Tinius Olsen

**Tinius Olsen Testing Machine Company**
1065 Easton Road, Horsham, PA 19044, US

Redhill, Surrey, UK • Noida, UP, India • Shanghai, PR China

www.tiniusolsen.com

info@tiniusolsen.com

# Testing Solutions for the Civil & Construction Industry

EQUIPMENT, SOFTWARE, CALIBRATION, SERVICE AND AFTER SALES SUPPORT

Tinius Olsen

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Specifications in this catalogue are subject to change without notice

# Tinius Olsen

The industrial history of materials testing by machine can be traced to Tinius Olsen, a visionary inventor who built the first universal testing machine.

By 1880, he had proven and patented enough revolutionary ideas and designs to create an entire line of testing machines and launch his own company. Over the years, he introduced and innovated application-specific solutions for materials testing that spanned industrial manufacturing and construction.

After the turn of the century and the innovations of motor vehicles and modern highways, the scope of Tinius Olsen's offerings expanded to include a new product line dedicated to the testing of cement, concrete and road materials.

Nearly 140 years later and many of Tinius Olsen's original designs and technological approaches are still viewed as industry standards and are testament to his knowledge of the sciences, the natural and man-made materials that make up our world, and of best engineering practices.

At Tinius Olsen, we are proud of our founder's legacy and continue to seek to build on it with new and creative systems that combine the best of proven materials testing machine technologies with the latest in automation and in digital monitoring, control and analysis software.

We offer equipment for testing high performance metals, the latest engineering grades of plastics, the toughest textiles and the most exotic composites. Building on some of the early solutions of our founder, we also offer one of the industry's most comprehensive and reliable lines of products and services for testing construction-related materials.

The breadth of machines and testing resources on the following pages is supported by our technical team, which keeps our ever-growing customer base up and running with precisely-calibrated testing machinery.

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# Our Global Presence

Tinius Olsen proudly owns in US, UK, India and China:

- Customer service centers
- Training centers
- Showrooms
- Calibration facilities

Our global partner for the civil and construction industry is PowerCept Technologies. Contact details are:

**PowerCept Middle East LLC**
**PO BOX 123489**
**Dubai – UAE**

**Website: www.powercept.com**
**Email: info@powercept.com**

Key highlights of PowerCept are:

- Combines 45 years of regional knowledge and experience in the field of testing and measurement across the dynamic markets of the Middle East, Europe, India SAARC and Asia Pacific
- Specialises in packaged product and support solutions for civil engineering, education & research and manufacturing.
- Provides clients with comprehensive application advice, customer service, calibration, repair and training.
- Ensures value through close working relationships with regulatory bodies, technology partners and end users.
- Empowers local customers with proven track record of bringing diverse business cultures together with best-in-class engineering solutions.

# Package Solutions


# Turnkey Project Management


**All Tinius Olsen Package Solutions include the following:**

- Lab layouts and machine placements
- Power requirements
- Manpower requirements
- Comprehensive product training
- Application and technical support
- Calibration support
- Installation & commissioning
- Pre and post-sales support
- Certification and traceability
- User application training
- After sales and warranty support

## Tinius Olsen offers Package Solutions as per BS/ASTM/EN/ISO/AASHTO International Standards for the following:

- Ready Mix Plant
- Pre Cast Factory
- Educational Laboratory
- Cement Plant
- Contractors Laboratory
- Accredited Commercial Laboratories for testing:
  - Rebar
  - Geotextiles
  - Membranes
  - Concrete
  - Aggregate
  - Soil
  - Asphalt
  - Cement
  - General Laboratory Testing

# Horizon Software

## Key features

- Test method library
- Test Editor
- Tabbed Test and Recall Area
- Multiple Machine Control
- Closed loop control of compression testers
- Output Editor
- Multilingual with translation
- Basic statistics
- Exporting (printing and ASCII)
- Central server capability and connectivity
- Help Desk access
- Multifaceted security
- Tinius Olsen Knowledge Center (requires internet access)

Tinius Olsen is proud to introduce the next evolution of its testing software with the Horizon package. As part of the development process, we have taken the best features of our existing software offerings, added a host of report writing and data manipulation capabilities and, in the process, created a new, unparalleled testing platform. This will make easy work of your materials testing programs, whether they're designed for the demanding rigors of R&D or the charting and analysis functions of QC testing.

Horizon software uses the most current Windows environments. These familiar formats make it easy to use and learn, especially because the same familiar functionality is maintained throughout the program.

Horizon software can accept data from not only our tension compression materials testing machines but it can also take manual data entry from equipment such as the Marshall tester, CBR, Soil Compactor, Speedy testers, Blaine apparatus, Sieve grading results and all types of Civil Engineering Equipment test results.

If your testing hardware has PC communication and control capabilities, then Horizon software can also automatically control the tests for you, in accordance with the appropriate testing specifications, gather the test data and calculate the required results. Horizon can then take these results and produce a consolidated testing report that can incorporate your or your customer's logo.

Modular in design, Horizon software can be configured in a number of different ways so that your immediate needs are addressed; further enhancements are readily available as your testing needs change and grow.

Talk to your sales engineer to see how Horizon software can best meet your needs.

# MODEL TO-040 & TO-041

# Liquid Limit Device



The liquid limit is the level of water content at which soil changes from liquid to a plastic state. From an instrumentation perspective, the liquid limit is measured as the point where two halves of a soil sample flow together when jolted in a particular fashion. The equipment consists of a brass cup, which is repeatedly dropped a distance of 1cm onto a hard rubber base.

## Typical procedure

The soil sample is placed in the cup and a groove applied down the centre of the sample using the Casagrande grooving tool and gage block. The cup is raised and allowed to fall a distance of 1cm onto a hard rubber base, at a rate of two drops per second, during which the groove closes up gradually as result of the impact. The number of drops required for the groove to close is recorded.

### Key features

- High quality design that ensures consistent results.
- Compliant with most relevant international standards.
- Motorized version with an integrated counter available.

## APPLICABLE STANDARDS

- **ASTM D4318; AASHTO T89, T90; BS 1377; IS 9259**

## ORDERING INFORMATION

BS Standards

- **TO-040-BS-01** Motorized Liquid Limit Device for 110V, 60Hz
- **TO-040-BS-02** Motorized Liquid Limit Device for 220V, 60Hz
- **TO-040-BS-03** Motorized Liquid Limit Device for 220V, 50Hz
- **TO-041-BS** Manual Liquid Limit Device

ASTM Standards

- **TO-040-ASTM-01** Motorized Liquid Limit Device for 110V, 60Hz
- **TO-040-ASTM-02** Motorized Liquid Limit Device for 220V, 60Hz
- **TO-040-ASTM-03** Motorized Liquid Limit Device for 220V, 50Hz
- **TO-041-ASTM** Manual Liquid Limit Device

## STANDARD FEATURES

- **TO-04102** Grooving tool and gage for BS
- **TO-04101** ASTM grooving tool

## OPTIONAL ACCESSORIES

- **TO-04102** Grooving tool and gage for BS
- **TO-04101** ASTM grooving tool

# MODEL TO-054

## Motorized Sieve Shaker

A motorized sieve shaker along with digital timer delivers more accurate results compared to mechanical sieves. A compact and lightweight design makes it easy for handling operations and noise reduction makes it more eco-friendly.

Electrically operated mechanical Sieve Shakers are offered for dry sieving. These produce accurate results and eliminate personal errors involved in manual sieving. The Sieve Shakers are popular not only in soil laboratories but also in a number of industries where sieving is required, such as for ores, refractory materials, minor aggregates, pigments, powdered coal, soap, cement, roofing materials, plastic molding powders and pharmaceuticals.

The design is compact and lightweight and can be mounted on a bench top. This eliminates the use of concrete foundation. A digital timer adjustable from 0-99 minutes is incorporated as an integral part of the equipment.

The Sieve Shaker can carry up to eight sieves of 20cm diameter. It is driven by a ¼ HP geared motor. The table is inclined from the vertical axis and the direction of inclination changes progressively in a clockwise direction. In addition to the gyratory motion of the table, there is a tapping motion as well.

### APPLICABLE STANDARD

- **EN 932-5**

### Key features

- Ideal for dry sieving.
- Used for ores, refractory materials, minor aggregates, pigments, powdered coal, soap, cement, roofing materials, plastic molding powders, and pharmaceuticals.
- Compact and lightweight for benchtop use.
- Employs noise reduction technology.

### ORDERING INFORMATION

- **TO-054** Motorized sieve shaker

### SUPPLIED AS STANDARD

- Adaptor for 20cm dia sieve
- Digital timer
- Geared motorized unit

### OPTIONAL ACCESSORIES

- **TO-05401** Adapter for 30cm diameter sieve

### PACKAGING INFORMATION

- **Net weight:** 53kg; **gross weight:** 73kg
- **Packaging dimensions:** 76 x 64 x 53cm



# MODEL TO-064

## Triaxial Test Load Frame

### Triaxial tests

Tinius Olsen's triaxial test system is modular in design and can be tailored to suit a wide range of customer requirements.

The system is made up of various components, with the major items being:

- A 50kN (11,200lbf) capacity load frame.
- Triaxial cell complete with accessories for drained and undrained testing of 2.8in or 70mm diameter specimens to confining pressures of up to 145psi (1,000kPa).
- Data acquisition system.
- Set of electronic measurement transducers for load, displacement, pressure and volume change.
- Data system triaxial software for recording, analysis and report generation in English or Metric units.
- De-aired water tank system for precise application of confining, back and saturation pressures.

This 50kN capacity machine is supplied complete with integral electronic kit for triaxial testing of soil specimens up to 100mm diameter x 200mm long.

It consists of a rigid twin-column construction with an integral, fully variable microprocessor controlled drive unit and LCD display with a touch sensitive keyboard. It is bench-mounted for ease of installation and operation.

### Key features

- Microprocessor control.
- Large on-board LED screen display.
- Direct entry via a touch sensitive keyboard.
- Rapid approach and return to datum of platen.
- Fully variable speed to 9.99mm/min.
- Samples up to 100mm diameter.

The use of a microprocessor controlled drive system and keyboard entry provides the load frame with a wide variety of features, including pause and speed reset during test, RS232 interface for computer control, operator programming of speed and control functions, and self-test diagnostics.

A robustly constructed steel case houses the motor drive system and protects against water and dirt. All operating controls are mounted on the front panel of the machine, which is angled and recessed to prevent physical and environmental damage.

### APPLICABLE STANDARDS

- **BS 598, 1377, 1924; EN 12697-23, 24, 13286-47; ASTM D1883; AASHTO T193**

### ORDERING INFORMATION

- **TO-064E-01** Triaxial Test Load Frame, 110VAC, 60Hz
- **TO-064E-02** Triaxial Test Load Frame, 220VAC, 60Hz
- **TO-064E-03** Triaxial Test Load Frame, 220VAC, 50Hz

| MODEL TO-064 SPECIFICATIONS | |
|---|---|
| **Capacity** | 50kN |
| **Type** | Microprocessor-controlled stepper motor drive |
| **Platen speed range** | Up to 9.99mm/min |
| **Rapid approach speed** | 25mm/min |
| **Horizontal clearance** | 364mm |
| **Maximum vertical clearance** | 910mm |
| **Maximum platen travel** | 100mm |
| **Specimen diameter** | 38mm (50, 75 and 100mm can also be used) |

# MODEL TO-075

## Triaxial Cells

The cells are for testing specimens measuring 38mm diameter x 76mm long and 50mm diameter x 100mm long.

The Triaxial Cell consists of a perspex (acrylic plastic) chamber with an anvil and a loading plunger. Releasing four tie rods easily splits the cell. It is leakproof up to 10 bar (10kg/cm) fluid pressure. Cells that withstand pressures of 20 bar can be made on request.

An oil plug and air vent are provided for introducing a thin layer of oil over water. This provides effective sealing at the plunger for long duration tests. The cell is also fitted with four ball valves of no-volume change type, at the base.

### APPLICABLE STANDARDS

- **BS 1377; ASTM D2850, D4767**

### SUPPLIED AS STANDARD

38mm Triaxial Cells

- **TO-07501** Top loading pad, perspex, 38mm diameter
- **TO-07502** Plain perspex disc 38mm diameter x 6mm thick
- **TO-07503** Porous stone 38mm diameter x 6mm thick
- **TO-07504** Sheath stretcher for 38mm diameter specimen
- **TO-07505** Sand former for 38mm diameter (1 qty)
- **TO-07506** Rubber sheath for 38mm diameter specimen (set of 12)
- **TO-07507** 4 x drainage tube (short), 38mm diameter
- **TO-07508** 4 x drainage tube (long), 38mm diameter
- **TO-07509** 'O' rings for 38mm diameter specimen (set of 4)
- **TO-03105** Split mold, 38mm diameter

### SUPPLIED AS STANDARD

50mm Triaxial Cells

- **TO-07501** Top loading pad, perspex, 38mm diameter
- **TO-07502** Plain perspex disc, 38mm diameter x 6mm thick
- **TO-07503** Porous stone 38mm diameter x 6mm thick
- **TO-07504** Sheath stretcher for 38mm diameter specimen
- **TO-07505** Sand former for 38mm diameter (1 qty)
- **TO-07506** Rubber sheath for 38mm diameter specimen (set of 12)
- **TO-07507** 4 x drainage tube (short), 38mm diameter
- **TO-07508** 4 x drainage tube (long), 38mm diameter
- **TO-07509** 'O' rings for 38mm diameter specimen (set of 4)
- **TO-07510** Brass pedestal 38mm diameter
- **TO-07521** Top loading pad, perspex, 50mm diameter



### SUPPLIED AS STANDARD

50mm Triaxial Cells (continued)

- **TO-07522** Plain perspex disc 50mm diameter x 6mm thick
- **TO-07523** Porous stone 50mm diameter x 6mm thick
- **TO-07524** Sheath stretcher for 50mm diameter specimen
- **TO-07525** Sand former for 50mm diameter
- **TO-07526** Rubber sheath for 50mm diameter specimen (set of 12)
- **TO-07527** 4 x drainage tube (short), 50mm diameter
- **TO-07528** 4 x drainage tube (long), 50mm diameter
- **TO-07529** 'O' rings for 50mm diameter specimen (set of 4)
- **TO-07530** Brass pedestal, 50mm diameter
- **TO-03105** Split mold, 38mm diameter
- **TO-03301** Split mold, 50mm diameter
- **TO-07540** Top loading pad, 38mm diameter (plain)
- **TO-07541** Top loading pad, 50mm diameter (plain)

### ORDERING INFORMATION

- **TO-075** Triaxial cell suitable for 38mm and 50mm diameter specimens
- **TO-075-38** Triaxial cell suitable for 38mm diameter specimens

### OPTIONAL ACCESSORIES

- **TO-07501** Top loading pad, perspex, 38mm diameter
- **TO-07502** Plain perspex disc, 38mm diameter x 6mm thick
- **TO-07503** Porous stone, 38mm diameter x 6mm thick
- **TO-07504** Sheath stretcher for 38mm diameter specimen
- **TO-07505** Sand former for 38mm diameter (1 qty)
- **TO-07506** Rubber sheath for 38mm diameter specimen (set of 12)
- **TO-07507** 4 x drainage tube (short), 38mm diameter
- **TO-07508** 4 x drainage tube (long), 38mm diameter
- **TO-07509** 'O' rings for 38mm diameter specimen (set of 4)
- **TO-07510** Brass pedestal, 38mm diameter
- **TO-07521** Top loading pad, perspex, 50mm diameter
- **TO-07522** Plain perspex disc, 50mm diameter x 6mm thick
- **TO-07523** Porous stone 50mm diameter x 6mm thick
- **TO-07524** Sheath stretcher for 50mm diameter specimen
- **TO-07525** Sand former for 50mm diameter
- **TO-07526** Rubber sheath for 50mm diameter specimen (set of 12)
- **TO-07527** 4 x drainage tube (short), 50mm diameter
- **TO-07528** 4 x drainage tube (long), 50mm diameter
- **TO-07529** 'O' rings for 50mm diameter specimen (set of 4)
- **TO-07530** Brass pedestal, 50mm diameter
- **TO-03105** Split mold, 38mm diameter
- **TO-03301** Split mold, 50mm diameter
- **TO-07540** Top loading pad, 38mm diameter (plain)
- **TO-07541** Top loading pad, 50mm diameter (plain)

# MODEL TO-081

## Oil Water Constant Pressure System

The Oil Water Constant Pressure System is an extremely versatile apparatus that can be used for a wide range of applications.

This system provides an effective alternative to a Mercury and Water Constant Pressure system, especially where space is at a minimum. The apparatus is designed to provide confining pressure up to 16 bar to triaxial cells.

The system consists of an oil pump, driven by an electric motor during the entire period of operation to maintain the desired pressure. The unit provides variable pressure up to 16 bar, which can be increased or decreased simply by turning a control knob. A transparent oil water interchange vessel is provided to transmit water pressure to the test apparatus.

### ORDERING INFORMATION

- **TO-081-1-01** Constant Pressure System, oil/water type, 110VAC, 60Hz
- **TO-081-1-02** Constant Pressure System, oil/water type, 220VAC, 60Hz
- **TO-081-1-03** Constant Pressure System, oil/water type, 220VAC, 50Hz
- **TO-081-2-01** Oil Water Constant Pressure System with two cells, oil/water type, 110VAC, 60Hz
- **TO-081-2-02** Oil Water Constant Pressure System with two cells, oil/water type, 220VAC, 60Hz
- **TO-081-2-03** Oil Water Constant Pressure System with two cells, oil/water type, 220VAC, 50Hz

| MODEL TO-081 SPECIFICATIONS | |
|---|---|
| **Range** | 10 bar (10kg/cm²) |
| **Resolution** | 0.05 bar (0.05kg/cm²) |
| **Accuracy pressure** | ± 1% of the indicated |

**Note:** Supplied complete with pressure gages, flow valves and connecting pressure hose.

### Key features

- Use of mercury is eliminated.
- Maintains constant pressure continuously.
- Pressure capacity, 10 bar (10kg/cm).
- Also suitable for mobile laboratories.




# MODEL TO-085

## Data Acquisition System

The Triaxial Data Acquisition System comprises a 10kN (1000kgf) capacity external load cell, a 20 bar (20kg/cm) capacity pore pressure transducer, an LVDT displacement sensor with a range of +10mm, and a 3-channel digital indicator that has been specially designed to meet the requirements of triaxial testing.

### ORDERING INFORMATION

- **TO-085-01** Triaxial Data Acquisition System, 110VAC, 60Hz
- **TO-085-02** Triaxial Data Acquisition System, 220VAC, 60Hz
- **TO-085-03** Triaxial Data Acquisition System, 220VAC, 50Hz

| MODEL TO-085 SPECIFICATIONS | |
|---|---|
| **TO-08501** | **3-channel digital indicator** |
| **Mode of display** | Micro-controller multi-line alpha numeric VFD display for all simultaneous channels – no need for channel selection |
| | |
| **TO-08502** | **External load cell** |
| **Capacity** | 10kN (1000kgf) |
| **Load cell excitation** | 5V, DC |
| **Resolution** | 0.01kN (1kgf) |
| **Sensing element** | Strain gages in full bridge configuration |
| | |
| **TO-08503** | **Pore pressure transducer** |
| **Capacity** | 20 bar (20kg/cm²) |
| **Pressure cell excitation** | 5V, DC |
| **Resolution** | 0.01 bar (0.01kg/cm²) |
| **Sensing element** | Strain gages in full bridge configuration |
| | |
| **TO-08504** | **LVDT displacement transducer** |
| **Range** | ±10mm |
| **Sensing element** | LVDT |

# MODEL TO-097

## De-aired Water Apparatus

The De-aired Water Apparatus works on the principle of removal of dissolved air from the water present in the soil in order to measure the pore pressure. It is used to study the levels of dissolved oxygen acceptable for geotechnical test methods for soil.

Benefits include:

- Time to consolidate soil samples is reduced
- Simultaneous flushing of many hydraulic piezometer lines in dams and earthworks considerably reduces labor and disturbance at the top ends.

**Note** Any dissolved air in the water will lead to errors in the measurement of pore pressure, particularly at low pressure, and also gives slow or incorrect saturation results.

### APPLICABLE STANDARD

- **BS 1377**

### ORDERING INFORMATION

- **TO-097-1-01** De-aired Water Apparatus, 110VAC, 60Hz
- **TO-097-1-02** De-aired Water Apparatus, 220VAC, 60Hz
- **TO-097-1-03** De-aired Water Apparatus, 220VAC, 50Hz

### OPTIONAL ACCESSORIES

- Pressurized storage tank, capacity 20 liters
- Valves and pressure gage (for storing de-aired water to be used in the field)
- Water pump


### Key features

- Fully microprocessor controlled.
- Real time clock function included.
- Oil free-vacuum pump.
- The unit is fully automatic and shuts off when the de-airing program is complete.



# MODEL TO-105-2

## Direct Shear Test Apparatus

Every building or structure imposes loads on the soil supporting the foundation and this develops stress among the soil particles; failure of this stress leads to the sliding of one body of soil relative to the surrounding mass.

Tinius Olsen's direct shear test apparatus is a motorized dead weight testing machine designed for direct and residual shear testing on undisturbed and remolded soil specimens. The machine uses a 10:1 beam loading device to control confining pressures, a load cell with readout measures shear pressure and a displacement transducer to measure shear and vertical displacement.

### ORDERING INFORMATION

- **TO-105-2-01** Direct Shear Test Apparatus, 2kN with data acquisition unit, 110VAC, 60Hz
- **TO-105-2-02** Direct Shear Test Apparatus, 2kN with data acquisition unit, 220VAC, 60Hz
- **TO-105-2-03** Direct Shear Test Apparatus, 2kN with data acquisition unit, 220VAC, 50Hz

### SUPPLIED AS STANDARD

- **TO-10401** Shear box assembly
- **TO-10402** Shear box housing with linear bearing case
- **TO-10405** Specimen cutter
- **TO-10410** Weight set to attain 3kg/cm² stress on sample
- **TO-10501** Data acquisition system

### MODEL TO-105-2 SPECIFICATIONS

| | |
|---|---|
| **Mode of display** | Micro-controller multi-line alpha numeric display for all simultaneous channels |
| **Capacity** | 2kN (200kgf) load cell |
| **Range** | ± 20 mm. LVDT displacement sensor with 3m long cable |
| **Shear measurement** | Direct/residual |
| **Fast forward/ reverse speed** | 10mm/min |
| **Rates of strain** | Up to 9.99mm/minute |
| **Specimen size** | 60 x 60 x 25mm |

### APPLICABLE STANDARDS

- **BS 1377; EN 1997-2; ASTM D3080**

### Key features

- Microprocessor control.
- Rapid approach and return to start datum.
- Fully variable speed, up to 9.99mm/min.
- Reduced operator involvement.
- Direct entry through keyboard.
- Direct reading in engineering units.
- Modular transducer system.

### OPTIONAL ACCESSORIES

- **TO-10401** Shear box assembly
- **TO-10402** Shear box housing with linear bearing case
- **TO-10405** Specimen cutter
- **TO-10410** Weight set to attain 3kg/cm² stress on sample

# MODEL TO-114

## Automatic Soil Compactor

Preparing specimens for compaction studies can be costly and time consuming. The Tinius Olsen Compactor automatically compacts soil specimens, eliminating the effort of hand compaction. The height and weight of the hammer is adjustable to suit test requirements. An automatic blow pattern ensures optimum compaction for each layer of soil. The hammer itself travels across the mold and the table rotates the mold in equal steps on a base that is extremely stable. The number of blows per layer can be set at the beginning of the test by means of the simple digital counter system.

### STANDARD FEATURES

BS Standards

- **TO-11201** Proctor compaction mold for light compaction – 105mm ID x 115.5mm high
- **TO-11201-H** Compaction mold for heavy compaction – 152mm ID x 127mm high

ASTM Standards

- **TO-11301** Compaction mold for light compaction – 101.6mm ID x 116.4mm high
- **TO-11301-H** Compaction mold for heavy compaction – 152mm ID x 116.4mm high

AUS Standards

- **TO-11201-AS** Light compaction mold
- **TO-11201-H-AS** Heavy compaction mold

### PACKAGING INFORMATION

- **Net weight:** 131kg; **gross weight:** 183kg
- **Packaging dimensions:** 165 x 48 x 88cm

### APPLICABLE STANDARDS

- **BS 1377; EN 1997-2, 1924; ASTM D558, D560, D698, D1557; AASHTO T99, T134, T135, T136, T180**

### OPTIONAL ACCESSORIES

- **TO-11201** Proctor compaction mold for light compaction – 105mm ID x 115.5mm high
- **TO-11201-H** Compaction mold for heavy compaction – 152mm ID x 127mm high
- **TO-11301** Compaction mold for light compaction – 101.6mm ID x 116.4mm high
- **TO-11301-H** Compaction mold for heavy compaction – 152mm ID x 116.4mm high
- **TO-11201-AS** Light compaction mold – 400 x 600mm
- **TO-11201-H-AS** Heavy compaction mold – 400 x 600mm



### ORDERING INFORMATION

- **TO-114-BS-01** Automatic Soil Compactor, to BS EN standards, configured for operation at 110VAC, 60Hz
- **TO-114-BS-02** Automatic Soil Compactor, to BS EN standards, configured for operation at 220VAC, 60Hz
- **TO-114-BS-03** Automatic Soil Compactor, to BS EN standards, configured for operation at 220VAC, 50Hz
- **TO-114-ASTM-01** Automatic Soil Compactor, to ASTM standards, configured for operation at 110VAC, 60Hz
- **TO-114-ASTM-02** Automatic Soil Compactor, to ASTM standards, configured for operation at 220VAC, 60Hz
- **TO-114-ASTM-03** Automatic Soil Compactor, to ASTM standards, configured for operation at 220VAC, 50Hz
- **TO-114-AS-01** Automatic Soil Compactor, to AUS standards, configured for operation at 110VAC, 60Hz
- **TO-114-AS-02** Automatic Soil Compactor, to AUS standards, configured for operation at 220VAC, 60Hz
- **TO-114-AS-03** Automatic Soil Compactor, to AUS standards, configured for operation at 220VAC, 50Hz
- **TO-114-ASTM-03** Automatic Soil Compactor, to ASTM standards, configured for operation at 220VAC, 50Hz
- **TO-114-AS-01** Automatic Soil Compactor, to AUS standards, configured for operation at 110VAC, 60Hz
- **TO-114-AS-02** Automatic Soil Compactor, to AUS standards, configured for operation at 220VAC, 60Hz
- **TO-114-AS-03** Automatic Soil Compactor, to AUS standards, configured for operation at 220VAC, 50Hz

| MODEL TO-114 SPECIFICATIONS | |
|---|---|
| **Rammer** | Circular faced, 50.8mm/2in diameter foot; adjustable to either 2.5kg/5.5lb or 4.5kg/10lb weight |
| **Drop** | Adjustable to either 305mm/12in or 457mm/18in |
| **Controls** | Digital counter system, selector switch for either standard proctor test or modified proctor/CBR testing |
| **Dimensions** | (WxDxH) 250 x 430 x 1400mm/ 10 x 17 x 55in |
| **Weight (net)** | 190kg/419lb |
| **Note:** Compaction molds are not included and must be ordered separately | |

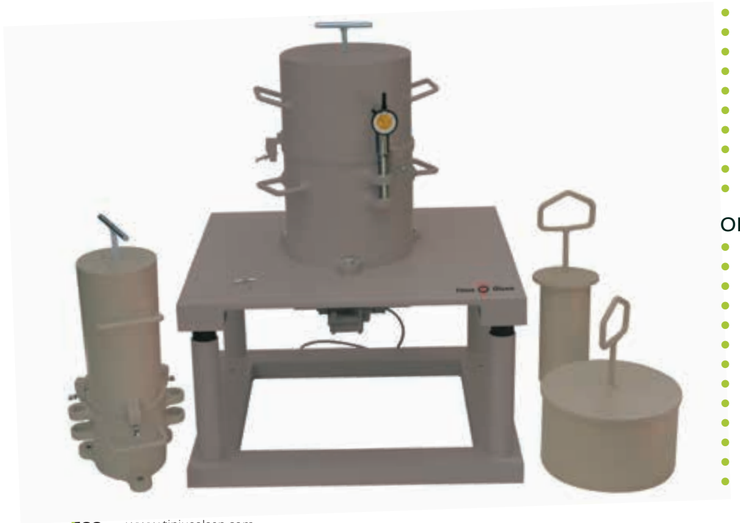
### Key features

- Pre-set blow pattern ensures even compaction.
- Solid state controls for reliability and ease of maintenance.
- Automatic counter reset after completion of blow pattern.

# MODEL TO-115

## Relative Density Apparatus

Relative density relates the dry density of cohesionless soil to the maximum and minimum densities. The degree of compaction of cohesion or less soil can be stated in terms of relative density.



### ORDERING INFORMATION

- **TO-115-01** Relative Density Apparatus 110V, 60Hz
- **TO-115-02** Relative Density Apparatus 220V, 60Hz
- **TO-115-03** Relative Density Apparatus 240V, 50Hz

### SUPPLIED AS STANDARD

- **TO-11501** Vibrating table, frequency 3600rpm
- **TO-11502** Cylindrical metal mold volume 3000ml
- **TO-11503** Guide sleeve for TO-11502
- **TO-11504** Surcharge base plate for TO-11502
- **TO-11505** Handle for TO-11504 and TO-11509
- **TO-11506** Surcharge weight for TO-11502
- **TO-11507** Cylinder metal mold volume 15000ml
- **TO-11508** Guide sleeve for TO-11507
- **TO-11509** Surcharge base plate for TO-11507
- **TO-11510** Surcharge weight for TO-11507
- **TO-11511** Dial gage holder
- **TO-11512** Calibrating bar 75 x 300 x 3 mm
- **TO-072** Dial gage

### OPTIONAL ACCESSORIES

- **TO-11501** Vibrating table, frequency 3600rpm
- **TO-11502** Cylindrical metal mold volume 3000ml
- **TO-11503** Guide sleeve for TO-11502
- **TO-11504** Surcharge base plate for TO-11502
- **TO-11505** Handle for TO-11504 & TO-11509
- **TO-11506** Surcharge weight for TO-11502
- **TO-11507** Cylinder metal mold volume 15000ml
- **TO-11508** Guide sleeve for TO-11507
- **TO-11509** Surcharge base plate for TO-11507
- **TO-11510** Surcharge weight for TO-11507
- **TO-11511** Dial gage holder
- **TO-11512** Calibrating bar 75 x 300 x 3mm
- **TO-072** Analog dial gage



# MODEL TO-120

## CBR Test Apparatus – Analog

The California Bearing Ratio test (usually called CBR test) is an empirical test developed in California, USA. It determines the relative bearing ratio and expansion characteristics under known surcharge weight of base, sub base and sub grade soils for the design of roads, pavements and runways. The CBR test is used extensively in selection of materials and control of sub grades.

The test can be performed in the laboratory on prepared samples or in-situ on location. Because of the empirical nature of the test, it is valid only for the application for which it was developed i.e., the design of highway base thickness.

This load frame is designed for conducting Unconfined, Triaxial, CBR and other routine tests.

The loading system comprises of a screw jack with detachable handle. The lower platen moves up and down. The top bracket is adjustable for vertical clearance and has an adaptor for connecting standard proving rings. A dial gage mounting bracket is provided on one of the two pillars. Rate of strain: 1.00 and 1.27mm/min.

| MODEL TO-120 SPECIFICATIONS | |
|---|---|
| **Dimensions** | 550 x 400 x 1220mm |
| **Maximum vertical clearance** | 800mm |
| **Horizontal clearance** | 255mm |
| **Platen diameter** | 133mm |
| **Platen travel** | 105mm |
| **Weight** | 80kg |
| **Note:** This test, being of an empirical nature, is valid only for the application for which it was developed, i.e. the design of highway base thicknesses. | |

### APPLICABLE STANDARDS

- **BS 1377, 1924; EN 13286-47; ASTM D1883; AASHTO T193**

### PACKAGING INFORMATION

- **Net weight:** 125kg; **gross weight:** 198kg
- **Packaging dimensions:** 76 x 53 x 150cm

### Key features

- Two-speed machine (BS/EN and ASTM).
- Rapid platen adjustment.
- Complete with stabilizing bar.
- Compact, bench-mounting design.
- Options for mechanical or electronic measurement.

### SUPPLIED AS STANDARD

- **TO-274** Proving ring 50kN
- **TO-072** Dial gage 0.25 x 0.01mm

*See the next two pages for more details of the standard accessories supplied with the main unit.*

| Differences according to standards | | |
|---|---|---|
| | **BS/EN standards** | **ASTM/AASHTO standards** |
| **Mold** | 152 x 127mm (inside dia x height) | 152.4 x 177.8mm (inside dia x height) |
| **Collar** | 51mm height, fits both ends of mold | 50.8mm height, fits both ends of mold |
| **Base plate** | Solid, fits both ends of mold | Perforated |
| **Construction** | All steel, plated | All steel, plated |
| **Weight** | 7.3kg | 9kg |

# MODEL TO-120

## CBR Test Apparatus – Analog (continued)

**BS 1377, 1924; EN 13286-4, EN 1997-2**

### ORDERING INFORMATION

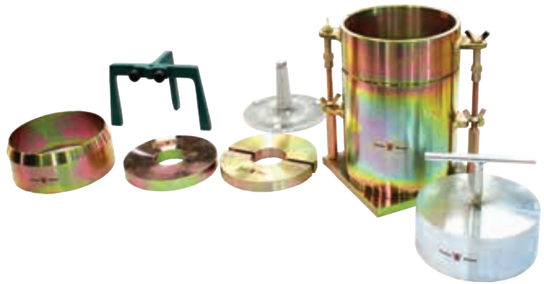
- **TO-120-1-01-BS** CBR Test Apparatus complete with accessories, 110VAC, 60Hz
- **TO-120-1-02-BS** CBR Test Apparatus complete with accessories, 220VAC, 60Hz
- **TO-120-1-03-BS** CBR Test Apparatus complete with accessories, 220VAC, 50Hz

### SUPPLIED AS STANDARD

- **TO-12001-BS** BS CBR mold complete with collar and base plate
- **TO-12002-BS** BS CBR base plate
- **TO-12003-BS** BS CBR extension collar
- **TO-12004-BS** Penetration piston as per BS
- **TO-12005** Adjustable bracket for penetration dial gage
- **TO-12006-BS** BS spacing compacting disc
- **TO-12007-BS** BS Annular surcharge weight 2kg
- **TO-12008-BS** BS Split surcharge weight 2kg
- **TO-12009** Perforated swell plate
- **TO-12010** Metal tripod for dial gage
- **TO-12011-BS** BS CBR cutting collar
- **TO-274** Proving ring, 50kN
- **TO-072** Dial gage 25mm travel x 0.01mm least count
- **TO-11202** Compacting rammer for light compaction 2.5kg x 300mm fall
- **TO-11202-H** Compacting rammer for heavy compaction 4.5kg x 450mm fall

### OPTIONAL ACCESSORIES

- **TO-12001-BS** BS CBR mold complete with collar and base plate
- **TO-12002-BS** BS CBR base plate
- **TO-12003-BS** BS CBR extension collar
- **TO-12004-BS** Penetration piston as per BS
- **TO-12005** Adjustable bracket for penetration dial gage
- **TO-12006-BS** BS spacing compacting disc
- **TO-12007-BS** BS Annular surcharge weight 2kg
- **TO-12008-BS** BS Split surcharge weight 2kg
- **TO-12009** Perforated swell plate
- **TO-12010** Metal tripod for dial gage
- **TO-12011-BS** BS CBR cutting collar
- **TO-072** Dial gage 25mm travel x 0.01mm least count
- **TO-11202** Compacting rammer for light compaction 2.5kg x 300mm fall
- **TO-11202-H** Compacting rammer for heavy compaction 4.5kg x 450mm fall





**ASTM D1883; AASHTO T193**

### ORDERING INFORMATION

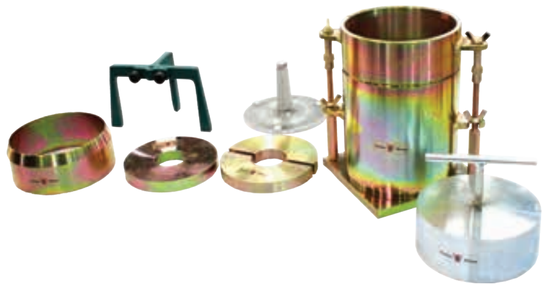
- **TO-120-1-01-ASTM** CBR Test Apparatus complete with accessories, 110VAC, 60Hz
- **TO-120-1-02-ASTM** CBR Test Apparatus complete with accessories, 220VAC, 60Hz
- **TO-120-1-03-ASTM** CBR Test Apparatus complete with accessories, 220VAC, 50Hz

### SUPPLIED AS STANDARD

- **TO-12001-ASTM** ASTM CBR mold complete with collar and base plate
- **TO-12002-ASTM** ASTM CBR base plate
- **TO-12003-ASTM** ASTM CBR extension collar
- **TO-12004-ASTM** Penetration piston as per ASTM
- **TO-12005** Adjustable bracket for penetration dial gage
- **TO-12006-ASTM** ASTM spacing compacting disc
- **TO-12007-ASTM** ASTM Annular surcharge weight 2.27kg
- **TO-12008-ASTM** ASTM Split surcharge weight 2.27kg
- **TO-12009** Perforated swell plate
- **TO-12010** Metal tripod for dial gage
- **TO-12011-ASTM** ASTM CBR cutting collar
- **TO-274** Proving ring, 50kN
- **TO-072** Dial gage 25mm travel x 0.01mm least count
- **TO-11202** Compacting rammer for light compaction 2.5kg x 300mm fall
- **TO-11202-H** Compacting rammer for heavy compaction 4.5kg x 450mm fall

### OPTIONAL ACCESSORIES

- **TO-12001-ASTM** ASTM CBR mold complete with collar and base plate
- **TO-12002-ASTM** ASTM CBR base plate
- **TO-12003-ASTM** ASTM CBR extension collar
- **TO-12004-ASTM** Penetration piston as per ASTM
- **TO-12005** Adjustable bracket for penetration dial gage
- **TO-12006-ASTM** ASTM spacing compacting disc
- **TO-12007-ASTM** ASTM Annular surcharge weight 2.27kg
- **TO-12008-ASTM** ASTM Split surcharge weight 2.27kg
- **TO-12009** Perforated swell plate
- **TO-12010** Metal tripod for dial gage
- **TO-12011-ASTM** ASTM CBR cutting collar
- **TO-072** Dial gage 25mm travel x 0.01mm least count
- **TO-11202** Compacting rammer for light compaction 2.5kg x 300mm fall
- **TO-11202-H** Compacting rammer for heavy compaction 4.5kg x 450mm fall



# MODEL TO-121

## CBR Test Apparatus – Digital

The California Bearing Ratio test (usually called CBR test) is an empirical test developed in California, USA. It determines the relative bearing ratio and expansion characteristics under known surcharge weight of base, sub base and sub grade soils for the design of roads, pavements and runways. The CBR test is used extensively in selection of materials and control of sub grades.

The test can be performed in the laboratory on prepared samples or in-situ on location. Because of the empirical nature of the test, it is valid only for the application for which it was developed i.e., the design of highway base thickness.

This load frame is designed for conducting Unconfined, Triaxial, CBR and other routine tests.

The loading system comprises of a screw jack with detachable handle. The lower platen moves up and down. The top bracket is adjustable for vertical clearance and has an adaptor for connecting standard load cells. A display sensor mounting bracket is provided on one of the two pillars and a data acquisition system accompanies the equipment. Rate of strain: 1.00 and 1.27 mm/min.

### SUPPLIED AS STANDARD

- **TO-12101** Data acquisition system comprises digital indicator, load cell 50kN, displacement sensor 0.20mm

*See the next two page for more details of the standard accessories supplied with the main unit.*

### APPLICABLE STANDARDS

- **BS 1377, 1924; EN 13286-47; ASTM D1883; AASHTO T193**

### Key features

- Two-speed machine (BS/EN and ASTM).
- Rapid platen adjustment.
- Complete with stabilizing bar.
- Compact, bench-mounting design.
- Options for mechanical or electronic measurement.

### Differences according to standards

| | BS/EN standards | ASTM/AASHTO standards |
|---|---|---|
| **Mold** | 152 x 127mm (inside dia x height) | 152.4 x 177.8mm (inside dia x height) |
| **Collar** | 51mm height, fits both ends of mold | 50.8mm height, fits both ends of mold |
| **Base plate** | Solid, fits both ends of mold | Perforated |
| **Construction** | All steel, plated | All steel, plated |
| **Weight** | 7.3kg | 9kg |

### MODEL TO-121 SPECIFICATIONS

| | |
|---|---|
| **Dimensions** | 550 x 400 x 1220mm |
| **Maximum vertical clearance** | 800mm |
| **Horizontal clearance** | 255mm |
| **Platen diameter** | 133mm |
| **Platen travel** | 105mm |
| **Weight** | 80kg |

**Note:** This test, being of an empirical nature, is valid only for the application for which it was developed, i.e. the design of highway base thicknesses.

### PACKAGING INFORMATION

- **Net weight:** 75kg; g**ross weight:** 123kg
- **Packaging dimensions:** 76 x 53 x 150cm





**BS 1377, 1924; EN 13286-4, EN 1997-2**

### ORDERING INFORMATION

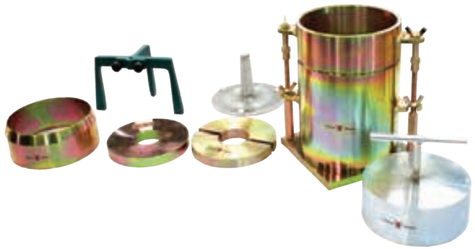
- **TO-121-1-01-BS** CBR Test Apparatus with accessories, 110VAC, 60Hz
- **TO-121-1-02-BS** CBR Test Apparatus with accessories, 220VAC, 60Hz
- **TO-121-1-03-BS** CBR Test Apparatus with accessories, 220VAC, 50Hz

### SUPPLIED AS STANDARD

- **TO-12001-BS** BS CBR mold with collar and base plate
- **TO-12002-BS** BS CBR base plate
- **TO-12003-BS** BS CBR extension collar
- **TO-12004-BS** Penetration piston as per BS
- **TO-12005** Adjustable bracket for penetration dial gage
- **TO-12006-BS** BS spacing compacting disc
- **TO-12007-BS** BS annular surcharge weight 2kg
- **TO-12008-BS** BS split surcharge weight 2kg
- **TO-12009** Perforated swell plate
- **TO-12010** Metal tripod for dial gage
- **TO-12011-BS** BS CBR cutting collar
- **TO-12101-01** Electronic CBR kit; digital indicator, 50kN load cell and 20mm LVDT, 110VAC, 60Hz
- **TO-12101-01** Electronic CBR kit; digital indicator, 50kN load cell and 20mm LVDT, 220VAC, 60Hz
- **TO-12101-01** Electronic CBR kit; digital indicator, 50kN load cell and 20mm LVDT, 220VAC, 50Hz
- **TO-11202** Compacting rammer for light compaction 2.5kg x 300mm fall
- **TO-11202-H** Compacting rammer for heavy compaction 4.5kg x 450mm fall

### OPTIONAL ACCESSORIES

- **TO-12001-BS** BS CBR mold with collar and base plate
- **TO-12002-BS** BS CBR base plate
- **TO-12003-BS** BS CBR extension collar
- **TO-12004-BS** Penetration piston as per BS
- **TO-12005** Adjustable bracket for penetration dial gage
- **TO-12006-BS** BS spacing compacting disc
- **TO-12007-BS** BS annular surcharge weight 2kg
- **TO-12008-BS** BS Split surcharge weight 2kg
- **TO-12009** Perforated swell plate
- **TO-12010** Metal tripod for dial gage
- **TO-12011-BS** BS CBR cutting collar
- **TO-11202** Compacting rammer for light compaction 2.5kg x 300mm fall
- **TO-11202-H** Compacting rammer for heavy compaction 4.5kg x 450mm fall



# MODEL TO-121

## CBR Test Apparatus – Digital (continued)

**ASTM D1883; AASHTO T193**

### ORDERING INFORMATION

- **TO-121-1-01-ASTM** CBR Test Apparatus with accessories, 110VAC, 60Hz
- **TO-121-1-02-ASTM** CBR Test Apparatus with accessories, 220VAC, 60Hz
- **TO-121-1-03-ASTM** CBR Test Apparatus with accessories, 220VAC, 50Hz

### SUPPLIED AS STANDARD

- **TO-12001-ASTM** ASTM CBR mold with collar and base plate
- **TO-12002-ASTM** ASTM CBR base plate
- **TO-12003-ASTM** ASTM CBR extension collar
- **TO-12004-ASTM** Penetration piston as per ASTM
- **TO-12005** Adjustable bracket for penetration dial gage
- **TO-12006-ASTM** ASTM spacing compacting disc
- **TO-12007-ASTM** ASTM annular surcharge weight 2.27kg
- **TO-12008-ASTM** ASTM split surcharge weight 2.27kg
- **TO-12009** Perforated swell plate
- **TO-12010** Metal tripod for dial gage
- **TO-12011-ASTM** ASTM CBR cutting collar
- **TO-12101-01** Electronic CBR kit; digital indicator, 50kN load cell and 20mm LVDT, 110VAC, 60Hz
- **TO-12101-01** Electronic CBR kit; digital indicator, 50kN Load cell and 20mm LVDT, 220VAC, 60Hz
- **TO-12101-01** Electronic CBR kit; digital indicator, 50kN Load cell and 20mm LVDT, 220VAC, 50Hz
- **TO-11202** Compacting rammer for light compaction 2.5kg x 300mm fall
- **TO-11202-H** Compacting rammer for heavy compaction 4.5kg x 450mm fall

### OPTIONAL ACCESSORIES

- **TO-12001-ASTM** ASTM CBR mold with collar and base plate
- **TO-12002-ASTM** ASTM CBR base plate
- **TO-12003-ASTM** ASTM CBR extension collar
- **TO-12004-ASTM** Penetration piston as per ASTM
- **TO-12005** Adjustable bracket for penetration dial gage
- **TO-12006-ASTM** ASTM spacing compacting disc
- **TO-12007-ASTM** ASTM annular surcharge weight 2.27kg
- **TO-12008-ASTM** ASTM Split surcharge weight 2.27kg
- **TO-12009** Perforated swell plate
- **TO-12010** Metal tripod for dial gage
- **TO-12011-ASTM** ASTM CBR cutting collar
- **TO-11202** Compacting rammer for light compaction 2.5kg x 300mm fall
- **TO-11202-H** Compacting rammer for heavy compaction 4.5kg x 450mm fall



# MODEL TO-126

## Consolidation Apparatus – Analog

### Key features

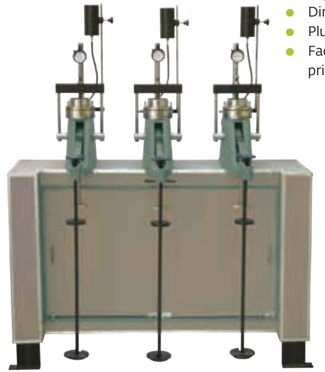
- High capacity – 8800kPa on 50mm diameter specimens using 11:1 beam ratio.
- Triple beam ratio, 9:1, 10:1, 11:1.
- Compact unit ensures maximum space saving.

The Consolidation Apparatus consists of a fixed ring type of consolidometer cell for testing specimens of 60mm dia x 20mm thick, but a variety of specimen sizes from 50 to 100mm dia can also be tested. Additionally, the same loading unit can be used with optional floating ring consolidometer cells.

The standard consolidation apparatus is supplied with a weight set to achieve a total pressure of 10kg/cm² (in addition to the seating load of 0.05kg/cm² on the specimen), but an additional set of weights is required to reach the full capacity of 20kg/cm².

The consolidation is measured by conventional dial gages or digital gages and common configurations include a single and three-gang consolidometers, with a six-gang version available on special request.

- Digital readout reduces the possibility of operator error.
- Direct reading in mm.
- Plug-in transducer module system.
- Facility for connecting readout unit to compatible logging or printing system.



### ORDERING INFORMATION

- **TO-126-1-AN** Consolidation stage, single station, with TO-070 analog dial gage
- **TO-126-3-AN** Consolidation stage, three station, with three TO-070 analog dial gages

### SUPPLIED AS STANDARD

- **TO-12501** Consolidation unit
- **TO-12502** Cell assembly complete with all accessories suitable for 60mm diameter x 20mm thick specimens
- **TO-12503** Set of 29 weights to generate 10kg/cm² stress on 60mm diameter specimen
- **TO-12504** Water reservoir with tube, T connection and pinch cock

### OPTIONAL ACCESSORIES

- **TO-12502** Cell assembly complete with all accessories suitable for 60mm diameter x 20mm thick specimens
- **TO-12503** Set of 29 weights to generate 10kg/cm² stress on 60mm diameter specimen
- **TO-12504** Water reservoir with tube, T connection and pinch cock
- **TO-070** Dial gage, 5mm x 0.002mm

### APPLICABLE STANDARDS

- **BS 1377; EN 1997-2; ASTM D2435, D4546; AASHTO T216**

# MODEL TO-126

## Consolidation Apparatus – Digital

The Consolidation Apparatus consists of a fixed ring type of consolidometer cell for testing specimens of 60mm dia x 20mm thick, but a variety of specimen sizes from 50 to 100mm dia can also be tested. Additionally, the same loading unit can be used with optional floating ring consolidometer cells.

The standard consolidation apparatus is supplied with a weight set to achieve a total pressure of 10kg/cm² (in addition to the seating load of 0.05kg/cm² on the specimen), but an additional set of weights is required to reach the full capacity of 20kg/cm².

The consolidation is measured by conventional dial gages or digital gages and common configurations include a single and three-gang consolidometers, with a six-gang version available on special request.

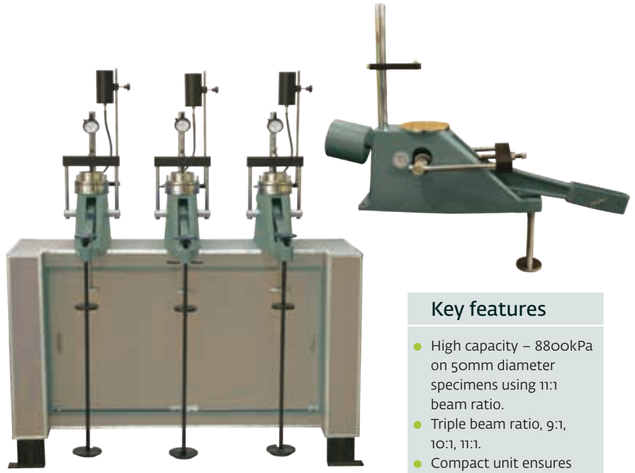
- Digital readout reduces the possibility of operator error.
- Direct reading in mm.
- Plug-in transducer module system.
- Facility for connecting readout unit to compatible logging or printing system.

### ORDERING INFORMATION

- **TO-126-1-DG** Consolidation stage, single station, with TO-072DG digital gage
- **TO-126-3-DG** Consolidation stage, three station, with three TO-072DG digital gages

### SUPPLIED AS STANDARD

- **TO-12501** Consolidation Unit
- **TO-12502** Cell assembly complete with all accessories suitable for 60mm diameter x 20mm thick specimens
- **TO-12503** Set of 29 weights to generate 10kg/cm² stress on 60mm diameter specimen
- **TO-12504** Water reservoir with tube, T connection and pinch cock



### Key features

- High capacity – 8800kPa on 50mm diameter specimens using 11:1 beam ratio.
- Triple beam ratio, 9:1, 10:1, 11:1.
- Compact unit ensures maximum space saving.

### OPTIONAL ACCESSORIES

- **TO-12502** Cell assembly complete with all accessories suitable for 60mm diameter x 20mm thick specimens
- **TO-12503** Set of 29 weights to generate 10kg/cm² stress on 60mm diameter specimen
- **TO-12504** Water reservoir with tube, T connection and pinch cock
- **TO-070** Dial gage, 5mm x 0.002mm
- **TO-12801** Digital displacement sensor, 0-10mm
- **TO-12802** Digital indicator for single channel
- **TO-13001** Digital indicator for three channels

### APPLICABLE STANDARDS

- **BS 1377; EN 1997-2; ASTM D2435, D4546; AASHTO T216**



# MODEL TO-157

## Plate Bearing Test Apparatus

The Plate Bearing Test is essentially a model test of foundations. It gives the load deformation characteristics for determining the ultimate bearing capacity of foundations. This test is a standard technique for determining bearing capacity of soils and the results of other methods are compared and calibrated with the values obtained from the plate bearing test. In this method, a steel plate is subjected to a gradual increment of load and the corresponding settlement is noted. The ultimate bearing capacity is taken as the load at which the settlement increases at a rapid rate.

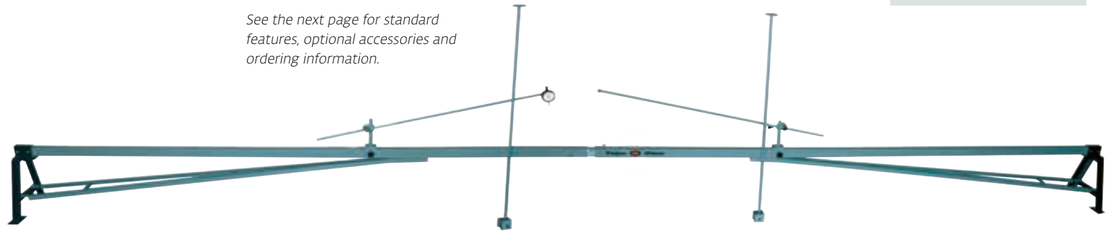
*See the next page for standard features, optional accessories and ordering information.*

### APPLICABLE STANDARDS

- **BS 1377; EN 1997-3; ASTM D1194, D1195, D1196**

### Key features

- Determination of bearing capacity of the soil in-situ.
- Designing for static loads on spread footings.
- Repetitive and non-repetitive plate loading tests of soils and flexible pavements.



| MODEL TO-157 SPECIFICATIONS | |
|---|---|
| **Loading jack** | 500kN capacity with integral ball seating |
| **Pump** | Hand-operated, single speed with integral oil reservoir |
| **Hose** | 3m long. Maximum pressure 70MPa with quick release couplings |
| **Gage** | 100mm dia with quick release couplings and graphs to convert readings to kN, kgf and lbf |
| **Weights** | Loading jack 24kg, pressure system 12.5kg |
| **Note:** The equipment is used in conjunction with a reaction beam. This is not supplied with the equipment. | |

# MODEL TO-157

## Plate Bearing Test Apparatus (continued)

### ORDERING INFORMATION

- **TO-157** Plate bearing test apparatus

### SUPPLIED AS STANDARD

- **TO-15715** Grooved M.S. Plate, 30cm x 30cm dia square x 25mm thick
- **TO-15716** Grooved M.S. Plate, 45cm x 45cm dia square x 25mm thick
- **TO-15717** Grooved M.S. Plate, 60cm x 60cm dia square x 25mm thick
- **TO-15718** Grooved M.S. Plate, 75cm x 75cm dia square x 25mm thick
- **TO-15721** Plain M.S. Plate, 30cm x 30cm dia square x 25mm thick
- **TO-15722** Plain M.S. Plate, 45cm x 45cm dia square x 25mm thick
- **TO-15723** Plain M.S. Plate, 60cm x 60cm dia square x 25mm thick
- **TO-15724** Plain M.S. Plate, 75cm x 75cm dia square x 25mm thick

### OPTIONAL ACCESSORIES

- **TO-46801** Hand operated hydraulic jack, capacity 500kN (50,000kgf)
- **TO-475** Hydraulic hand operated pump with 200mm dia load gage capacity 500kN (50,000kgf)
- **TO-47503** High pressure flexible metallic pipe 5m long
- **TO-15702** Ball and socket arrangement consisting of two steel plates, with one steel ball in between the plates
- **TO-15703** Extension rod long, 12mm dia x 25cm for taking dial gage readings (16 sets)
- **TO-15704** Magnetic base with female threaded on top, for holding extension rod (four sets)
- **TO-15705** Top end plate 50mm dia with male thread, for fitting onto the extension rods and positioning the dial gage plunger (four sets)
- **TO-15706** Column 15cm dia x 25cm long, with flanges, complete with four bolts and nuts (two sets)
- **TO-15707** Column 15cm dia x 50cm long, with flanges, complete with four bolts and nuts
- **TO-15708** Datum bar lightweight, portable, total span 5m height approximately 30cm, mounted on two removable legs. It is made in two parts. Provision exists for datum bar of 2.5m span to be used. A spare leg is provided for the purpose. Complete with two quick release clamps for positioning and holding the dial gage brackets (two sets)
- **TO-15705** Top end plate 50mm dia with male thread, for fitting onto the extension rods and positioning the dial gage plunger (four sets)
- **TO-15709** Anchor spikes (set of 10)
- **TO-15711** Quickly release clamp for positioning dial gage bracket (set of four)
- **TO-072** Dial gage 0-25 x 0.01mm (set of four)



# MODEL TO-206

## Point Load Index Tester

The Point Load Index Tester is used to determine the Diametral Point Load Strength Index of rock cores and irregular lumps, which can be tested without any treatment. The Point Load Test is primarily an index test for strength classification of rock materials. This instrument is mainly intended for field measurements on rock specimens but it can also be used in the laboratory. The results of the test may also be used to predict the uniaxial compressive strength of rock from correlations. The apparatus is light and portable.

### Key features

- Rock core specimens can be tested without any preparation.
- The instrument can be used in the laboratory as well as at the drilling site.
- Results may also be used to predict the uniaxial compressive strength of rock.
- A wide range of core sizes can be tested.
- The selected engineering unit (which is any one unit via SI, Metric or Imperial fixed) will be displayed on the front panel through LED.
- Peak load displayed on sample failure.
- Four key buttons to Program, Start and Stop, Set Break Point, and Zero.
- Battery or mains operation.
- Failure detection definable.

### APPLICABLE STANDARDS

- **EN DD ENV 1997-2; ASTM D5731**

### ORDERING INFORMATION

- **TO-206-1-ECO** Point Load Index Tester with ECO digital read-out

# MODEL TO-217

# Unconfined Compression Tester for Rocks

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 load frame is extremely versatile and designed to conduct Triaxial Unconfined test and Unconfined compression test on rock specimens with diameters from 38-100mm and AX, BX, NX specimens.

The instrument consists of a cabinet that houses the gear system and motor with sturdy angle iron frame. Loading is done through the bottom loading platen, which is carried on a lead screw that 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 adaptor for standard proving rings or 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: 12 fixed speeds between 1.25 and 0.0064mm/min.
- Suitable for operation on 230V, 50Hz, single phase, AC supply.

## ORDERING INFORMATION

- **TO-217-S2-SP2-03** Unconfined Compression Tester 200kN with 200kN load cell and 25mm LVDT with data acquisition

## STANDARD FEATURES

- **TO-065** Load frame, 200kN capacity 12-speed
- **TO-21701** Loading platen as per ASTM standard
- **TO-21704** Electronic conversion kit with 200kN load cell and 25mm LVDT with data acquisition

## APPLICABLE STANDARDS

- **ASTM 2938, D7012**

## DAQ – SPECIFICATIONS

- Keypad for data logger configuration.
- Inbuilt RTC for the real-time in standalone mode.
- Standalone and real-time data acquisition.
- LCD display of four lines, 20 characters, with back light.
- Operating temperature range of -45-70°C. Live channel data
- Peak hold facility
- Inbuilt battery for real-time clock
- Input as analog voltage
- Analog inputs: maximum four channels
- Maximum input voltage: 0-5V, +/-5V
- Accuracy
- Memory communication: internal storage minimum capacity should be 128MB or store on a PC that is configurable.
- Should be compatible with USB/RS232.
- Communication interfaces: Ethernet, RS232, USB, web server, Modbus server (slave)


## Key features

- Two-pillar type.
- Enclosed motor and gear system.
- Jewel lamps indicating direction of motion.
- Operational ease.

# MODEL TO-036

# Speedy Moisture Meter



| MODEL TO-036 SPECIFICATIONS | |
|---|---|
| **Model No.** | **TO-036-1** |
| Moisture range | 0-25% |
| Gage division | 0.5% |
| Sample weight | 6g |
| **Model No.** | **TO-037-1** |
| Moisture range | 0-50% |
| Gage division | 1% |
| Sample weight | 6g |

Tinius Olsen's Speedy Moisture Meter is used for determining the water (moisture) content of soil by chemical reaction. A measurement is made of the gas pressure produced when a specified mass of wet or moist soil is placed in a testing device with an appropriate volume of reagent and mixed.

The Speedy Moisture Meter is supplied as a complete kit, which consists of a digital balance, scoop, aluminum bottle fitted with a moisture gage, calcium carbide reagent, steel pulverizing balls and cleaning brushes. The complete kit is supplied in a customized case.

## APPLICABLE STANDARDS

- **BS 812; ASTM D4944; AASHTO T217**

## ORDERING INFORMATION

- **TO-036-1** Speedy Moisture Meter with 25% moisture range
- **TO-037-1** Speedy Moisture Meter with 50% moisture range

## SUPPLIED AS STANDARD

- **TO-03601** Calcium carbide reagent (supplied in a pack of six bottles)
- **TO-03602** Moisture gage, 0-25% Å~ 0.5%
- **TO-03603** Digital Balance, 50g
- **TO-03604** Sample container
- **TO-03701** Moisture gage, 0-50% Å~ 1%

## OPTIONAL ACCESSORIES

- **TO-03601** Calcium carbide reagent (supplied in a pack of six bottles)
- **TO-03602** Moisture gage, 0-25% Å~ 0.5%
- **TO-03603** Digital Balance, 50g
- **TO-03604** Sample container
- **TO-03701** Moisture gage, 0-50% Å~ 1%

## PACKAGING INFORMATION

- **Net weight:** 4.6kg; **gross weight:** 5.5kg

## Key features

- Reliable and accurate moisture measurement.
- Direct reading in percent moisture.
- Rapid results for quick turnaround.
- Robust construction ideal for field use.
- Heavy duty carrying case with portable electronic balance.

# MODEL TO-042

## Soil Cone Penetrometer

The Soil Cone Penetrometer enables simple and rapid determination of liquid limit. The unit is supplied complete with a 35mm long stainless steel penetration test cone with a smooth polished surface and an angle of 30°. Cone height can be a adjusted in relation to the specimen.


### APPLICABLE STANDARDS

- **BS 1377, 1924-2; EN 1997-2**

### ORDERING INFORMATION

- **TO-042-1-01** Soil cone penetrometer for 110V, 60Hz
- **TO-042-1-02** Soil cone penetrometer for 220V, 60Hz
- **TO-042-1-03** Soil cone penetrometer for 220V, 50Hz

### SUPPLIED AS STANDARD

- **TO-04201** Penetration test cone
- **TO-04202** Penetration test cup

### OPTIONAL ACCESSORIES

- **TO-04201** Penetration test cone
- **TO-04202** Penetration test cup
- **TO-515** Penetration cone
- **TO-518** Penetration kit
- **TO-51801** Penetration needle

### Key features

Advantages over the Casagrande method include:

- Results do not depend on the apparatus design.
- Applicable on a wider range of soil type.
- Reduction of operator error.
- Reproducible test results based on soil shear strength.



# MODEL TO-045

## Shrinkage Limit

The shrinkage limit in soil refers to the upper limit of moisture content in soil after which further reduction of moisture does not cause any reduction in volume. In this phenomenon the water content in fine grained soil is reduced below the plastic limit leading to shrinkage of the soil mass until it achieves its shrinkage limit.

**Note:** Shrinkage limit is significant in clays but less so in silts and sands

### APPLICABLE STANDARDS

- **BS 1377; ASTM D427; AASHTO T92**

### ORDERING INFORMATION

- **TO-045** Shrinkage Limit set

### SUPPLIED AS STANDARD

- **TO-04501** Porcelain evaporating dish
- **TO-04502** Shrinkage dish
- **TO-04503** Glass cup
- **TO-04504** Perspex plate, with three metal prongs
- **TO-04505** Perspex plain plate
- **TO-04506** Spatula
- **TO-04507** Glass cylinder, graduated, 25ml
- **TO-04509** Straight edge

### OPTIONAL ACCESSORIES

- **TO-04501** Porcelain evaporating dish
- **TO-04502** Shrinkage dish
- **TO-04503** Glass cup
- **TO-04504** Perspex plate, with three metal prongs
- **TO-04505** Perspex plain plate
- **TO-04506** Spatula
- **TO-04507** Glass cylinder, graduated, 25ml
- **TO-04509** Straight edge

# MODEL TO-046

## Pycnometer

A pycnometer works on the principle of Specific Gravity, which defines the weight ratio of a given volume of material in air with respect to an equal volume of distilled water at the same stated temperature. Powdered soil is added to the pycnometer and weighed; the pycnometer is filled with a liquid of known density, in which the soil is completely insoluble and weighed. The weight of the displaced liquid can be determined and hence the specific gravity of the soil.

### APPLICABLE STANDARDS

- **BS 1377, 812-2; EN 1097-7, 1997-2; ASTM D854; AASHTO T100**

### ORDERING INFORMATION

- **TO-046** Pycnometer

### OPTIONAL ACCESSORIES

- Rubber seal

### Key features

- Tests a wide range of materials from clay to sand and gravel, smaller than 10mm.
- Supplied as a set of six.
- Each consists of 1kg glass jar with brass cone, locking ring and rubber seal.




# MODEL TO-056

## High Speed Stirrer


The High Speed Stirrer with dispersion cup and baffle is mainly used for the pretreatment stage of soils before particle size analysis. Suitable for operation on 220V, 50Hz, single phase, AC power supply.

### APPLICABLE STANDARDS

- **BS 1377; ASTM D422; AASHTO T88**

### ORDERING INFORMATION

- **TO-056-1-01** High Speed Stirrer with dispersion cup and baffle, 110V, 60Hz
- **TO-056-1-02** High Speed Stirrer with dispersion cup and baffle, 220V, 60Hz
- **TO-056-1-03** High Speed Stirrer with dispersion cup and baffle, 220V, 50Hz

### Key features

- Compact bench-mounted design.
- Pretreats soils before particle size analysis.
- Anti-splashing baffle improves mixing efficiency.

# MODEL TO-112

## Proctor Compaction Apparatus (BS)

### Compaction test 2.5kg

This test method utilizes a 2.5kg hand compaction hammer and compaction molds are made of corrosion protected steel. Often referred to as the 'Proctor' test, it is suitable for soils containing particles no larger than 20mm.
**Note:** Both hand compaction hammer and compaction molds are made of corrosion protected steel to withstand the heavy usage involved in the test.

#### ORDERING INFORMATION

- **TO-11201** Proctor compaction mold for light compaction, 105mm ID x 115.5mm high to BS standards
- **TO-11202** Compaction rammer for light compaction 2.5kg x 300mm fall to BS standards

#### Key features

- Hand compaction hammer.
- Compaction mold.

#### APPLICABLE STANDARDS

- **BS 1377-4, 1924-2; EN 1997-2**

| MOLD SPECIFICATIONS | |
|---|---|
| **Mold volume** | 1000ml |
| **Dimensions** | 105mm ID x 115.5mm high |
| **Construction** | All steel, with plated threaded studs and wing nuts |

| RAMMER SPECIFICATIONS | |
|---|---|
| **Rammer weight** | 2.5kg |
| **Drop height** | 300mm |
| **Guide sleeve** | Machined steel tubing with air pressure release holes |
| **Finish** | Corrosion resistant |

### Compaction test 4.5kg

This test method utilizes a 4.5kg hand rammer resulting in approximately 4.5 times greater compactive energy being applied to the sample with the heavier rammer. This method is often specified where higher levels of compaction are necessary in a structure, e.g. an airfield sub-base material.
**Note:** Manufactured from corrosion protected steel components, the 4.5 kg rammer is designed to withstand heavy usage involved in the test method.

#### ORDERING INFORMATION

- **TO-11201-H** Compaction mold for heavy compaction, 152mm ID x 127mm high to BS standards
- **TO-11202-H** Compaction rammer for heavy compaction 4.5kg x 450mm fall to BS standards

| MOLD SPECIFICATIONS | |
|---|---|
| **Mold volume** | 2305ml |
| **Dimensions** | 152mm ID x 127mm high |
| **Construction** | All steel, with plated threaded studs and wing nuts |

| RAMMER SPECIFICATIONS | |
|---|---|
| **Rammer weight** | 4.5kg |
| **Drop height** | 450mm |
| **Guide sleeve** | Machined steel tubing with air pressure release holes |
| **Finish** | Corrosion resistant |




# MODEL TO-113

## Proctor Compaction Apparatus (ASTM)

### Compaction test 2.5kg

#### ORDERING INFORMATION

- **TO-11301** Compaction mold for light compaction, 101.6mm ID x 116.4mm high to ASTM standards
- **TO-11302** Compaction rammer for light compaction 2.49kg x 305mm fall to ASTM standards

| MOLD SPECIFICATIONS | |
|---|---|
| **Mold volume** | 994ml |
| **Dimensions** | 101.60mm ID x 116.40mm high |
| **Construction** | All steel, with plated threaded studs and wing nuts |

| RAMMER SPECIFICATIONS | |
|---|---|
| **Rammer weight** | 2.49kg |
| **Drop high** | 305mm |
| **Guide sleeve** | Machined steel tubing with air pressure release holes |
| **Finish** | Corrosion resistant |

### Compaction test 4.54kg

#### ORDERING INFORMATION

- **TO-11301-H** Compaction mold for heavy compaction, 152mm ID x 116.4mm high to ASTM
- **TO-11302-H** Compaction rammer for heavy compaction 4.54kg x 457mm tall

#### Key features

- Hand compaction hammer.
- Compaction mold.

| MOLD SPECIFICATIONS | |
|---|---|
| **Mold volume** | 2124ml |
| **Dimensions** | 152mm ID x 116.4mm high |
| **Construction** | All steel, with plated threaded studs and wing nuts |

| RAMMER SPECIFICATIONS | |
|---|---|
| **Rammer weight** | 4.54kg |
| **Drop height** | 457mm |
| **Guide sleeve** | Machined steel tubing with air pressure release holes |
| **Finish** | Corrosion resistant |

**Note:** Molds are available in either Gun Metal or Mild Steels. When ordering, use GM suffix for gun metal and MS for mild steel, i.e., 11201-GM, 11201-MS, 11201-H-GM, 11201-H-MS

#### APPLICABLE STANDARDS

- **ASTM D558, D559, D560, D698, D1557; AASHTO T99, T134, T135, T136, T180**


#### ORDERING INFORMATION

- **TO-112** Proctor compaction apparatus as per BS
- **TO-11201** Proctor mold, 105mm ID x 115.5mm high, 1000ml
- **TO-11202** 2.5kg x 300mm fall
- **TO-112-H** Compaction apparatus for heavy compaction as per BS code
- **TO-11201-H** Proctor mold, 152mm ID x 127mm high, 2305ml
- **TO-11202-H** 4.5kg x 450mm fall
- **TO-113** Compaction apparatus for light compaction as per ASTM code
- **TO-11301** Compaction mold, 101.6mm ID x 116.4mm high, 944ml
- **TO-11302** 2.49kg x 305mm fall
- **TO-113-H** Proctor compaction apparatus as per ASTM code
- **TO-11301-H** Compaction mold, 152mm ID x 116.4mm high, 2124ml
- **TO-11302** 4.54kg x 457mm fall

# MODEL TO-131-BS

## Laboratory Permeability Apparatus (Falling Head)

### Key features

- Plated steel chamber head assembly.
- Corrosion-resistant cast aluminum base assembly.
- Includes accessories for conducting both constant and falling head permeability studies.

### APPLICABLE STANDARDS

- **BS 1377; EN 1997-2; ASTM D2434; AASHTO T215**

Permeability is a property of soil that permits flow of water through its interconnecting voids. Permeability is an important engineering property that governs the rate of settlement of saturated compressible soil layers and the rate of flow of aquifer. Permeability is taken into account for pumping ground water, spacing well points for de-watering foundation sites for excavation, retention of water in reservoirs, design of dams and selection of soils to be used for various zones of embankments of dams and reservoirs.

Falling Head Permeameters are used for testing remolded or undisturbed fine grained soil having less than 10cm/sec coefficient of permeability and Constant Head Permeameters are used for coarse grained cohesion less soils.

### ORDERING INFORMATION

- **TO-131-BS** Laboratory permeability apparatus (falling head method)

### SUPPLIED AS STANDARD

- **TO-13101** Stand with three glass tubes of 6, 10 and 20mm dia approx.
- **TO-13102** Metallic mold 100mm dia x 127.3mm high, 1000ml volume
- **TO-13103** Extension collar 100mm dia x 60mm high
- **TO-13104** Drainage base plate with a recess for porous stone and an outlet valve
- **TO-13105** Metallic clamping ring
- **TO-13106** Drainage cap with recess for a porous stone and fitted with inlet valve and air release valve
- **TO-13107** Dummy plate to serve as false bottom during compaction
- **TO-13108** Porous stone for drainage base plate
- **TO-13109** Porous stone for drainage cap
- **TO-13110** Rubber connection tube 3m long, with pinch cock

| MODEL TO-131-BS SPECIFICATIONS | |
|---|---|
| **Cell** | Plated seamless tube 100mm diameter x 130mm high |
| **Base** | Porous plate with three tie rods |
| **Construction** | Machined to accept smaller tubes |

### OPTIONAL ACCESSORIES

- **TO-13101** Stand with three glass tubes of 6, 10 and 20mm dia approx
- **TO-13102** Metallic mold 100mm dia x 127.3mm high, 1000ml volume
- **TO-13103** Extension collar 100mm dia x 60mm high
- **TO-13104** Drainage base plate with a recess for porous stone and an outlet valve
- **TO-13105** Metallic clamping ring
- **TO-13106** Drainage cap with recess for a porous stone and fitted with inlet valve and air release valve
- **TO-13107** Dummy plate to serve as false bottom during compaction
- **TO-13108** Porous stone for drainage base plate
- **TO-13109** Porous stone for drainage cap
- **TO-13110** Rubber connection tube 3m long, with pinch cock

**Note:** 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.



# MODEL TO-161

## Core Cutter

For quality control of compacted earth fill, the measurement of in-situ density is essential. All types of earthwork constructions such as embankments, dams, roads, airfields and trenches need density determination. For quick determination of in-situ density of soil, a core-cutter of known volume is driven into the soil by a rammer. The core-cutter is removed, trimmed and the soil obtained is weighed and dried for a moisture and density check.

**Note:** Compaction molds not included, order separately.

### Key features

- Cylindrical core cutter made of steel, 100mm dia x 130mm long.
- Steel dolly 25mm high and 100mm dia.
- Rammer with steel rod.

### ORDERING INFORMATION

- **TO-161-BS** Core Cutter complete with dolly and rammer

### SUPPLIED AS STANDARD

- **TO-16101** Cylindrical core cutter
- **TO-16102** Steel dolly
- **TO-16103** Rammer with steel rod

### OPTIONAL ACCESSORIES

- **TO-16101** Cylindrical core cutter
- **TO-16102** Steel dolly
- **TO-16103** Rammer with steel rod

### APPLICABLE STANDARD

- **BS 1377**

# MODEL TO-162

## Sand Pouring Cylinder Apparatus

This Apparatus is used to determine 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.

### APPLICABLE STANDARDS

- **BS 1377, 1924**

### ORDERING INFORMATION

- **TO-162-1-BS** Sand Pouring Cylinder 100mm complete with calibrating container and metal tray
- **TO-162-2-BS** Sand Pouring Cylinder 150mm complete with calibrating container and metal tray
- **TO-162-3-BS** Sand Pouring Cylinder 200mm complete with calibrating container and metal tray
- **TO-16201-1-BS** Sand Pouring Cylinder 100mm without calibrating container and metal tray
- **TO-16201-2-BS** Sand Pouring Cylinder 150mm without calibrating container and metal tray
- **TO-16201-3-BS** Sand Pouring Cylinder 200mm without calibrating container and metal tray


### Key features

- Sand pouring cylinder fitted with conical funnel and shutter, 3 liter capacity.
- Cylindrical calibration container 100mm ID x 150mm high.
- Metal tray size 30 x 30 x 4cm, with 10cm central hole.



# MODEL TO-164

## Proctor Penetrometer


Compaction control in the field is exercised by determining the moisture content and dry density. Quick evaluation of this is done by developing curves in the laboratory, showing the relationship between moisture content versus dry density and penetration resistance, using Proctor Needles while conducting the Standard Compaction tests.

The penetrometer consists of a body housing a spring, a plunger calibrated to read 0-40kg x 1kg and a handle. Two stems are provided, a larger stem and a shorter stem, both graduated at 12.5mm intervals, to indicate the depth of penetration. The larger stem and the smaller stem are used with needles of larger and smaller areas respectively.

### Key features

- Spring-type penetrometer.
- Calibrated cylinder.
- Sliding collar.

### APPLICABLE STANDARD

- **ASTM D1558**

### ORDERING INFORMATION

- **TO-164** Proctor penetrometer

# MODEL TO-202

## Core Cutting and Grinding

This machine is designed for cutting and grinding cylindrical rock specimens up to NX size. Includes a 200mm diameter diamond cutting wheel, a fine diamond impregnated grinding wheel, a water supply system and sample holder. Clamps to hold the samples up to 55mm dia x 140mm are included. Core cutting and grinding machines for 100mm and 150mm diameter samples can be provided.

### Key features

- Table mounted.
- Stable construction.
- Feed arrangement for cutting.
- Cooling water arrangement.
- Heavy duty, AC, single phase motor.

### ORDERING INFORMATION

- **TO-202-02** Core Cutting and Grinding for up to 55mm diameter specimens, 415V, 60Hz
- **TO-202-03** Core Cutting and Grinding for up to 55mm diameter specimens, 415V, 50Hz
- **TO-202-100-02** Core Cutting and Grinding for up to 100mm diameter specimens, 415V, 60Hz
- **TO-202-100-03** Core Cutting and Grinding for up to 100mm diameter specimens, 415V, 50Hz
- **TO-202-150-02** Core Cutting and Grinding for up to 150mm diameter specimens, 415V, 60Hz
- **TO-202-150-03** Core Cutting and Grinding for up to 150mm diameter specimens, 415V, 50Hz




# MODEL TO-274

## Integral Proving Rings

Tinius Olsen Clamped Boss Load Rings are available in the range 1-50kN. The Proving Rings are made up 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 of the integral type: 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 readings that occurs with bolted abutments.

The rings are supplied complete with dial gage and Works Calibration Chart, individually packed in polished wooden boxes. The repeatability and accuracy of all clamped boss rings comply with the requirements of NIS 0415 Accreditation for the Calibration of Force Measuring Rings and Load Cells used in Soil Testing. Proving rings to meet special requirements are also available on request.

A separate polished and ground pair of loading pads for compression proving rings and a pair of shackles for tension proving rings are provided to suit each proving ring.

**Note:** All clamped boss load rings are calibrated in kN and supplied with a calibration chart.

### Key features

- Repeatability within 0.2% of indicated load.
- Accuracy within ±1% of indicated load.
- Works calibrated.

### ORDERING INFORMATION

- **TO-274** Proving ring, 50kN capacity
- **TO-271** Compression proving rings, 25kN capacity
- **TO-264** High sensitive proving ring, 2kN capacity
- **TO-284** Tension compression proving rings, 2kN capacity

### SPECIFICATION

- The repeatability of all load rings is within 0.2% of indicated load and accuracy is ±1% of indicated load over the upper 80% of the working range, at the calibration loads.

# Standards Reference Listing

## AASHTO

| Standard | Title | Equipment Reference | Page |
|---|---|---|---|
| E131 | Test is used to determine the quantity of water required to produce a cement paste of 'standard' consistency | Vicat Apparatus | 55 |
| IP49 | In this test, a chosen force is applied over a given area for a know period of time and the depth of penetration or the depression made in the sample is measured in tenths of a millimeter, which is expressed as a penetration number | Bitumen Penetration Kit | 88 |
| T22 | Standard method of test for compressive strength of cylindrical concrete specimens | DG Series Semi Automatic Concrete Compression Testers | 18 |
| | | FA Series Fully Automatic Concrete Compression Testers | 8 |
| T23 | Making and curing concrete compression and flexural test specimens in the field | Curing Tank | 34, 43 |
| T49 | Standard method of test for penetration of bituminous materials | Bitumen Penetration Kit | 88 |
| T51 | Standard method of test for ductility of asphalt materials | Ductility Testing Machine | 83 |
| T53 | Standard method of test for softening point of bitumen (ring-and-ball apparatus) | Softening Point – Ring and Ball Apparatus | 81 |
| T58 | Test for determining bitumen percentage in bituminous paving mixtures | Centrifuge Extractor Apparatus | 82 |
| T71 | Standard method of test for effect of organic impurities in fine aggregate on strength of mortar | Flow Table | 48 |
| T85 | Standard method of test for specific gravity and absorption of coarse aggregate | Density Basket | 76 |

## AASHTO

| Standard | Title | Equipment Reference | Page |
|---|---|---|---|
| T88 | Standard method of test for particle size analysis of soils | High Speed Stirrer | 117 |
| | | Particle Size Sieve Analysis | 72 |
| T89 | Test for determining the liquid limit of soils | Liquid Limit Device | 89 |
| T90 | Standard method of test for determining the plastic limit and plasticity index of soils | Liquid Limit Device | 89 |
| T92 | Standard method of test for determining the shrinkage factors of soils | Shrinkage Limit | 115 |
| T96 | Standard method of test for resistance to degradation of small-size coarse aggregate by abrasion and impact in the Los Angeles machine | Los Angeles Abrasion Apparatus | 64 |
| T99 | These methods of test are intended for determining the relation between the moisture content and density of soils compacted in a mold of a given size with a 2.5kg (5.5lb) rammer dropped from a height of 305mm (12in) | Automatic Soil Compactor | 98 |
| | | Proctor Compaction Apparatus | 119 |
| T100 | This method covers determination of the specific gravity of soils by means of a pycnometer | Pycnometer | 116 |
| T106 | Standard method of test for compressive strength of hydraulic cement mortar | Flow Table | 48 |
| T107 | Standard method of test for autoclave expansion of hydraulic cement | Cement Autoclave | 47 |
| | | Volume Change Apparatus with Length Comparator | 45 |
| T126 | Standard method of test for making and curing concrete test specimens in the laboratory | Consistometer | 40 |
| | | Motorized Flow Table | 31 |



## AASHTO

| Standard | Title | Equipment Reference | Page |
|---|---|---|---|
| T129 | Standard method of test for normal consistency of hydraulic cement | Vicat Apparatus | 55 |
| T134 | Standard method of test for moisture density relations of soil-cement mixtures | Automatic Soil Compactor | 98 |
| | | Proctor Compaction Apparatus | 119 |
| T135 | Standard method of test for wetting-and drying test of compacted soil-cement | Automatic Soil Compactor | 98 |
| | | Proctor Compaction Apparatus | 119 |
| T136 | Standard method of test for freezing-and thawing tests of compacted soil-cement mixtures | Automatic Soil Compactor | 98 |
| | | Proctor Compaction Apparatus | 119 |
| T137 | Standard method of test for air content of hydraulic cement mortar | Flow Table | 48 |
| T152 | Standard method of test for air content of freshly mixed concrete by the pressure method | Air Entrainment Meter – Type B | 29 |
| T153 | Standard method of test for fineness of hydraulic cement by air permeability apparatus | Air Permeability Apparatus (Blaine type) | 54 |
| | | Auto Blaine Apparatus | 46 |
| T160 | Standard method of test for length change of hardened hydraulic cement mortar and concrete | Volume Change Apparatus with Length Comparator | 45 |
| T164 | Standard method of test for quantitative extraction of asphalt binder from hot mix asphalt (HMA) | Centrifuge Extractor Apparatus | 82 |

## AASHTO

| Standard | Title | Equipment Reference | Page |
|---|---|---|---|
| T180 | This method of test is intended for determining the relationship between the moisture content and density of soils when compacted in a given mold of a given size with a 4.54kg (10lb) rammer dropped from a height of 457mm (18in) | Automatic Soil Compactor | 98 |
| | | Proctor Compaction Apparatus | 119 |
| T193 | Standard method of test for the California Bearing Ratio | CBR Test Apparatus – Analog | 101 |
| | | CBR Test Apparatus – Digital | 104 |
| | | Triaxial Test Load Frame | 91 |
| T197 | Standard method of test for time of setting of concrete mixtures by penetration resistance | Spring Type Concrete Penetrometer | 41 |
| T215 | Standard method of test for permeability of granular soils (constant head) | Laboratory Permeability Apparatus (Falling Head) | 120 |
| T216 | Standard method of test for one-dimensional consolidation properties of soils | Consolidation Apparatus – Analog | 107 |
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