

## Soil/Geotechnical Lab

## Civil Engineering Lab Equipment

### PLASTIC LIMIT TEST DEVICE

As Per 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 : I) Glass plate 20cm x 15cm having round ends, ii) Brass or stainless steel rod 3mm dia. x 150mm long, iii) Flexible spatula 15 cm, iv) Set of 6 moisture containers, v) Porcelain basin 150mm dia, vi) Plastic wash bottle 500ml.



### SHRINKAGE LIMIT TEST DEVICE

As Per 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. Specification : Set consists of one each :- I) Porcelain evaporating dish, ii) Shrinkage dish, iii) Glass cup, iv) Perspex plate with three metal prongs, v) Flexible spatula 100mm, vi) Glass cylinder, vii) 25ml x 1ml, supplied without mercury



### SOIL HYDROMETER

As Per IS 2720 (PART IV) 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 for 15-30 minutes under a total sliding weight of 148 gm penetrates 25mm gives the liquid limit.



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### LIQUID LIMIT DEVICE

**Optional:** Motorized Liquid Limit also Available

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

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 or 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.

### MARSH CONE

As Per 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.



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### MUD BALANCE

As Per ASTM D 2419, AASHTO T 176

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 center which rests in a fulcrum fitted in the stand. Leveling screws and spirit level are fitted to the stand.



### HIGH SPEED STIRRER

As Per IS 2720 (PART IV)

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.



### GRAIN SIZE ANALYSIS (PIPETTE METHOD)

As Per IS 2720 (PART IV) AND BS 1377:2.

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 : i) Sedimentation Pipette (Anderson pipette) 25ml, ii) Sedimentation tube 100ml, iii) Sedimentation pipette 10ml, iv) Sedimentation tube 500ml, v) Test forms pad of 50



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### PLUMMET BALANCE

As Per ASTM D 2419, AASHTO T 176

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 75microns, 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 0.002mm 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 is jewel bearing an moves over a graduated scale. Scale graduations are market 0-100% x 2% 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%



### PROCTOR COMPACTION TEST

As Per IS: 2720(P-VII)

Specification :Soil compaction is of utmost requirement for constructing earth fill for dams, canal embankments, reservoirs, highways, runways and railways. The relationship between soil moisture content and compacted dry density largely determine the construction specifications and quality control of compacted earth fill. To check the strength of the soil the density of the soil is taken into account and hence the quality control is checked otherwise.



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### UNIVERSAL AUTOMATIC COMPACTOR

As Per ASTM D 558, BS 1377-4

It is a motor driven mechanical compactor useful for soil compaction into 100mm to 102 mm & 150mm to 152.4 mm diameter moulds. Two sets of Rammers are provided, one of 2.5 kg and arranged for 300 mm & 305 mm drop and other 4.5 kg and arranged for 450 mm & 457 mm drop. The rammer assembly is provided with a ratchet and pawl arrangement to lift it from the top of the soil layer. When the rammer reaches the required height the pawl release the rammer which falls freely on soil surface. The release mechanism is operated by an arm moving up and down which is connected to a reduction gear coupled to the motor through another arm. An automatic blow counter fitted to the compactor is used to set the number of blows. The base plate of the specimen mould is to be fitted to the rotating base plate of the instrument which marks 1/5" revolution per stroke. The equipment is suitable for operation on 230 V, 50 Cycles, Single Phase, A.C. supply moulds are to be ordered separately.



### RAPID MOISTURE METER

As Per IS 2720 (PART II)

For quick determination of moisture content of materials in powder form viz. Soil, Sand, Coal pottery slip, cement etc. Calcium carbide when comes in contact with moisture acetylene gas is generated. This principle is used in Rapid moisture meter. A weighed quantity of samples is mixed with fixed quantity of calcium carbide reagent and the whole mixture is thoroughly shaken in a vessel to which a pressure gauge is fixed. The acetylene gas produced develops pressure. The instrument indicate moisture on Wet / weight basis . easily convertible to dry weight basis. The unit consists of a pressure vessel with clamp for sealing cap, rubber sealing gasket, pressure gauge calibrated in percentage moisture content 0 -25%, 50% on wet weight basis . A counte poised balance for weighing sample, a scoop for measuring carbide reagent , one bottle of reagent approx. 450 gram, One cleaning brush and a steel balls for through mixing. Complete in wooden carrying box with handle.



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### SAND POURING CYLINDER

As Per IS 2720 (P-XXVIII) BS 1377-9

Specification: The soil testing equipment is used for determination of the dry density of compact, fine, medium grained soils and for layers not exceeding 50cm thickness. A circular hole is dug into the ground, all the soil from within it collected, weighed and dried, and the hole back filled with a standard uniform sand or fine gravel, poured from a calibrated container for calculating the volume of hole. The complete apparatus consists of a Sand Pouring Cylinder fitted with Conical funnel and Shutter, Cylindrical Calibration Container, and a Metal tray with a central hole.



### DOLLY CORE CUTTER HAMMER

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

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 made 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.



### PYCKNOMETER

As Per IS 2386 (P-III)

Specification : Specific Gravity is the ratio of the weight in air of a given volume of a material at a standard temperature to the weight in air of an equal volume of distilled water at the same stated temperature. The Pycnometer Bottle can be used to test a wide range of materials from clay to sand and gravel smaller than 10mm. It consists of 1kg Glass Jar with Brass Cone, Locking Ring and Rubber Seal.



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### PERMEABILITY TEST APPARATUS CONSTANT & FALLING HEAD

As Per IS 2720 (Part XBII)- 1966 BS 1377; EN DD ENV 1997-2; ASTM D2434;AASHTO T215 This equipment is used for testing the permeability of granular soils (sands and gravels).The specimen is formed in a permeability cell and water is passed through it from a constant level tank Take-off points located along the sides of the permeability cell are connected to three manometer tubes mounted on a panel complete with a meter scale. Water passing through the specimen is collected and measured, either for a specific quantity or over a period of time. The reduction of head is noted from the variation of water level in the manometer tubes. Comprising three glass tubes of constant bore, meter scale and connecting tubing for cell pressure take-off points, all mounted on a free-standing panel. Manufactured from transparent plastic with attachment for wall mounting. The inlet, outlet and overflow pipes are fitted to the base of the tank and can be adjusted for height within the tank. Supplied complete with connecting tubing.

Clays and silts are tested using the 'falling head' technique. Flow of water through the specimen is observed by monitoring the rate of fall of water in the tube. It is essential that soils of very low permeability are sealed inside the cylinder to prevent seepage along the sides of the specimen. Before testing, the specimen must be completely saturated with water as the presence of air will restrict the flow of water Specification : The equipment comprises one each : - Gun metal mould - 100mm I.D. x 127.3mm high x 1000ml Volume. - Gun metal mould extension collar - 100mm dia x 60mm high for the above mould. - Gun metal drainage base plate with a recess for a porous stone, GI Tank



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### UNIVERSAL PERMEABILITY TEST

As Per IS 2720 (Part XBII)- 1966 BS 1377; EN DD ENV 1997-2; ASTM D2434; AASHTO T215 Clays and silts are tested using the technique. Flow of water through the specimen is observed by monitoring the rate of fall of water in the tube. It is essential that soils of very low permeability are sealed inside the cylinder to prevent seepage along the sides of the specimen. Before testing, the specimen must be completely saturated with water as the presence of air will restrict the flow of water. 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.



### RELATIVE DENSITY TEST APPARATUS

As Per 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. Surcharge 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. /sq. cm. For mould. Cylindrical metal unit weight mould 15000 ml. capacity. (Total weight together with the above mould & surcharge weight is equivalent to 140 kg./sq. cm) dial gauge 0.01mm x 50mm travel. Extension piece 25mm for dial gauge.



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### **HYDRAULIC UNIVERSAL EXTRUDES**

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



### **SCREW TYPE UNIVERSAL EXTRACTOR**

As Per 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 an 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 claimed 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.



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### SAMPLING AUGER

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.



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### CONSOLIDATION TEST APPARATUS (Single Gang)

**Optional:** Three Gang also available

As Per IS 2720 (Part XV), IS 12287, BS 1377, ASTM D 2435

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.sq. 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 (Odometer) 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 .sq., 5nos. 0.1 kg/sq.cm., 6nos. 0.5kg/sq. cm., and 5 nos. 1.0 kg/sq.cm. Supplied complete as above but without dial gauge.

**ACCESSORIES :** Dial gauge 0.002 mm x 10mm. Extension piece, 40 mm long, consolidation test forms pad of 50 for one dimensional consolidation.

**OPTIONAL EXTRAS :** Varying head stand pipe, 50cms. Long with mm. Scale. Fixed ring type of Consolidometer (Odometer) cell assembly for 50mm. dia. x 20mm thick specimens , complete with fixed ring guide ring. Pair of porous stones, perforated pressure pad, channeled base, gasket and flanged water jacket. Set of weights to give a pressure of 10kg/sq.cm. on 50cm. dia specimen. Fixed ring type of Consolidometer (Odometer) cell assembly for 70mm dia x 20mm thick specimens, complete with accessories as above. Set of weights to give a pressure of 10 kg/sq.cm. on 70mm dia. specimens. Fixed ring type of consolidometer (odometer) cell assembly for 100mm dia. x 25mm thick specimens,



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complete with accessories as above. Set of weights to give a pressure of 10 kg/sq.cm. on 100mm. Dia. specimens.

### **DIRECT SHEAR TEST APPARATUS**

#### **Hand Operated**

**Optional: Single Speed Motorized Also Available**

**Three Speed Motorized Also Available**

**Twelve Speed Motorized Also Available**

AS PER IS: 2720 (Part-VIII), ASTM D-3080 For determination of the direct shear strength of soils on specimen size 60 mm x 60 mm x 25 mm. Specification: The apparatus comprises of the following: Loading Unit: Supplied with load yoke with direct and lever system for applying load. Normal stress capacity 8kg/sq.cm. Load is applied either directly or through a counter balanced detachable lever. Provision is made for 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 25 mm one pair of plain gripper plates, one pair of perforated gripper plates, one pair of porous stones, one top 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 from larger samples. Set of weights to give a normal stress of 3 kg/sq.cm. through lever as follows:

To give kg/cm sq.      Qty.

0.05 4 Nos.

0.1 1No.

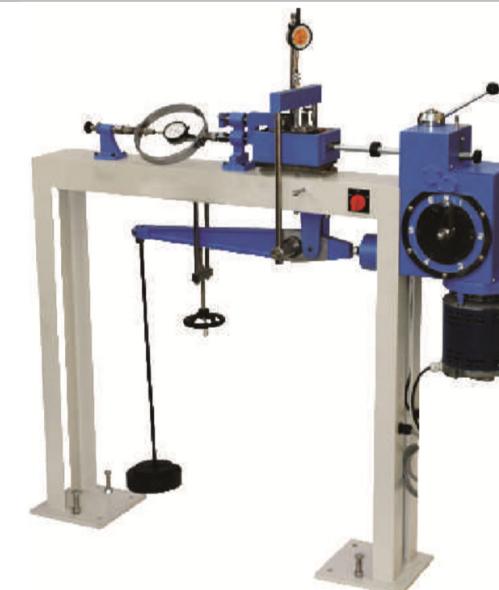
0.2 1No.

0.5 3 Nos.

1..0 1No.

Complete set as above but without proving ring. Nett weight 140Kg.

Essential Accessories: High sensitivity compression ring cap 200 kg one consolidation dial gauge 0.01 mm x 25 mm and one strain dial gauge 0.01 mm x 25 mm and one strain



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dial gauge 0.01 mm x 25 mm. Optional extras: Additional set of weights to give a normal stress of 5 kg/cm<sup>2</sup> Soil Sampler for 60 mm x 60mm specimen and test from pad of 50. Spares: Porous stone for 60 mm x 60 mm size sample available in pairs.

### **CBR TESTING MACHINE**

As Per IS : 9669, IS : 2720 (Part XVI)

It is used in large road construction projects has increased considerably in recent years. This apparatus, mounted on a rolled steel joint cantilevered from the back of the truck or fitted to the underside of a mobile frame, can be used to determine the bearing capacity of soils quickly and efficiency. This method of testing in-situ, using piston penetration, is useful for determining the load carrying capacity in the field, when the in-place density and water contents are such that the degree of saturation is 80% or greater. When the material is coarse grained and cohesionless so that it is not affected by changes in the water content and when the material has been in-place. Similar to above but supplied with bench mounting type 5000kgf. Capacity load frame motorized, in place of load frame hand operated. The lead screw of the load frame has a single constant rate of travel of 1.25mm/minute. Dial Gauge 2 in. travel & 0.001 in division for CBR penetration measurement, having provision for increasing the dial gauge- plunger length .Proving ring , 50 kN (5,000kgf) capacity x 0.5. kN/Div sensitivity/ readability, one with 25 kN capacity x 0.04 kN / div sensitivity / readability and one with 10 kN capacity x 0.01 kN / div sensitivity / readability.

Note: Proving Rings of other capacities are also available



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### UNCONFINED COMPRESSION TESTING MACHINE

As Per IS 2720 (PART X) ASTM T 208 This is similar to above with the added advantage of a motorized drive permitting constant rates of strain. Specification : Comprises a screw operated load frame, cap.5000kg with a gear box and motor drive giving 1.25 mm/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 38mm, 50mm, 75mm & 100mm.



### TRIAXIAL TEST APPARATUS

As Per IS 2720 (PART XII)

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. 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

One load frame 5000 Kgf motorized , consists one rate of strain type, giving the following rates of strain. 1.25mm/min . Load frame is supplied with a dial gauge bracket. Universal triaxial cell (stationary bushing) 10kg/cm.sq. One lateral pressure assembly 0-10 kg/cm.sq. One lateral pressure assembly 0-10kg/cm.sq. complete with foot pump and rubber hose. One high sensitivity proving ring capacity 1000kg. One strain dial gauge 0.01 x 25mm.



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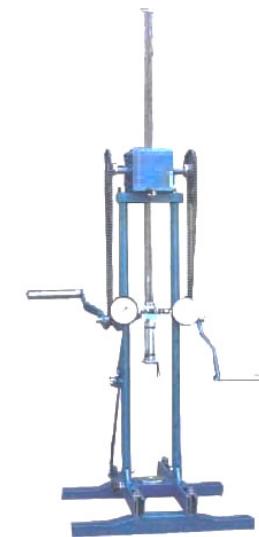
Suitable for operation on 230 V A.C.

It is designed for application of cell pressure upto 10kg/cm 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. The apparatus consists of a pressure chamber which has a flanged top 2 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. 2 The foot pump supplied easily develops a pressure of 10 kg/cm<sup>2</sup> Complete with connecting pressure hose.

### **STATIC CONE PENETROMETER, 30KN (300KGF) CAPACITY**

As Per IS 4968 (Part III)

Static cone penetration test is internationally recognized as a standard field test to collect data about bearing capacity and frictional resistance of soil. Static C one Test is unsatisfiable for gravelly soils. The Static Cone resistance is correlated with the 'N' value as obtained from standard penetration test, thus increasing the utility of the test. The drive is by means of a rack and pinion manually through a gearing arrangement. The gear box and pinion are fixed on two handles, sprockets and chain arrangement. The movement of the rack is guided by a bracket (attached to the rack) and two pillars. The penetration resistance i.e. the pressure is indicated on hydraulic gauges through a hydraulic measuring head. Two pressure gauges of 15cm dia. dial and 2 capacities 0-160kg/cm are provided. An automatic cut-off valve, to protect the low capacity gauge from being overloaded is provided. The 2 valve can be adjusted and locked at desirable values between 20 to 60cm . A provision is made to anchor the unit to the ground (with the help of four anchors supplied with the unit) and there is a provision for lateral 2 movement of the unit so that subsequent tests could be performed without shifting the entire anchorage. A 10cm penetration cone with friction jacket is provided along with fifteen mantle tubes (non-uniform having an effective length of 1 m each with sounding rods for finding out the cone (point) resistance or jacket friction.



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### STANDARD PENETRATION TEST

As Per IS 2131, IS 9640

This can be used in drilling operations to increase the footage & improve jab safety consist of three metal pipe legs approximately 5 mtr. long connected by a tie bolt each leg is made up of two parts for ease of transportation complete with one pulley one leg has building ladder Standard Penetration Test is a powerful tool for measuring the penetration resistance of the ground and for relating it to the degree of compactness of cohesionless soil and consistency of cohesive soil. The results can be used for design of foundations. SPT is widely used for measuring the undisturbed strength of the soil and for assessing its resistance to liquefaction due to ground vibrations caused by earthquakes or other dynamic forces. The Standard Penetration Resistance is measured as the number of blows 'N' required to drive a split spoon sampler to a depth of 300 mm using a 65 kg weight falling freely through a height of 750 mm.

### DYNAMIC CONE PENETRATION TEST

The Dynamic Cone Penetrometer (DCP) is used for rapid in-situ measurement of the structural properties of existing road pavement constructed with unbound materials. The unit incorporates an 8 kg weight having a drop of 575 mm, fitted to the end of the shaft is a 20 mm diameter cone. With the standard DCP measurements can be made down to a depth of approximately 850 mm. Readings are usually taken after a set number of blows, changing the number according to the strength of the layer being penetrated. For good granular bases, readings every 5 – 10 blows are satisfactory, but for weaker sub-base layers and subgrades, readings every 1 – 2 blows may be appropriate. The DCP requires three operators, one to hold the instrument in a vertical position, one to raise the hammer and let it fall and one to record the results. A typical test takes only a few minutes, providing a very efficient method of obtaining information which would otherwise require the excavation of test pits. Where pavement layers have different strengths, boundaries can be identified and layer thickness determined.



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### LABORATORY VANE SHEAR TEST APPARATUS

As Per IS 2720 (XXX)-1968 BS 1377.

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 a hand wheel 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 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 sq., 4kgs/cm sq., 6 kgs/cm sq. & 8kgs/cm sq. complete as above in a wooden carrying case



### IN-SITU VANE SHEAR TEST APPARATUS

As Per IS 4434 This apparatus is designed for conducting in-situ Vane shear test from the bottom of 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 has a section cut from it and deforms as torque is applied and the resultant deformation is indicated by a dial gauge. A pointer is provided for registering the rotation of the vane. A detachable stand is provided to anchor the instrument. An attachment to securely hold the string of rods is provided. A calibration curve to convert the dial gauge readings to kg-cm of torque is also supplied.



### SIEVE SHAKER HAND OPERATED 200mm Dia.

**Optional: 300mm Dia., 450mm Dia. Also Available**

This is a light, portable but sturdy sieve shaker suitable for bench mounting the side to side movement to the carrier which can take upto 7 sieves of 200mm dia. is through a train of gears operated by a hand wheel. A heavy fly wheels ensures smooth operation.



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### MOTORIZED SIEVE SHAKER

Carries upto 7 sieves of 200mm or 300m, 450mm diameter. The shaker is driven by a ¼ 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 of inclination changes 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 are supplied. The holder can be fixed on the top of the upper most sieve, and thus the sieve set is firmly held. Suitable for operation from 230 V, 50 Hz Single Phase A.C. Supply.

### PLATE LOAD TEST APPARATUS

As Per 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 outfit consists of 50 tons hydraulic jack with separate pumping unit fixed to it a 0 - 500KN x 0.5KN, Pressure gauge and flexible metal pipe 5 mtr. long, Special ball and socket arrangement between the jack and the bearing plate, Extension rod 12mm dia. x 25 cm long for taking dial gauge readings, Magnetic base with female thread on top for holding extension rod, 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 nut, Column 15cm dia x 50cm long with flanges complete with four bolts and nuts, 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, 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 0.01mm x 25mm.

#### 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.



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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.

### **STANDARD TEST SIEVES**

As Per IS :460 (Par t-I, II) 1978 Test Sieves is a common laboratory requirement. Sieves are used for sieving of chemical powders, medical powders, aggregate, sand soil and cement etc. These sieves are manufactured as per various standards like IS, BS, ASTM, DIN etc. In Civil Engineering it is a common practice to use sieves for gradation and particle size determination. Manufacturers brass frame and G.I. Frames Sieves of dia. 200mm, 300mm and 450mm. Normally brass sieves are manufactured in 200cm dia. and frame is spun brass, The Sieve cloth used is standard SS or prosper bronze wire mesh. The G.I. Frames sieves manufactured normally in sizes 300mm dia. or 450mm dia. have a steel perforated sheet having accurately punched square holes.

### **Brass Frame 200mm Dia.:**

### **SIZES AVAILABLE:**

4.75 mm, 4mm, 3.35mm, 2.80mm, 2.36mm, 2mm, 1.70mm, 1.40mm, 1.18mm, 1mm, 850micron, 600micron, 500micron, 425micron, 355micron, 300micron, 250micron, 212 micron, 180micron, 150micron, 125 micron, 106 micron, 90 micron, 75 micron, 63 micron, 53 micron, 45 micron, 38 micron, 25 micron.

### **G.I. Frame Sieves 300mm Dia and 450mm Dia:**

SIZES AVAILABLE : 125mm, 106mm, 100mm, 90mm, 80mm, 75mm, 63mm, 53mm, 50mm, 45mm, 40mm, 37.5mm, 31.5mm, 26.5mm, 25mm, 22.4mm, 20mm, 19mm, 16mm, 14mm, 13.2mm, 12.5mm, 11.2mm, 10mm, 9.5mm, 8mm, 6.7mm, 6.3mm, 5.6mm, 4.75mm, 4.0mm, 3.35mm, 2.36mm, 1.18mm, 1.00mm. Lid & receiver in G.I. frame for 300mm dia & 450mm dia sieves



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### HYDRAULIC JACK

These jacks are portable and available in various capacities. The pumping unit is connected to the hydraulic jack by means of a flexible connecting pipe 2 meter long. The jack is fitted with lifting handles for easy transportation. The approximate lift of the ram is 90 to 120mm. The pumping unit is a single plunger type with detachable handle. The unit is fixed on a channeled base which is fitted with lifting handles. A pressure release valve is provided on the pumping unit. The load is indicated on a 15cm dial hydraulic pressure gauge of appropriate capacity which can be detached from the pump when not in use. The least count of the calibrated dial will be according to the capacity of the gauge.

