a 50 mm diameter and is adjustable to 2.5 kg. or 4.5 kg.

An automatic blow pattern ensures effective compaction for each layer of soil and the rammer travels across the mould. The table rotates the mould in equal steps and the number of blows per layer can be set at the beginning of the test by the digital counter. User defined blow number and in-out distribution is also available.

A standard proctor / CBR switch, emergency stop and start push buttons are located beside the blow counter. 220V, 50-60 Hz, 1 Ph



ZI 3021



Control Box  
(Close-up)

Drop Height (mm)	300-450 (adjustable)
Rammer Weight (Kg)	2.5-4.5
Dimensions (mm)	640x340x1506
Weight (Kg)	135
Power (W)	370

**ZI 3022 PROCTOR NEEDLES (SPRING TYPE)****Specification:**

The instrument consists of a needle attached to a spring loaded plunger, the stem of which is calibrated to read 0 to 40 kg division. Long stem is graduated at every 12.5mm to read depth of penetration and for use with needles of larger areas. The small penetration stem is also graduation in 12.5mm division and is used with needles of smaller areas. Needle points one each of 0.25, 0.5, 1.0, 1.5, 2.0, 3.5 and 6.0 sq cm. And one Tommy pin is supplied. Complete as above in a wooden carrying case.

**ZI 3023 POCKET PENETROMETER**

ASTM D 1558 D 2573

This instrument is used to estimate approximate unconfined compressive strength and the estimation to shear strength of soil. Cohesive soils can also be classified in terms of consistency using this Penetrometer. This is a handy and convenient instrument.

**Specification:**

It consists of a light weight barrel assembly with a polished and ground steel loading piston plunger. A direct reading scale is engraved on the piston barrel and indicates load in kg. / sq. cm. A maximum load indicator ring is provided on the penetration plunger. The calibrated spring is heat treated and plated for rust resistance. The barrel diameter is 20mm and the length 150mm. Supplied with carrying case.

**ZI 3024 VICKSBERG PENETROMETER (PROVING RING TYPE)**

This is for determining the bearing capacity of sub grades or for compaction control. It also used for rapidly of soils in shallow exploration work.

**Specification:**

Consists of a sturdy handle under. Which is fixed a sensitive proving ring. An extension piece is fixed to the bottom of the proving ring and carries a detachable penetration cone at its tip. Proving ring capacity 100 kg (1kn) and 0.002mm dial gauge provided indicates the penetration load applied.

An optical viewer is provided to facilitate reading the dial gauge by the operator. Simplified for single person operation. A calibration chart is provided for the proving ring. Instrument is complete in a wooden carrying case.

**ZI 3025 WATER LEVEL INDICATOR**

- ZI 3025A** Water level indicator 50 m cable length
- ZI 3025B** Water level indicator 100 m cable length
- ZI 3025C** Water level indicator 150 m cable length
- ZI 3025D** Water level indicator 200 m cable length

The water level indicators (electric contact meters) are portable, easy-to-use and reliable instruments for measuring water level and total depth in bore holes, wells, observation pipes, reservoirs, as well as control of pumping tests.

As soon as the measuring probe electrode touches the water surface, the signal indicator on the instrument lights up with an audible alarm. The water level can be read on the measuring tape in meters (m) and centimeters (cm).



**Technical Specifications:**

Measuring Range	50m, 100m, 150m, 200m
Accuracy	1 cm for a Measuring Range of 100m
Reproductibility	0.5 cm
Pressure Tightness	10 Bar (up to 50 Bar Possible)
Probe	Chromium-plated Brass
Standart Version	14 mm Dia. 140 mm Long
Special Version	10 mm Dia. 320 mm Long
Cable	Polyethylene with 2 steel cores (Anti-corrosive) with Polyamide-coated steel tape, Graduation in millimeters (mm), in centimetres (cm) and numbering in decimetres In black color, the meters (m) figures are red colour on yellow-green base
Cable Drum	Hard Rubber, Plastic Material and Temperature Resistant
Power Supply	3v DC.2 Baby-cells each 1.5v

**ZI 3026 DYNAMIC CONE PENETROMETER**

- A simple and robust instrument for rapid in-situ measurement of the structural properties of road pavements
- Provides fast and efficient method of obtaining information
- For continuous measurements up to a depth of 800 mm and 1,200 mm with the extension rod.
- Portable and can be accommodated in a carrying case

A typical test takes only a few minutes and the instrument therefore, provides a very efficient method of obtaining information which would normally require test-pits. Correlations have been established between measurements with DCP and California Bearing Ration (CBR) so that the results can be interpreted and compared with CBR specifications for pavement design. Agreement is generally good over most of the range but differences are apparent at low values of CBR, especially for fine grained materials.

It incorporates a 8 Kg weight dropping through a height of 575 mm and a 60 deg. cone having a diameter of 20 mm. It is supplied complete with assembly tools and weighs 20 Kg approx.

The DCP needs three operators, one to hold the instrument, other to raise and drop the weight and a technician to record the results. The instrument is held vertically and the weight carefully raised to the handle limit and then allowed to fall onto the anvil.

The equipment consist of the following replaceable parts

- ZI 3026A** Top and Bottom Rod
- ZI 3026B** Handle
- ZI 3026C** Hammer
- ZI 3026D** 1 m Scale
- ZI 3026E** 60 deg. Cone
- ZI 3026F** Anvil





ZI 3027

**ZI 3027 SPEEDY MOISTURE METER (D2 LARGE)**

ASTM D 4944 AASHTO T 217

**Specification:**

The unit consists of a pressure vessel with clamp for sealing cap, capacity is 20 gms. Rubber sealing gasket, pressure gauge calibrated in percentage moisture content 0-25% x 0.25% on the wet weight basis, an electronic balance for weighing sample, a scoop for measuring carbide reagent, a bottle of reagent, one cleaning brush and a set of 4 steel balls for thorough mixing. Complete in highly polished wooden carrying case with handle.



ZI 3028

**ZI 3028 RAPID MOISTURE METER**

The unit consists of a pressure vessel with clamp for sealing cap, capacity is 6 gms. Rubber sealing gasket, pressure gauge calibrated in percentage moisture content on the wet weight basis, a counter poised balance for weighing sample, a scoop for measuring carbide reagent, a bottle of reagent, one cleaning brush and a set of 4 steel balls for thorough mixing. Complete in highly polished wooden carrying case with handle.

**ZI 3028-A** : Pressure gauge calibrated  
0-50% x 0.50%

**ZI 3028-B** : Pressure gauge calibrated  
0-25% x 0.25%

**Spares:**

Carbide reagent, in bottles of 500 gms. each available on extra cost



ZI 3029

**ZI 3029 INFRARED MOISTURE METER**

It is a fast, accurate method to derive direct moisture % in a sample by Loss on Heating Method. Heating arrangement consists of a 250 watt heating lamp with a solid state power stat to control rate of drying and also temperature.

**ZI 3030 PERMEABILITY APPARATUS (FALLING HEAD PERMEABILITY)**

IS 2720 (PART XVII) 1966.

The apparatus is used for the laboratory determination of permeability of soil using a constant or a variable head. This test is recommended for soils with co-efficient permeability in the range of  $0-10^{-3}$  to  $10^{-7}$  cm/sec. The maximum particle size of the soil which can be tested in the mould is 10mm.



ZI 3030

**ZI 3031 UNIVERSAL PERMEABILITY**

IS 2720 (PART XVII)

**Specification:**

Same as ZI 3030 but instead of a set of three glass stand pipes a stand with nine glass tubes of 6mm, 10mm, 20mm, 25mm, 40mm, 50mm, 60mm, 70mm, 75mm, bore tube is provided with over flow arrangement for constant head tests. The remaining tubes are used for falling head test.



ZI 3031

**ZI 3032 SOIL PERMEABILITY 75 MM**

IS 2720 (PART XVII)

**Specification:**

Same as ZI 3030 but with glass tubes of 75mm, bore tube is provided with over flow arrangement for constant head tests. The remaining tubes are used for falling head test.



ZI 3032

**ZI 3033 SAND POURING CYLINDER**

IS 2720 (PART XXVIII) 1966

This apparatus is used for the in place determination of the dry density of compact, fine and medium grained soils and for layers not exceeding 500mm thickness. The complete apparatus consists one each of Small sand pouring cylinder, 3 litre capacity fitted with conical funnel and shutter. Cylinder calibrating container, internal dia 100mm and 150mm height.

**Accessories:**

Metal tray, 300mm square and 40mm deep with hole.

**Note:**

Sand pouring cylinder Medium (150mm) and Large (200mm) as per IS 2720 (P-XXVIII) also available.

**ZI 3034 SAND POURING CYLINDER**

BS 1377-9

**Specification:**

Same as ZI 3033 but this apparatus is as per the BS standard for 100 mm, 150 mm, 200 mm dia cylinders.

**ZI 3035 SAND DENSITY CONE APPARATUS**

ASTM D 1556- AASHTO T 191

**Specification:**

Used to determine the in-situ density of fine grained compacted soil. The test consist in digging a hole into the ground and then collect, dry and weight the sampled soil. The hole is then filled with dry sand from the cone container. The apparatus consist of a double metal cone, one plastic 5 lts jar & a metal tray with centre hole. Size of the cone is 6½" (165.1 mm)

**Note:**

On request 12" (305 mm) Sand Density Cone Apparatus is also supplied at an extra cost.

**ZI 3036 CORE CUTTER**

IS 2720 (PART XXIX) 1966 & BS 1377-9

**Specification:**

This is used for determination of in situ dry density of natural or compacted fine grained soil, free from aggregates. A cylindrical cutter is used to extract a sample of the soil with the help of a dolly and rammer. From the weight, density and the moisture, and dry density of the soil is ready calculated .

It consists one each of: cylindrical core cutter mode of steel, 127.3mm. Long and 100mm internal diameter. Steel dolly, 25mm high with a lip to enable it to be located on top of the core cutter, rammer with detachable steel rod.

**Spare, Optional Extra and Accessories:**

1. Cylindrical core cutter 100mm i.d. x 175mm long
2. Dolly
3. Test form pad of 50.



ZI 3036

**Specific Gravity**

**ZI 3037 PYCNOMETERS**

BS 812

Useful to determine specific gravity of clays, sand and gravel of size smaller than 10mm.

**Specification:**

Comprises a 1 kg. glass jar with brass cone. Locking ring and rubber seal.

**Spare:** Rubber seal.

ZI 3037



**ZI 3038 DENSITY BOTTLE (GAY-LUSSAC TYPE)**

BS 1377-2, ASTM D 854

**Specification:**

For determining the particle density (Specific Gravity) of sand, fine aggregate & filler.

Capacity 25ml, 50ml, 100ml, 250ml, 500ml & 1000ml.



ZI 3038

**ZI 3039 PARTICLE DENSITY BY GAS JAR METHOD (END-OVER-END SHAKER)**

BS 1377-2

**Specification:**

This method applies for soil containing upto 10% of particles retained on 37.5 mm sieve. The equipment is used to rotate two gas jars at approx. 50 R.P.M.. Glass Jar is 1 litre in capacity with rubber bung.



ZI 3039



**ZI 3040 RELATIVE DENSITY TEST**

IS 2720 (PART XIV), ASTM D 4253 & ASTM D 4254

The equipment is used for the determination of the relative density of cohesion less free draining soils and meets the essential requirements

**Specification:**

The equipment consists one each of:

Vibratory table, with a cushioned steel vibrating decks about 75cm x 75cm. It has a frequency of approximately 3600 vibratory table, minute under a 11.5kg load. Amplitude is variable in between 0.65mm in step of 0.05 to 0.25mm, 0.25 to 0.45 mm and 0.45 to 0.65mm. Suitable for operations on 415V, Three Phase supply. Cylindrical metal unit weight mould, 3000ml capacity. Guide sleeve with clamp assembly. Surcharges base plate for mould. Handle for surcharge base plate. Surcharge weight.

The total weight together with surcharge base plate and handle is equipment to 140 kg. / cm<sup>2</sup>. For mould. Cylindrical metal unit weight mould 15000 ml. capacity. (Total weight together with the above mould & surcharge weight is equivalent to 140 kg./ cm<sup>2</sup>) dial gauge 0.01 mm x 50mm travel. Extension piece 25mm for dial gauge.



ZI 3040

**ZI 3041 SOIL TESTING KIT**

A very useful kit to determine on the spot soil pH value. This is a compact kit easy to carry on site.

**Consists of :**

- 12 thick walled test tubes with rubber bungs.
  - 1 tube Cleaning brush.
  - 1 bottle of Barium Sulphate (100gm)
  - 1 bottle of Soil indicator (100gm )
  - 1 bottle of Distilled water (500gm)
  - 1 Spatula.
  - 1 Colour chart, range 4.0 to 8.0 ph in 0.5 ph steps.
- Supplied complete with carrying case.



ZI 3041

**ZI 3042 WATER TESTING KIT**

- A. Acidity Testing Kit
- B. Chloride Test Kit
- C. Hardness Test Kit
- D. Sulphate Test Kit
- E. Alkalinity Test Kit

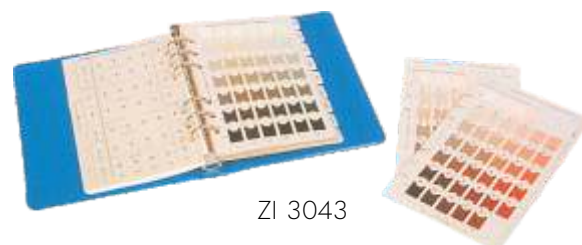


ZI 3042

**ZI 3043 COLOUR STANDARD CHART**

BS 1377:3

The chart provides a simple method for soil classification by of determining the color of soil specimens. Test set consists of 7 constant hue charts covering a total of 196 colors. The color chart and the diagram are fitted in a pocket size binder. Supplied complete with a tropical soil color chart, set of 2 which can be fitted into the binder.

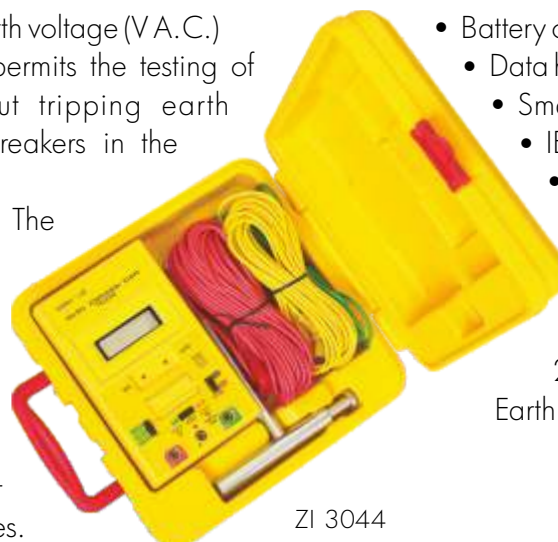


ZI 3043

**ZI 3044 EARTH RESISTIVITY METER**

ASTM G 57

- Capable of measuring earth voltage (V.A.C.)
- 2mA measuring current permits the testing of earth resistance without tripping earth leakage current circuit breakers in the circuit.
- Auto power off function. The timer operates auto power off function. The time operates the "PUSH BUTTON SWITCH" and "TIMER ON BUTTON" are pressed together. This will keep the test "NO" for about three to five minutes.



ZI 3044

Then auto power off.

- Battery operated
- Data hold function
- Small and light weight
- IEC 1010 CAT III 200V
- Calibration performed with supplied test leads

**Specifications:**

Measurement Ranges

Earth Resistance: 0-20W / 0-200W / 0-2000W

Earth Voltage: 0-200V AC (40-500Hz)

**ZI 3045 UNIVERSAL EXTRUDER FRAME HYDRAULIC**

ZI 3045

The extractor frame is used for taking out soil samples compacted or undisturbed, from 100mm dia and 150mm dia cylinders such as Core Cutters, Proctor moulds, C.B.R. moulds etc.

**Specification:**

It consists of a 50Kn capacity hand operated, hydraulic jack mounted on a suitable frame. Two plungers, one for 4"/100mm dia and the other of 6"/150mm dia moulds are supplied Height of thrust plate is adjustable.

**Accessories :**

Set of plungers adaptors and thrust plates for 38mm, 50mm and 75mm dia specimen.

**Note:** Motorised model also available

**ZI 3046 EXTRACTOR FRAME UNIVERSAL (SCREW TYPE)**

ASTM D 698 , BS 598:107

Designed to extract specimens from almost every type of sampling tube and mould used in solid engineering laboratory or in the field. It can be mounted vertically or horizontally as desired. It has a unique feature that three 38mm dia sample.

**Specification:**

Comprises of a frame designed for screw jack operation, one each of the adaptors for 38mm, 75mm, 100mm, 150mm dia meter specimens and a stand to obtain simultaneously three 38mm diameter samples from one 100mm diameter sample. The adaptor plate which slides along the slotted support can be clamped at any desired position by means of locking nuts. Besides this, the tube or mould can be held in position by raising the tube guides and held in position with locking screws. The lead screw movement can be stopped at any predetermined position by tightening the lead screw collar.

Plunger adaptor for 200mm dia samples.

Adaptor plate with 200mm dia hole and device to extract b number 38mm dia samples.

**ZI 3047 SOIL TRIMMER (HAND OPERATED)**

ZI 3047

For trimming various diameter specimen for triaxial and unconfined compression tests.

**Specification:**

The lower specimen grip is mounted on a disc which rotates freely. The soil sample is mounted on the lower specimen grip and the upper grip is firmly seated on top of the specimen. The vertical guide can be adjusted to control the depth of cut. While trimming the lower disc is rotated by hand. Supplied complete with a wire saw. Trimming knife, mounted on a support, can be adjusted horizontally as well as vertically to permit trimming of the specimen to the exact size of the ring. A guide supplied prevents over cutting. Complete with 38mm, 50mm, 75mm and 100mm dia specimen rings.

**ZI 3048 Constant Volume Mould**

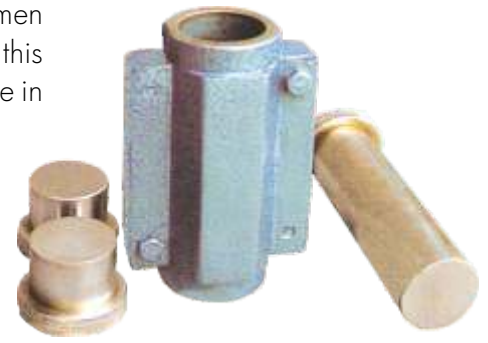
Often in the laboratories it is required to quickly prepare remoulded soil specimen for Triaxial and Unconfined Tests. Constant volume moulds are used for this purpose, using either dynamic or static compaction. The moulds are available in different sizes .

**ZI 3048A** For specimen size 38 mm x 76 mm long comprises  
 Split mould 38 mm dia x 126 mm long.  
 End plug 38 mm dia x 25 mm long pair.  
 Split collar interchangeable.  
 Ejecting plunger 38 mm dia x 126 mm long.

**ZI 3048B** For specimen size 50 mm dia x 100mm long specimen  
 comprises of Split mould 50mm dia x 178 mm long.  
 End plugs 50 mm x 39 mm long pair.

**Accessories :**

Split mould 38mm dia x 76mm long and split mould 38 mm dia. x 86 mm long.



ZI 3048

**Consolidation****ZI 3049 CONSOLIDATION APPARATUS (SINGLE GANG)**

IS 2720 (PART XV)

Consolidation test is un-dimensional test considered extremely important in soil mechanics. Sample taken from adjacent areas of a single site show differential settlement even when tested using same techniques. Soil of similar strength may show varying consolidation. Samples are very carefully prepared and vertical settlement of the specimen in saturated or drained conditions carefully recorded when known load is applied.

**Specification:**

The standard outfit comprises of the following items. Loading unit, maximum capacity 20kg/cm<sup>2</sup>. Having a loading yoke connected to a lever arm with a counter balancing adjustment and having a lever ratio of 1:1 the whole assembly being mounted on a sturdy steel frame stand. The loading unit is so designed that it can be used for consolidation cells of different diameters as well as different dia floating ring type consolidation cells.

Fixed ring type Consolidometer (Odeometer) cell assembly for testing 60mm dia x 20mm thick specimen comprising:

Fixed ring for specimens 60mm dia x 20mm thick with guide ring.

Top and bottom porous stones for 60mm dia specimen.

Perforated pressure pad, channeled base with water inlet and gasket

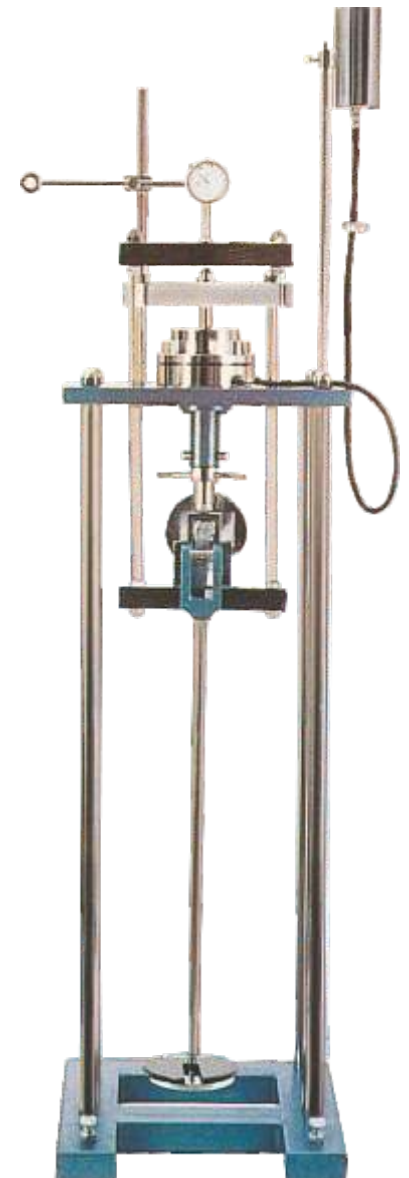
Flanged water jacket, water reservoir with plastic tube and pinch cock.

Set of weights to give a pressure of 10kg/cm.sq. On 60mm dia specimen, comprising : 7 nos. 0.05 kg/cm<sup>2</sup>, 5nos. 0.1 kg/cm<sup>2</sup>, 6nos. 0.5kg/cm<sup>2</sup>, and 5 nos. 1.0 kg/cm<sup>2</sup>.

Supplied complete as above but without dial gauge.

**Accessories :**

Dial gauge 0.002 mm x 5mm. Extension piece, 40 mm long, consolidation test forms pad of 50 for one dimensional consolidation.



**ZI 3050 CONSOLIDATION APPARATUS (FRONT LOADING TYPE)**

BS 1 377-5, ASTM D 2435

**Specification:**

Rigidly manufactured from aluminium alloy casting to provide a high degree of accuracy with any frame distortion under load. The load bridge group is supported in high accuracy self-aligning seat balls. The beam provides three loading ratio: 9:1 10:1 11:1 and the beam assembly is fitted with an adjustable counterbalance weight.

Maximum load: 150 kg of slotted weights. The oedometer accepts cells up to 100 cm. sq. Supplied complete with rod holding the weights and coupling block holding the dial gauge or transducer. Supplied 'without': Consolidation cell, Weights, Dial Gauge (or transducer), holding bench which have to be ordered separately.



ZI 3050

**ZI 3051 CONSOLIDATION CELLS (FLOATING)**

Water trough : Floating ring type of Consolidometer (Oedometer) cell assembly for 60mm dia x 20mm thick specimens complete with floating ring with two guide rings, pair of porous stones, pressure pad and cutting collar.

Set of weights to give a pressure of 10kg/cm. sq. on 60mm dia specimens. Floating ring type of Consolidometer (Oedometer) cell assembly for 50mm dia x 20mm thick specimens complete with accessories as above.



ZI 3051

Set of weights to give a pressure of 10kg/cm<sup>2</sup>. On 70mm dia specimen.

Floating ring type of Consolidometer (Oedometer) cell assembly for 100mm dia x 25mm thick specimens complete with accessories as above.

Set of weights to give a pressure of 10kg/cm<sup>2</sup>. On 100 mm dia specimen.

Additional set of weights for loading up to 20kg/cm<sup>2</sup>.

Set of weights to give a pressure of 10kg/cm<sup>2</sup>. On a 60mm dia specimen comprising 10 off 1.0kg/cm<sup>2</sup>.

Set of weights to give a pressure of 10kg/cm<sup>2</sup>. On a 50mm dia specimen comprising 10 off 1.0kg/cm<sup>2</sup>.

Set of weights to give a pressure of 10kg/cm<sup>2</sup>. On a 70mm dia specimen comprising 10 off 1.0kg/cm<sup>2</sup>.

Set of weights to give a pressure of 10kg/cm<sup>2</sup>. On a 100mm dia specimen comprising 10 off 1.0kg/cm<sup>2</sup>.

Pair of top & bottom porous stones for 50mm dia cell

Pair of top & bottom porous stones for 60mm dia cell

Pair of top & bottom porous stones for 70mm dia cell

Pair of top & bottom porous stones for 100mm dia cell

**ZI 3052 CONSOLIDATION APPARATUS (THREE GANG MODEL)**

BS 1 377-5, ASTM D 2435

**Specification:**

Same as model ZI 3050 but consists of 3 consolidation test assemblies mounted on a single frame. Complete with 3 sets of Consolidation cell assembly for 60mm dia samples and three sets of weights each giving 10 kg/cm<sup>2</sup>. On each sample.

### ZI 3053 CONSOLIDATION APPARATUS (ELECTRONIC BENCH MODEL)

BS 1377-5, ASTM D 2435

#### Specification:

Same as ZI 3052 except that the data is displayed and acquired in the digital electronic system.



ZI 3053

## Direct Shear Apparatus

### ZI 3054 DIGITAL DIRECT / RESIDUAL / SHEAR APPARATUS

ASTM D3080; BS 1377:7; AASHTO T236, CEN-ISO/TS 17892-10

The test covers the determination of consolidated drained shear strength of a soil material in direct shear. This Automatic Direct / Residual Shear Test Machine is motorized and floor mounted. Supplied with carriage assembly load hanger and integral 9:1, 10:1 and 11:1 lever loading device as standard. The beam loading device which is used to amplify the vertical load on the shear box assembly can receive up to 50 kg of weight. The total load on the specimen can reach up to 5 kN (5000 N).

The machine accepts 60 mm square, 100 mm square, 60 mm dia. round, 100 mm dia. round and 2.5 inc. dia. round shear box assemblies. All shear box assemblies are designed to contain water that surrounds the specimen. The Assemblies consist of a shear box with a rigid wall square or round hole complete with a vertical loading pad grooved back face, a grooved retaining plate, 2 pcs. porous plates, 2 pcs. plane grids and 2 pcs. perforated grids.

The shear machine is driven by high resolution servomotor and gear box assembly. Speed range is fully stepless variable over the range 0.00001 to 9.99999 mm/min for both direction (forward and reverse). After test the reverse speed is 10 mm/min. 5 kN load cell is used for load measurement. 10 x 0.001 mm and 25 x 0.001 mm sensitivity linear potentiometric transducers are used for vertical and horizontal displacement measurements respectively. Displacement limits are controlled by limit switch.

Shear Box Assembly, Slotted Weight Set and other



ZI 3054

optional accessories including specimens cutter and extrusion dolly should be ordered separately

The Automatic Direct Residual Shear Test Machine is supplied complete with

- Load Cell 5 kN
- Linear Potentiometric Displacement Transducer (10x0.001 mm)
- Linear Potentiometric Displacement Transducer (25x0.001 mm)
- Software

**ZI 3055 DIRECT SHEAR (MOTORISED TWELVE SPEED)**

IS 2720 (PART XIII)

The apparatus comprises of the following.

**Loading Unit:**

Supplied with load yoke with direct and lever system for applying load. Normal stress capacity 8 kg/sq. cm. Load is applied either directly or through a counter balanced detachable lever. Provision is made for the load to be applied either through a steel ball recessed in the loading pad or direct through a boss on the pre calibrated loading yoke. The loading unit is provided with V strips and roller strips for frictionless movement of shear box housing.

**Shear Box Assembly:**

Comprising direct shear box in two halves for a square specimen size 60 x 60 x 25mm one pair of plain gripper plates, One pair of perforated gripper plates, one pair of porous stones, one top of loading pad.

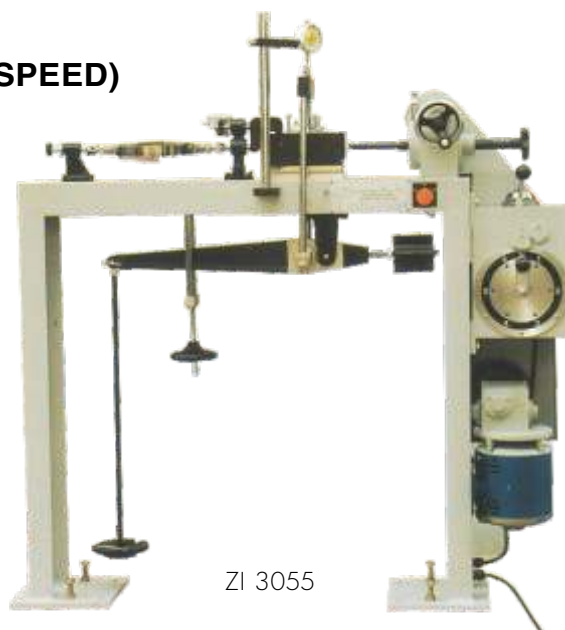
**Shear Box Housing:**

Accommodates the direct shear box assembly. Complete with two ball roller strips.

Specimen cutter: for cutting 60 x 60 x 25 mm.

Specimen form larger samples. Set of weights to give a normal stress of 3kg/sa.cm. Through larger as following :

To give kg/cm. sq.	Qty.
0.05	4 nos.
0.1	1 no.
0.2	1 no.
0.5	3 nos.
1.0	1 no.



Complete set as above but without proving ring. Net weight 140 kg.

**Essential Accessories:**

High sensitivity compression proving ring. Cap 200kg. One consolidation dial gauge 0.01 mm x 25mm and one strain dial gauge 0.01 mm x 25mm

**Optional Extras:**

Additional set of weights to give a normal stress of 5 kg/cm<sup>2</sup>. Soil sampler for 60mm x 60mm specimen and test forms pad of 50.

**Spares:**

Porous stone for 60mm x 60mm size sample available in pairs.

Unit is electrically operated to give the following 12 rates or strains. 1.25, 0.625, 0.25, 0.125, 0.05, 0.025, 0.01, 0.005, 0.002, 0.001, 0.004 and 0.0002 mm/min. The apparatus is suitable for operation on 230 Volts Single Phase A.C. Supply.

**Unconfined Compression Testing****ZI 3056 UNCONFINED COMPRESSION TESTER (MOTORISED)**

IS 2720 (PART X) ASTM T 208

This is a motorized instrument for determining the unconfined compression strength of soil specimens of dia. ranging from 38 to 100mm. Load on the sample is applied gradually by a load frame and loads are measured on a sensitive proving ring attached to the load frame.

**Specification:**

Comprises a screw operated load frame, cap.5000kg with a gear box and motor drive giving 1.25, 1.5, 2.5mm/min. Rates of strain, a pair of cone seating, adaptor for proving ring, and stain dial gauge bracket. Supplied with one pair of male/female coning tools for 38mm dia samples but without ring and dial gauge. Suitable for operation on 230 V, Single Phase A.C. Supply.

**Accessories:**

Coning tools in pairs (Male & Female) for samples having diameter 38, 50, 75 & 100mm



**ZI 3057 TRIAXIAL CELL**

IS 2720 (PART XII) (stationary Bushing) For 38mm Dia Specimen

**Specification:**

The cell is useful for testing 38mm dia x 76mm high soil specimen. Transparent Perspex chamber with anvil and loading plunger, the cell is easily opened by releasing four nuts of the tie rods. It is leak proof up to 10kg/cm.sq. Fluid pressure. An oil plug which can also be used as an air vent is provided for introducing a thin layer of oil over water. This provides effective sealing at the plunger for long duration tests. The cell is fitted with four sleeve packed valves of no volume change type on the base. These valves are used for cell pressure, pore water pressure, drainage or back pressure. The loading plunger of the cell has dial gauge rest.



ZI 3057

- Loading pad made of Perspex for 38mm dia specimens.
- Pair of plain discs made of Perspex 38mm dia 6mm thick.
- Pair of porous stones 38mm dia specimen.
- Split sand former for 38mm dia specimen.
- Sheath stretcher for 38mm dia specimen.
- One dozen rubber sheaths for 38mm dia samples.
- For synthetic rubber 'o' rings for 38mm dia specimen.
- One plastic drainage tube.

**ZI 3058 PORE PRESSURE APPARATUS 10 KG/CM<sup>2</sup>**

This apparatus is used for measuring pore water pressure and pore air pressure in soils. This is as per the principals outlined in the book " measurement of soil properties in triaxial tests" by A.W. BISHOP and D.J. HENKEL. This is used as an accessories for triaxial test apparatus.

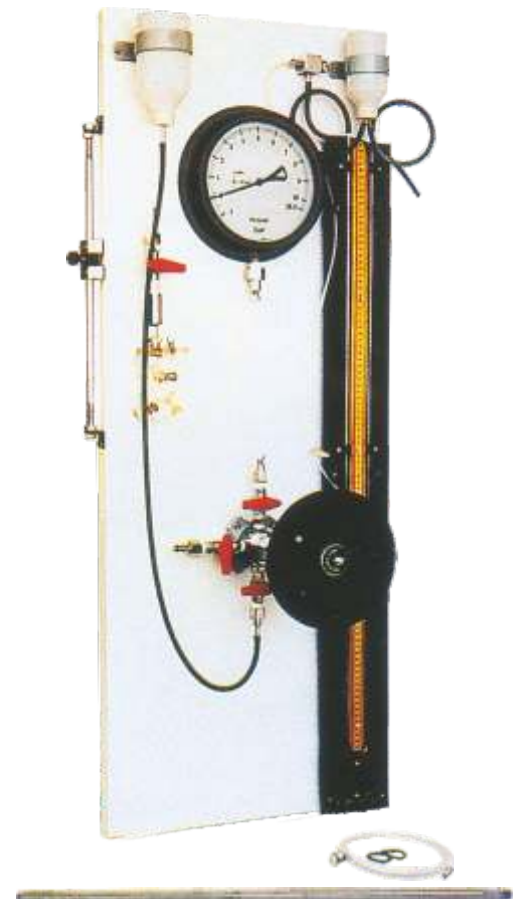
**Specification :**

The apparatus consists of a panel for wall mounting on which are fitted 1.0 to 10kg/cm sq x 0.1kg cm. sq. a pressure gauge, bourdon tube type 15 cm dia.

**Manometer:** Glass u-tube manometer for measuring low positive pore pressures negative pore measures and checking zero error of pressure gauge. It is provided with a mercury trap (mercury supplied at extra cost.) Null indicator made out of clear transparent Perspex with mercury trap and cursor to indicate the mercury level.

**Burette:** 50ml burette for measuring the volume change in the soil specimen. Pressure pump fitted with four sleeve packed valves, operated by means of a hand wheel on the end of the piston rod which is threaded through the pump cap and gives a smooth, fine adjustment of pressure.

Copper coil and water reservoir is fitted on board with complete stand assembly. The unit is tested against leaks up to 10kg/cm sq.





**ZI 3059 PORE PRESSURE APPARATUS 20 KG/CM<sup>2</sup>**

Same as ZI 3058, but fitted with pressure gauge 0-20kg/cm<sup>2</sup> x 0.2kg/cm sq.

**Spares:** Polythene tube 3mm bore x 5 mm. O.D.

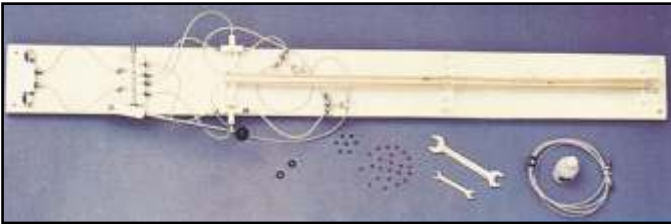
**ZI 3060 VOLUME CHANGE GAUGE**

**ZI 3060A** Single burette, 10ml. Capacity, graduated in 0.05 ml division.

**ZI 3060B** Single burette, 25ml. capacity, graduated in 0.1 ml. Division.

**ZI 3060C** Twin burette, 50ml. Capacity graduated in 0.2 ml divisions.

The unit consists of two glass graduated burettes of 50ml. 0.2ml. Capacity enclosed in two Perspex tubes sealed by two end caps.

**ZI 3061 DEAD WEIGHT TYPE OIL & WATER CONSTANT PRESSURE SYSTEM**

This device is used to maintain cell pressure constant for a long duration and the system can be used in place of conventional constant pressure system using mercury pots where certain minimum heights are required. Problems like de-airation of pump, leakage of mercury etc. is eliminated in this system. This unit is smaller in volume and can be used in mobile laboratory also. This can maintain pressure in the cell upto 20kg/cm sq. Pressure is maintained constant in the system by a balancing calibrated weights on a spindle against a column of oil, operating under constant feed back.

**Construction:**

The system consists of an oil pump continuously driven by an electric motor during the test period. The internal components are housed in a strong compact housing. The piston on which weights are kept rotates with minimum friction. A transparent oil water vessel is provided to transmit pressure to the cell. A hand pump provided facilitates priming and to maintain constant pressure during power failure

**Specification :**

- Range 0-20 bar(0-20kg/cm<sup>2</sup>)
- Steps of pressure 0.5bar(0.5kg/cm<sup>2</sup>)
- Accuracy + 0.5%
- Electric supply 230V, Single Phase, 50Hz, AC supply.

Supplied complete with pressure gauge, flow valves, connecting pressure hose and set of weights to give maximum pressure of 20 bar (20 kg/cm<sup>2</sup>)



**ZI 3062 LATERAL PRESSURE ASSEMBLY 10KG / cm<sup>2</sup>**

It is designed for application of cell pressure upto 10kg/cm<sup>2</sup> on a triaxial specimen in the triaxial cell. The unit is mostly used in routine tests which last for about 10 to 15 minutes wherein the variations of cell pressure can be tolerated.

**Specification :**

The apparatus consists of a pressure chamber which has a flanged top cap fitted with a 10 kg/cm<sup>2</sup>. Pressure gauge and a valve for pumping in air. Water inlet and drain cock are fitted to the chamber.

The foot pump supplied easily develops a pressure of 10 kg/cm<sup>2</sup> Complete with connecting pressure hose.

Note: Also available 20Kg/cm<sup>2</sup>



ZI 3062

**ZI 3063 LOAD FRAME, MOTORISED, 30 SPEEDS**

**Features:**

- Two pillar type
- Detachable Frame
- Enclosed motor and gear system
- Jewel lamps indicating direction of motion
- Operational ease
- Useful for Triaxial and CBR Tests

The Load Frame consists of a cabinet which houses the gear system and motor with sturdy angle iron frame. the loading is done through the bottom loading platen, which is carried on a lead screw, which advances upwards. the top load bracket, which slides over two upright pillars, can be positioned at any desired height and locked. It carries a screw adapter for standard Proving rings and Load Cells.

The loading part of the unit is detachable from the main unit for ease of transport and to avoid damage to the tension rods.

**Rates of Strain:** 30 fixed speeds between 0.00048 mm/min and 6.00 mm/min.

Suitable for operation on 220 V, 50 Hz, single phase, AC supply.



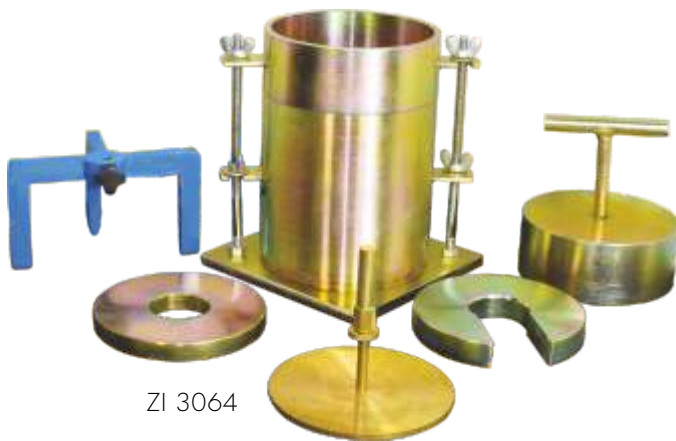
ZI 3063

**California Bearing Ratio**

**CALIFORNIA BEARING RATIO (CBR)**

The California Bearing Ratio Test, (usually called CBR test) is an empirical penetration test for evaluation of mechanical strength of natural ground, subgrades and base courses beneath new carriageway construction. It is to determine the relative bearing ratio and expansion characteristics. It was developed by the California department of transportation before World War II.

The test can be performed in the laboratory on prepared samples or in-situ on location. It is important to appreciate that this test, being of an empirical in nature, is valid only for the application for which it was developed i.e., the design of highway base thickness. The basic site test is performed by measuring the pressure required to penetrate soil or aggregate with a plunger of standard area. The measured pressure is then divided by the pressure required to achieve an equal penetration on a standard crushed rock material

**ZI 3064 CALIFORNIA BEARING RATIO APPARATUS(ASTM VERSION MOULD)**

ZI 3064

ASTMD 1883 AASHTOT 193

**ZI 3064A** CBR mould body complete with collar & perforated base plate. Plated Steel 6 In.(152.4mm) Dia x 7 In. (177.8mm) Height

**ZI 3064B** Spacer Disc with T handle 5 15/16 In. Dia(150.8mm) x 2.416 In. (61.4mm) height

**ZI 3064C** Annular surcharge weight 2.27 kg

**ZI 3064D** Slotted surcharge weight 2.27 kg

**ZI 3064E** Filter paper 150 mm dia No 1 Fisherman (Pack of 100 circles)

**ZI 3065 CALIFORNIA BEARING RATIO APPARATUS (BS VERSION MOULD)**

ZI 3065

BS 1377-4

**ZI 3065A** CBR mould body plated steel, with both ends threaded to fit the base or collar, 152 mm ID x 127 mm high

**ZI 3065B** Extension collar 152mm ID x 50 mm high

**ZI 3065C** Perforated base plate

**ZI 3065D** Solid base or top plate

**ZI 3065E** Cutting collar

**ZI 3065F** C Spanner to mount and dismount the collar from the mould body. Two are required for the operation.

**ZI 3065G** Compaction plug with handle 150 mm x 50 mm high

**ZI 3065H** Annular surcharge weight 2 kg

**ZI 3065I** Split surcharge weight 2 kg

**ZI 3065J** Filter paper 150 mm dia No 1 Fisherman(Pack of 100 circles)

**ZI 3066 LABORATORY CALIFORNIA BEARING RATIO APPARATUS, MOTORISED**

IS 9669, IS : 2720 (PART XVI)

The Apparatus Consists of :

**ZI 3066A**

Load Frame, 50kn ( 5000 kgf) Capacity, 3 Speeds

**ZI 3066B**

Mould 150mm ID x 175mm high

**ZI 3066C**

Perforated Base Plate for ZI3074- 2 Mould

**ZI 3066D**

Extension Collar, 150mm ID x 50mm high

**ZI 3066E**

Penetration Piston, 50mm face dia

**ZI 3066F**

Adjustable Bracket, for Penetration Dial Gauge

**ZI 3066G**

Circular Metal Spacer Disc. With detachable handle, 148 mm dia x 47.7 mm high time.

**ZI 3066H**

Annular Metal Weight, 2.5kg, 147mm dia with 53 mm dia central hole

**ZI 3066I**

Perforated Metal Weight 2.5 kg. 147mm dia, with 53mm dia soft

**ZI 3066J**

Perforated Plate, 148mm dia, with adjustable stem and lock nut

**ZI 3066K**

Metal Tripod for Dial Gauge

**ZI 3066L**

Cutting Collar

**ZI 3066M**

Rammer 2.6kg, 310mm controlled drop

**ZI 3066N**

Rammer 4.9kg, 450mm controlled drop

**ZI 3066O**

Proving Ring Capacity 50 KN

**ZI 3066P**

Dial Gauge, 25 mm travel, 0.01mm least count

Optional Extras:

**ZI 3066Q**

Annular Metal Weight 5 kg, 147mm dia with 53 mm dia central hole

**ZI 3066R**

Slotted Metal Weight 5 kg 147mm dia with 53mm dia slot



ZI 3066

**ZI 3067 AUTOMATIC CBR TEST APPARATUS**

EN 13286-47; BS 1377:4; ASTM D1883; AASHTO T193; NF P94-078; UNI CNR 10009

The automatic CBR test machine is designed for performing laboratory evaluation of the CBR value of highway sub-bases and sub-grade, and determination of the strength of cohesive materials which have maximum particle sizes less than 19 mm (3/4"). This CBR apparatus is composed of a robust and compact two column frame with adjustable upper crossbeam driven by an electro-mechanical ram with a maximum capacity of 50 kn and a data acquisition and processing system.

The machine is designed to load the penetration piston into the soil sample at a constant rate to measure the applied load and piston penetration at predetermined intervals. The ram speed can be set between 0.5 mm/min to 5 mm/min by using the digital readout unit. This main feature allows the user to perform tests complying to BS, EN, ASTM or AASHTO standards with the same machine.

Rapid adjustment of the platen is also provided by up and down buttons which are located on the front panel of the machine. The machine is supplied complete with a 50 kN load cell, penetration piston, linear potentiometric displacement transducer (25 mm x 0.001 mm), computer software and connection cable. PC is optional.



ZI 3067

**Main Features:**

- Calculates corrected CBR value at 2.5 and 5 mm the digital unit saves the load value at user defined displacement values such as 0.625, 1.25, 1.875, 2.5, 3.75, 5, 7.5, 10, 12.5 mm
- The load corresponds to the displacements corrected respect to the linear region of the data has also saved
- The % CBR at 2.5 mm and % CBR at 5 mm is also automatically calculated and saved
- Can make test with displacement and limited load control.
- Real time display of test graph.
- CPU card with 32-bit arm RISC architecture
- Permanent storage capacity up to 10000 test results
- 4 analog channels, 2 channels are active for CBR
- 1/256000 points resolution per channel
- 10 data per second sample rate for each channel
- Ethernet connecting for computer interface
- 800x480 resolution 65535 color TFT-LCD industrial touchscreen
- 4 main function keys
- Multi-language support
- 3 different unit system selection; kn, ton and lb
- Real-time clock and date
- Test result visualization and memory management interface
- Remote connection through ethernet
- USB flash disc for importing test results and for firmware
- USB printer support for inkjet and laser printers(ask for compatible models)
- Camera support for real-time video recording during test(ask for compatible models)
- Free of charge PC software for the test control and advanced report generation

**The CBR test machine is supplied complete with:**

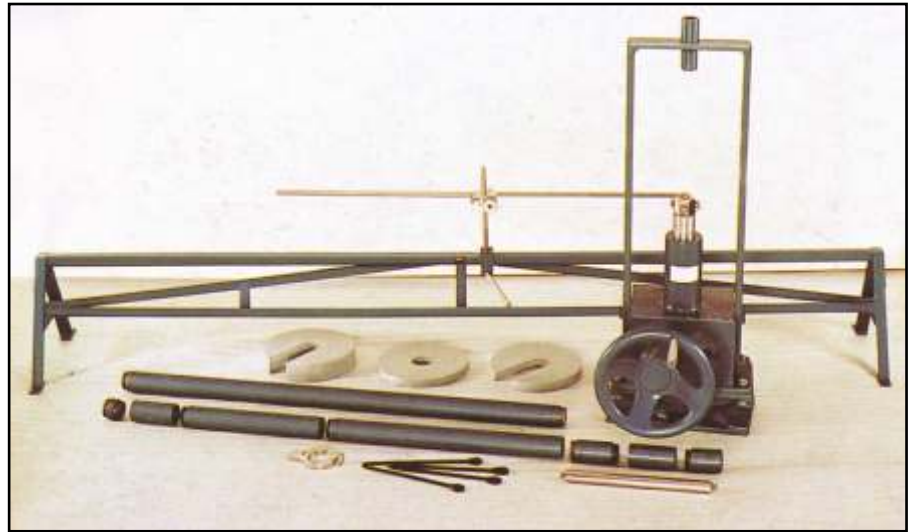
- Load cell, 50 kN
- Penetration piston
- Linear potentiometric displacement transducer with connection part, 25x0.001 mm
- Computer software
- Connection cable
- Advanced report generation

Dimensions	:	480 x 650 x 1150 mm
Weight (approx.)	:	110 Kg
Power	:	370 W

**ZI 3068 CALIFORNIA BEARING RATIO TEST (FIELD TYPE)**

IS 2720 (PART XXXI) 1969.

In recent years it has become important to know C.B.R. values in situ. It is useful in determining the load carrying capacity in the field when in place density and water contents are such that the degree of saturation is 80% of greater, when material is cohesionless and coarse grained, such that it is not effective by changes in water contents and when the material has been in place for considerable the loading is effected by means of a mechanical load frames which can be fixed to the under side of a truck

**Specification :**

Mechanical screw loading jack, 10,000 kg. Capacity with u-bracket and swivel head. Penetration piston, 50mm dia. Threaded at the upper end. Extension rods consisting of 2 lengths 5 cm. g lengths 10cm. 1 length 30 cm., 1 length 50 cm. and 1 length 100 cm. used as spacers between the proving ring and penetration piston. The lengths are machined from steel tubing. Connector set, has eight connectors for coupling the penetration piston and proving ring assembly either directly or through extension pieces. Dial gauge support of seamless pipe constructions. It stands 30 cm high and 45 cm. Wide at the base. Provided with a quick release screw type clamp capable of sliding and locking anywhere along 2 meter length of the bridge. Supplied with annular metal weight 5 kg., 250mm dia with 53 mm dia central hole, slotted metal weight 5 kg., 215mm to 250mm dia with 53 dia slot 2 nos.

**Accessories:**

Dial Gauge 0.01 mm x 25mm.

High sensitivity proving ring 5000kg capacity with calibration chart and carrying case.

**ZI 3069 SWELL TEST APPARATUS****Specification :**

It is designed to determine the swelling pressure developed by soil specimens moulded to desired densities at known moisture contents when soaked in water. The load applied to restrain the swelling is transferred to a load measuring proving ring through a perforated swell plate and a load transfer bar. The proving ring is attached to the lead screw of hand operated load frame. A soaking tank is provided for saturating the specimen and the base of the mould has channels and radial grooves with connecting holes it consists one each of :

**ZI 3069-1**

Load Frame, Hand Operated, Capacity 50 KN (5,000 kgf)

**ZI 3069-2**

Mould, 100mm dia x 127.3mm height (1,000ml volume) with base plate and collar

**ZI 3069-3**

Proving Ring, with integral boss, high sensitivity 2.5KN (250 Kgf) capacity

**ZI 3069-4**

Dial Gauge , 25 mm travel, 0.01 mm least count  
Lid & receiver in G.I. frame for 300 mm dia x 450 mm dia sieves

**ZI 3069-5**

Perforated swell plate, 100 mm dia x 16 mm thick

**ZI 3069-6**

Spencer, 100 mm dia x 12.7 mm thick

**ZI 3069-7**

Pair of Porous stones, 100 mm dia x 12.7 mm thick

**ZI 3069-8**

Load Transfer Bar

**ZI 3069-9**

Steel Ball

**ZI 3069-10**

Soaking Tank, 250 mm dia x 210 mm high



ZI 3069

## Sampling Augers



ZI 3070

### **ZI 3070 AUGER POSTHOLE TYPE**

Augers are used to collect disturbed soil samples at reasonable depths for laboratory tests. Augers are available in two types and each in different sizes. Blade type (posthole type) and helical type (screw type). Each auger outfit consists one each of auger head, one meter long rod, tee piece and handle. Depth of excavating can be increased using additional extension rods.

#### **ZI 3070A AUGER POSTHOLE TYPE**

- |               |               |
|---------------|---------------|
| (a) 50mm      | (b) 75mm      |
| (c) 100mm dia | (d) 150mm dia |

#### **ZI 3070B AUGER SCREW TYPE**

- |               |           |
|---------------|-----------|
| (a) 25mm      | (b) 38mm  |
| (c) 50mm      | (d) 75mm  |
| (e) 100mm     | (f) 150mm |
| (g) 200mm     | (h) 250mm |
| (i) 300mm dia |           |

#### **Extras :**

Extension rod 1 meter length with threading at both ends and couplings, set of two spanners and tee piece.

**ZI 3071 SAMPLING TUBES****ZI 3071A UNRELIEVED**

(a) 150mm (b) 200mm (c) 225mm (d) 300mm long.

**ZI 3071B RELIEVED**

(a) 150mm (b) 200mm (c) 225mm (d) 300mm long.

**ZI 3071C SAMPLING OUTFIT (HEAVY DUTY)**

Undisturbed samples of soil at different depths can be collected using these sampling tubes. The kit includes all necessary implements for boring. Collection and sealing with wax. The operation may be carried out either using a tripod stand or without it. The equipment is supplied in a canvas bag.

**Specification:**

150mm auger blade type, complete with handle 'T' piece and 1 mtr. long rod 1 no.

**Extension:**

1 mtr. long and 37.5mm diameter 5 nos.

Jarring link (large) for driving samplers 50mm, 100mm or 150mm dia. This can be connected to the sampler or to the extension rod.

One eye hook, one wax container, one methylated spirit stove, one wax ladle, and one pair spanners complete in carrying case.

**Accessories:**

Samplers for undisturbed sampling are available in different sizes. These are used with sampling outfit. Each sampler is 45cm long is supplied complete with two end caps, cutting nose. Driving head with air outlet valve and 3 nos. C-spanners. Sampler are available in 50mm dia, 100mm dia & 150mm dia. Thin walled samplers are also available in diameter 50mm, 75mm and 100mm. Each sampler is 60cm long and its cutting edge is hardened. These samplers can be used with sampling outfit 'a' drill rods by using suitable adoptors.



ZI 3071

**Static Cone Penetration Test****ZI 3072 SPLIT SPOON SAMPLER**

IS 2131-1963, IS 9640-1980

**Specification:**

This is used for standard penetration test for determining penetration resistance (N value) of soil which can be related to unconfined compressive strength. Penetration resistance (N value) of soil is determined by giving a number of blows with a 65 Kgs weight falling through a given distance of 75cm required to penetrate the assembly to a depth of 30 cm when properly seated on the ground.

The sampler is made from a steel tube split length wise & held together by a head fitted with a ball check valve & a hardened steel shoe in size cutting edge of 35 mm dia.



ZI 3072

The sampler is 35 mm i.d. & 50.8mm in outer dia & 508mm long. One adopter to connect 'A' type drill rods is also supplied.

**Spares :**

Body of split spoon sampler, shoe of split spoon sampler, head of split spoon sampler.

**ZI 3073 SPLIT SPOON SAMPLER WITH LINER**

**Specification:** Same as ZI 3072 but the diameter is increased to accommodate a brass liner complete with brass liner.





ZI 3075

**ZI 3074 PORTABLE ALUMINIUM DERRICK WITH PULLEY**

It is a light weight aluminium derrick can be dismantled for ease of transportation. The equipment is suitable for shallow soil sampling, standard penetration tests & lifting operations complete with upper tie bolt & ball but without sleeve. The pulley is used with portable aluminium derrick. It attaches to the ball at the top of the derrick.

**ZI 3075 DROP HAMMER AND GUIDE PIPE ASSEMBLY**

Weight 65 Kg. Complete with two end caps to give a free fall of 75cm the drop hammer

**Vane Shear**



ZI 3076

**ZI 3076 LABORATORY VANE SHEAR APPARATUS (MOTORISED)**

Consists of a torque head adjustable in height by means of a lead screw rotated by a drive wheel to enable the vane to be lowered into the specimen. Rotation of the vane is by means of an electrically operated motor. Rate of rotating is 1/60 R.P.M. Suitable for operation on 230 V A.C. Single Phase which operates a worm gear arrangement turning the upper end of a calibration torsion spring, vane dia, rod dia, vane size & vane height are as per IS specifications.

The vane shaft is attached through the hollow upper shaft to a resettable pointer, which indicates the angle of torque on a dial graduated in degree the dial reading multiplied by spring factor gives the torque a container for soil sample is also supplied & a sampling tube of 38mm. i.d. & 150mm long can also be used as container.

Supplied with set of four springs, one each of approx. 2 kgs/cm<sup>2</sup>, 4kgs/cm<sup>2</sup>, 6 kgs/cm<sup>2</sup> & 8kgs/cm<sup>2</sup> complete as above in a wooden carrying case.



ZI 3077

**ZI 3077 POCKET VANE SHEAR APPARATUS**

This is an accurate and portable instrument for the determination of in-situ shear strength of cohesive soil, either on-site or on undisturbed or re-moulded samples in the Laboratory. The instrument comprises of a torque head with a direct reading scale which is turned by hand. A non return pointer assists in reading. Vanes of either 19 mm or 33 mm dia with rods are fixed to the underside of the torque head, and can be pushed well into the undisturbed material below or behind and excavated surface.

**ZI 3078 IN-SITU VANE SHEAR TEST**

IS 4434-1967

**Specification :**

The apparatus is designed for conducting in situ vane shear test from bottom of a bore hole in saturated cohesive deposits for determining their in place shearing resistance.

The equipment consists of a torque applicator assembly mounted on a base, a gear wheel, which is marked in degrees, holds a torque ring and is geared to a crank, the torque ring is a split ring & deforms as torque is applied & the deformation is indicated by a dial gauge. A calibration chart to convert dial gauge readings to torque force in  $\text{kgs/cm}^2$  is supplied. A pointer is provided

For registering the rotations of the vane, a detachable stand is provided to anchor the instrument an attachment to securely hold the string of rods is provided the equipments comprises of the following :

Torque applicator assembly capacity  $2000\text{kg/cm}^2$  with split proving ring & dial gauge  $0.002 \times 5\text{mm}$  complete with stand.

Vane ( with vane rod )  $37.5\text{mm}$  dia x  $75\text{mm}$  high 1 no.

Vane ( with vane rod )  $50.0\text{mm}$  dia x  $100\text{mm}$  high 1 no.

Torque rod ( square cross section)  $0.6\text{mts}$  long 1 no.

Rods quick couplind type, 1 mtr. long 1 no.

Rods quick coupling type,  $1 \frac{1}{2}$  mtr. long 1 no.

Dummy rod, corresponding to  $37.5\text{mm}$  dia vane 1 no.

Dummy rod , corresponding to  $50.0\text{mm}$  dia vane 1 no.

**Test Sieves****ZI 3079 G. I. FRAME SIEVES 300 & 450 MM DIA (POWDER COATED)**

IS 460 (PART I)

A sieve, or sifter, is a device for separating wanted elements from unwanted material or for characterizing the particle size distribution of a sample. This is called a Sieve Analysis (or Gradation Test) the particle size distribution of a granular material.

Labtest offers a wide range of high quality testing sieves which are used in all types of sieve testing applications, from sampling and classification of soils, aggregates and other powdered and granular materials. Labtest testing sieves are of the highest quality to ensure consistent fit, accurate specifications and durable construction.

Woven wire cloth and perforated plate sieves are supplied in 200 mm and 300 mm frame diameters in various nominal aperture sizes suitable for several applications and standards.

Wet washing sieves are used for wet testing of various materials enabling to wash the fines through the sieve without losing any of the sample. Available in 200 mm diameter with 100 mm and 200 mm deep models. They are made with only the highest quality materials and are available in diameter sizes of 100, 200, 300 and 450 mm or in 4, 8, 12 or 18 inches. They can be supplied with aperture sizes ranging from 125 mm down to 20 microns in full or half height versions. Woven wire mesh sieves are available in frame materials of either brass or galvanized steel

**Sizes Available (in mm):** 125, 106, 100, 90, 80, 75, 63, 53, 50, 45, 40, 37.5, 31.5, 26.5, 25, 22.4, 20, 19, 16, 14, 13.2, 12.5, 11.2, 10, 9.5, 8, 6.7, 6.3, 5.6, 4.75, 4.0, 3.35, 2.36, 1.18, 1.00. Lid & receiver.





**ZI 3080 BRASS FRAME SIEVES 100, 200, 300 & 450 MM DIA.**

(BS 410)	(IS 460 part 1.1985)	ASTM E 11 micron	(Aperture)
-	4.75 micron	4	4750
4	4.00 micron	5	4000
5	3.35 micron	6	3350
6	2.80 micron	7	2800
7	2.36 micron	8	2400
8	2.00 mm	10	2000
10	1.70 mm	12	1680
12	1.40 mm	14	1400
14	1.18 mm	16	1200
16	1.00 mm	18	1000
18	850 micron	20	850
22	710 micron	25	710
25	600 micron	30	600
30	500 micron	35	500
36	425 micron	40	425
44	355 micron	45	355
52	300 micron	50	300
60	250 micron	60	250
72	212 micron	70	210
85	180 micron	80	180
100	150 micron	100	150
120	125 micron	120	125
150	106 micron	140	106
170	90 micron	170	90
200	75 micron	200	75
240	63 micron	230	63
300	53 micron	270	53
350	45 micron	325	45
400	38 micron	400	38
500	25 micron	-	25

Lid & Receiver Brass for 200mm dia or 8" dia sieves.

**ZI 3081 SIEVE SHAKER 'ROTAP'**

**Specification :**

To make process of sieving simpler and quicker, Rotap sieve shaker is useful , this produces circular shaking of the sieves. At the same time the sieves are tapped. The mechanism for imparting circular action and topping is oil immersed in a tank and in motorized. The shaker can accommodate upto 7 nos. Sieves of dia 150mm or 200mm. Suitable operation of 230 V A.C. Single Phase.



ZI 3081

**ZI 3082 SIEVE SHAKER 'GYRATORY'**

**Specification :**

Carries upto 7 sieves of 150 or 200 mm diameter. The shaker is driven by a 1/4 H.P. Motor through a reduction gear immersed in oil. The sieve table does not rotate but is inclined from the vertical axis and the direction on inclination charges progressively in clockwise direction. If the stop pin below the table is removed, the shaker can have a rotary motion. In addition to this gyratory motion of the table, there is an upward and downward movement ensuring that each square cm of the sieve is utilized. A pair of rods and a holder can be fixed on the top of the upper most sieve, and thus the sieve set in firmly held. Suitable for operation from 230 V 50 Hz, Single phase A.C. supply.

- a) Adopter for 300 mm dia. sieve available at extra cost
- b) Adopter for 450 mm dia. sieve available at extra cost



ZI 3082

**ZI 3083 WET SIEVE SHAKER**

This is yodar type, motor driven sieve shaker for carrying out wet sieve analysis of materials.

**Specification :**

Consists of a water reservoir and a holder for sieves, which can take up to 7 sieves of 150mm or 200mm diameter. Shaker is driven by a 1/4 H.P. motor through a belt drive. Shaker mechanism moves the sieves up and down in the reservoir. The reservoir has a water out-let for draining out the used water. Suitable for operation 230 V A.C. Single Phase



ZI 3083



ZI 3084

**ZI 3084 SIEVE BRUSHES**

BS 812

**ZI 3084A** Bristle round brush 30 mm.

**ZI 3084B** Nylon sieve brush 33 mm.

**ZI 3084C** Soft Hair brush 3 mm dia.

**ZI 3084D** Double ended brass & nylon bristle.

**ZI 3084E** Double ended nylon sieve brush.

**ZI 3085 PLATE BEARING TEST**

IS 1888 1962, ASTM D 1194, BS 13779

This is for estimating the bearing capacity of shallow foundations in situ and for the design of flexible pavement. In the test procedure a steel plate is subjected to gradually increasing load and settlements of the plates recorded.

- Specification :** The out fit consists of
- 50 tonne hydraulic jack with separate pumping unit fixed to it a 0 - 500KN x 0.5KN. 1 No.
  - Pressure gauge and flexible metal pipe 5 mtr. long 1 No.
  - Special ball and socket arrangement between the jack and the bearing plate 1 No.
  - Extension rod 12mm dia x 25 cm long for taking dial gauge readings 16 Nos.
  - Magnetic base with female thread on top for holding extension rod 4 Nos.
  - Top end plate, 50mm, dia with male thread for fitting onto the extension rods and positioning the dial gauge plunger 4 Nos.
  - Column 15cm dia x 25cm long with flanges complete with four bolts and nuts 2 Nos.
  - Column 15cm dia x 50cm long with flanges complete with four bolts and nuts 1 No.
  - Bridge support of welded steel angle construction, 5 mtr. Span and stands approximately 30 cm. High. Fitted with two quick release clamps a for positioning and holding the dial bracket 2 Nos.

Plane M.S. plate 60cms x 60cm .

Square x 60 cms. Square x 25mm thick.

Plane M.S. plate 45cm x 45cm x square x 25mm thick.

Plane M.S. plate 30 cms x 30 cms x 25mm

thick. Dial Gauge 0.01 mm x 25mm - 4 Nos.

**Accessories:**

Plane M.S. 75mm x 25mm thick

Plane M.S. 50cm x 25mm thick

Grooved M.S. plate 60cms x 60cms x 25mm thick

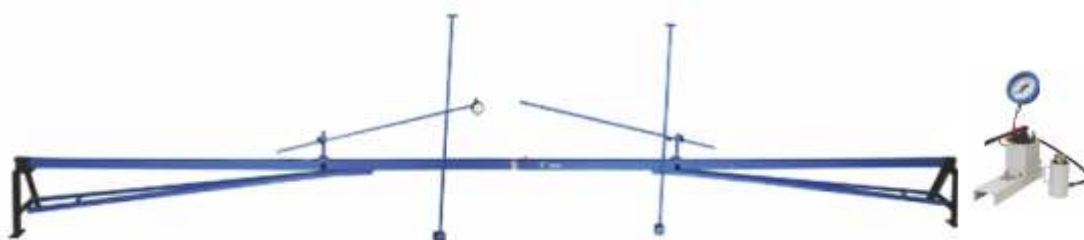
Grooved M.S. plate 45cms x 45cms x 25mm thick

Grooved M.S. plate 30cms x 30cms x 25mm thick

Grooved M.S. plate 75cms x 75cms x 25mm thick

**Note :**

- 1) When plates of size more than 30cm sq, are used, in order to prevent deflection of the edge, a series of smaller plates are advised to be placed concentrically on the bottom plate.
- 2) Flexible rubber pipe 1 mtr. length can be supplied for the hydraulic jack in place of metal pipe at extra cost. For site testing load trusses to meet the reaction of loading are available in different capacities as under.



**ZI 3086 LIGHT WEIGHT DEFLECTOMETER**

ASTM E2835-11

Corresponding to "German technical test code for soil and rock mechanics in road constructions" TP BF-STP part B 8.3 from the German federal road research institute (Bundesanstalt für Straßenwesen) accredited compaction test according to ZTV E 2009 and ZTV A 2012 (German supplementary technical terms and conditions of contract and guidelines for earthworks in road construction and excavations in traffic areas) RL 836 German National Railway Company Deutsche Bahn AG

Calibration record corresponding to German standard TP BF-STB part B 8.3 Detailed instruction manual in English

**Mechanical System:**

- Loading device with 10 kg drop weight (measurement range EVD=1.5-70 mn/Sq. m)
- Load plate 300 mm with high-quality accelerometer
- Angled load plate handles for hooking up (mobile testing system)
- Ergonomic hexangular weight-catching grip for comfortable handling on the construction site
- Safety grip with integrated spirit level, tightly screwed to the guide rod
- Electro less nickel coating, especially suitable for construction sites, since largely resistant to alkaline constituents (lime, cement, concrete etc.)
- TÜV-certified

**Testing Computer:**

Testing computer in weatherproof box with large inspection window and external control buttons, enabling operation under closed cover, protecting the measurement electronics against dust and rain intuitive English-language menu guidance integrated GPS system for immediate calculation, printout and storage of test coordinates testing point will be shown in satellite picture with EVD-value, date and time (can be turned off) integrated thermal printer for immediate report printout on the construction site with GPS coordinates saving on chip card for convenient data transfer to the PC

Text input function available illuminated graphic display for illustration of settlement curves,  $s/v$  value and deflection modulus EVD high-performance rechargeable battery with extremely long service life internal memory for more than 2000 tests, PC interface via USB socket charger for 100-240 V input voltages as well as car charger USB data transfer cable for reading out the internal memory via the PC switchable to 1.5Kg loading device.

**Software in English:**

Software for MS-Windows NT, windows 2000, XP, vista, windows 7 on cd rom presentation of testing points with date and time in satellite picture (can be turned off) Individual data records with user-designed company logo and color coded settlement curves as A4 sized record.

Statistical analysis of the tests in accordance with German standard TP BF STP part B8.3 detailed English user guide.

Information cards with quick start guide in English.

Rules for proper use correlation static/dynamic

Chart EV2-EVD (static/dynamic) with minimum requirements according to German standard ZTV E



**ZI 3087 INTEGRAL PROVING RINGS**

The Proving rings are made of special steel carefully forged to give maximum strength and machined to give high sensitivity commensurate with stability ensuring long life and accuracy.

All proving rings are integral type viz, the loading (outside) bosses are forged integral with the ring body. This ensures that there is no possibility of abutment shift and consequent loss of accuracy in reading that always exists with bolted abutments.

The dial gauge and anvil are mounted on U-brackets clamped to the ring body by set screw. The dial gauge is fitted with a special back cover and threaded bush. Which does not permit any shift from the original dial alignment, coaxial with the loading boss centres, that is set at the factory before calibration.

For all compression proving rings and tension compression proving rings up to and including 5 KN capacity the loading bosses have female threading 1/2" BSP (16 TPI)

The boss faces are ground and polished and are plane parallel to within 0.2mm total DTI run out. Tension compression rings have their integral loading bosses male threaded, 1.25" dia, 8 tpi square thread, 1.25" long. Caps are provided for use when loading in compression

Repeatability is as stipulated in IS 4169 The rings are supplied complete with dial gauge and Works calibration Chart. Individually packed in polished wooden. Boxes. NCCBM Calibration can also be arranged for any proving ring at an additional cost. Proving rings to meet special requirements are also available on request.

Separate polished and ground pair of Loading Pads FOR Compression Proving Rings and Pair of Shackles for Tension Proving Rings are provided to suit each proving ring, at extra cost.



ZI 3087

**COMPRESSION PROVING RINGS**

Sl. No.	Capacity	Design	Approximate Sensitivity	Weight
1	0.25 kN	25 kgf	0.21 N/Div	1.00 kg
2	0.5 kN	50 kgf	0.42 N/Div	1.00 kg
3	1 kN	100 kgf	0.83 N/Div	1.10 kg
4	2 kN	200 kgf	1.15 N/Div	1.20 kg
5	2.5 kN	250 kgf	2.1 N/Div	1.30 kg
6	4 kN	400 kgf	3.3 N/Div	1.40 kg
7	5 kN	500 kgf	4.5 N/Div	1.50 kg
8	10 kN	1,000 kgf	10 N/Div	1.70 kg
9	15 kN	1,500 kgf	17 N/Div	3.40 kg
10	20 kN	2,000 kgf	22 N/Div	3.50 kg
11	25 kN	2,500 kgf	28 N/Div	3.60 kg
12	30 kN	3,000 kgf	33 N/Div	3.75 kg
13	40 kN	4,000 kgf	44 N/Div	3.90 kg
14	50 kN	5,000 kgf	56 N/Div	4.00 kg
15	100 kN	10,000 kgf	125 N/Div	5.00 kg
16	200 kN	20,000 kgf	300 N/Div	14.00 kg
17	300 kN	30,000 kgf	430 N/Div	16.00 kg
18	500 kN	50,000 kgf	833 N/Div	18.00 kg
19	1000 kN	100,000 kgf	2,500 N/Div	24.00 kg
20	2000 kN	200,000 kgf	5,000 N/Div	25.00 kg
21	3000 kN	300,000 kgf	6,000 N/Div	34.00 kg



A large rectangular area with rounded corners, enclosed by a thin brown border. The interior of this area is filled with horizontal dotted lines, providing a space for writing notes.

A large rectangular area with rounded corners, enclosed by a thin brown border. The interior of this area is filled with horizontal dotted lines, providing a space for writing notes.



Bituminous materials, a by-product of the oil distillation process, look set to remain as a constituent material of road paving for some considerable time to come, being used to withstand the flexural and compressive stresses caused by traffic hence the main area of usage of bituminous mixtures is in road construction. The title of bituminous mixtures is called Asphalt in USA. Bituminous mixtures consist of essentially two ingredients, aggregate and binder. The major difference between asphalt and concrete is that bitumen and bituminous materials are used as binder in asphalt

<p><b>88</b> Softening Point</p> <p><b>89</b> Distillation</p> <p><b>90</b> Penetration</p> <p><b>91</b> Crushing &amp; Grinding</p> <p><b>92</b> Binder Extraction</p> <p><b>93</b> Viscosity</p> <p><b>96</b> Paving Mix Tests, Marshall Stability &amp; Compaction</p>	<p><b>98</b> Ductility</p> <p><b>99</b> Surface Regularity</p> <p><b>99</b> Flexure</p> <p><b>100</b> Core Drilling</p> <p><b>101</b> Compaction</p> <p><b>101</b> Asphalt Ovens</p> <p><b>103</b> Asphalt Density</p>
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**ZI 4001 RING AND BALL APPARATUS**

IS 1205 1985, IP 58/63 & ASTM D 36

This apparatus is used to determine Softening point of Bitumen. It is that temperature at which a sample of bituminous material loaded by a 9.5mm dia steel ball, drops a specified distance when heated under specified conditions.

**Specification:**

The apparatus consists of steel bracket with a sliding plate support. That support has two holes of 10mm dia on which a ring and ball guide can be kept. A central hole on this plate is for inserting thermometer. Supplied with a glass beaker approximate 600ml, high and a hand stirrer and 2 Nos. 9.5mm dia steel balls.



ZI 4001

**ZI 4002 RING AND BALL APPARATUS (ELECTRICAL)**

ASTM D36, AASHTO T 53, BS 2000 Electrical heating, with a Heater and Energy Regulator, Suitable for operation on 230 V, 50Hz, Single Phase, A.C. supply. Each unit is supplied with bath of heat resistant glass and the following.

- ZI 4002-A Tapered Rings 2 Nos.
- ZI 4002-B Ball Centering Guide 2 Nos.
- ZI 4002-C Steel Ball, of 9.5mm dia. 2 Nos.
- ZI 4002-D Ring Holder 1 No.
- ZI 4002-E Electric Heater (Hot Plate) 1 No.

**Essential Accessories:**

- ZI 4002-F Thermometer IP 60° C, Range : -2° C to 80° C
- ZI 4002-G Range: 30° C to 200°C



ZI 4002

**ZI 4003 RING & BALL APPARATUS (SEMI AUTOMATIC)**

Ref. Standards - IS:1205, ASTM D 36, E 28, IP 198, IP 58, AASHTO T53, BS:2000, EN 1427

For determining the temperature at which a sample of bituminous material loaded by a 9.5 mm dia steel ball, drops a specified distance when heated under specified conditions.

**Ring and Ball Apparatus**

The new design of Ring and Ball Apparatus is compact user friendly and has better aesthetics. It has magnetic stirrer with heating facility and digital display of temperature, the heating can be adjusted through knob.

Suitable for operation on 220 V, 50 Hz, single phase, AC supply. Each unit is supplied with a bath of heat resistant glass and the following:

- ZI 4003-A Tapered Rings 2 Nos.
- ZI 4003-B Ball Centering Guide 2 Nos.
- ZI 4003-C Steel Balls of 9.5 mm dia 2 Nos.
- ZI 4003-D Ring Holder 1 No.
- ZI 4003-E Electric Heater (Hot Plate) 1 Nos.



ZI 4003

ZI 4004

**ZI 4004 FRAASS BREAKING POINT APPARATUS**

En 12593

**ZI 4004** Fraass Breaking Point Apparatus**ZI 4004-A** Stainless Steel Plaque**ZI 4004-B** Fraass Apparatus (pack of 10)  
Dry ice maker

The ZI 4004 Breaking Point Apparatus is used to determine the breaking point of solid and semisolid bitumen.

The Fraass Breaking Point is the temperature at which bitumen first becomes brittle, as indicated by the appearance of cracks when a thinfilm of the bitumen on a metal plaque is cooled and flexed in accordance with specified conditions.

The apparatus consists of stainless steel plaque, cooling and bending apparatus, thermometer IP 42C (-38°C/+30°C), plate and stand.



ZI 4005

**ZI 4005 WATER IN BITUMINOUS MATERIAL (DEAN-STARK)**

ASTM D 95, D 244

**Specification:**

Used to determine the water in petroleum products or bituminous materials by distilling them with volatile solvent. The equipment comprises electric heater with thermoregulator, glass still, support stand, condenser, receiving trap, clamp.

ZI 4006

**ZI 4006 DISTILLATION FOR CUT BACK BITUMEN**

The apparatus consists of a heavy gauge shield, lagged with asbestos cover in two parts and wire gauge. The shield is supported on a platform with chimney arranged for fitting to stand. Complete with one distillation flask of 500 ml and one 100 ml crow receiver but without thermometer. Electric hot plate heated with energy regulator. Thermometer ASTM 8°C - 2 to +400°C SUBD. 1°C.

**ZI 4007 STANDARD PENETROMETER**

ASTM D5, BS 2000

Used to determine grade of bitumen. The penetration tests determine consistency of bitumen for the purpose of grading. Depth in units 1/10 of millimeter to which a standard needle having a standard weight will penetrate vertically in a duration of five seconds at a temperature of 25° C determines penetration for gradation.

**Specification:**

It consists of a vertical pillar mounted on a base provided with leveling screws. The head, together with dial plunger rod a cone (or needle) slides on a pillar and can be clamped at any desired height. A rack and pinion and pointer assemble provides fine adjustment of needle or cone tip to sample. It incorporates a clutch mechanism. Which makes reading of penetration and subsequent resetting a simple and accurate operation. The dial is graduated in 400 1/10 and the millimeter subdivisions and the needle pointer against figures makes easy reading.

Supplied with a bitumen penetration needle, ring weight one each 50 gms. and 100 gms. two sample containers.

**Accessories:**

Penetration cone for empirical estimation of penetration of lubricating grease, petroleum jelly etc.



ZI 4007

**ZI 4008 DIGITAL PENETROMETER**

IS 310, 1203, 1448, IP 60, 49, 50 ASTM D5, 217, D637, BS 2000-49

Same as ZI 4007 but the unit is compact with timer to control duration of penetration. The instrument is provided with lead screw gear arrangement, leveling screws, Spirit level and a digital preset timer.



ZI 4008

**ZI 4009 SEMI-AUTOMATIC PENETROMETER**

BS 1377:2; NF P94-052-1; CEN ISO/TS 17892-6, 17892-12

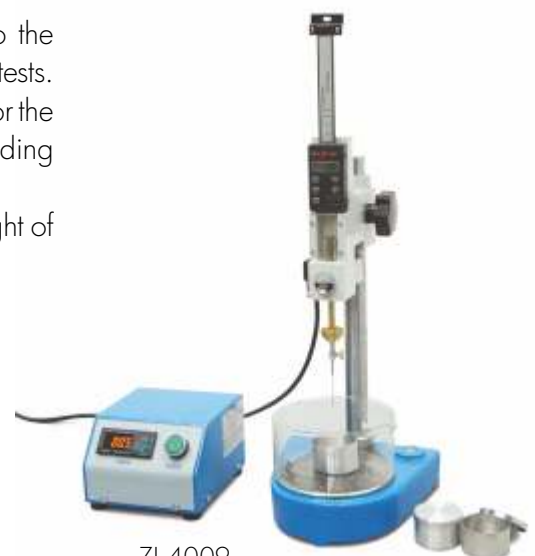
The Semi-Automatic Penetrometer for Liquid Limit consists of a cast iron base with course and fine leveling screws, a digital penetration measurement gauge 0.01 mm resolution/readability and an automatic penetration timer unit.

The is equipped with a digital, 99 second timer, which can be set to the standard 5 second free-fall time or to some other setting for customized tests. When engaged the timer will allow the needle to free fall into the sample for the specific time interval and then lock the needle from advancing while providing a direct reading of the test results.

320 g weight should be added to the 30° angle cone to get a total weight of 400 g for the shear strength test.

Semi-Automatic Penetrometer for Liquid Limit supplied complete with:

- Automatic Penetration Timer Unit
- 30° Penetration Cone
- Sample Cups, 3 pcs. Aluminium, Ø55 mm x h:35 mm.



ZI 4009



ZI 4010

**ZI 4010 REFLUX EXTRACTOR 4000 GMS**

ASTM D 2172- AASHTO T 164

**Specification :**

The simple apparatus working on the same operation principle of consisting of cylindrical glass jar supporting two metal cones of stainless steel cloth and a metal condenser on top of the jar. Supplied complete with 100 filter papers & wire gauge, Hot Plate.

**Note:** Spare Cylindrical glass jar can be supplied at an extra cost.



ZI 4011

**ZI 4011 HARDNESS TESTER FOR MASTIC ASPHALT**

IS 1195

**Specification:**

For determining the hardness number of Mastic Asphalt for flooring.

It consist of an internally insulated cabinet to the base of which is fitted a water bath having two taps. The bath is heated by an immersion heater and the temperature is controlled with the thermostat at  $35^{\circ} \pm 0.5^{\circ} \text{C}$ . A 6.5mm dia pin is loaded on the specimen by means of a lever to give a 31.7 Kg weight. A dial gauge  $0.01 \times 25 \text{ mm}$  is provided to record the penetration of pin into the specimen.



ZI 4012

**ZI 4012 STRIPPING VALUE APPARATUS**

For determining stripping value of bituminous mixes having aggregate size: 1.0mm to 75 micron.

**Specification:**

A circular tray rotates in a vertical plane at a rate of approximately 100 R.P.M. by an electrical geared motor. 4 bottles of approximately 400 cc are mounted on this circular tray at an angle of  $90^{\circ}$  to each other with their mouth towards center of the tray. A time switch is provided. Suitable for operation on 230 V.A.C. Single Phase.

**ZI 4013 CENTRIFUGE EXTRACTOR (HAND OPERATED)**

ASTM D2172, AASHTO T-58, T-164.

**Specification:**

The Instrument is used for determination and checking of Bitumen percentage in Bituminous mix, the mix is added with a solvent and dissolved bitumen is removed by centrifugal action. Consists of a removable Aluminum rotor bowl, Capacity 1500 gms.

With a cap and tightening nut. The bowl assembly is mounted on a vertical shaft, which protrudes from a cast housing. This shaft and thus the bowl is rotated fast manually by enclosed gears in the cast body and handle. Solvent is introduced during the test through the holes in the cap of the housing. A drain is provided to collect dissolved Bitumen coming out of the rotating bowl and getting collected in the housing.



ZI 4013

**ZI 4014 CENTRIFUGE EXTRACTOR (MOTORISED)**

ASTM D2172 AASHTO T-58, T-164

**Specification:**

Centrifuge Extractor, Electrical Operation, Capacity 1500g, with a Dimmer stat for speed control from 2,400 to 3,600 rpm. Suitable for operation on 230 V, 50 Hz, Single Phase, A.C. supply.

**Optional Extra:**

**ZI 4014-A** Filter Paper Discs, Set of 25



ZI 4014

**ZI 4015 CENTRIFUGE EXTRACTOR (MOTORISED)**

ASTM: D2172 AASHTO: T-58, T-164

**Specification:**

Used for the determination of bitumen percentage in bituminous mixtures. It consists of a removable, precision machined aluminium rotor bowl (accessory 1500 or 3000 g capacity), housed in a cylindrical aluminium box. The separate control panel incorporates an electronic card fitted with AC drive that automatically drives the bowl speed rotation ramp from 0 to 3600 R.P.M. as requested by Standards, with automatic fast stop bowl rotation at the end of the test. Supplied complete with speed regulator and digital display monitoring the frequency. Power supply: 230 V A.C. Single Phase.



ZI 4015





ZI 4016

**ZI 4016 FILTERLESS CENTIFUGE EXTRACTOR**

- The equipment is in accordance with EN 12697-1, EN 13108
- Centrifuge is designed for proper separation of the filter quickly without fillers or binders containing suspended sediment mixtures
- Is not required no filter, no dispersion of the material, which ensures maximum accuracy so
- Solution is poured into a funnel and falls in container dia test. 70x200mm that rotates, due to centrifugal effect, the liquid rises vertically, leaving the pot filler and mineral particles
- The centrifuge is supplied complete with aluminum tank, two sites of 2mm and 0.063mm
- Rotation speed is 11,500 rpm and extractive capacity is up to 100 g of filler per test
- 230v, 50hz, 600w

**Viscosity**

**ZI 4017 KINEMATIC VISCOMETER BATH**

This bath is designed and developed under the strict supervision of our experienced professionals in accordance with the international quality standards. Our offered bath is thoroughly checked on various parameters to ensure zero-defect. This bath is widely used in national laboratories and pharmaceutical industries.

**Features:**

- Intelligent signal sampling for accurate data measuring and parameter reading
- Accurate viscometer for improving experimental efficiency
- High precision digital display
- Ideal for controlling the temperature accuracy
- Durable glass bath for optimum heat preservation
- Desktop based all-in-one design for easy operations and portability
- Electric stirrer for ensuring uniform temperature of bath
- Easy cleaning and drying of viscometer tubes

**Other Information:**

The accompanying absolute kinematic viscosity bath are utilized to measure supreme thickness of consistency reviewed clearing bitumen (IS:73:2006) at 60°C as per IS:1206 (part II) (like ASTM D 2171), which utilizes a vacuum slender viscometer.

Complete absolute viscosity testing equipment adjusting to IS: 1206 (part II) method for testing tar and bitumen materials: determination of absolute viscosity with the accompanying segments:

**Consistent Temperature Bath** - a suitable shower for drenching of no less than 2 vacuum fine viscometer tubes with a computerized temperature controller. The precision

of the temperature in the shower will be + 0.1oc all through the shower.

**Vacuum System** - capable of keeping up a vacuum inside + 0.05 cm of the coveted level the system will comprise of vacuum pump, dampness trap, vacuum controller, drain valve, all interconnecting tubing/channeling, and some other frill as required to finish the vacuum framework.

**Thermometer for Bath** - mercury in glass, run 37.8 to 82°C, and graduations of 0.2°C

**Timing Device** - a stop watch is fit of perusing up to 1 second.

**Cannon** - manning vacuum viscometers - viscometer holder and silicone stopper. Size 12 and size 13 (one every) [size 12 is suitable for testing VG-10 and size 13 is suitable for testing VG-20, VG-30, and VG-40 bitumen.



ZI 4017

**ZI 4018 SOLVENT RECOVERY UNIT**

On-flammable solvent liquids used for the binder extraction test can be successfully recovered using the solvent recovery unit.

The recovery unit consists of two stainless steel chambers, one for the dirty used solvent and the other for the cleaned recovered solvent. Solvent in the left-hand side chamber is distilled by an electrical heater and then passes through a water cooling system and drops into the second chamber ready for re-use. A temperature switch automatically stops the heating elements when the recovery process is completed. The unit is supplied complete with 10 m plastic tubing, tube clamps, sieve insert 0.6 mm opening and one lid.

The solvent recovery unit is supplied complete with:

- Plastic tubing, 10 m
- Tube clamps
- Sieve insert, 0.6 mm
- Lid

**Specifications:**

Dimensions : 400 x 320 x 650 mm  
 Weight (approx.) : 17 Kg  
 Power : 1200 W  
 Max. Temperature : 150°C



ZI 4018

**ZI 4019 SAY BOLT VISCOMETER**

ASTM D88, D244, AASHTO T72

Say bolt Viscometer, Electrically Heated, ASTM D88, D244, AASHTO T72 for the empirical measurement of Say bolt Viscosity of petroleum products at specified temperatures between 70°F and 210°F. This is also used for determining the Saybolt Furol Viscosity of bituminous materials at temperatures of 250, 275, 300, 350, 400 and 450°F. It comprises one each of Cylindrical Oil Cup, Universal Tip, Furol Tip, Bath Fitted with immersion Heater mounted on a stand. Dimmer stat for temperature control, Stirrer with shield. Complete with insulated handle and thermometer support receiving flask, withdrawal tube, filter funnel, thermometer support for cup and circular spirit level. Suitable for operation on 230 V 50 Hz, Single Phase, A. C.

**Optional Extras:**

- ZI 4019-A** Brass Oil Tube
- ZI 4019-B** Receiving Flask, 60ml
- ZI 4019-C** Universal and Furol Tip (Set of 2)
- ZI 4019-D** Filter Funnel
- ZI 4019-E** Thermometer Support
- ZI 4019-F** Heating Coil
- ZI 4019-G** ASTM Thermometer Type 18 F  
Range : 66°F to 80°F
- ZI 4019-H** ASTM Thermometer Type 19 F  
Range: 94°F to 80°F
- ZI 4019-I** ASTM Thermometer Type 19 F  
Range: 120°F to 148°F



- ZI 4019-J** ASTM Thermometer Type 20F  
Range: 134°F to 148°F
- ZI 4019-K** ASTM Thermometer Type 21 F  
Range : 174°F to 188°F
- ZI 4019-L** ASTM Thermometer Type 22 F  
Range : 204°F to 218°F
- ZI 4019-M** ASTM Thermometer Type 77F  
Range: 245°F to 265°F
- ZI 4019-N** ASTM Thermometer Type 77F  
Range: 295°F to 315°F
- ZI 4019-O** ASTM Thermometer Type 78 F  
Range: 345°F to 365°F
- ZI 4019-P** ASTM Thermometer Type 80F  
Range : 395°F to 415°F
- ZI 4019-Q** ASTM Thermometer Type 81 F  
Range: 445°F to 465°F

**ZI 4020 SAYBOLT TWO-TUBE DIGITAL VISCOMETER**

ASTM D88, AASHTO T72

The Saybolt Viscometer is used to determine empirical measurement of Saybolt Viscosity of petroleum products at specified temperatures.



The viscometer can be used for temperatures between 21 to 99°C (70 to 210°F) the viscometer includes water-oil bath, stirrer, cooling coil, electric heater with digital thermo regulator, furol orifice, universal orifice, thermometer support and 2 x 60 ml glass Saybolt Viscosity Flask.

Viscosity thermometer set consists of 6 thermometers with the temperature ranges; 19 to 27°C, 34 to 42°C, 49 to 57°C, 57 to 65°C, 79 to 87°C (250 mm length) and 95 to 103°C where each thermometer with 0.1°C subdivisions.

Filter funnel, withdrawal tube and thermometer set should be ordered separately.

Supplied complete with:

Universal orifice

Furol orifice

Thermometer support

Heat transfer oil, 5 lt

Key Saybolt Viscosity Flask, Glass, 60 ml, 2 pcs.

**ZI 4020** : Saybolt Two-tube Digital Viscometer  
220-240 v 50-60 Hz

**ZI 4020A** : Filter Funnel with Wire Mesh and Clip

**ZI 4020B** : Withdrawal Tube

**ZI 4020C** : Saybolt Viscosity Thermometer set, 6 Pcs.

**ZI 4020D** : Saybolt Viscosity Flask, Glass, 60 ml

Dimensions : 450 x 300 x 550 mm

Weight (approx.) : 10 Kg

Power : 750 W

**ZI 4021 STANDARD TAR VISCOMETER**

Electrical Heating with Immersion Heating Elements and Dimmer stat for controlling the temperature. Suitable for operation on 230 V, 50Hz, Single Phase , A.C. supply. Supplied complete with 10mm cup and valve.

**ZI 4021A** Cup, 10mm

**ZI 4021B** Ball Valve, 10mm

**ZI 4021C** Cup, 4mm

**ZI 4021D** Ball Valve, 4mm

**Optional Extras:**

**ZI 4021E** Thermometer IP 8C, Range: 0° to 45° C

**ZI 4021F** Thermometer IP 9C, Range: 40° to 85° C

**ZI 4021G** Thermometer IP 10C, Range: 76° - 122° C



**ZI 4022 MARSHALL STABILITY TEST APPARATUS**

ASTM: D 1559 T-62. BS 598-107

Marshall Apparatus Consists Of:

- Robust construction
- 50KN capacity
- Rate of travel 50.8mm/min
- Safety cut-off switch

It consists of body housing, a geared screw jack and motor drive mechanism suitable for operation on 230 V, 50Hz, Single Phase, A.C. supply.



ZI 4022-I



ZI 4022

<b>ZI 4022-A</b>	MARSHALL LOAD FRAME	1 No.
<b>ZI 4022-B</b>	Breaking Head Stability Mould, with a dial gauge ( having 25mm travel and 0.01 mm least count), for flow measurement	1 No.
<b>ZI 4022-C</b>	Compaction Mould, Steel cylindrical	3 Nos.
<b>ZI 4022-D</b>	Base Plate	3 Nos.
<b>ZI 4022-E</b>	Extension Collar	3 Nos.
<b>ZI 4022-F</b>	Compaction Pedestal, Manual Operation, Comprising a steel plate capped on a wooden post. A Mould Clamp is fitted to the top of the plate .	1 No.
<b>ZI 4022-G</b>	Compaction Hammer, satisfies BS 598. The hammer has a 4535 g sliding weight with a free fall of 457 mm	2 Nos.
<b>ZI 4022-H</b>	Load Transfer Bar	1 No.
<b>ZI 4022-I</b>	Paper Discs, Non absorbent, 11 cm diameter pack of 100 No.	1 Pkt.

**ZI 4023 AUTOMATIC MARSHALL STABILITY TEST MACHINE**

- ZI 4023-A** Automatic Marshall Stability Test Machine, 50 KN, 220-240 V 50-60 HZ
- ZI 4023-B** Breaking Head (Stability Mould) 4"
- ZI 4023-C** Linear Potentiometric, Displacement Transducer, 25x0.001 mm with Bracket for ZI 4023-A and ZI 4023-B
- ZI 4023-D** Indirect Tensile Splitting Device for Compacted Bituminous Samples 100 mm (4") Dia.

EN 12697-34, 12697-23, 12967-12, ASTM D1559, D5581, D 6927; AASHTO T245

The 50 kN capacity Automatic Marshall Stability Test Machine is used to determine the maximum load and flow values of bituminous mixtures. The machine comprises of a robust and compact two column frame with adjustable upper cross beam. The unit is a bench mounting compression frame with motor and worm gear housed within the base unit. The speed of the lower platen can be adjusted between 6 mm/min to 60 mm/min using the data acquisition and control unit. For safety, the up and down travel of the lower platen is limited the use of limit switches. Rapid adjustment of the platen is controlled using the up and down buttons on the front panel of the machine. The machine can be hand operated by a lateral hand wheel for calibration purposes.

The measuring system consists of a 50 kn capacity strain gauge load cell fitted to the upper cross beam to read stability values and the 25 x 0.001 mm linear potentiometric displacement transducer fitted to the breaking head. The Automatic Marshall Stability Machine is suitable for testing 6" dia. 4" dia. specimens conforming to ASTM D5581

**The Automatic Marshall Stability Test Machine is supplied complete with:**

- Load cell, 50 kn
- Linear potentiometric displacement transducer with bracket, 25 x 0.001 mm
- PC software
- Connection cable
- Hand wheel for manual control
- Breaking head, 4

**Main Features**

- Automatically calculates flow and stability values
- Can make test with displacement and limited load control
- Real time display of test graph.
- CPU card with 32-bit Arm RISC architecture
- Permanent storage capacity up to 10000 test results.
- 4 analog channels, 2 channels are active for marshall test
- Programmable digital gain adjustment for load-cell, pressure transducers, strain-gauge based sensors, potentiometric sensors, voltage and current transmitters
- 1/256000 points resolution per channel
- 10 data per second sample rate for each channel
- Ethernet connecting for computer interface
- 800x480 resolution 65535 color TFT-LCD industrial touchscreen
- 4 main function keys
- Multi-language support
- 3 different unit system selection; kn, ton and lb
- Real-time clock and date
- Test result visualization and memory management interface
- Remote connection through ethernet
- USB flash disc for importing test results and for firmware
- USB printer support for inkjet and laser printers (ask for compatible models)
- Camera support for real-time video recording during test (ask for compatible models)
- Free of charge PC software for the test control and advanced report generation



ZI 4023



ZI 4024

**ZI 4024 MIXER WITH HEATING JACKET**

A 6-litre Mixer Used in conjunction with an Iso Mantle, is suitable for mixing samples of asphalt.

Bench mounting Mixer, 6 liter nominal capacity. Supplied with bowl, beater and whisk. Motorised with two speed operated on 230 V A.C., Single Phase.

**ZI 4025 DUCTILITY TESTING APPARATUS**

IS 1208-1058, ASTM D 113, IP32, 55, AASHTO T 51  
Designed to test three specimens simultaneously. The machine consists of a carriage moving over a lead screw. An electric motor driven reduction gear unit ensures smooth constant speed and continuous operation. The entire assembly is mounted with a stainless steel lined water bath completely encased in metal bound hardwood. It is equipped with an electric pump circulator and heater. The temperature is controlled thermostatically. Two rates of travel i.e. 50 mm/min and 10 mm/min are provided. Suitable for operation on 230 V, 50 Hz, Single Phase, A.C. supply.

**Complete With:**

**ZI 4025-A** Ductility Mould, with Base Plate  
3 Nos.

**ZI 4025-B** Thermometer IP 38° C, Range:  
23° C to 27° C

**ZI 4026 REFRIGERATED DUCTILITY TEST**

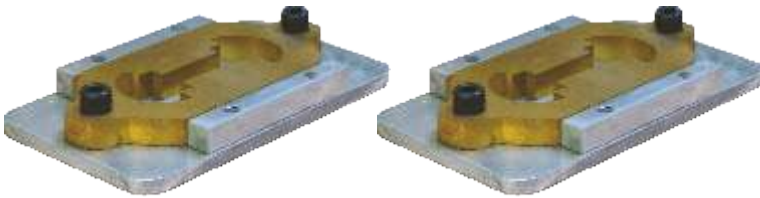
With refrigeration system and micro-processor based digital temperature controller. Ductility is defined as distance in cm to which a standard briquette of bitumen can be stretched before the thread breaks. The briquette is stretched at a rate of 50 mm/min.  $\pm 2.5$  mm per minute at a temperature of  $27^{\circ}\text{C} \pm 0.5^{\circ}\text{C}$ . The machine is having built in refrigeration system to work a below ambient temperature up to  $8^{\circ}\text{C}$  in tropical conditions. The machine will operate at  $27^{\circ}\text{C}$  with control accuracy of  $\pm 0.5^{\circ}\text{C}$  as per the requirement of IS. The apparatus consists of water bath with a heater, and a circulating pump to maintain uniform water temperature. One half of the briquette moulds is fixed in a fixed plate in the water bath, the other half of the briquette mould is fixed to a carrier which slides over a rotating threaded shaft with a clutch, the motor and gears to rotate the shaft are housed in a cabinet fixed above the other end of the bath. A pointer fixed to the carrier moves over. A scale graduated from 0-100 cm x 1 mm fixed on the bath with "0" (zero) of the scale towards the fixed plates side. The rotating shaft has 2 speeds of travel for the bracket, 5 cm/min. And 1 cm/min. Selected by a clutch. Water bath inside is of stainless steel with insulation and water drain cock. A heater with is fitted inside the water bath. The temperature is controlled by dual display microprocessor based auto tuning PID digital temp. Indicator cum controller. Control switches for motor, stirrer, heater and indicator lamps are fixed at a convenient place on the water bath. Complete with three briquette moulds and one base plate, all supply single phase. As per IS 1208.



**ZI 4027 ELASTIC RECOVERY MOULD**

A set of three moulds as per IRC-SP-53-2002 made of brass /gunmetal with the shape, dimensions and tolerances. The ends B & B` are known as clips, and the parts A & A' are known as sides of the mould. The dimensions of the mould shall be such that when properly assembled it will form a briquette specimen having the following dimensions.

Total length :  $75 \pm 0.5$  mm



A =  $36.5 \pm 0.1$  MM

B =  $30.0 \pm 0.1$  MM

C =  $17.0 \pm 0.1$  MM

D =  $10.0 \pm 0.1$  MM

E =  $10.0 \pm 0.1$  MM

**Surface Regularity**

ZI 4028

**ZI 4028 STRAIGHT EDGE (3 Meters)**

A straight edge approximately 3 meters in length may be used to determine lateral surface regularity of a road surface. This lightweight apparatus is made up of mild steel or aluminum as per customers requirement and is equally supported at both ends producing a set height between the road surface & the beam. Any vertical irregularity is measured using incremented wedges.



ZI 4029

**ZI 4029 TRAVELLING BEAM DEVICE**

The Travelling Beam Device is used to check for any irregularities in both concrete and bituminous road surfaces. A sensing unit comprising a wheel connected to an indicator provides a magnification of 4:1. Deviation of the surface from a straight-line is shown on a scale calibrated in increments of 2 mm in the 0-10 mm range and 5 mm increments in the 10-25 mm range. It comprises a manual dye marker which is used to mark irregular surface sections when found.

**ZI 4030 BENKELMAN BEAM**

AASHTO T 256

- Lightweight Aluminium construction
- Ease of Transportation
- Unique Telescopic Design Simplifying Field set up
- Compact, Thereby reducing the amount of storage space needed

Benkelman Beam utilizes the technique of using balanced beam in conjunction with a suitable vehicle to measure road flexure

The improved Benkelman Beam is a convenient, accurate device for measuring the deflection of flexible pavements under moving wheel loads. Operating on a simple lever arm principle, the unit consists. Supplied with carrying case

**Note:** Benkelman Beam with Digital Dial Gauge also available at an extra cost

**Core Drilling****ZI 4031 PAVEMENT CORE DRILLING MACHINE****Specification:**

The Pavement Core Drilling Machine is petrol engine powered. Road/Building drill has been designed specifically for the purpose of drilling test cores from or holes in, Roads, Airport Runways, Bridges etc.

The Machine comprises of two vertical support columns, which carry the Drill head/Engine assembly with the help of screwed spindle.

The 5 HP petrol engine with pulley mechanism works with minimum vibrations. The double precision bit advances with screwed spindle, which provides a constant, accurate drill pressure, minimum core chipping & long bit life.

The complete assembly is supplied on a rigid metal base with leveling facility and is suitable for vertically down coring applications only.

Bit Diameter	Varying from 25mm to 150mm
Maximum depth of core	700mm
Drill Speed	475 & 800 R.P.M.
Guide Shafts	50mm dia
Screwed Spindle	20mm dia
Water Tap	12mm
Drill Wrenches	Included
Water Tank	Included
Levelling Pads	Included





**ZI 4032 AUTOMATIC COMPACTOR FOR BITUMINOUS MIXES**



ZI 4032

BS 598-107

- Rugged construction to withstand hard work
- Fully automatic and easy to operate
- Uniform compaction
- Automatic Preset Blow Counter

**Specification:**

The Automatic Compactor eliminates the laborious process of manual compaction and an even degree of compaction is achieved. The driven mechanism lifts the weight of 4.5kg and drops it through a correct height of 457 mm.

The rammer foot is removable, which facilitates preheating. A compaction pedestal with specimen holder is fixed to the base. An Automatic Blow counter enables the number of blows to be present before each test and automatically stops the machine on completion. Suitable for operation on 230 V, 50 Hz, Single Phase, A.C. supply.

Note: Also available for modified compaction test (10.2 Kg.)



ZI 4033

**ZI 4033 PRD MOULD BS 590:10**

This mould, vertically split on one side foreseen of clamp attachment to the box plate. Plated against corrosion, is utilized for determining the degree of compaction of Bituminous pavements for quality control purpose

**Asphalt Ovens**

**ZI 4034 LOSS ON HEATING / THIN FILM OVEN**

BS 2000-45 ASTM D6, D 1754 AASHTO T 47, T 179

This dual purpose oven is designed to determine the loss in weight of bitumen and flux oils (Loss on Heating test) and the effect of heat and air on asphaltic materials (Thin Film test).

The unit is heavily insulated and has a double glass door for viewing the test chamber thermometer and samples.

Temperature is controlled at  $163^{\circ} \text{C} \pm 1^{\circ} \text{C}$  by means of a variable temperature controller and thermostat. Two rotating platforms are supplied with each oven: One accepts 9 standard penetration cups for the loss on heating test, the other accepts two 140mm diameter test pans for the thin film test. The platforms are rotated at 5 to 6 rpm by an external motor.

**ZI 4034A**

Chamber Dimensions: 350 x 350 x 350 mm (L x W x H)

Series Loss on Heating / Thin Film Oven Operating Voltage 230 V A.C. Single Phase

**ZI 4034B**

Aluminium Test Pan 140 mm diameter x 9.5mm deep.



ZI 4034

**ZI 4035 ASPHALT CONTENT TESTER**

Asphalt Content Tester is used to determine the asphalt content of hot mix asphalt(HMA) and pavement samples by removing the asphalt in an ignition furnace by means of sample heating not by means of solvent. Standard followed is ASTM D6307 & EN 12697 39. Suitable for operation on 415 V 50 Hz 20 ampere three phase ac power supply. Maximum weight specimen is 4000 gms, suggested weight of specimen is 1000 gms to 1500 gms. Balance provided is 10 Kg x 0.1 gms, working temperature of furnace is 800° C, standard working temperature is 538° C. Testing time is 20-30 minutes. Size of the furnace: 350 mm length x 430 mm width x 300 mm height.



ZI 4035

**ZI 4036 ROLLING THIN FILM OVEN**

The superpave PG binder specification looked for tests which would closely simulate field performance. Hotmix asphalt binder experiences significant aging during the manufacturing and laying process. Investigating this phenomenon within a laboratory environment, with a repeatable and simple test is very useful within the design process. The rolling thin film oven (RTFO) test is used to measure the effect of heat and air on a moving film of semi-solid asphalt binder. The results of this treatment are determined from measurements of the binder properties before and after the test. Repeatability of the test is directly related to the accuracy with which the oven temperature can be maintained and the reproducibility of the thermal rise time of the system. Super accurate P.I.D. Controller



- Low thermal mass RTD
- Over temperature safety cut-out
- Double walled temperature cabinet
- Unique temperature control suppression

<b>Construction</b>	: Double-walled construction, 16-gauge welded steel exterior, 18-gauge corrosion resistant stainless steel interior
<b>Insulation</b>	: 89 mm of high density fiberglass insulation
<b>Controller</b>	: Programmable microprocessor UL listed
<b>Temperature display</b>	: Measured temperature – 4 digit red LEDs Temperature set point – 4 digit green LEDs
<b>Thermal Protection</b>	: Prevents oven from overheating in the event of control failure
<b>Temperature Range</b>	: Ambient to 200°c
<b>Vents</b>	: Double exhaust vents for dissipation of expended volatile from specimen
<b>Air Flow Adjustment</b>	: Needle valve (long taper)
<b>Air Pressure Gauge</b>	: Range 0 – 100 PSI
<b>Heat Exchanger</b>	: 5/16 inch dia. copper tube
<b>Electrical Supply</b>	: 230 V AC 50 Hz single phase
<b>Dimensions</b>	: 1016 x 660 x 915 mm (w x d x h)
<b>Estimated Weight</b>	: 100 Kg

**ZI 4037 ASPHALT MIXER THEORETICAL DENSITY METER**

Asphalt Mixer theoretical density meter as per ASTM D 2041-03. This equipment is used for determination of theoretical density of asphalt mixer by vacuum method for application such as asphalt mixer design, road condition investigation, calculation of porosity and compactness in road construction quality management. This equipment has a main body fitted with a vacuum gauge of Wika make Germany, 2 vacuum containers made of acrylic pipe & a vibratory table under with complete control panel. The Vibratory table operates on manual and automatic mode to release the entrapped air from the asphalt sample kept inside the vessels. It is suitable to work on 230 V AC single phase 50 Hz. Vacuum range 0-100 KPA (0-750 mm Hg) vibration loading is 10 kg. no of samples tested is 2.

**NOTES**

A large rectangular area with rounded corners, enclosed by a thin brown border. The interior of this area is filled with horizontal dotted lines, providing a space for handwritten notes.



Mineral aggregates are fundamental materials that are used in all areas of construction industry such as concrete, mortars, bituminous mixtures, surface treatments for roads, airfields and other trafficked areas, railway ballast, unbound and hydraulic bound mixtures in civil engineering works and road constructions, which comprise our modern world as buildings, highways, dams, railways etc. Thus it is crucial to determine the properties of aggregates according to related EN, ASTM, AASTHO, BS standards.

In the majority of cases the EN Standards correspond to other reference Standards as for example ASTM and AASHTO and, apart from a few exceptions there is almost no difference in the specification of test apparatus.

**106** Determination of Flakiness  
**107** Bulk Density, Voids and Bulking  
**108** Specific Gravity & Water Absorption  
**108** Sampling

**109** Mechanical Properties of Aggregates  
**111** Abrasion Testing  
**112** Crushing and Grinding  
**113** Tile Abrasion

**ZI 5001 THICKNESS GAUGE**

IS 2386 (PART-1) & BS 812

**Specification:**

Used for determining the Flakiness Index of Aggregates.

It Consists of a frame with a sliding panel. The Panel has slots of Different Standard Lengths and Widths accurately Cut.



ZI 5001

**ZI 5002 LENGTH GAUGE**

IS 2386 (PART-1) & BS 812

**Specification:**

Consists of a hard wood base with vertically mounted metal studs as Specified in the IS 2386 (Part-1) & BS 812.



ZI 5002

**ZI 5003 GRID SIEVES**

EN 933-3; NF P18-561; UNI 8520-18; NIT 354

For determination of particle shape Flakiness Index & Elongation of Aggregates are suitable only for hand sieving. these are made using aluminium frames and stainless steel rods of 5 mm dia. and comply fully with EN933-3:1997. Make Labtest size slot width 50.0, 40.0, 31.5, 25.0, 20.0, 16.0, 12.5, 10.0, 8.00, 6.30, 5.00, 4.00, 3.15, and 2.50 mm (set of 14 pcs)



ZI 5003

**ZI 5004 FLAKINESS SIEVE SET**

BS 812-105.1

Aggregate particles are considered as flaky when their thickness is less than 0.6 of their mean sieve size. Aggregate to be classified is separated into seven sieve fractions from 6.3 to 63 mm and each fraction is examined separately. The dimensions of each sieve comply with the relevant international standard, manufactured from heavy gauge steel sheet and coated with electrostatic paint. The accuracy of the slot size is better than 0.1 mm.

Flakiness index sieve set consists of 7 sieves.

For sample preparations 6.3, 10, 14, 20, 28, 37.5, 50 and 63 mm aperture sizes test sieves should be ordered separately.



ZI 5004

	Slot Size (WxL)	Weight (approx.)	Dimensions
<b>ZI 5004-A</b>	4.9x30 mm	1.5 Kg	300x220x80 mm
<b>ZI 5004-B</b>	7.2x40 mm	1.6 Kg	320x240x80 mm
<b>ZI 5004-C</b>	10.2x50 mm	1.9 Kg	300x220x80 mm
<b>ZI 5004-D</b>	14.4x60 mm	2.0 Kg	360x260x80 mm
<b>ZI 5004-E</b>	19.7x80 mm	2.2 Kg	390x280x80 mm
<b>ZI 5004-F</b>	26.3x90 mm	2.6 Kg	420x300x80 mm
<b>ZI 5004-G</b>	33.9x100 mm	2.9 Kg	470x320x80 mm



ZI 5005

**ZI 5005 SHAPE INDEX CALIPER**

EN 933-4, DIN 4226, CNR NO.95, NLT 354

Shape Index Caliper is used for the determination of the shape factor of aggregates. Measurement range is 200 mm and graduated with 0.05 mm increments.

Dimensions : 450X150X50 mm

Weight (approx.) : 0.4 Kg

**ZI 5006 INDEX APPARATUS (FLOW COEFFICIENT OF FINE AGGREGATES)**



ZI 5006

Efflux Index (Flow Coefficient of Fine Aggregates) apparatus is used to obtain information about the shape and the angularity of grains of fine aggregates.

The flow coefficient of an aggregate is the time, expressed in seconds, for a specified volume of aggregate to flow through a given opening, under specified conditions using a standard apparatus.

Efflux index (flow coefficient of fine aggregates) apparatus consist of two funnels with different opening, cylindrical hopper, metal stand with a shutter and metal container.

Dimensions (in mm) : 150 x 180 x 410

Weight Capacity : 5 Kg



ZI 5007

**ZI 5007 AVERAGE LEAST DIMENSION**

Average Least Dimension (ALD) device complete with ALD box - adjustable spacer – fine aggregates 2-9 mm, 1 x spacer set-fine aggregates spare case, spacer set extension 10-18 mm.

**Bulk Density, Voids and Bulking**



ZI 5008

**ZI 5008 CYLINDRICAL MEASURES**

IS 2386 (PART-III) & BS 812

**Specification:**

It Determines Bulk Density or unit weight of aggregates. It consists of a Calibrated Cylindrical Measures of sheet iron with handles. Capacities available 3, 5, 7, 10, 15, 20 & 30 liters.

Complete with One Tamping Rod 16mm dia x 600mm long both ends rounded.



ZI 5009

**ZI 5009 DENSITY BASKET**

IS 2386 (PART-III) & BS 812.

For Density Tests on Aggregates as per Procedure Laid Down.

**Specification:**

Made of Brass / GI with Stainless steel Wire Mesh 6.3mm / 4.75mm size Ruggedly Constructed, Approximately 20cm dia x 20cm high. Complete with Handle.

Note: Customize sizes also available

**ZI 5010 SPECIFIC GRAVITY AND WATER ABSORPTION OF AGGREGATES**

IS 2386 (PART III) & BS 812

The buoyancy balance system consists of a rigid support frame, incorporating a water tank mounted on a platform.

A mechanical lifting device is used to raise the water tank through the frame height immersing the specimen suspended below the balance.

The balance supplied may also be used as a standard weighing device, thus providing a versatile and comprehensive weighing system in the laboratory

**Specification:**

The outfit comprises of

- Electronic balance, capacity 5 kg. Least Count 0.1gm, provision is made in this balance to suspend density basket under material pan. This balance is mounted on an angle iron frame stand. 1 No.
- Density basket. 1 No.
- Air tight container to suspend density basket. 1 No.
- GI Tray of area not less than 650 cm sq. 1 No.
- Absorbent cloths 75cm x 45cm. 2 Nos.



**Sampling**

**ZI 5011 RIFFLE SAMPLE DIVIDER**

IS 1607-1960

Used for sampling Aggregates, Ores, Refractory .

**Specification:**

It consists of a sheet metal box mounted on Legs and fitted with a series of chutes of equal width which discharge the material alternatively in Opposite Directions into separate pans. The chutes of the Riffle are steep enough to allow rapid flowing of the Materials.

The unit offered are supplied in a range of sizes from 7 mm to 75 mm



ZI 5011

**ZI 5012 RIFFLE SAMPLE DIVIDER**

BS 812

Used for Sampling Aggregates, Ores, Refractory

**Specification:**

For the rapid preparation of samples, i.e. division into two representative portions. Detailed below is a range of dividers, each constructed of heavy gauge sheet metal with particular attention given to reinforcement of the partition to maintain the accuracy of the slot dimensions.

The unit offered are supplied in a range of sizes from 7 mm to 75 mm



ZI 5012



Model No.	Slot Width	No. of Slots (Ltrs.)	Approx. Capacity	Weight Kg.
ZI 5012A	7	12	0.3	1.5
ZI 5012B	13	12	2.0	6.0
ZI 5012C	15	12	2.0	8.0
ZI 5012D	19	10	4.0	9.0
ZI 5012E	25	10	4.0	11.5
ZI 5012F	30	10	4.0	17.5
ZI 5012G	38	8	11.0	17.5
ZI 5012H	50	8	14.0	22.5
ZI 5012I	64	8	18.0	27.0
ZI 5012J	75	8	22	35.0



ZI 5013

**ZI 5013 SAMPLE SPLITTER**

ASTM C 136

**Specification:**

Designed for the reduction of test samples which are too large in volume to be conveniently handled. It handles any material from Sand sizes up to dia. 108 mm. Each Chute bar is 12 mm wide so that openings of 12-24-36-48-60-72-84-96-108 mm are possible. Supplied complete with two collecting pans. Clam shell hopper: 30 litres capacity. Very sturdily constructed, it is totally Cadmium Plated for rust protection.

**Mechanical Properties of Aggregates****ZI 5014 AGGREGATE CRUSHING VALUE APPARATUS**

IS 2376 (PART-IV) &amp; BS 812:111

For Measuring of Resistance of Aggregate to Crushing.

**Specification:**

The Aggregate Crushing Value (ACV) test set provides a relative measure of the resistance of an aggregate to crushing under a gradually applied compressive load. Each set consists of steel cylinder, plunger, base plate, cylindrical measure and tamping rod. All parts of the apparatus are powder coated or galvanized steel, heat treated and ground before manufacturing to make it durable and reliable.

**Specification:**

Consists of M.S. Cylindrical Container 150mm +/-0.5mm dia x 130mm to 140mm high with base plate 200 to 230mm/sqr x 6mm thick. A Plunger of 148mm +/-0.5mm dia x 100 to 115mm high. Supplied complete with Tamping Rod, 16mm dia x 600mm long, both ends rounded, 1 no. Metal Measure 115 +/- 0.5mm dia x 180 +/- 0.5mm high.

**Note:**

On Special Request Aggregate Crushing Value Apparatus having 75mm dia or 300mm dia cylinder size can be supplied.



ZI 5014

**ZI 5015 AGGREGATE IMPACT TESTER WITH BLOW COUNTER**

IS 2386 (PART IV) 9377 & BS 812:112

It is robustly designed to determine the aggregate impact value (AIV) of aggregates which provides a relative measure of the resistance of an aggregate to sudden shock or impact. The counter fitted to the machine automatically records the number of blows delivered to the sample, manufactured from heavy duty plated steel to resist corrosion.

**Specification:**

The instrument consists of a circular base with Two vertical guides. The Hammer of weight 13.75 +/-0.25kg can be raised to fall freely down the vertical guides. The Height of fall can be adjusted through 380 +/- 5mm. The Hammer is provided with a locking arrangement.

The hammer falls freely to the base and is removable for employing. Supplied complete with metal measure 75mm dia x 50mm high

(For specimen preparation) and Tamping Rod 230mm long x 10mm diameter.

A Blow Counter to count the number of strokes is fitted on top of the equipment.



ZI 5015

**ZI 5016 ACCELERATED POLISHING MACHINE**

- High ground steel main spindle running in precision sealed ball bearings additionally protected by a labyrinth seal spindle axially loaded to eliminate end play
- Adjustable 3 phase motor speed control with adjustable timing belt drive, reducing power consumption and improves control
- Inverter drive to motor for precise speed control
- Digital display preset timer and revolution counter
- Robust welded steel mainframe, standing on adjustable pads
- Specimens manufactured and easily removed from precision machined moulds
- 14 Specimens located on 'Road Wheel' by rubber rings and held by simple side fixing
- Water gravity fed from high level tank through calibrated flow meter
- Used abrasive and water collected in easily removable tray
- Loaded tyre raised and lowered to the running surface by mechanical lifting device
- Protection by covers and guards may be easily removed for maintenance

**Specifications**

• Road Wheel Speed	320 ± 5 rev min <sup>-1</sup>
• Tyred Wheel Set Diameter mm	200 ± 3
• Tyred Wheel Set Width mm	38 ± 2
• Tyred Wheel Hardness	(69 ± 3) mm IRHD
• Applied Load on the Wheel	(725 ± 10) Newton
• Electrical Supply	230v / 110v. 50/60 Hz Single Phase 13 amp
• Dimensions mm (WxDxH)	810 x 790 x 1230
• Water Tank Height cm	155
• Palletised Dimensions mm (WxDxH)	1200 x 800 x 1280
• Weight (max) Kg	210



ZI 5016

**ZI 5017 SKID RESISTANCE AND FRICTION TESTER STANDARD**



EN 13036-4 (Also Conforming to EN 1097-8, ASTM E103)  
Used for the measurement of surface friction properties, the apparatus is suitable for both site and laboratory applications and for polished stone value tests using curved specimens from accelerated polishing tests. The equipment is supplied with:

- Additional scale for tests on polished stone value specimens
- 6 rubber sliders for site use, complete with conformity certificate
- Thermometer -10 to +110°C for surface temperature measurement
- 1 litre washing bottle, for surface wetting
- Tool set with case, for machine assembly
- Rule for sliding length verification

**Specification:**

- Rocker weight : 1500 +/- 30 g
- Distance between rocking centre & center of gravity : 410 +/- 5 mm
- Positive static pressure on pavement : 22.2 +/- 0.5 kn
- 6 rubber slider and base plate dimension (mm) : 700x360x700

**Abrasion Testing**

**ZI 5018 LOS ANGELES ABRASION TESTING MACHINE**



ZI 5018

IS 2386 (PART IV) ASTM C 131, AASHTO T-96  
Used for testing Crushed Rock, Crushed Slag, Crushed and Uncrushed Gravel For Resistance to Abrasion.

**Specification:**

The machine consists of a hollow cylinder mounted horizontally on a study frame on ball bearings. There is an opening which can be closed with a dust tight cover to facilitate charging and discharging the drum with the material under test. A detachable shelf which extends throughout the inside length of the drum which catches the abrasive charge and does not allow it to fall on the cover. The drum is rotated by an electric motor through a heavy reduction gear at a speed of 30-33 R.P.M. A revolution counter is fitted to the frame. A tray is supplied for collection of the material at the end of the test. Complete with Abrasive Charge consisting of a set of Twelve hardened steel balls, approximately 48mm dia. Suitable for operation on 440 V, 3 Phase, 50 cycles, A.C. Supply.

**ZI 5019 DIGITAL LOS ANGES ABRASION TESTING MACHINE**



ZI 5019

EN 1097-2, 12697-17, 13450; ASTM C131, C535; AASHTO T96

The machine consists of an electronic control unit and a rolled steel drum having an inside diameter of 711 mm and internal length of 508 mm. The drum is rotated at a speed of 31-33 r.p.m. The internal shelf provided with the machine conforms to ASTM, AASHTO and EN standards. The machine is equipped with an automatic counter, when the preset revolution count is reached, the machine will stop automatically. The drum is equipped with an interlock device which allows the operator to lock the drum into position for easy loading/unloading of the sample. Power consumption: 750 W

**ZI 5020 DORRY ABRASION TESTING MACHINE**

BS 812

For Testing Aggregates for Resistance to Abrasion.

**Specification:**

It consists of a disc rotating about a shaft connected to a reduction gear box coupled to a motor. The disc rotates at 28-30 RPM.

Under the rotating disc is a tray with an outlet to facilitate the removal of sand. Two Conical Hoppers are mounted on a bracket fixed to the circular tray. An arrangement is made for start and stop the flow of sand. Two containers with weights are supplied to keep the specimens pressed against the rotating disc. Suitable for operation on 220 V, 50 cycles, A.C. Supply.



ZI 5020

**ZI 5021 DEVEL ATTRITION TESTER**

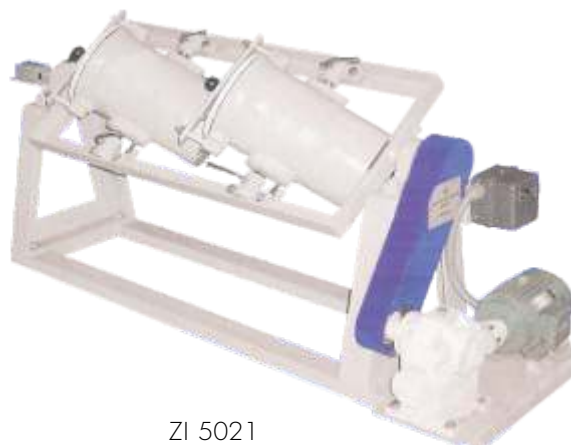
ASTM D2-33 & IS 2386 (PART IV)

For The Determination of Resistance of Aggregates to Wear by Abrasion.

**Specification:**

It consists of two hollow cylinders closed at one end and provided with fitting covers at the either end. These cylinders are mounted on a shaft at angle of 300 with the axis of rotation of the shaft. The shaft rotates at 30-33 RPM. Through a reduction gear operated by a motor and is provided with a revolution counter. Complete with Abrasive Charge consisting of 12 Nos. Hardened steel Balls of 48mm dia. Suitable for operation on 440 Volts, Three Phase, 50 Cycles, A.C. supply.

**Note :** Option of Digital Preset Counter can be provided at an Extra Cost



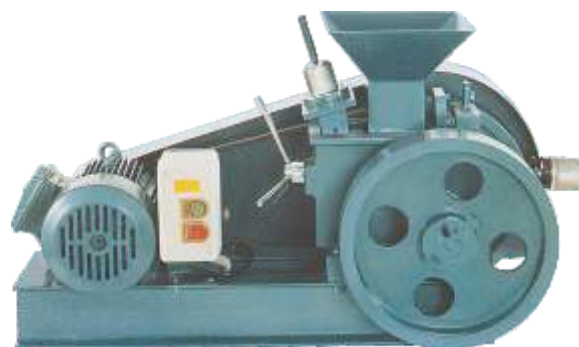
ZI 5021

**Crushing and Grinding**

**ZI 5022 JAW CRUSHER**

**Features:**

- Compact and rugged for laboratory and small production units
- Designed for speed crushing
- Discharge opening adjustment range: 3 - 10mm
- Manganese steel jaws adjustable up to 6 mm opening
- 250 kg materials can be crushed in approx eight hours
- Supported with strong steel frame
- Voltage: 440 V, Three Phase A.C. Supply



Laboratory Jaw Crusher Size		Feed Size	Discharge Size	Motor	Capacity
4" x 6"	100x150mm	25 to 30mm	6mm to 20mm	3 H.P. 3 Ph.	150-200Kg/hr.
6" x 8"	150x200mm	45 to 50mm	10mm to 22mm	5 H.P. 3 Ph.	300-400Kg/hr.
8" x 12"	200x300mm	65 to 70mm	12mm to 25mm	7.5 H.P. 3Ph.	400-500Kg/hr.
12" x 16"	300x400mm	90 to 100mm	15mm to 30mm	10 H.P. 3 Ph.	600-750Kg/hr.
15" x 24"	375x600mm	100 to 150mm	25mm to 55mm One Point Setting	15 H.P. 3 Ph.	1 Ton/hr.

**ZI 5023 PULVERISER**

ZI 5023

- Designed for grinding materials to produce fine mesh samples Ideal for use in Cement and Chemical Industries
- Self contained grinder with a rotating disc having planetary movement in vertical plane
- Reduces about 450g quartz type material to 100 mesh in one minute
- Dia. of grinding wheel: 175mm
- Material of grinding wheel: High Carbon Steel having 53-60 HRC hardness
- Input of material:  $\leq 6$ mm
- Suitable for operation with 440V, Three Phase, A.C. supply

**Tile Abrasion****ZI 5024 TILE ABRASION TESTING MACHINE**

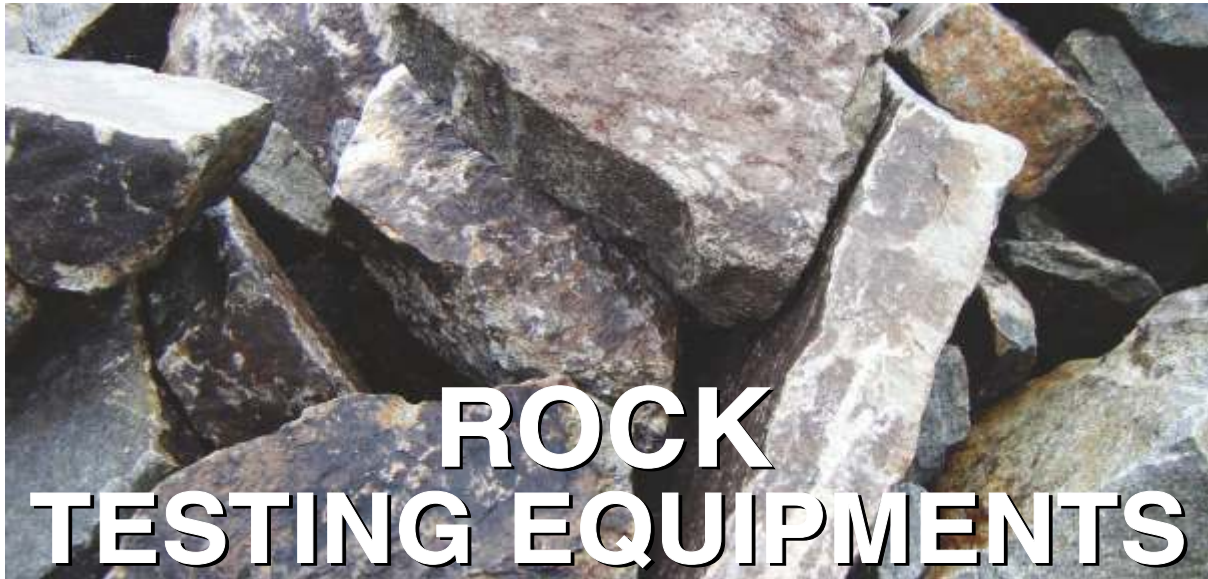
IS 1237, IS 1706

**Specification:**

This is used for determination of resistance to wear for Cement & Concrete flooring tiles. Tiles specimen of size 7.06 cm x 7.06 cm is pressed face-wise under specific load on a grinding path and abrasive powder is evenly spread on the rotating grinding disc the second parallel side of the tile is subjected to wear for similar number of rotations. The wear of the tile is measured on a thickness gauge specifically made for the purpose. The machine consists of a disc rotating at a speed of 30 R.P.M. in a circular tray. A bracket is provided to hold the specimen. A counter balance lever loads the specimen. Load applied is 30 Kgf. A funnel is fitted to evenly spread abrasive powder on the grinding path. A Pre-set Counter automatically stops the machine after 22 revolutions. This counter is Re-adjustable. The machine works on 440 V A.C. Three Phase electrical supply. On request machine to operate on 230 V A.C. Supply can also be supplied.

**NOTES**

A large rectangular area with rounded corners, outlined in yellow, containing numerous horizontal dotted lines for writing notes.



Rock mechanics is the theoretical and applied science about the physical behavior of rock and rock masses as well as their reaction to the force fields of their physical environment. It also deals with the application of the principles of engineering mechanics to the design of the rock structures generated by mining, drilling, reservoir production or civil construction activity, such as slopes, tunnels, dam foundation mining shafts, underground excavations, open pit mines, oil and gas wells, road cuts, waste repositories and other structures built in or made of rock. It also includes the design of reinforcement systems such as rock bolting patterns.

Testing of rocks mainly aims to simulate stress conditions that a rock sample is exposed in nature and to get necessary parameters such as stress, strain, elastic modulus, Poisson's ratio properties to evaluate specimen. When a rock sample is subjected to defined stress conditions in the laboratory, the stress-strain diagram can show non linear relations also for very small strains, hysteresis, anisotropy, etc. All these phenomena can be mathematically described and used for mechanical design simulations.

116 Coring & Cutting  
 118 Sample Preparation  
 119 Strength Index

121 Pullout Test  
 121 Rock Strength  
 121 Deformability

**ZI 6001 CORE CUTTING/CORE DRILLING MACHINE (PETROL)**

**Specification:**

Suitable to cut/drill cores of concrete, rocks, stones, tiles or the similar materials. The machine is suitable for core samples of size upto 150 mm diameter with the help of thin walled diamond bits which are at extra cost. The machine has sturdy base with pillar support in which rack and pinion is provided for adjustment in height and penetration assembly. The leveling screws are provided at the base. For gripping the sample in position suitable grips are provided. A suitable petrol engine is fitted in the machine with cooling arrangement with water. The base frame is also fitted with wheels for ease of transportation.

Dimension approx, are as under:

- Height : 1300 mm
- Base : 625 x 900 mm
- Head travel on rack : 500mm
- Drill speeds : 900 R.P.M. for soft samples and 350 R.P.M. for hard Samples
- Water swivel : Built in the machines.
- Accessories** : (1) Thin wall diamond bits.  
(2) Core barrel.  
(3) Petrol engine 190 cc



ZI 6001

**ZI 6002 PORTABLE CORE CUTTING DRILLING MACHINE PETROL DRIVEN**

EN 12697-27

Compact and portable Labtest core drilling machine is designed to cut cores up to 200 mm diameter from concrete, asphalt and similar hard construction materials. The machine comprises a vertical support column which carries the drill head/motor assembly. The motor assembly comprises a 6.5 hp petrol engine. A ball screw mechanism enables close control of the drilling pressure and rapid return when drilling is completed. A water spraying assembly is mounted on the machine. The complete assembly is supplied on a rigid wheel mounted metal base frame with leveling and fixing facility during the operation.

- Weight (approx) : 100 Kg
- Power : Petrol Engine 6.5 HP  
Briggs & Stratton USA



**ZI 6003 CORE CUTTING/CORE DRILLING MACHINE (MOTORISED)**

**Specification:**

- Rated Voltage: ~220 V / 50Hz
- Power Input: 2800W
- No-load Speed: 840rpm
- Max. bit diameter: Ø50mm/100mm/150mm
- Shaft Male: 1 1/4"UNC

**Features:**

- Compact size with light weight as well as safety in operation

- The drills are equipped with a friction clutch as well as over load current protection for protecting motor
- High-strength gear to keep the drill working long hours constantly
- Excellent speed, smooth and stability during drilling
- Out setting water swivel seal facilitate making replacement when the seal worn out
- Bits capacity: 25mm Dia - 150mm Dia





ZI 6003

**Complete Combination:**

The core drill includes drill motor, base, column, carriage, control panel, friction clutch, motor mount plate, rack, gear-box, out setting water swivel seal, hydraulic system.

Optional parts include water pump, rod for ceiling jack, water container, adapters.

**Application:**

The Core Drill is the industry standard, designed for concrete, reinforced concrete, Asphalt and brick in construction.



ZI 6004

**ZI 6004 ROCK/CONCRETE CUTTING MACHINE**

EN 12390:3, ASTM C42

Electrically operated with cooling system.

**Masonry Table Saw**

For people who work with stone, brick, large tiles or blocks, it goes without saying that precision is crucial to the end result. But the efficiency of the machine should never compromise the need for good ergonomics and a reasonable workload. Put simply, the stone or tile you cut must fit perfectly, just as the machine and the blade you use must fit your work situation perfectly.

Universal table saw with a unique super-stable height adjustment device, lockable in any position. max. cutting depth in top position is 230 mm, by turning the material over.

Specifications:	
Rated voltage : 230v	Rated power : 2200w
Max cutting depth : 90mm	Cutting length : 650 mm
Rated speed : 2800r/min	Blade diameter : 350mm
Arbor size : 25.4 mm	Water pump runoff : 10-12l/min
Packing size : 1320 x 740 x 825 mm	
Weight : 80kg	



ZI 6005

**ZI 6005 ASPHALT & CONCRETE FLOOR SAW**

Driven by electrical motor or by engine as per customers requirement. Diamond blade from 350 to 500 mm maximum can be supplied as per requirement. The trolley in which the engine is fitted is supplied with cooling arrangements with the help of a water tank. Arrangements to control the depth is also provided. A safety guard is also provided on the diamond blade. Two wheels are provided for easy movability of the machine.

**ZI 6006 CORE CUTTING GRINDING MACHINE**

- Table Mounted
- Stable Construction Feed arrangement for cutting
- Feed arrangement for cutting
- Cooling water arrangement

**Specification:**

This unit is designed for cutting and grinding cylindrical rock specimens upto NX size. The outfit includes 200mm dia diamond impregnated cutter, a fine diamond impregnated grinding wheel a water supply system and sampler holder.

A V-Vice, to hold the sample up to 55mm dia x 140mm long to be cut parallel and square to the longitudinal axis is provided. Cores longer than 140mm can be prepared by reversing the specimen and holding against the vice, A hand feed arrangement is provided to facilitate the specimen with a uniform and smooth feeding motions. This unit is provided with a 3 HP, Three Phase, 440 V A.C. Motor.



ZI 6006

**ZI 6007 POLISHING AND LAPPING MACHINE**

- Compact table model
- 20 cm dia top and Adapter to hold polishing cloth or paste
- Sample Holders to accommodate upto NX size Cores
- Continuous water feed arrangement during operation

**Specification:**

This unit is provided with a 1 HP Single Phase, A.C. motor

This bench mounted single spindle lapping machine is Ideally suited jar the final polishing of mounted rock or concrete specimens. Two sample holders of sample size ordered for are provided with each machine as standard supply Sample holders of other size can also be provided on request. This is a motor driven unit with 450/500 rpm. A swing-in tap, for continuous water supply during operation is also provided.



ZI 6007

**ZI 6008 AUTOMATIC GRINDING MACHINE**

The automatic grinding machine provides fast grinding of cylinder specimen ends to obtain plane and parallel surfaces according to EN and ASTM standards.

Three units of ø38 to 100 mm or two units of ø150-160 mm concrete cylinders ends can be ground simultaneously with the suitable cradle and water restraint panel. The length of the any specimen must be longer than 70 mm.

According to ASTM and EN standards, the planeness accuracy of grinded surface is 0.05 mm. and the deviation of perpendicularity of the side with reference to the end faces is 0.5°. The equipment has selectable advance grinding time functionality by user from 50 to 400 seconds. Optimum grinding time per end of all type specimens is 90 to 120 seconds. The cradle which specimens are fixed on has automatic bidirectional radial displacement ability. The safe and ergonomic design prevents the user to exposure to water and dust and provides easy access to the water inlet and outlet. Specimen cradles and water restraint panels can easily be installed without the need for any assembly.



ZI 6008

Mobility of the machine is achieved with the help of the integral wheels, and all components of the system can be safely accessed for easy maintenance.

The frame is manufactured from aluminum to obtain a lighter weight and the stainless steel exterior shell assures resistance to corrosion.

The water restraint panels should be ordered separately for cubic specimens or different sized cylindrical specimens.

**The preparation of concrete cylinder test specimen for compressive strength test**

EN 12390-1, 12390-3, ASTM C31, C39, C192, C617

The maximum tolerance on the flatness of the potential load bearing surfaces (the ends of compression test specimens) is 0.002 in. [0.050 mm]

**The preparation of drilled concrete cores specimen for compressive strength test**

EN 12504-1, 12390-1, 12390-3 ASTM C42, C397

The deviation of perpendicularity of the side, with reference to the end faces is 5

Dimensions : 730 X 1080 X 1510 mm

Weight (Approx.) : 280 Kg

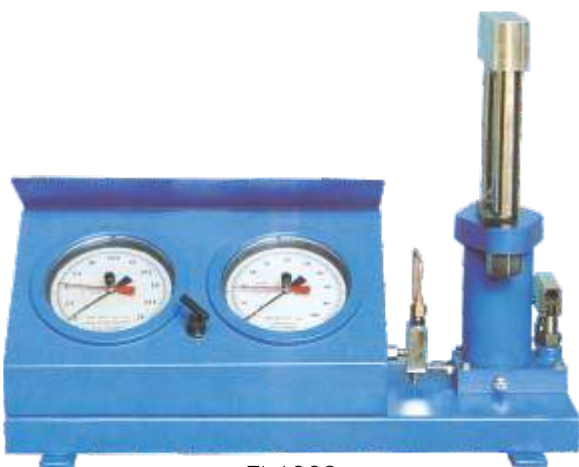
**Strength Index**

**ZI 6009 POINT LOAD INDEX TESTER**

IS 8764

Point Load Index tester, a rock testing instrument for determining the Diametrical Point Load Strength Index of rock cores and Irregular Lumps which may be tested without

any treatment. The Point Load Test is primarily as index Test for strength classified of rock materials. This instrument is mainly intended for field measurements on rocks specimen, but it can be used in the laboratory. The results of the test may also be



ZI 6009

**Features:**

- Equipment is light and portable
- Rock core specimens can be tested without any preparation
- The instrument can be used in the laboratory as well as at the drilling site
- The results of the test may also be used to predict the uniaxial compressive strength of rock.
- With this instrument, a wide range of core size can be tested
- The frame has adequate adjustments to align perfectly the loading axis passing through the centre of the

- bearing plates and loading platens at the position of the ram of the hydraulic jack

The equipment comprised the followings:

**ZI 6009-A** Loading Frame, fitted with Hydraulic Jack, hand operated, capacity 100 KN (10,000 kgf)

**ZI 6009-B** Load Gauge, 25KN (2,500 kgf) to read upto 0.25KN (25kgf)

**ZI 6009-C** Load Gauge, 100KN (10,000 kgf) to read upto 0.50KN (50kgf)

**ZI 6009-D** Conical Loading Platens

**ZI 6009-E** Diaphragm Bolt

**ZI 6010 DIGITAL POINT LOAD TEST APPARATUS**

ASTM D5731

Digital Point Load Test Apparatus consists of a 60 kN capacity load frame with a hydraulic loading ram driven by a hand pump. The frame is adjustable for testing of samples up to 102mm diameter. A ruler assembled on the frame allows the direct measurement of the distance between the conical platens before and after the test. The compression load is measured by a pressure transducer connected to an advanced digital display unit assuring the best accuracy and resistance to the failure shocks.

**Safety Features:**

- Load range : 0- 60 kn
- Digital display : 2 x 16 characters
- Resolution : 32.000 div.
- Accuracy : ± 1%
- Load pacer included
- Load measurement in both kn and mpa
- Serial port for pc connection



ZI 6010

**ZI 6011 BRAZILIAN TEST APPARATUS**

IS 10082-1982

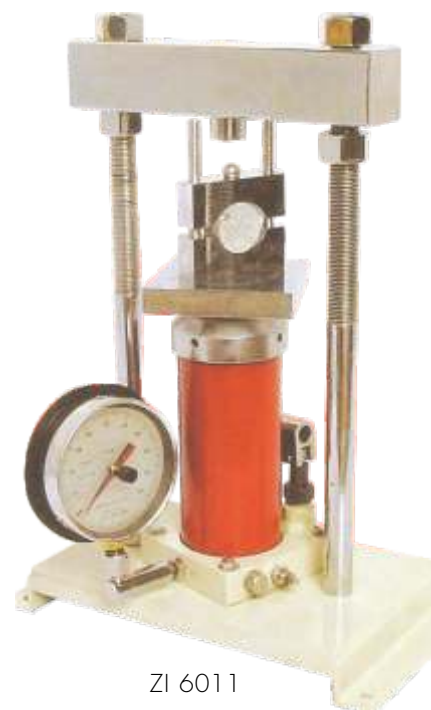
**Specification:**

The instrument is useful for testing specimen from 50mm dia to 100mm and of thickness of half the diameter. This is to test for indirect measurement of tensile strength of rocks. The specimen is held in circular jaws, this is primarily similar to a compression machine and consists of a small load frame having sturdy base with two vertical threaded rods and an adjustable cross head. The hydraulic jack is fitted at the centre of the base of the load frame. The jack of the load frame is self retracting and two plain platens are supplied. A pressure gauge capacity 0-100 kn x 1 kn is fixed at the base of jack. A maximum pointers is also provided on the gauge, a pair of semi circular platens for 50mm dia samples also provided. The instrument can be used in field also.

**Optional Extras:**

Pair of jaws for samples dia

(a) 60mm (b) 70mm (c) 80mm (d) 90mm (e) 100mm.



ZI 6011

**ZI 6012 SLAKE DURABILITY APPARATUS**

ASTM D 4644

**ZI 6012** Plake durability apparatus, 220-240 v 50 hz

**ZI 6012-A** Pair of mesh drums for ZI 6012

This test method has been developed to assess the deterioration of rocks over a period of time when subjected to water immersion. Slake durability is a simulated weathering test to determine abrasion resistance during wetting and drying cycles of shale and similar soft rocks as used in embankments and other construction-related applications. Samples are alternately tumbled in mesh drums through a water medium and oven-dried for two cycles. The percent loss of mass is referred to as the slake durability index.

The ZI 6012 slake durability apparatus consists of a motorized drive unit which is mounted on a baseplate and which can rotate two or four drums at a speed of 20 r.p.m. The tank assemblies are filled with water to a level 20mm below the drum axis. The test drums are manufactured from 2.00 mm mesh, 140 mm dia. X 100 mm long.



ZI 6012



ZI 6013

**ZI 6013 ROCK BOLT PULL OUT TEST APPARATUS**

IS 11309, ASTM D 4435

**Specification:**

The objective of the test method is to measure the working and ultimate capacities of rock bolt anchors. The system comprises of a central hole jack, hand pump with a load gauge, directional control valve (only for central hole jacks above the capacity of 500 kn), flexible hose pipe 5 mts, truss high tensile bolts with coupling. In general the pull out force is indicated on the load gauge, however a load cell with digital indicator can be used to measure the pull out load. Arrangement is provided for fixing the dial gauge for estimating deflection against the load.

**Rock Strength****ZI 6014 LOAD FRAME FOR UNIVERSAL COMPRESSION TEST OF ROCKS  
12 SPEED 200 KN**

ZI 6014

ASTM 2938

This equipment is used for determining unconfined compressive strength of intact rock core specimens. The rock sample is cut to length and the ends are machined flat. The specimen is placed in a loading frame and if required heated to the desired test temperature. Axial load is continuously increased on the specimen until peak load and failure are obtained.

The equipment consist of the following replaceable parts :

- Load frame, 200 kn capacity 12 speed from 0.0064 to 1.25 mm/min
- Proving ring, 200 kn with calibration certificate
- Dial gauge 25mm travel, 0.01 mm least count.
- Platen set as per ASTM 2938 requirements
- Platen set as per ASTM 2938 requirements
- Horizontal clearance 300 mm
- Vertical clearance 750 mm
- Maximum platen diameter 198 mm
- Maximum platen travel 100 mm
- Specimen diameter 38 mm to 100 mm
- Can test AX, BX, NX rock specimen upto 100 mm

**Deformability****ZI 6015 HOEK TRIAXIAL**

ZI 6015

**ZI 6015** Hoek Triaxial Cell BX, 42.04 mm dia.**ZI 6015-A** Spare Sealing Sleeves dor Hoek Triaxial Cell BX**ZI 6015-B** Hoek Triaxial Cell NX, 54.7 mm dia.**ZI 6015-C** Spare Sealing Sleeves for Hoek Triaxial Cell NX**ZI 6015-D** Hoek Triaxial Cell HQ, (Ø 63.5 mm)**ZI 6015-E** Spare Sealing Sleeves HQ, (Ø 63,5 mm) for Hoek Triaxial Cell

Hoek Cells have been designed to be used for triaxial testing of rock specimens. Hoek Cells comprise a steel body complete with two quick release self-sealing couplings, two steel end caps which are screwed to the cell body, 2 pieces of upper and 2 pieces of lower loading caps with spherical coupling and a rubber sealing sleeve to separate the specimen from the cell fluid.

A large rectangular area with rounded corners, enclosed by a thin green border. It contains 30 horizontal dotted lines for writing notes.



Steel is an alloy of iron and other elements, primarily carbon, that is widely used in construction and other applications because of its high tensile strength and low cost. Steel's base metal is iron, which is able to take on two crystalline forms (allotropic forms), body centered cubic (BCC) and face centered cubic (FCC), depending on its temperature. It is the interaction of those allotropes with the alloying elements, primarily carbon, that gives steel and cast iron their range of unique properties. In the body-centered cubic arrangement, there is an iron atom in the centre of each cube, and in the face-centred cubic, there is one at the center of each of the six faces of the cube. Carbon, other elements, and inclusions within iron act as hardening agents that prevent the movement of dislocations that otherwise occur in the crystal lattices of iron atoms. They Are different test in Laboratories for steel like Tensile, Bending, Shearing, Torsion, Hardness Brinell, Rockwell & Vickers. We cover most of these equipment in this section

**124** Universal Testing Machines  
**126** Torsion Testing Machine  
**127** Hardness Tester  
**128** Impact Tester

**129** Fatigue Testing Machine  
**130** Tensile Testing Machine  
**131** Metallurgical Lab

## UNIVERSAL TESTING MACHINES

Universal Testing Machine is designed for testing metals and other materials under tension, compression, bending, transverse and shear loads. Hardness test on metals can also be conducted.

### Principle of Operation:

Operation of the machine is by hydraulic transmission of load from the test specimen to a separately housed load indicator. The hydraulic system is ideal since it replaces transmission of load through levers and knife-edges, which are prone to wear out and damage due to shock on rupture of test pieces.

Load is applied by a hydrostatically lubricated ram. Main cylinder pressure is transmitted to the cylinder of the pendulum dynamometer system housed in the control panel. The cylinder of the dynamometer is also of self-lubricating design. The load transmitted to the cylinder of the dynamometer is transferred through a lever system to a pendulum. Displacement of the pendulum actuates the rack and pinion mechanism which operates the load indicator pointer and the autographic recorder. The deflection of the pendulum represents the absolute load applied on the test specimen.

Return movement of the pendulum is effectively damped to absorb energy in the event of sudden breakage of specimen.

The Machine consists of:

### Straining Unit:

This consists of a hydraulic cylinder, motor with chain and sprocket drive and a table coupled with the ram of the hydraulic cylinder, mounted on to a robust base. The cylinder and the ram are individually lapped to eliminate friction. The upper cross-head is rigidly fixed to the table by two straight columns. The lower cross-head is connected to two screwed columns which are driven by a motor. Axial loading of the ram is ensured by relieving the cylinder and ram of any possible side loading by the provision of ball seatings.

An elongation scale, with a minimum graduation of 1 mm, is provided to measure the deformation of the specimen.

Tension test is conducted by gripping the test specimen between the upper and lower cross-heads. Compression, transverse, bending, shear and hardness tests are conducted between the lower cross-head and the table.

The lower cross-head can be raised or lowered rapidly by operating the screwed columns, thus facilitating ease of fixing of the test specimen.

### Control Panel:

The control panel consists of a power pack complete with drive motor and an oil tank, control valves, a pendulum dynamometer, a load indicator system and an autographic recorder.

### Power Pack:

The power pack generates the maximum pressure of 200 Kgf/cm<sup>2</sup>. The hydraulic pump provides continuously non-pulsating oil flow. Hence the load application is very smooth.

### Hydraulic Controls:

Hand operated wheels are used to control the flow to and from the hydraulic cylinder. The regulation of oil flow is infinitely variable. Incorporated in the hydraulic system is a regulating valve, which maintains a practically constant rate of piston movement.

### Load Indicator System:

This system consists of a large dial and a pointer. A dummy pointer is provided to register the maximum load reached during the test. Different measuring ranges can be selected by changing relevant weights on the pendulum and operating the range selection knob. An overload trip switch is incorporated which automatically cuts out the pump motor when the load range in use is exceeded.

### Pendulum Dynamometer:

This unit permits selection of favourable hydraulic ratios producing relatively small frictional forces. Pressurised oil in the loading cylinder pushes up the measuring piston proportionately and actuates the special dynamometer system. The piston is constantly rotated to eliminate friction. The dynamometer system is also provided with an integral damper and ensures high reliability of operation. The load transmitted to the dynamometer is transferred through a pendulum to the load indicator.

### Accuracy And Calibration:

All Universal Testing Machines are closely controlled for sensitivity, accuracy and calibration during every stage of manufacture. Every machine is then calibrated over each of its measuring ranges in accordance with the procedure laid down in British Standards 1610:1964 and IS: 1828-1975.

### Universal Testing Machines comply with:

Grade "A" of BS : 1610 and Grade 1.0 of IS : 1828 An accuracy of  $\pm 1\%$  is maintained from 20% of the load range selected to full load.



**ZI 7001 HYDRAULIC COMPUTERIZED UTM**

**Application System:**

- Peak load along with on line load
- Maximum elongation with online elongation
- Ultimate Tensile Strength
- Graphical Display of Load vs. Time
- Graphical Display of Elongation vs. Time
- Graphic Display of Load vs. Elongation
- Graphic Display of Stress vs. Strain
- Complete Statistical Analysis
- Data Report Management

**Safety Features:**

- Machine stops after specimen failure
- Safety against Over travel of piston
- Safeguard against
- High temperature
- Surge Protector
- Auto Machine Diagnosis
- Safety against overload

**PC Configuration:**

- Processor: Quad Core processor from Intel / AMD
- Processing Speed: 2.0 GHz or higher
- Hard Disk Drive: 250 GB or higher
- RAM: 4 GB
- DVD Writer
- Colour Monitor: 17" LED TFT
- Key Board: 104 Key
- Printer : Inkjet
- Printer : Laser ( Optional at extra cost )
- Mouse Optical
- UPS of at least 600 VA capacity

**Software:**

- Pre-loaded with window 7 based software
- The software provided on CD ROM also
- Automatic saving and providing database for carrying out statistical calculation of multiple test results
- Software application shall be capable of providing functions like Auto Return to Zero

**Note:**

Computer Desktop / Laptop is not included in the price of machine

**Hydraulic Grips also available**



**ZI 7002 TORSION TESTING MACHINE**

It is designed for conducting Torsion and Twist Tests on various metal wires, tubes sheet materials. Torque measurement is by Pendulum dynamometer System. Torque ranges can be adjusted. Torque is applied to specimen by geared motor through gear box. Autographic recorder can be provided to know the relation between torque and angle of twist on specific request. The Accuracy of the torque indication is  $\pm 1\%$  of the true torque. The complete system is hydraulically damped for vibration free Loading.



- Unique 'TALON-CLAW' Grips for Round and Flat specimens
- Torsional Speed of 0.1/0.2 RPM
- Torque Compensated Motors
- Maintenance Free Gear Box
- Auto Range Selection with Range Selector Wheel (Optional)
- 3 or 4 Torque Ranges for Higher Accuracy (Optional)
- Load-unload Capability
- Variable Speed Drive (Optional)

**Specifications:**

Model	TT-6	TT-10	TT-20	TT-50	TT-100	TT-200	TT-300	TT-600
Capacity kg-m	6	10	20	50	100	200	300	600
Ranges in kg-m	6, 3 & 1.0	10, 5 & 2	20, 10 & 5	50, 25 & 10	100, 50 & 25	200, 100 & 50	300, 150 & 50	600, 300 & 150
No. of divn. on dial	600	500	500	500	500	500	600	600
Torsion Speed &	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	
Direction	One way	Reverse	Reverse	Reverse	Reverse	Reverse	Reverse	Reverse
Clearance Between	0-400	0-420	0-450	0-500	0-500	0-1000	0-1000	0-1500
Grips for flat bars (mm)	1-5	2-8	3-10	5-12	5-15	10-20	15-25	25-40
Width (mm)	25	25	30	40	50	60	60	70
Gear Motor 3ph (hp)	0.5	0.5	0.5	0.5	0.5	1.0	1.5	2.0

**Also in Our Range of Manufacture:**

- Electronic Microprocessor Based Version with Digital Indication of Torque and Angle of Twist
- Computerized Version
- Grips for Round bars can be provided at an Extra Cost

**ZI 7003 ROCKWELL HARDNESS TESTER**

Standard Rockwell / Brinell Machine

The Hardness Testers have been designed and manufactured strictly conforming to IS, BS, ASTM, ISO and DIN Standards. Since 1966 for most exacting test requirements in the Laboratories and Workshops etc. These testers are designed and manufactured for measuring hardness of metals and alloys of all types, hard or soft, flat, round, tubular or irregular in shape. The testers are simple in design, easy to operate, yet very reliable and accurate.

**Standard Rockwell Method-Manual Operation**

ZI 7003A: With automatic zero setting dial gauge and manual load selection.

ZI 7003B: With automatic zero setting dial gauge and Automatic load selection Standard Rockwell/Brinell Method-Manual Operation

ZI 7003C: With automatic zero setting dial gauge device and automatic load selection. Brinell Hardness Testing facility according to  $30 F/D^2$  ratio, with 187.5 kgf load and 2.5 mm dia ball indenter.

ZI7003D: Similar to ZI 7003C, but with additional test load of 250 kgf and 5 mm dia ball indenter for, testing Brinell hardness of non-ferrous metals according to  $10F/D$  ratio.



	ZI 7003A	ZI 7003B	ZI 7003C/D
Calibrated weight set kgf.	60,100,150	60, 100, 150, 187.5	60, 100, 150, 187.5, 250
Suitable Dial gauge	1 pc.	1 pc.	1 pc.
Flat testing table 50 mm dia.	1 pc.	1 pc.	1 pc.
Testing table 40 mm dia.	1 pc.	1 pc.	1 pc.
Spot Anvil	nil	nil	nil
Sphero-conical diamond cone penetrator 120°	1 pc.	1 pc.	1 pc.
1/16" dia. steel ball indenter	1 pc.	1 pc.	1 pc.
2.5 mm dia. steel ball indenter	nil	1 pc.	1 pc.
5 mm dia. steel ball indenter	nil	nil	1 pc.
10 mm dia. steel ball indenter	nil	nil	nil
Test Block Rockwell C	1 pc.	1 pc.	1 pc.
Test Block Rockwell B	1 pc.	1 pc.	1 pc.
Test Block Rockwell Superficial 30 N	nil	nil	nil
Test Block Rockwell Superficial 30 T	nil	nil	nil
Test Block HB 2.5/187.5	nil	nil	1 pc.
Test Block HB 5/250	nil	nil	1 pc.
25X Brinell Microscope with achromatic objective & light	nil	nil	1 pc.
Allen Spanner	2 pc.	2 pc.	2 pc.
Clamping device	1 pc.	1 pc.	1 pc.
Dashpot Oil	1 bottle	1 bottle	1 bottle
Instruction Manual	1 book	1 book	1 book
Collapsible cover for main screw protection	1 pc.	1 pc.	1 pc.
Storage case for accessories	1 pc.	1 pc.	1 pc.

**ZI 7004 BRINELL HARDNESS TESTER**

The machine is designed with a Hydraulic Power pack and control circuit for effortless loading unloading operation. A dial gauge in front measures depth of ball penetration. This facilitates production testing within tolerance limits by comparison method.

**Standard Accessories**

- Model Capacity 3000 Kgf
- Testing Table 200 mm ø
- Testing Table 200 mm ø with 'V' groove
- For round jobs-10 to 80 mm dia
- Ball holder 5 mm
- Ball holder 10 mm
- Test Block HB-5/750
- Test Block HB-10/3000
- Brinell Microscope
- Allen Spanner
- Telescopic cover for elevating screw protection
- Instruction Manual

- PMT 3
- 1 pc.
- 1 pc.
- 1 pc.
- 1 pc.
- 1 pc.
- 1 pc.
- 1 pc.
- 1 set
- 1 book



**Impact Tester**

**ZI 7005 CHARPY IMPACT TESTER**

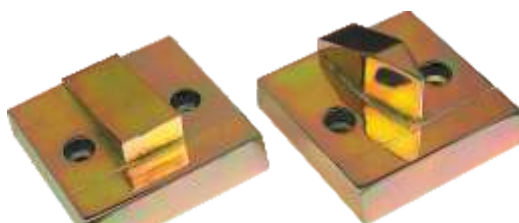
Designed for conducting CHARPY, 1ZOD and IMPACT TENSION Tests. The test methods confirm to IS 1757-1961, IS 1499-1959 and BS 131 Part 2 & 3, IS 1598-1960, BS 131 (Part 1) and ASTM E 32-47T.

The impact energy absorbed by the specimen during rupture is measured as the difference between the height of drop before rupture and the height of rise after rupture of the test specimen and is read on the dial scale.

**Salient Features:**

- Release of Pendulum by Hand operation
- Safety guards for Protection
- Braking Arrangement provided to arrest the swing of pendulum after specimen rupture

**Capacity 30 KgM / 300 Joules**



Izod Striker

Charpy Striker

	Charpy and Impact Tension Test	Izod Test
Pendulum drop angle	140°	85°
Pendulum effective weight	20.59 kgs.	21.79 kgs.
Pendulum speed	5.3465 m/sec.	3.857 m/sec.
Pendulum impact energy	30 kgM ( 300 J )	16.4 kgM ( 164 J )
Min. graduation	0.2 kgM ( 2 J )	0.2 kgM ( 2 J )
Distance of axis of hammer rotation and centre of test piece/point of test piece hit by hammer.	825 mm	825 mm
Max. permissible loss by friction X windage, etc.	0.5% of max. impact energy	

**Max. capacity available: upto 100 kgM**  
**Also available in Electronic Digital version**



**ZI 7006 FATIGUE TESTING MACHINE**

**Application & Operation**

This machine is used to test the fatigue strength of materials and to draw S-N diagram ideal equipment for Technical Institutions, Research Institutes, Laboratories etc. This is a rotating beam type machine in which load is applied in reversed bending fashion. The standard 8 mm dia specimen is held in special holders at its ends and loaded such that it experiences a uniform bending moment. The specimen is rotated at 4200 RPM by a motor. A complete cycle of reversed stresses in all fibers of the specimen is produced during each revolution. The bending moment is applied with a lever system and can be easily changed by moving a weight over the lever. Total number of revolutions at which the specimen fails are recorded by a mechanical counter. An interlocking system puts off the motor at specimen failure. Machine meets requirements of International / Indian Standards

**Features**

- Light weight, compact size, simple design
- Table model, no need of foundation
- Simple lever system for changing load
- Accurately calibrated as per IS 5075
- Calibration in Nm available on request

**8 digit electronic counter instead of mechanical counter can be supplied at additional price and the model is termed as FTG-8 (D).**

**Machine with maximum bending moment upto 400 kg cm can be offered on request.**

**Technical Specifications**

Maximum bending moment	kg cm	200
Bending moment adjustable.	kg cm	30 – 200
Ranges.	I-kg cm	30 – 100
	II-kg cm	100 – 200
Gripping dia of specimen	mm	12
Testing dia of specimen	mm	8
Rotating speed	rpm	4200
Accuracy of applied bending moment.		± 1%
Mechanical counter No. of digits		8
Power required	HP	0.5
Main supply	A.C.3 ph.	440 V, 50 Hz
Overall size (approx)	mm	1000L x 500W x 600H
Weight (approx)	kg	120

**ZI 7007 TENSILE TESTING MACHINE**

Floor mounted, vertical type, two column construction specially manufactured for various applications.

**Tensile Testing Machines** are designed for determining the Tensile Strength and Elongation of a host of materials like ferrous and non ferrous materials, cables & conductors, Plastic, PVC, Rubber specimens, paper, plywood etc.

Our Tensile Testing Machines are also capable for conducting compression, Cross breaking and Shear tests thus making them more versatile with a few additional attachments.

Tensile Testing Machines are available in various capacities depending upon the requirements right from 5 kgf to 10 Tonnes ensuring ± 1% accuracy in test results.

We assure high accuracy, sensitivity, reliability, consistency, repeatability and excellent workmanship.

Tensile Testing Machines are backed up by prompt and effective after service by a team of factory trained technicians.

Our machines are available in KGF/ kN/N as per your specific requirements.

Tensile Testing Machines are also available with State of Art Electronic Microprocessor based Digital Indicator systems with PC and Printer.

**Horizontal Models and Computerized versions are also in our range of production.**



**Technical Specifications**

MODEL	ZI 7007-A	ZI 7007-B	ZI 7007-C	ZI 7007-D	ZI 7007-E	ZI 7007-F
Capacities (Kgf)	250	500	1000	2500	5000	10000
Least Count	0.1 gms.	0.1 gms.	0.1 kgf.	0.1 kgf.	0.1 kgf.	0.1 kgf.
Traverse Speed (mm/ min)	500 and 100	100	100	100	100	25 and 12.5
	<b>and also as per your specific requirements.</b>					
Grip Separation						
Minimum	25 mm	25 mm	25 mm	25 mm	25 mm	25 mm
Maximum	1000 mm	1000 mm	750 mm	750 mm	600 mm	500 mm
Power Requirement	3ph440V	3ph440V	3ph440V	3ph440V	3ph440V	3ph440V
	50 c/s AC	50 c/s AC	50 c/s AC	50 c/s AC	50 c/s AC	50 c/s AC
Over-travel Safety Switches	Incorporated	Incorporated	Incorporated	Incorporated	Incorporated	Incorporated
Load Elongation Recorder	Optional	Optional	Optional	Optional	Optional	Optional

**ZI 7008 METALLURGICAL INVERTED MICROSCOPE**

Magnification Range:	20x to 400 x (Standard) 0
Observation Head:	Binocular 45 with interpupillary and diopter adjustment
Stand:	Sturdy and Durable pressure Die cast Aluminium stand.
Mechanical Stage:	Co-Axial low drive double plate mechanism system travel on ball bearing guide ways.
Focusing System:	Co-axial coarse & fine mechanism system with ball bearing guide ways.
Epi-Illumination:	Built in base 12V-50W Halogen lamp with light intensity control system.
Quadruple Nose Piece:	A precision mechanism ensures the accuracy and optical alignment of the system.
Filters:	Green & Blue.
DIN-LWD Objectives:	M4 x M10x, M20x & M40x (SL). Anti Fungal & infinity corrected.
Eye Pieces:	5x & 10x Paired. Extra wide field, Anti fungal & Anti reflected

**ZI 7009 DOUBLE DISC POLISHING MACHINE**

This is double disc polishing machine for met allographic samples. Two independent polishing units is mounted on a common MS frame, other specification as per single disc. This Machine is portable model for polishing of met allographic sample. Disc dia 200 mm made of Aluminum. Speed continuously variable up to 950 RPM. Rating- 0.25 HP single phase 220 Volt A.C. Provided with sink and swing type laboratory water tap. Water proof Formica table top.

**ZI 7010 SPECIMEN MOUNTING PRESS**

Automatic metallography specimen mounting press is a kind of full automatic mounting press, equipped with in-out water cooling system. It is suitable for the heat mounting (thermohardening & thermoplastic) for all kinds of materials. After the parameters such as heating temperature, heat preserving time and applied force etc. are set up, put the specimen and mounting material into the machine, close the cover and press the start button, then the machine will finish the job automatically. It is not necessary for the operator to be on duty. According to different requirements of the material, there are four kinds of moulds that can be chosen to meet the demands at will. Also it is available to prepare two pieces of specimens at the same time, the capacity is doubled.

**Technical specifications**

1. Diameter of specimen: Ø25mm, Ø30mm, Ø40mm, Ø50mm
2. Power supply: 220V, 50Hz
3. Max. power consumption: 1800W
4. Setting range of system pressure intensity: 0-2MPa  
(corresponding preparing pressure intensity: 0-72MPa)
5. Temperature setting range: 0-300 °C
6. Heat preserving time: 0-99m99s
7. Dimensions: 615 x 510 x 500 cm
8. Net weight: 110Kg
9. Cooling method: water cooling

A large rectangular area with rounded corners, enclosed by a blue border. The interior is filled with horizontal dotted lines, providing a space for handwritten notes.



# SAFETY & SURVEY EQUIPMENTS



Personal protective equipment (PPE) refers to protective clothing, helmets, goggles, or other garments or equipment designed to protect the wearer's body from injury or infection. The hazards addressed by protective equipment include physical, electrical, heat, chemicals, biohazards, and airborne particulate matter. Generally, safety equipment is the protection that is used by workers to avoid injuries, casualties, life threatening situations etc. Different types of safety equipment are used by workers depending upon the nature of risk involved in the work. For example, in a welding operation the dark welding helmets are used as a piece of safety equipment. In construction operations, Rebar Caps, Corner Guards foot gear and coveralls are considered safety equipment.

Surveying or land surveying is the technique, profession, and science of determining the terrestrial or three-dimensional position of points and the distances and angles between them. A land surveying professional is called a land surveyor. These points are usually on the surface of the Earth, and they are often used to establish land maps and boundaries for ownership, locations like building corners or the surface location of subsurface features, or other purposes required by government or civil law, such as property sales.

**134** Safety Equipments

**136** Survey Equipments

**ZI 8001 SCAFFOLD POLY CLIP**

Use Poly Clip to secure poly sheeting to scaffolding

- Standard 11" length
- Internal ribbing helps to grab poly
- Saves time and material
- Inexpensive
- Reusable
- Package size: 100 Pcs./Carton



ZI 8001

**ZI 8002 ROUND POST HOLE FORM**

Form professional looking tapered holes in concrete to receive posts for railings, awnings, and other common uses.

- Simple installation.
- Easy to strip/remove - just pull tab.
- Holes can receive square posts up to 2" or 2" pipe (2 3/8" OD)
- Accurate alignment - tip of tab is centerline of hole form
- Use with any concrete thickness
- Pre-install for slabs up to 6" thick
- High visibility
- Safe to use - no sharp edges

Model	Rail Diameter	Box Qty.
ZI 8002-A	Up to 2-3/8" OD	25
ZI 8002-B	Up to 3 1/2" OD	15



ZI 8002

**ZI 8003 SQUARE HOLE FORM**

Forms professional looking squared holes in concrete to receive posts for railings, awnings, and other common uses.

Elevated base eliminates post exposure through floor or balconies, causing the post to rust through.

- Simple installation
- Easy to strip/ remove - just pull tab
- Accurate alignment - tip of tab is centerline of hole form
- High visibility
- Safe to use - no sharp edges
- Creates 4"x4" opening

Dimensions: square top without base: 4" wide by 5.75" tall. Base alone: 5.5" wide by 2.25" tall. 8" tall with base and square top .



ZI 8003

**ZI 8004 CORNER GUARD**

Corner guard provides an inexpensive method of protecting all products from strap and chain abrasion. Large shoulder on the chain guard prevents chain or strap from riding up and over the protector. Ribbed back prevents sliding and movement. Reusable.

- Will accommodate 4" strap or chain
- Freeze tested to below 0 degrees
- Prevent chipping and scarring of concrete
- Product will not discolor
- Packaged 100 Pcs. or 10 Pcs. per carton



ZI 8004



ZI 8005

**ZI 8005 IMPALEMENT SAFETY COVERS**

Labtest caps are steel reinforced and conform to state and federal safety regulations.

- Complies with BIS specifications
- Made of engineered high-impact plastic.
- 16 sq. inches top surface area aids in protection.
- Fits a range of diameters.
- Self-centering formed steel insert seats cover perpendicular to rebar.

**ZI 8006 PROTECTIVE CAPS FOR REBAR, PIPE, BOLTS**

Used to minimize possible accidents to protect both employees and equipment.

- Reusable
- Weather resistant
- Brightly colored for good visibility
- Available in two sizes



ZI 8006

Model No.	Rebar Size	Package Qty.
ZI 8006-A	#3-#8	200
ZI 8006-B	#7-#18	50



ZI 8007

**ZI 8007 SAFETY HELMET**

Safety Helmets that are essential for head protection during construction jobs and mining process. Safety Helmets are fabricated using robust material that are capable of withstanding harsh conditions and provide optimum safety to the users from any kind of injuries. Suitable for construction works, material handling, mining, sand blasting, ports etc. Made with hard PVC.

**ZI 8008 SAFETY CONE**

Red PVC Non Reflective Traffic Safety Cone  
Supplied in a pack of 10 cones.



ZI 8008

**ZI 8009 ELECTRONIC THEODOLITE**

The ZI 8009 Theodolites have Smart appearance, reasonable structure, practical functions. They are easy-to-use, and with excellent performance and reliable quality. (Includes: theodolite, tribrach, NiH rechargeable battery, Charger, user manual, and one year manufacturer warranty)

**Specification:****Telescope:**

- Magnification: 30X
- Objective Lens: 45mm
- Overall Length: 157mm
- Stadia Ratio: 100
- Stadia Constant: 0
- Image: Erect
- Field of View: 1° 30"
- Minimum Focus: 1.4m
- Resolving Power: 3.0'

**Electronic Angle Measurement:**

- Reading System Photoelectric detection by incremental encoder
- Diameter of Circle (Vhz): 79mm
- Minimum Reading: 1"/5" (Selectable)
- Accuracy: 2"
- Horizontal Angle: Dual
- Vertical Angle: Dual

**Display:**

- (LCD) Display Type: 2 sides, segment LCD in two lines

**Level Sensitivity:**

- Plate Level: 30"/2mm (30" per 2mm)
- Circular Level: 8'/2mm (8" per 2mm)

**ZI 8010 TOTAL STATION**

The ZI 8010 reflector 2 "Total Station offers a state-of-the-art at an affordable price. This fully electronic device will pull angles and distances to a prism reflector with the push of a button. With no mode prism, you can measure up to 200 meters (650ft) without prism.

The ZI 8010 comes with two NiMH batteries 8 hours. A lead optical website for quick and easy set-up. A 4 line adjustable LCD display for easy data manipulation. Four yellow function key to guide you

**Auto Vertical Compensator:**

- System: liquid-electric detection/plate level selectable
- Working range: +3'
- Accuracy: 1" (liquid-electric detection) 30"/2mm (plate level)

**Optical Plummet Telescope:**

- Image: Erect
- Magnification: 3X
- Focusing Range: 0.5m - infinity

through the operations angle, distance and coordinates. Embedded applications will save you time and money in the field. Perform isolated elevations, resections, missing lines and rapid implementation and precise. On-board storage (storage of 10,000 points) and allows you to collect points in the same location inside the unit. You can also use the standard RS-232 port to connect the external data collector. The interface is the same as the Topcon and Sokkia total stations.



ZI 8010

**ZI 8010 includes:**

- ZI 9010 reflectorless 2" total station
- 2 NiMH batteries
- AC Charger
- Hard shell carrying case with strap
- RS-232 PC download cable
- User manual



ZI 8011

**ZI 8011 TOTAL STATION BUILDER**

Easily affordable, tough total stations, built specially for site work. Anybody can use, regardless of profession no experience needed. Fast, reliable angle & distance measurements. Stake out. Excellent in-built laser distance measure. Simple routines for any building and construction tasks.

For anybody working on or around a site with the need of a simple, intuitive, yet innovative, long-lasting and powerful measuring tool. It is designed a perfectly tailored tool for every construction job. Regardless of your profession, Builder will amazingly accelerate your work flow. From simple tasks to professional all-day use, the Builder Series offers a scalable product family that exactly meets your needs.

Builder Series is equipped with all of the above features plus wireless communication via Bluetooth, full laser distance measurements up to 250m/820ft and up to 1.5mm accuracy at 100m covers the full range of tasks to be performed on any construction site. An -30°C option is available additionally.



ZI 8012

**ZI 8012 LASER DISTANCE METER**

The compact and handy base model is specifically designed for indoor applications. Shortcut keys for addition, subtraction, area and volume calculation make measuring fast and very reliable. The last 10 measurements are also stored. The laser dot is clearly visible. You can always see your targeting point, even if the target object is in a hard to access area.

**Quick and Easy**

Measure distances at the touch of a button and calculate areas or volumes.

**Measure from Edges or Corners**

With the flip-out end-piece you are equipped for any measuring situation.

**Small and Handy**

Thanks to its ergonomic and compact design with soft grip, ZI 8012 sits securely in your hand and fits into any pocket.

**ZI 8013 AUTOMATIC LEVEL**

ZI 8013 Automatic Level (Magnification 24X) feature enhanced reliability under all environmental conditions. Tough and compact bodies are more tightly sealed against water, humidity and dust (IPx6). The level provide quick setup, easy sighting, and superior durability against vibration and shock, ensuring the increased productivity over an extra-long period of time.

**Precise, Reliable Automatic Compensator**

This level incorporate the most precise and reliable compensator available in the market today. Four super-high-tensile suspension wires and magnetic damping system ensure accuracy and stability even when exposed to temperature changes, vibrations, or shock.

**Superior Telescope**

Optimally designed telescope provides exceptionally bright and sharp view that reduces operator's eye strain. Ultra-short focus distance of 20cm (7.9in.) from end of telescope makes it easiest to use in confined locations.

**Quick Collimation**

Two knobs of endless horizontal motion drives can be operated with either hand for fast and easy aiming.

**ZI 8014 AUTOMATIC LEVEL**

Specifically designed for the construction sector, this is the most economically priced optical / dumpy level. Ideal for general construction levelling, the beautifully built Automatic Level is also the ideal tool for profiling, landscaping and much more.

Featuring 24x magnification and an upright telescopic image, this Level also includes an air damped, auto compensator, a 360° field of vision, a cutting edge 'fine drive' for superbly accurate aiming as well as IP54-rated protection against water.

**Clear Display**

The results are shown on a 3-line display. The illuminated display is easily readable, even in the dark.

**Simply Clever**

Minimum / maximum measurements, tracking and storage of results makes your work much easier.

**Holster:** Stows Everything Away Neatly

**Hand Loop:** secures the instrument at all heights

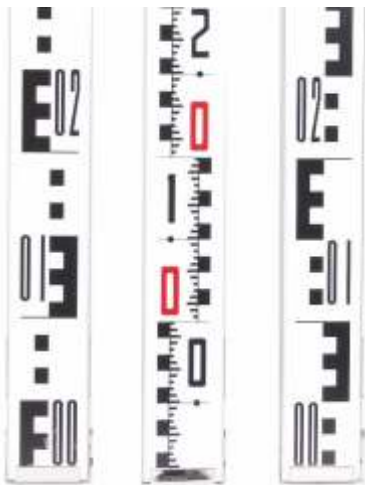




ZI 8015

**ZI 8015 AUTOMATIC LEVEL**

Utilizing a finely tuned magnetic damping system, this automatic levels ( Magnification 24X) quickly level and stabilize the line of sight. These precision instruments ensure reliable leveling even when working near heavy equipment or busy highways where fine vibrations could be present. The automatic levels feature IPX6 protection against powerful water jets from all directions and are fully resistant to driving rain and splashing water.

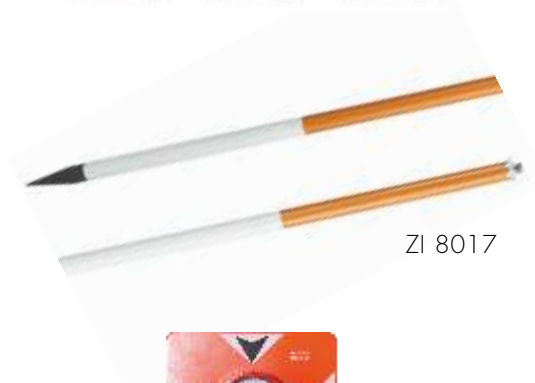


ZI 8016

**ZI 8016 LEVELLING STAVES**

Level Staff is a graduated aluminium rod, used with a levelling instrument to determine the difference in height between points or heights of points above a datum surface. It cannot be used without a leveling instrument.

Zeal International provide a range of levelling staffs including E-type, bar coded, standard invar and industrial Invar Levelling Staffs. Most of the staffs are sectional and so can be adjusted in length to allow for easy storage and transport. The aluminium staffs adjust with telescopic section inside each other, whilst the wooden versions use sliding slip joints or connections. Sizes: 4/5/6 metres.



ZI 8017

**ZI 8017 RANGE POLE**

Heavy-duty range pole features alternating 12" orange and white sections. 5/8" x 11 Threaded joints allow for fast assembly. Sizes: 2/3 metres.



ZI 8018

**ZI 8018 PRISM WITH POLE**

Survey Prism Poles, which we offer, are appreciated for their sturdy make. These Survey Prism Poles can be assembled in different configurations. Prisms can be mounted on the top, bottom, middle or between pole sections. These Survey Prism Poles are meant for robotic or total station applications.

**Features:**

- 25.4mm tilting prism w/ 0/30mm offsets
- Built-in circular vial With 4 (30mm dia.) threaded pole sections
- 5cm stainless steel threaded point

**ZI 8019 ALUMINUM TRIPOD**

- Professional, multi-functional aluminum elevator tripod
- Fast clamps
- Circular bubble
- Extendible centre column
- mm-scale
- Exchangeable rubber feet



ZI 8019

**ZI 8020 WOODEN TRIPOD**

- Robust construction
- With cut out handle and shoulder carrying strap
- Used for RTK's, Total Station



ZI 8020

**ZI 8021 GPS SYSTEM**

- Worldwide basemap
- 2.2" monochrome display, easy to read in any light
- GPS and GLONASS satellites for faster positioning
- Paperless geocaching
- 25-hour battery life with 2 AA batteries

Enhanced 2.2" monochrome display that's easy to read in any lighting situation. Both durable and water resistant, ZI 8021 is built to withstand the elements. Its easy-to-use interface means you'll spend more time enjoying the outdoors and less time searching for information. This features the legendary toughness that's built to withstand the elements. Dust, dirt, humidity, water — none are a match for this navigator.



ZI 8021

**ZI 8022 PLANIMETER**

Offered in a roller-type model this planimeter features an unique 6-digit pulse count operation that permits cumulative measurement of areas up to 10m-100 times the measuring capacity of ordinary planimeters. Enhanced with advanced micro-processors for accuracy, this instrument is ideal for many applications where precise large area measurements are needed, such as in civil engineering, surveying, forest management, mapmaking and agriculture. Other features include hold and measuring control, clear liquid crystal digital readout, and scale readings in either Metric or English. Comes packaged in a plastic carrying case with AC adapter (battery included) and operating instructions.

**Specifications:**

- Max. measuring range: 325mm vertical; 30m horizontal
- Accuracy: within  $\pm 0.2\%$  (within  $\pm 2/1000$  pulses)



ZI 8022





ZI 8023

**ZI 8023 GEOLOGICAL HAMMER**

A geologist's hammer, rock hammer, rock pick, or geological pick is a hammer used for splitting and breaking rocks. In field geology, they are used to obtain a fresh surface of a rock to determine its composition, nature, mineralogy, history, and field estimate of rock strength. In fossil and mineral collecting, they are employed to break rocks with the aim of revealing fossils inside. Geologist's hammers are also sometimes used for scale in a photograph



ZI 8024

**ZI 8024 BRUNTON COMPASS**

We are offering Brunton Compass Pocket Transit Type that is appreciated for its quality and reliability. The Brunton Compass is used to measure strike, inclination and topography skeleton survey. We make sure that the Brunton Compass is at par with industry standards and as per the specifications laid by our clients. Avail precision made Brunton Compass from us at very reasonable prices.

**Features:**

- Precision made
- Sturdy
- Accuracy
- Smooth finishing



ZI 8025

**ZI 8025 PRISMATIC COMPASS**

A prismatic compass is a surveying instrument which is extensively used for calculating bearings of survey lines and included angles between them. Sizes: 4"/6" diameter with telescopic aluminium folding stave.



ZI 8026

**ZI 8026 PLANE TABLE SET**

We offer our clients a Plane Table which is primarily used in surveying and related areas. The Plane Table provides a solid and flat surface in order to make field drawings, charts and maps. These have been appreciated for characteristics like sturdy built and high durability. Our team of experienced designers is adept at designing Plane Tables which are solid and in adherence with the specifications detailed to us by our clients. These can be availed at industry leading prices. The Specifications of Plane Table are given below: Extensively used in surveying and allied areas Provides a level surface for drawing charts and maps improved durability and strength.

**Features:**

- Extensively used in surveying and allied areas.
- Provides a level surface for drawing charts and maps.
- Improved durability and strength

**NOTES**

A large rectangular area with rounded corners, enclosed by a thin orange border. It contains numerous horizontal dotted lines, providing a space for handwritten notes.



To perform the different tests on all building materials: Aggregates, Cement, Concrete, Soil, Rock, Asphalt etc., very often, a vast range of General Laboratory Apparatus is required. This range include important equipment as, for example, Ovens, Balances, Measuring Instruments, Meteorological Equipment, Vacuum Pumps, Air Compressors, Laboratory Glassware and Hardware as Graduated Cylinders, Porcelain, Scoops, Containers, Plasticware etc. All single items have been selected to suit the requirement of Standards and laboratory technicians.

**ZI 9001 SAMPLING TRAYS**

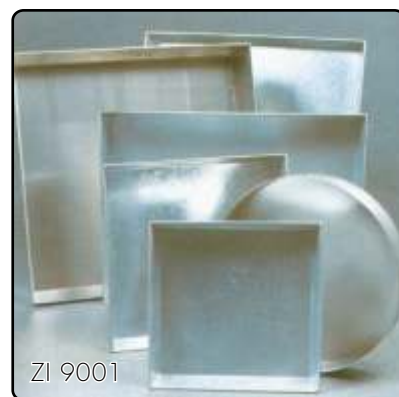
**Specification:**

These trays are used to keep samples in it for heating in the oven.

Sizes Available (in mm):

254x254x38   306x306x38   460x460x50   500x400x120  
 610x305x50   610x610x63   400x400x50   760x460x63  
 760x760x63   910x610x76   910x910x76   1040x1040x76

On special request we can manufacture customized sizes also.



ZI 9001

**ZI 9002 MEASURING TAPES**

**Specification:**

To measure dimensions in mm, cm, inches, feet, metres available in Steel, Metal Wired, Fibre Glass. Size 3mtrs, 5mtrs, 7.5mtrs, 15 mtrs, 30 mtrs, 50 mtrs, and 100 mtrs.



ZI 9002

**ZI 9003 GRADUATED MEASURING JARS**

**Specification:**

These are commonly used at site for measurement of Silt & Sand, to measure the quantities of liquids these are available in Ordinary Glass, Polypropylene Plastic, Borosilicate Glass, Soda Glass. Capacity available form 5ml to 2000ml.



ZI 9003

**ZI 9004 FUNNELS AND FLASKS**

Model	Description	Capacity
ZI 9004-A	Volumetric Flask	100, 500, or 1000ml
ZI 9004-B	Conical Flask	250 or 500 ml (nominal)
ZI 9004-C	Filter Flask	1000 ml
ZI 9004-D	Extraction Flask	250 ml
ZI 9004-E	Buchner Funnel	
ZI 9004-F	Glass Funnel	
ZI 9004-G	Funnel	



ZI 9004

**ZI 9005 MOISTURE TINS**

**Specification:**

To determine moisture contents in soil and other material . These are made from aluminium or stainless steel.

Sizes available: (a) 25mm dia. (b) 50mm dia. (c) 75mm dia.  
 (d) 80mm dia (e) 100mm dia (f) 150mm dia.  
 (g) 200mm dia.

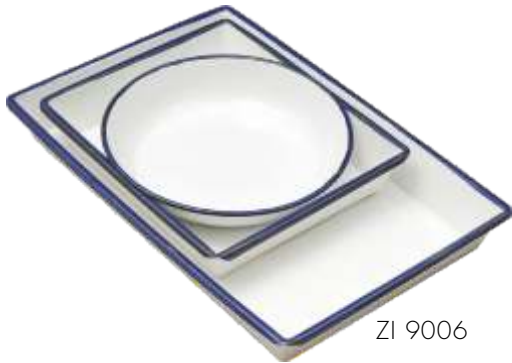


ZI 9005

**ZI 9006 ENAMEL TRAYS**

Different sizes made up of

Sizes: 10" x 12", 12" x 14", 18" x 14", 8" x 10", 19" x 24"



ZI 9006

**ZI 9007 SAMPLING BOWLS**

Different sizes made up of stainless steel.

Sizes: 25 cm dia., 30 cm dia. and 40 cm dia.



ZI 9007

**ZI 9008 STANDS, BOSSHEADS AND CLAMPS**

Model No.	Description
ZI 9008 - A	Retort Stand
ZI 9008 - B	Bosshead
ZI 9008 - C	Clamp
ZI 9008- D	Support Assembly



ZI 9008

**ZI 9009 LABORATORY SCOOPS**

Scoops are used for transferring Soil, Cement, Aggregate or Any Other Grainy Material Or Powder. They are made up of Stainless Steel/Aluminium fitted with handle. Assorted sizes and types are available. Made up of Stainless Steel / Aluminium.

Capacity: 325 cc, 500 cc, 1000 cc, 2000cc and 5000cc



ZI 9009

**ZI 9010 WATER BATH (6 HOLES)**

**Specification:**

Rectangular water bath double walled construction, inner reservoir of stainless steel. Outer body in mild steel with glass wool insulation in between, supplied with lid having one hole of 12.5cms dia & 6 holes of 7.5 cms dia. Concentric rings with lids are provided on holes. The top plate & concentric rings are of stainless steel temperature range ambient to 100° C. Controlled by capillary thermostat.

Size of the chamber 30cm x 25cm x 12cm. These water baths are useful for laboratory work. Thermometers at extra cost suitable for: 230 V A.C. Single Phase.

Note: 9 & 12 Holes Water Bath also available.



ZI 9010

**ZI 9011 UNIVERSAL WATER BATH (SEROLOGICAL TYPE)**

**Specification:**

Double walled inner chamber in stainless steel outer chamber in mild steel temperature range Ambient to 100° C controlled by capillary thermostat. Accuracy ± 2° C operated on 230V A.C. Single Phase. These baths are suitable for washing Marshall specimen. Lid is made up of stainless steel with a hole for glass thermometer to penetrate.

Following sizes are available:

A) 12" length x 9" width x 7" height having rating 750 W.

B) 18" length x 12" width x 7" height having rating 1500 W.

Customised sizes also available. Rack also available for Le Chatelier mould for 12 Nos.



ZI 9011

**ZI 9012 UNIVERSAL WATER BATH (SEROLOGICAL TYPE)**

**Specification:**

Same as ZI 9011 but supplied with Digital Temperature Controller range ambient to 100.0 deg C accuracy ±0.2° C, least count ±0.1° C. & FHP Motor cum Stirrer. Heaters are provided according to the size of the chamber. A control panel in which the digital controller, switches for mains, FHP stirrer, regulator for the stirrer is fit is by the side. Sizes available: 18"x12"x10" inner chamber in stainless steel, outer in mild steel. Rating of heater 2000 W suitable to run on 230 V A.C. Single Phase.



ZI 9012

**ZI 9013 LABORATORY OVEN**

**Specification:**

Oven are designed, calibrated & tested to suitable various applications in growing fields.

**Construction:**

Double walled constructed with inside Aluminium / Stainless Steel chamber having 60-75 mm glass wool insulation. Door is Fitted with heavy chrome plated hinges. Provided with adjustable Steel / Aluminium / Wire mesh trays. Temperature is recorded by means of L shaped thermometer fitted at the front of the cabinet.

Temperature controlled by hydraulic capillary thermostats.

**Heating:**

Heating elements are made up of high grade (Kanthal) resistance wire heaters are fitted/wound along all the sides of the oven.

Complete with two pilot lamps, plug pins.



Available size	No. of Trays	Rating
12" x 12" x 12" (300 x 300 x 300mm)	2	1.5kW
14" x 14" x 14" (350 x 350 x 350mm)	2	1.5kW
18" x 18" x 18" (450 x 450 x 450mm)	2	1.5kW
18" x 18" x 24" (450 x 450 x 605mm)	2	2.0kW
14" x 24" x 24" (605 x 605 x 605mm)	3	2.5kW
24" x 24" x 36" (605 x 605 x 900mm)	3	2.5kW
24" x 18" x 36" (605 x 450 x 900)	3	2.5kW

Temperature Gauge:- Ambient To 250° ±1° C

- (i) Air circulation can be fitted in all the sizes mentioned above for proper air circulation at an extra cost.
- (ii) Digital temperature indicator cum controlled can be fitted for better accuracy results.
- (iii) Alarm system can be fitted at an extra cost.
- (iv) For higher temperature i.e. 200° C always buy stainless steel chambers.
- (v) High temperature ovens/driers can be manufactured up to 350° C

**Sizes:** Available In Single Phase 230 V A.C., Three Phase 440 V A.C. Model With Available Industrial Heaters & Industrial Driers.

3' x 2' x 2'	3' x 3' x 3'
4' x 2' x 2'	4' x 3' x 3'
5' x 2' x 2'	5' x 3' x 3'
5' x 4' x 4'	5' x 4' x 3'



**ZI 9014 DIGITAL DOUBLE DOOR DRYING OVEN**

This range of ovens is designed for drying large quantities of soil and aggregate samples and maintains temperature in accordance with most B.S. and ASTM requirements.

The 225 lts. and 425 lts. are economy models constructed with coated mild steel exterior and Stainless Steel coated interior chamber, which is both durable and corrosion resistant. These units meet the requirements of BS 1377 and are ideal for on-site laboratories and general soil and aggregate testing.

**Options And Accessories:**

- Dial thermometer with collar fixing for door
- Heavy duty shelves (on Request at an extra price)
- Color of the Oven (Only on qty. greater than 3 Units)

**Specifications:**

- The larger soil drying ovens are constructed with mild steel and powder coated exterior and Stainless Steel coated chamber which is both durable and corrosion resistant.
- All Sizes of Oven are fitted with a (PID Controller) having a microprocessor digital control as standard.
- All units comes with MCB tripping device in cases of any short circuit, overloading of voltage and low voltage cut off. Wiring of heaters can be connected / dis-connected removing the side panels of the Oven.
- Caster wheels with locking arrangement are fitted below the Oven for easy movability of the unit from one place to another. Door locking arrangement is very easy & convenient with lever to lock & unlock with half turn lever
- A Safety Thermostat is fitted inside the Oven for safety purpose. Incase of the failure of the PID controller the safety thermostat will serve as the temperature controller.
- A High / Low switch is fitted on the panel of the Oven for Heaters. This feature allows heaters to burn all together or half of them.
- The Least Count Division for viewing / setting the Temperature is 0.1°C



**Technical Specifications:**

Model No.	Capacity (litres)	Temperature	Fluctuation	No. of Shelves	No. shelf positions	Weight (kg)
ZI 9014-225	225	Ambient-200° C	0.75	3	4	90
ZI 9014-425	425	Ambient-200° C	0.75	4	5	170
ZI 9014-750	750	Ambient-200° C	0.5	5	8	200
ZI 9014-1000	1000	Ambient-200° C	0.5	5	11	240





ZI 9015

**ZI 9015 HOT PLATE (CIRCULAR)**

Deluxe quality with heavy Cast Iron base duly heat resistant Painted, Rating 1.5 kW fitted with ER control or Thermostat controller, fiber blanket Insulated with Kanthal heater & Fire proof connection, to with stand temp, upto 300° C, suitable to work on 230 V A.C. Supply.

**ZI 9016 HOT PLATE (RECTANGULAR)**

Rectangular Hot Plate with Outer M.S. Sheet body duly powder Coated Stove painted To work on 230 V AC Supply. Useful for continuous heating up to 300° C. Heavy duty cast Iron Top with heat resistant paint.

Hot Plate Size	Rating
10" x 12" x 6" (250 x 300 x 150 mm)	1.5 kW
16" x 10" x 6" (400 x 250 x 150 mm)	1.5 kW
18" x 12" x 6" (450 x 300 x 150 mm)	1.5 kW
18" x 24" x 6" (450 x 600 x 150 mm)	1.5 kW

Available with Thermostat / E. Regulator Control



ZI 9016

**ZI 9017 HEATING MANTLE**

**Specification:**

Most suitable for Labs, Pharmaceuticals, Chemicals Glass Plants Etc. Useful for heating inflammable liquids electric heating net is hard Knitted from glass yarn (without any joint) & for durability & stands temp. Up to 350° C body of mantle is spun one piece from non rusting Alum (duly stove 1 powder coated) mantles are logged with special grade mineral wool. Most suitable to work on 230 V A.C. supply. Capacity: From 250 ml to 20 lts.



ZI 9017

**ZI 9018 VACUUM PUMP**

High vacuum consist of a metallic casing having Cylindrical bore accommodating an eccentrically mounted slotted rotor bearing, a pair of Vanes in the slots forced a part and pressed against the wall of the casing of the spring. With the rotor these vanes slide along the wall Casing wiping before them the air which has entered the apparatus via the suction orifice. The air is finally forced out of the pump by the Vanes through the oil immersed exhaust valve. The pumps are made in either single or double stages, the pumps are electrically operated. Experienced and research in the field, strict supervision by trained experts and Quality contact by qualified and experienced engineers. Sizes: 0.25, 0.50, 1.0 HP available. Operated on 230 V AC, Single Phase Supply, 50 Hz.



ZI 9018

valve. The pumps are made in either single or double stages, the pumps are electrically operated. V belts driven and mounted on iron base plates.

Experienced and research in the field, strict supervision by trained experts and Quality contact by qualified and experienced engineers ensure that every pump is reliable technically proved to give trouble free along service.

**ZI 9019 HUMIDITY CHAMBER**

**Construction:**

Double walled outer M.S. Sheet duly powder coated. Inner Aluminium/ Stainless Steel with 2nos. adjustable shelves duly perforated. Having heavy duty M.S. Stand. The door is an impressive structure having glass window & sealed by Rubber Gasket. Gap between the walls is filled with glass.

**Control Panel:**

Consist of Temp. controller i.e. Thermostat for dry temp. Control, Wet Temp. controller Energy Regulator, Mains, Dry, Wet Indicator Humidity Indicator, Mains, Illumination Switch. Humidity controlled by Imported Humidistate placed inside the chamber. Supplied with Hygrometer/ wet and dry thermometer to check exact Humidity inside the chamber.



The Temperature is recorded on the "L" shaped prismatic Thermometer fitted at the front of the cabinet. The water tank is provided at the bottom & the steam is circulated by water pump/motor fitted at the top of the chamber. (Available sizes are same as given below)

**ZI 9020 HUMIDITY CHAMBER**

Top panel model with spray injection consist of stainless steel water tank, 2 nos, deluxe motor for dry & spray unit connected to the water bath. Inlet & Outer nozzle is fitted at the side for water supply inside the tank. Outer nozzle is also fitted at the side for cleaning the water tank inside the panel.

**Specification:**

As given above having water level to check water inside the tank.

**Control Panel:**

Consist of Temp. Controller i.e. Thermostat for dry temp. Control, Wet Temp. Controller ER/Thermostat, Mains, Dry, Wet Indicator, Humidity Indicator, Mains, Illumination Switch.

Temp. Range:

Ambient to 40/45±2° C, Suitable to work on 230 V A.C. Supply.

**Optional:**

1. Digital Controller-cum-Indicator required can be fitted at extra cost.



Chamber Size (inside)	No. of Trays	Ltr.
450X450X450 mm	2	95
450x450x700 mm	3	147
605x605x605 mm	2	225
605x605x900 mm	3	335

**ZI 9021 HUMIDITY CHAMBER COOLING (SIDE PANEL)**



**Construction:**

Double/Triple walled outer body made of M.S. Sheet duly powder Coated angle Iron from at bottom with caster wheel for easy moment. Fitted with Tecumseh / Kirloskar Eco- Friendly Compressor / Condensing Unit for Uniform& better cooling inside the chamber.

Full size control panel.

**Temperature Range: 5 to 50° C**

**Control Panel:**

Consist of Digital Temp, Controller-Cum-Indicator for Dry And Cooling, Voltmeter, Mains, Wet Temp. Controller, Pilot Lamp for Humidity & Wet Temperature, Illumination Switch.

Chamber Size (inside) S. Steel / Aluminium	No. of Trays	L t r.
450 x 450 x 450 mm	2	95
450 x 450 x 700 mm	3	147
605 x 605 x 605 mm	2	225
605 x 605 x 900 mm	3	335

**ZI 9022 MUFFLE FURNACE**

Light Weight with ceramic fibre wool insulation (instead of brick insulation). The outer casing is made of double walled thick P.C.R.C. Sheet, reattached with thick perforated sheet on the bottom portion, Painted with attractive stove enamel/powder coated. Heating elements are made of KANTHAL "A-1" wire and backed by high temperature ceramic wool insulation, which avoid loss of energy, Temperature control unit consist of Energy Regulator, fitted in front of furnace with two pilot lamps. The apparatus is complete with One Pyrometer, Thermocouples, Lever, Thermal Fuse, Main Lead With Power Plug. To work on 230 V A.C., the energy regulator dial is arbitrarily marked 0-100 position. This marking does not indicate temperature. It indicates control level i.e. at position '100' maximum electricity is allowed to flow to furnace. At position '0' minimum electricity is flow to furnace. Maximum Temp, is 950° C and working temp, 900° C

Rectangular shape wounded muffle baked at high temperature is fitted inside the chamber.

**Optional:**

1. Digital Temp. Controller instead of Energy Regulator & Pyrometer.
2. PID Temp. Controller at an extra cost.

Muffle Size (WxHxD)	Rating Working 900° C
100 x 100 x 225 mm	1.5kW
125 x 125 x 250 mm	2.0kW
150 x 150 x 300 mm	3.5kW
175 x 175 x 475 mm	3.5kW
200 x 200 x 300 mm	4.5kW



**ZI 9023 HIGH TEMPERATURE FURNACE (UP TO 1400° C)**

**Outer Body Made of M.S. Sheet With Angle Iron Frame Heavy Duty**

Ceramic fiber insulated with chamber made of high density ceramic fibre board. The furnace is heated heavy duty transformer unit. Control panel is provided with heavy duty controllers. Digital type "Temperature Indicator-cum-Controller Complete with PTPRH Thermocouple. Maximum Temperature range up to 1400° C but maximum working temperature 1350° C fitted with silicon carbide rods spiral shape to withstand temp, up to 1350° C

Muffle Size (WxHxD)	Rating Working 1350°C
100 x 100 x 225 mm	3.0 kW approx
125 x 125 x 250 mm	3.5 kW approx
150 x 150 x 300 mm	4.5 kW approx

**ZI 9024 LABORATORY INCUBATOR**

Incubators are designed fabricated & tested to suit various applications in growing field of Medical Agriculture. Research Laboratories of Hospital/Bio-Tech lab. Suitable to work on 230 V A.C. Supply 50 Hz

**Construction:**

Double walled construction outer body made of M.S. Duly stove enamel/powder coated, with inside Aluminium/Stainless Steel Chamber having 60-75mm glass wool insulation, door with glass window for observation of sample without disturbing. The door is fitted with heavy chrome plated hinge. Provided with adjustable Steel/Aluminium/Wire mesh tray. Temp is recorded means of "L" shaped Prismatic glass Thermometer fitted at the front of the cabinet

Temperature controlled by Hydraulic type Bi-Metallic Capillary Thermostat, having adjustable air ventilators on both sides.

**Heating:**

Heating element are made from high grade (Kanthal) Resistant wire. Heaters are fitted/wound along all sides & bottom. Complete with 2 pilot lamp cord & plug pin etc.



Available Size	No. Of Trays	Rating	Ltr
300 x 300 x 300mm	2	500W	28
350 x 350 x 350mm	2	500W	45
450 x 450 x 450mm	2	500W	95
450 x 450 x 605mm	2	750W	125
605 x 605 x 605mm	2	1.0 kW	224
605 x 605 x 900mm	3	1.0 kW	336
605 x 450 x 900mm	3	1.0 kW	252

**Optional:**

- 1 Air circulation can be fitted in all the above size at extra cost.
- 2 Digital Temp. Controller/Indicator can be fitted with air circulation system at system at extra cost if required.
- 3 Alarm system if required can be fitted against order.
- 4 Deluxe Model with Thermostat heavy Gauge Inside / Outside chamber.

## ZI 9025 PIPETTE AND BURETTES



Model No.	Description	Capacity
ZI 9025-A	Graduated Pipette	10 ml (nominal)
ZI 9025-B	Graduated Pipette	20ml (nominal)
ZI 9025-C	Bulb Pipette	50ml
ZI 9025-D	Burette	50ml (nominal)
ZI 9025-E	Burette	100ml (nominal)

## ZI 9026 EVAPORATING DISHES



Model No.	Description
ZI 9026-A	Evaporating Dish, Shallow form with spout, porcelain 100 x 40mm
ZI 9026-B	150 x 45mm
ZI 9026-C	200 x 45mm

Made up of Aluminium / Stainless Steel

## ZI 9027 LABORATORY THERMOMETERS



ZI 9027

### Specification:

Chemical thermometers made up of high class glass capillary with prominent mercury or alcohol column as per requirement for accurate results for Research Laboratories, Institutes, Schools, Colleges, General laboratories in private sectors. Range available between -100° C to + 600 ° C consumer should indicate the specified range, least count, accuracy class. We can also supply according to the customer drawings & samples.

ZI 9028



## ZI 9028 DIAL THERMOMETER

### Specification:

Dial Thermometers are useful for measuring the temperature of Soil, Bitumen or any hot material where inserting glass thermometer is risk from breakage point of view. These are essentially bi-metallic thermometers, bimetal element is enclosed in a hollow metallic stem with close fitting. As the temperature rises bimetal element expands and activates a pointer fixed on the dial to read temperature

### Following sizes are available

Dial Sizes:	2" to 6"
Stem length:	2" to 48"
Material of stem:	Stainless steel
Ranges:	0-50° C, 0-100° C, 0-150° C, 0-200° C, 0-300° C, 0-400° C -20 to +60° C, -30 to +50° C.

**ZI 9029 ROOM THERMOMETER**

**Specification:**

Types of room thermometer are normal room thermometer.  
Range -30 to +60°C



ZI 9029

**ZI 9030 MAXIMUM & MINIMUM THERMOMETERS**

**Ranges Available:**

-30°C to +50°C



ZI 9030

**ZI 9031 DIGITAL TEMPERATURE HUMIDITY METER**

- Large character LCD display, easy to read
- Temperature, Humidity and Clock display simultaneously
- Hourly chime, Daily alarm function
- Max/Min temperature and humidity memory function
- Calendar display function (Month and date)
- Temperature display modes: °C/°F
- 2 time display modes: 12/24H
- Desktop place or Wall hanging
- Product Size (HxWxD): 105 x 97 x 23 mm



ZI 9031

ZI 9031 with External Probe

**ZI 9032 ELECTRONIC THERMOMETER**

This series of thermocouple thermometers are micro controller based testers. With very intuitive interface, the user can fully operate the tester without second thought. They are digitally calibrated for long time stability. The whole series are equipped with PC interface for advance applications.

**Features:**

- Timer function
- PC interface
- Auto power off
- Resolution 0.1°C; 0.1°F
- Backlit LCD
- 4 input channels (ZI 9032-B)
- 4 readings display (ZI 9032-B)



ZI 9032-A

ZI 9032-B

**Technical Specifications:**

Model	ZI 9032-A (1 Channel)	ZI 9032-B (4 Channel)
Range: K type:	-200~1370°C; -328~2498°F	-200~1370°C; -328~2498°F
Accuracy:	±0.1%+0.7°C; ±0.1%+1.4°F	±0.3%+1°C; ±0.3%+2°F
Resolution:	0.1°C; 0.1°F	0.1°C; 0.1°F
Operation Temperature:	0°C~50°C (<80%RH)	0°C~50°C (<80%RH)
Storage Temperature:	-20°C~60°C (<70%RH)	-20°C~60°C (<70%RH)
Battery:	9V x 1	9V x 1
Dimensions:	184 x 64 x 30mm	184 x 64 x 30mm
Weight:	210g	220g



ZI 9033

**ZI 9033 DIAL GAUGE**

**Specification:**

Used for talking measuring settlements of Soil, used in Marshall Stability test apparatus, CBR Test Apparatus, Unconfined Compression Test Apparatus to measure deformalities, strains, displacements in general.

Range: 0-5mm x 0.002mm, 0-10mm x 0.01mm, 0-25mm x 0.01mm, 0-50mm x 0.01mm



ZI 9034

**ZI 9034 DIGITAL DIAL GAUGE**

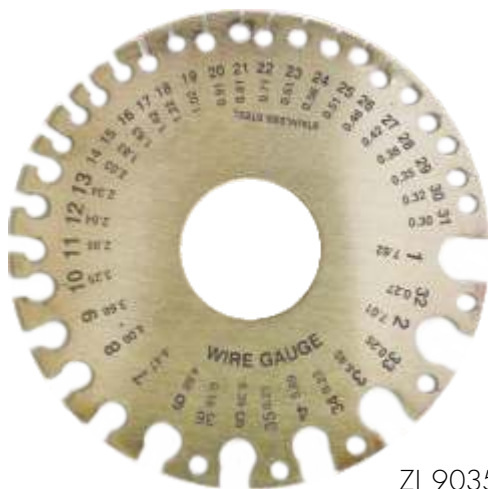
The digital display with its large numerals makes it very simple to use this Dial Gauge. Function and display section can be rotated through 270°. The sturdy construction guarantees precision and reliability.

**Features:**

- Button function: on/off, inch/mm, zero
- Cr2032 battery, automatic power off
- Data output
- Optional accessory: data output system, backs, contact points

**Technical Specifications:**

Model	Range	Accuracy
ZI 9034-A	12.7mm/0.5"	5µm
ZI 9034-B	25.4mm/1"	5µm
ZI 9034-C	50.8mm/2"	6µm
ZI 9034-D	12.7mm/0.5"	5µm



ZI 9035

**ZI 9035 DISC TYPE WIRE GAUGE**

Sheet metal thickness gauge, measuring range (in.) 0.007 to 0.3125, probe depth (in.) 0.80 to 1.60, graduations 0.289 in., number of leaves 0, length (in.) 3, width (in.) 3, thickness (in.) 0.125, measuring range (in./mm) 0 to 36, material steel, finish brushed, features display metal gauge size on one side and decimals on other side.



ZI 9036

**ZI 9036 DIGITAL VERNIER CALIPER**

**Features:**

- Resolution: 0.01 mm/0.0005"
- Buttons: on/off, zero, mm/inch
- Automatic power off, move the digital unit to turn on power
- Battery Cr2032
- Data output
- Meets DIN862
- Made of stainless steel
- Optional accessory: data output cable

**Technical Specifications:**

Model	Range	Accuracy
ZI 9036-A	0-150mm/0-6"	±0.03mm
ZI 9036-B	0-200mm/0-8"	±0.03mm
ZI 9036-C	0-300mm/0-12"	±0.03mm

**ZI 9037 DAILY RAIN GAUGE**

Copper Rain Gauge, with 127mm diameter rim. Supplied complete with inner can be measuring cylinder calibrated in mm and inches.

ZI 9037



**ZI 9038 TRIPOD STAND**

**Model No. Description**  
**ZI 9038-A** Tripod Stand. Circular with iron top and steel legs. Top external diameter 125mm height 200mm  
**ZI 9038-B** Iron Wire Gauge. 150mm square with ceramic centre. Pack of 10



ZI 9038

**ZI 9039 RUBBER TUBING**

Model No.	Internal Diameter	Outside Diameter
ZI 9039-A	5mm	8mm
ZI 9039-B	5mm	13mm
ZI 9039-C	6.5mm	16.5
ZI 9039-D	8mm	14mm
ZI 9039-E	10mm	14mm



ZI 9039

**ZI 9040 MORTAR AND PESTLE (PORCELAIN)**

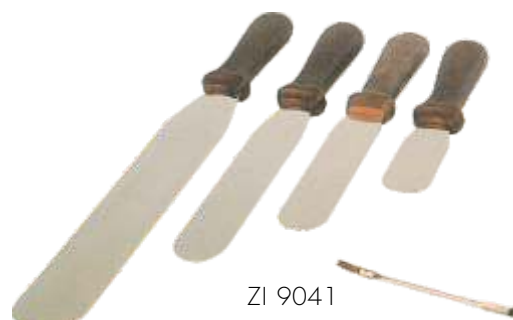
**Available Sizes:**  
**ZI 9040-A** 100mm, dia  
**ZI 9040-B** 125mm, dia  
**ZI 9040-C** 150mm, dia



ZI 9040

**ZI 9041 SPATULAS**

**Model No. Description**  
**ZI 9041-A** Spatula, 100mm blade with wooden handle  
**ZI 9041-B** Spatula, 150mm blade with wooden handle  
**ZI 9041-C** Spatula, 200mm blade with wooden handle  
**ZI 9041-D** Spatula, 300mm blade with wooden handle  
**ZI 9041-E** Chattaway spatula. 125mm long.  
 Made up of Stainless Steel sheet



ZI 9041





ZI 9042

**ZI 9042 FUME HOOD CABINET**

**Specification:**

Featuring a particular assembling metal frame that can be easily dismantled. Front and rear uprights are made of aluminium draw pieces, chromium treated and painted with epoxy resins, acid and solvent resistant. Front upright shape is designed at a 45° angle section, for preventing any reversal airflow and the generation of air whirls.



ZI 9043

**ZI 9043 TRIPLE BEAM BALANCE WITH VERNIER**

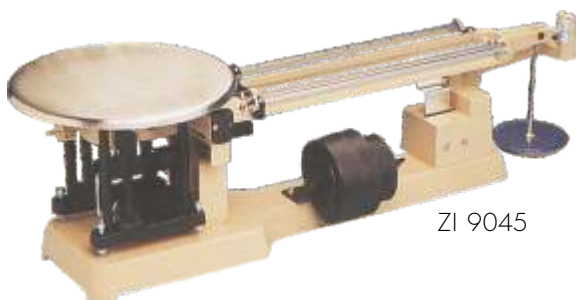
This balance has 310 g, capacity x 0.01 g sensitivity, includes stainless steel pan, zero adjustment.



ZI 9044

**ZI 9044 TRIPLE BEAM BALANCE**

Triple Beam Balance 2610 capacity x 0.1g sensitivity. Complete with stainless steel pan and set of weights.



ZI 9045

**ZI 9045 HEAVY DUTY BALANCE**

Heavy Duty solution balance 20 kg capacity x 1 gm sensitivity. Complete with set of weights, sliding weight for tare upto 2270 g, holding plate 280 mm diameter

**ZI 9046 ELECTRONIC BALANCE**

The Lab Digital Balances provide a wide range of maximum capacity and readability characteristics which make them economical and easy to use, they are ideal for central and site laboratories who require a range of balances for various applications.

The Lab Digital Balances are fitted with strain gauge load cells and are designed with large backlit LCD displays that give precise measurements within the 0°C to 40°C temperature range. Digital Balances have an internal / extension automatic calibration feature. Most models can be connected to printers or PC's through their RS 232 outputs and are supplied with 220-240 V, 50-60 Hz AC/DC adapters.



Model	Readability	Pan Size	Platform Size	Additional Power Supply
ZI 9046-A	210 g	0.0001 g	Ø 116 mm	AC Battery
ZI 9046-B	300 g	0.001 g	Ø 80 mm	AC Battery
ZI 9046-C	300 / 600 g	0.01 g	Ø 116 mm	Rechargeable Batt.
ZI 9046-D	2100 g	0.01 g	Ø 116 mm	Rechargeable Batt.
ZI 9046-E	6 kg	0.1 g	300x220 mm	Rechargeable Batt.
ZI 9046-F	15 kg	0.5 g	230 x 190 mm	Rechargeable Batt.
ZI 9046-G	10 / 20 / 30 kg	2 g	230 x 190 mm	Rechargeable Batt.
ZI 9046-H	50 kg	5 g	300x230 mm	Rechargeable Batt.
ZI 9046-I	100 kg	10 g	400x 400 mm	Rechargeable Batt.
ZI 9046-J	150 kg	10 g	400 x 400 mm	Rechargeable Batt.
ZI 9046-K	300 kg	50 gm	500 x 500 mm	Rechargeable Batt.

**ZI 9047 pH Tester**

ZI 9048 feature a rugged and ergonomically enhanced casing that fits comfortably in your hand and a larger LCD which makes it easier to read at any angle. With the latest innovation of a non-clogging fiber junction ZI 9048 meters last much longer. Simply pull out 1-2 mm (1/8") of the junction fiber to completely renew the junction.

ZI 9048 offers a Range of 0.0 to 14.0 pH and an Accuracy of ±0.1 pH. This tester is calibrated manually to 2 points.

**Specifications:**

- pH Range 0.0 to 14.0 pH
- pH Resolution 0.1 pH
- pH Accuracy ±0.1 pH
- Calibration manual, 2 points
- Battery Type / Life 4 x 1.5V / approx. 700 hours of continuous use
- Environment 0 to 50°C (32 to 122°F); RH max 95%
- Dimensions 175 x 41 x 23 mm (6.9 x 1.6 x 0.9")
- Weight 95 g (3.4 oz.)



ZI 9047

**ZI 9048 TDS METER**

Ideal for all water purification applications, wastewater regulation, aquaculture, hydroponics, and colloidal silver. Perfect for both consumer or commercial use. Carry one in your pocket or toolbox at all times!



ZI 9048

**Specifications**

- TDS Range: 0 - 9990 ppm (mg/L)
- Temp. Range: 0 - 80 degrees Celsius
- Resolution: 0-999: 1 ppm; 1000-9990: 10 ppm (indicated by a 'x10' icon)
- Temperature Resolution: 0.1 degree Celsius (Celsius only)
- Accuracy: +/- 2%
- EC-to-TDS Conversion Factor: NaCl (avg. 0.5)
- ATC: Built-in sensor for Automatic Temperature Compensation of 1 to 50 degrees Celsius (33 to 122 degrees Fahrenheit)
- Power source: 2 x 1.5V button cell batteries (included) (LR44 or equivalent)
- Battery life: 1000 hours of usage
- Dimensions: 15.5 x 3.1 x 2.3cm
- Weight with case: 76.5g



ZI 9049

**ZI 9049 FILTER PAPER**

Grade No.1 A pack of 100 circles. Dia. 11, 15, 23 cm for CBR Marshall Test and Binding Extraction



ZI 9050

**ZI 9050 pH PAPER**

Contain special indicator Dyes that are covalently bound to the cellulose of the reagent paper. Accurate & reproducible results.

pH Range : 1.0 to 14.0 pH  
2.0 to 10.5 pH



ZI 9051

**ZI 9051 PLASTIC WASH BOTTLES**

Capacity : 100 ml  
250 ml  
500 ml  
1000 ml

**ZI 9052 HAND GLOVES**

High temperature resistant gloves  
 Made of Asbestos sheet  
 Heat resistant gloves (oven gauntlets)



ZI 9052

**ZI 9053 TROWELS**

Trowel 90x115x165 mm to EN 12350-4  
 Trowel 60x140 mm  
 Trowel 100 mm, pointed type  
 Cement Trowel  
 Rectangular Trowel 120x250 mm



ZI 9053

**ZI 9054 BRUSHES**

Flat bristle brush 60 mm wide.  
 Wire brush No. 26 gauge.  
 Fine wire brush



ZI 9054

**ZI 9055 TOOL KIT**

General purpose tool kit.  
 Complete with carrying bag.



ZI 9055

**ZI 9056 LABORATORY TROLLEY**

Useful for handling concrete samples or moulds in the laboratory. Constructed in steel with rubber wheels mounted on bearings.



**NOTES**

A large rectangular area with rounded corners, enclosed by a thin blue border. The interior of this area is filled with horizontal dotted lines, providing a space for handwritten notes.

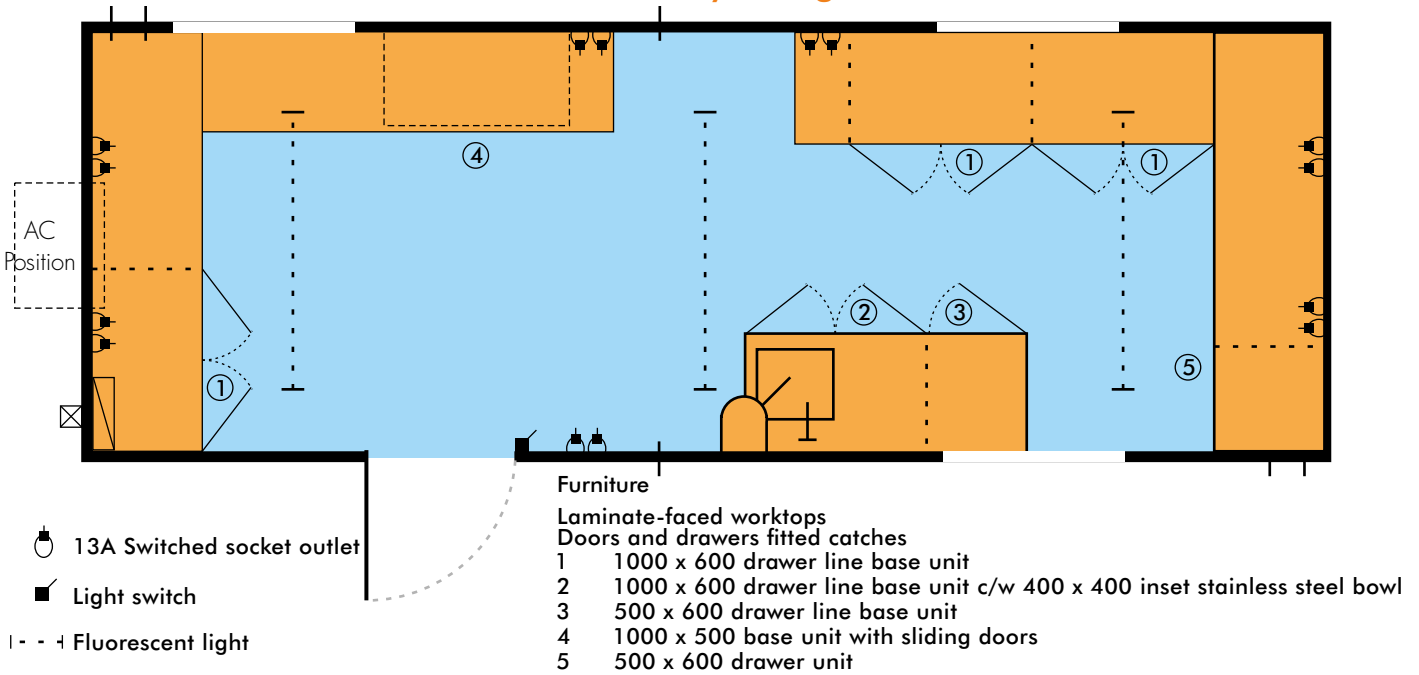
**ZI-ML MOBILE LABORATORY**

The Mobile Laboratory is designed for use on remote sites enabling the routine testing of soils, concrete and asphalt to be undertaken. The unit is mounted on a four-wheeled close-coupled axle chassis fitted with 50 mm ball hitch and 4 screw feet corner steadies. Standard layout and fittings are shown in the illustration below, but alternative designs and features are available. For further information contact Labtest.

**Laboratory on Wheel**

- A mobile laboratory for performing on site facilities both for physical and chemical test for soil, cement, concrete, Asphalt & other construction material.
- Rugged construction of vehicle for difficult terrain.
- Aesthetically designed interior with shelves and cupboards for housing laboratory equipments
- Performance of tests, as and when required, with immediate results.
- Getting to destination quickly, fully-equipped for the job & follow up and monitoring of several sites simultaneously
- The unit can be fabricated on customer's vehicle like TATA 207/407 or Swaraj Mazda etc.
- Depending on area available, the quality and location of benches, desks cabinets, sink, hood etc. can be decided
- Lab can be equipped with AC, generator etc. as required.

**Mobile Laboratory Design Service**



**Suggested list of equipment and Lab Layout Plan are appended below. However, changes can be done as per customer's specific needs.**

Soil Lab
Standard Penetration Test
Dynamic Cone Penetration Test
Soil Sampler
Liquid & Plastic Limit
Unconfined Compression Tester
Proctor Compaction
Sieves
Sieve Shaker
Balance
Nuclear Density / Moisture Gauge
Sand Replacement
Pressure Meter

Cement Lab
Compression Testing Machine, Hand Operated, 1000kN
Sieves
Pan & Cover for 20cm dia. sieves
Slump Test Apparatus
Measuring Cylinder
Mould Cast Iron
Concrete Test Hammer
Vicat Apparatus
Gauging Trowel

Concrete Lab
Sand Pouring Cylinder Apparatus
Electronic Balance
Sieves
Thickness/Length Gauge
Mould Cast Iron
Beam Mould
Slump Test Apparatus
Core Case
Air Entrainment Meter
Vibrating Table
Measuring Cylinder
Sample Tray

Highway Lab
Soil Compactor
Pavement Core Drilling Machine
Centrifuge Extractor
Sieves
Sieve Shakers
Balance
Marshall Apparatus
Benkelman Beam
Petrometer
Bitamers Penetration Kit

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# Conversion Guide

The italic symbols are those concerning the "SI" units.

## FORCE

1 N	= 0.10197 kgf = 0.224809 lbf
1 kN	= 1000 N = 101.971 kgf = 224.809 lbf = 0.101971 t
1 kgf	= 9.80665 N = 2.20462 lbf

## MASS

1 kg	= long: 0.01968413 cwt; short: 0.02204622 cwt = 2.20462 lb
1 g	= 0.03527 oz
1 t	= 1000 kg = long: 0.984221 ton; short: 1.102311
ton	
1 cwt	= long: 50.802424 kg; short: 45.35929 kg
1 lb	= 0.45359 kg
1 oz	= 28.349 g

## CAPACITY, VOLUME

1 m <sup>3</sup>	= 1.30795 yd <sup>3</sup>
1 dm <sup>3</sup> (litre)	= 0.03531 ft <sup>3</sup> = 1.7605 pint = 0.21997 imp gal = 0.2642 US gal
1 cm <sup>3</sup> (ml)	= 0.06102 in <sup>3</sup> = 0.0352 fl oz
1 yd <sup>3</sup>	= 0.76455 m <sup>3</sup>
1 ft <sup>3</sup>	= 28.3168 dm <sup>3</sup>
1 in <sup>3</sup>	= 16.3871 cm <sup>3</sup>
1 imp gal	= 4.54609 dm <sup>3</sup>
1 US gal	= 3.78541 dm <sup>3</sup>
1 pint	= 0.56826 dm <sup>3</sup>
1 fl oz	= 28.4131 cm <sup>3</sup>

## LENGTH

1 m	= 1.0936 yard = 3.281 ft = 39.370 in
1 km	= 0.6214 mile
1 yard	= 0.9144 m
1 ft	= 30.48 cm
1 in	= 25.4 mm
1 mile	= 1.6094 km

## PRESSURE, STRESS

1 Pa (N/m <sup>2</sup> )	= 0.01 mbar = 0.000145 lbf/in <sup>2</sup> (psi)
1 kPa (kN/m <sup>2</sup> )	= 0.01 kgf/cm <sup>2</sup> = 10 mbar = 20.885 lbf/ft <sup>2</sup> = 0.2953 in Hg
1 MPa	= 10.2 kgf/cm <sup>2</sup>
1 lbf/in <sup>2</sup> (psi)	= 0.07031 kgf/cm <sup>2</sup> = 6.89476 kPa
1 lbf/ft <sup>2</sup>	= 47.8803 Pa
1 tonf/ft <sup>2</sup>	= 1.094 kgf/cm <sup>2</sup> = 107.252 kPa
1 bar	= 100 kPa = 14.5038 lbf/in <sup>2</sup>
1 mbar	= 100 Pa = 2.0885 lbf/ft <sup>2</sup>
1 atm	= 101.325 kPa = 14.6959 lbf/in <sup>2</sup>
1 mm Hg (torr)	= 133.322 Pa = 0.01934 lbf/in <sup>2</sup>
1 mm H <sub>2</sub> O (torr)	= 9.80665 Pa

## DENSITY

1 kg/m <sup>3</sup>	= 1.686 lb/yd <sup>3</sup>
1 g/cm <sup>3</sup>	= 62.4280 lb/ft <sup>3</sup>
1 ton/yd <sup>3</sup>	= 1328.94 kg/m <sup>3</sup>
1 lb/yd <sup>3</sup>	= 0.593 kg/m <sup>3</sup>
1 lb/in <sup>3</sup>	= 27.6799 g/cm <sup>3</sup>

## ENERGY

1 MJ	= 0.277778 kWh
1 J	= 0.737562 ft lbf
1 kgf m	= 9.80665 J
1 Btu	= 1.05506 kJ

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