Bulletin
190-B

Tinius Olsen

Solutions for Construction Testing

Machines • Software • Calibration • Service

Asphalt Quality Control

PENETRATION EQUIPMENT

Universal Penetrometer

System Description

Our Penetrometers are used for testing a wide variety of materials such as grease, petroleum, bitumen, tar, asphalt, rubber, cement, and soils.

In this test, a chosen force is applied over a given area for a known 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. An accurately fabricated steel base has been designed to facilitate penetration tests to be made over a wide surface area of sample. Adjustable feet are provided in the base for leveling. The display and penetration arm are adjustable to permit the testing of samples immersed in a thermostat bath.

The unit is compact with in-built timer to control duration of penetration preset in factory to 5 seconds. The instrument is provided leveling screws.

Each penetrometer is supplied with a plunger weighing 47.5 g for testing bituminous product, one 50g weight, and one 100g weight. It also includes the cone and Penetration Unit.

Applicable Standards

ASTM D 5, ASTM D 1321, ASTM D 2884, ASTM D 1403, BS 1377, BS 2000- (Part 49), BS 4691, BS 4698, ASTM D 937, ASTM D 217, EN 1426, 13179-2, AASHTO T49, IP49

Ordering Information

TO-512 Universal Penertrometer

Model No + Electric Requirements Suffix
Example: TO-512-1-02
Where Suffix:
-01 - 110 VAC, 60 Hz, 1 ph
-02 - 220 VAC, 60 Hz, 1 ph
-03 - 220 VAC, 50 Hz, 1 ph

Penetration Cone

System Description

This cone is used for empirical estimation of the consistency of lubricating grease and petroleum. It is made of brass with a hardened steel tip. The stem of the cone is interchangeable with all types of Tinius Olsen Penetrometers manufactured to close tolerances, providing a unified cone and ensuring that there is no shoulder between the tip and the body.

Weight : 102.5 + 0.05 g

Applicable Standards

BS 1377, 1924.3, EN DDENV 1997-2

Ordering Information

TO-515 Penetration Cone

Bitumen Penetration Kit

Our Bitumen Penetration Kit consists of a Penetration Needle, transfer Dish and Aluminium Sample Containers.

Applicable Standards

ASTM D 5, BS 2000 (D-49), EN 1426, 13179-2, AASHTO T49, IP49

Ordering Information

TO-518 Bitumen Penetration Kit

Optional Accessories

TO-51801 Penetration Needle
TO-51802 Transfer Dish made of copper
TO-51803 Aluminium Sample Containers

STABILITY TESTING

Marshall Stability Test Machine

Key Features

- Single Speed, Bench top load frame
- Max. loading capacity of 50 KN
- Geared Screw jack and Motor Drive,
- Precise speed
- Limit Switch Protection for both upward and downward movement

System Description

Marshall Stability Test Equipment is used to test the stability of bituminous samples, by highway departments, contractors, engineers, testing laboratories, and other governmental agencies. It is used for measurement of resistance to plastic flow of cylindrical specimens of Bituminous paving mixture loaded on the lateral surface. The machine can provide measurement data for use with hot mixture containing asphalt or tar and aggregate up to 25.4 mm maximum size.

Equipment comprises a bench top loading frame with a screw driven adjustable crosshead.

The Marshall Stability Test Machines are

available in two models: digital, using a loadcell to measure force and an LVDT to measure displacement; and a non-digital version that uses a proving ring to measure force and a micrometer to measure displacement.

Specifications

Maxi Vertical Clearance	470 mm
Mini Vertical Clearance	250 mm
Horizontal Clearance	265 mm
Platen Diameter	133 mm
Platen Travel	25 mm
Platen Speed	50.8 mm/min
Rated Power	375 W
Dimension (l x w x h)	550 x 400x 870 mm

Weight 60kg

Applicable Standards

ASTM D1559 BS 598-107, EN 12697-34, AASHTO T-245

Ordering Information

TO-550 Marshall Stability Apparatus, two speed machine including machine mounted 25kN proving ring and micrometer.
TO-550-2 Digital Marshall Apparatus, including 25kN loadcell and LVDT displacement transducer.

Model No + Electric Requirements Suffix
Example: TO-518-2-01
Where Suffix:
-01 - 110 VAC, 60 Hz, 1 ph
-02 - 220 VAC, 60 Hz, 1 ph
-03 - 220 VAC, 50 Hz, 1 ph

Optional Accessories

TO-55001 Breaking Head Stability Mould
TO-55002 Compaction Mould
TO-55003 Base Plate
TO-55004 Extension Collar
TO-55020 Electric Conversion Kit for Marshall Test Equipment

CORE DRILLING

Pavement Core Drilling Machine

System Description

This petrol engine powered road building drill has been designed specifically for the purpose of drilling test cores from holes in roads, airport runways, bridges, etc.

The Machine comprises of two vertical support columns which carry the drill head/engine assembly accurately with the help of a screwed spindle.

The 6 HP petrol engine with pulley mechanism works with minimum vibrations. The double precision bit advances with a screwed spindle which provides a constant, accurate drill pressure, minimum core chipping, and long bit life.

The complete assembly is supplied on a rigid metal base with leveling facility, and is suitable for coring applications in a vertical downwards motion only.

Specifications

Bit Diameter	150 mm
Length	350 mm
Maximum depth of core	450 mm
Drill Speed	Variable speed from 900 to 200 rpm
Drive Motor	6 HP Petrol Engine
Guide Shafts	40 mm diameter
Screwed Spindle	20 mm diameter
Water Tap	12 mm
Drill Wrenches	Included

Applicable Standards

EN 12504-1

Ordering Information

TO-551-1 Pavement Core Drilling Machine

Accessories

Diamond Core Bits

TO-55101 50 mm diam. x 200 mm long
TO-55102 50 mm diam. x 450 mm long
TO-55103 75 mm diam. x 200 mm long
TO-55104 75 mm diam. x 450 mm long
TO-55105 100 mm diam. x 200 mm long
TO-55106 100 mm diam. x 450 mm long
TO-55107 150 mm diam. x 200 mm long
TO-55108 150 mm dia. x 450 mm long

Hilti bits are also available on request.

COMPACTION

Automatic Compactor for Bituminous Mixes - Light Compaction

Key Features

- Rugged construction to withstand hard work.
- Fully automatic and easy to operate.
- Uniform compaction.
- Automatic Blow Counter.

System Description

The Automatic compactor eliminates the laborious process of manual compaction and results in consistent laboratory specimens.

This equipment consist's of a drive mechanism that lifts the weight of 4.5 kg and drops it through a height of 457 mm. It has a rammer foot that is removable, which facilitates preheating. A compaction pedestal with specimen holder is fixed to the base. An automatic blow counter enables the number of blows to be preset before each test and automatically stops the machine on completion.

Applicable Standards
BS 598-107, EN 12697-10, -30, AASHTO T245

Ordering Information
TO-553 - 1 Automatic Compactor with light compaction
Model No + Electric Requirements Suffix
Example: TO-553-1-02
Where Suffix:
-01 - 110 VAC, 60 Hz, 1 ph
-02 - 220 VAC, 60 Hz, 1 ph
-03 - 220 VAC, 50 Hz, 1 ph

Each machine is supplied with a TO 55002 Compactor Mould, a TO 55003 Base Plate and TO 55004 Extension Collar.

Bitumen Compactor for Modified Marshall Moulds - Heavy Compaction

Key Features
- Rugged construction to withstand hard work.
- Fully automatic and easy to operate.
- Uniform compaction.
- Automatic Blow Counter.

System Description
The mechanical compactor design is similar to TO 533-1, with two exceptions
- Weight of rammer - 10.2 kg
- Provision for accommodating - 6 inch mould specimen

Other features are same as TO 553-1. It is supplied complete with 6 inch mould assembly.

Applicable Standards
ASTM D 5581:1996, D 6926

Ordering Information
TO-553 - 2 Automatic Compactor with heavy compaction

Model No + Electric Requirements Suffix
Example: TO-553-2-03
Where Suffix:
-01 - 110 VAC, 60 Hz, 1 ph
-02 - 220 VAC, 60 Hz, 1 ph
-03 - 220 VAC, 50 Hz, 1 ph

Softening Point - Ring & Ball Equipment

System Description
This equipment is used to determine the temperature at which a sample of bituminous material loaded by a 9.5 mm diameter steel ball, drops a specified distance when heated under specified conditions.

The Ring and Ball Apparatus has a magnetic stirrer with heating facility and digital display of temperature, the heating can be adjusted.
Suitable for operation on 220 V, 50 Hz/110 V, 60 Hz, single phase, AC supply. Each unit comes with a bath of heat resistant glass, Tapered Rings, Ball Centering Guide, Steel Balls, Ring Holder, a hot plates, and Thermometers.

Applicable Standards
ASTM D 36, E 28, STPTC PT 3, AASHTO T53, BS:2000, EN 1427

Ordering Information
TO-561-1-01 110 VAC, 60 Hz, 1 ph
TO-561-1-03 220 VAC, 60 Hz, 1 ph

Essential Accessories
TO-56101 Tapered Rings (set of 2)
TO-56102 Ball Centering Guide (set of 2)
TO-56103 Steel Balls of 9.5 mm diameter (set of 2)
TO-56104 Ring holder (1)
TO-56105 Electric Heater (Hot Plate) (1)
TO-56110 Thermometer IP 60C, Range: –2°C to 80°C
TO-56111 Thermometer IP 61C, Range: 30°C to 200°C

EXTRACTION

Centrifuge Extractor

System Description
This equipment is used to determine the bitumen percentage in Bituminous paving mixtures. It has a removable, precision machined, aluminium rotor bowl, mounted on a vertical shaft. A filter paper disc is pressed in-between the rotor bowl and cover plate by tightening a knurled nut. The bowl assembly is enclosed in a housing mounted on a cast body. In the electrical operating model, the rotor bowl is coupled to a motor. The solvent may be introduced during test through a cup on the housing cover.

This equipment is electrically operated with an in-built dimmerstat for speed variation from 0 rpm to 3600 rpm. Each unit is supplied with a set of 25 filter paper discs.

Applicable Standards
ASTM D 2172, AASHTO T-58, T-164, EN 12697-1

Ordering Information
TO-563-1 Centrifuge Extractor for a load of 1.5kg
TO-563-2 Centrifuge Extractor for a load of 3kg

Model No + Electric Requirements Suffix
Example: TO-563-2-01
Where Suffix:
-01 - 110 VAC, 60 Hz, 1 ph
-02 - 220 VAC, 60 Hz, 1 ph
-03 - 220 VAC, 50 Hz, 1 ph

Optional Extra
TO-56301 Filter Paper Disc (set of 25)

DUCTILITY

ASTM D 113, AASHTO T51

Bituminous surfaces exposed to varying temperature conditions undergo a great deal of expansion and contraction. An important characteristic of the binder is its ductility and the degree of ductility has an effect on the cracking of bituminous surfaces caused by traffic stress.

The ductility of bitumen is expressed as the distance in centimeters to which a standard briquette can be elongated before the thread thus formed breaks under specified conditions.

A molten bitumen sample is poured into a standard mould, allowed to cool to room temperature and then placed in a water bath so that the briquette can be brought to test temperature before mounting in the testing machine.

Ductility Testing Machine,

Electrically Operated, Digital

System Description

Designed to test three specimens simultaneously. The machine consists of a carriage moving over a lead screw. An electric motor driven reduction gear unit ensures smooth constant speed and continuous operation. The entire assembly is mounted with water bath completely encased in metal bound hardwood. It is equipped with an electric pump circulator and heater. The temperature is controlled by digital temperature controller. Two rates of travel i.e. 5 cm/minimum and 1cm/minimum are provided. The machine is supplied complete with 4 Ductility moulds, each with a base plate.

Ordering Information

TO-565 Ductility Testing Machine

Model No + Electric Requirements Suffix
Example: TO-563-2-01
Where Suffix:
-01 - 110 VAC, 60 Hz, 1 ph
-02 - 220 VAC, 60 Hz, 1 ph
-03 - 220 VAC, 50 Hz, 1 ph

Essential Accessories

TO-56501 Ductility Mould, with Base Plate

FLEXURE

Benkelman Beam

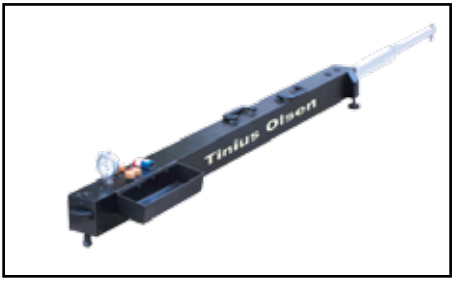
Key Features

- Lightweight aluminium construction.
- Easy to transport.
- Unique Telescopic Design, simplifying field set up.
- Compact, reduced storage space needed.

System Description

The Benkelman Beam uses the technique of using balanced beam in conjunction with a suitable vehicle to measuring road flexure, it is a convenient, accurate device for measuring the deflection of flexible pavements under moving wheel loads.
Operating on a simple lever arm principle, the unit consists of a Reference Beam, Body, two part Probe Beam and Rear

Zero adjust. This equipment is supplied with a wooden carrying case.



Applicable Standards
AASHTO T-256

Ordering Information
TO-566-1 Benkelman Beam with Dial Gauge (TO 072)
TO-566-1D Digital Benkelman Beam with Digital Dial Gauge (TO 072D)
TO-072 Dial Gauge, 25 mm travel and 0.01 mm least count for TO566-1
TO-072D Digital Dial Gauge, 25 mm travel and 0.001 mm least

PENETRATION

Pavement Dynamic Cone Penetrometer

Key Features
- A simple and robust instrument for rapid in-situ measurement of the structural properties of road pavements.
- Provides fast and efficient method of obtaining information.
- For continuous measurements up to a depth of 800 mm and 1200 mm with the extension rod.
- Portable and can be accommodated in a carrying case.

The Pavement Dynamic Cone Penetrometer (DCP) is a very robust instrument, designed for rapid in-situ evaluation of strength of sub- grade and the bases for roads and runway pavements. Continuous measurements can be made down to a depth of 800 mm, or when an extension is fitted, to a depth of 1200 mm. Where pavement layers have different strengths, the

boundaries can be identified and the thickness of the layers determined.

A typical test takes only a few minutes, so this instrument provides a very efficient method of obtaining information which would normally require test-pits. Correlations have been established

between measurements with DCP and California Bearing Ratio (CBR) so that the results can be interpreted and compared with CBR specifications for pavement design. Agreement is generally good over most of the range but differences are apparent at low values of CBR, especially for fine grained materials.

The design of the pavement DCPis similar to the one described by Kleyn, Maree and Savage (1982) in their paper. “The application of the pavement DCP to determine the bearing properties and performance of road pavements” published in proceedings of International Symposium on Bearing Capacity of Roads and Airfields, Vol.1. (The Norwegian Institute of Technology) and developed by TRRL, UK.

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

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

This equipment is supplied with Top Bottom Rod, Handle, Hammer, Scale, Cone and Anvil with a wooden carrying case.

Ordering Information

TO-567 Pavement Dynamic Cone Penetrometer

Essential Accessories

TO-56701 Top & Bottom Rod
TO-56702 Handle
TO-56703 Hammer
TO-56704 1m Scale
TO-56705 60° Cone
TO-56706 Anvil

MOBILE LABORATORY

At Tinius Olsen we can also offer a complete mobile lab solution to the construction and civil engineering industry. Conceived with the rigorous QC/QA requirements and need to have these on project locations, the mobile laboratory concept is quick and easy to install; these labs are not only configured with Tinius Olsen equipment but they can also accommodate equipment supplied by the End User on site. The novel use of retired shipping containers, rebranded by Tinius Olsen, is cost effective for our customers, supports efficient logistics and is environmentally friendly.

Key Features

- Custom designed in 6 m (20 ft) or 12 m (40 ft) containers.
- Thermal insulation for all 4 sides and roof.
- Internal walls and roof covered with laminated pylon wooden frame with split air conditioning system.
- Working space equipped with lab work table, wooden shelving, steel sinks, and drain points.
- Standard door frame with aluminium door and fire exit.
- Concealed electrical wiring and outlets with single and three phase power.
- Optional facility to provide generator, based on load requirements.

Ordering Information

Consult Tinius Olsen sales team for site specific order information

SOFTWARE

Tinius Olsen is proud to introduce you to the next evolution of testing software with our Horizon package. As part of our development process, we have taken the best features of our existing software offerings, including Test Navigator, QMat, EP600 and Impact software, added a host of report writing and data manipulation capabilities and in the process, we've created a new, unparalleled testing platform that will make easy work of your materials testing programs, whether they're designed for the demanding rigours of R&D or the charting and analysis functions of QC testing.

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 wKnowledge Center (requires Internet access)

One the first features you see within the Horizon software is its use of the most current Windows environments. These familiar formats make it easy to use and learn, especially since the same familiar functionality is maintained throughout the program.

Horizon software can accept data from all manner of testing equipment, including, but not limited to, compression testers, Marshall tester, Speedy testers, Super L, etc. , and can take manual data entry from equipment such as the slump cone test, Vicat penetration test, Blaine apparatus, sieve grading results, consistometer etc. 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 take all these results and produce a consolidated testing report complete with your, and/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 and has future enhancements readily available as your testing needs change and grow. talk to your sales engineer to see how Horizon software can best suit your needs and wants.

CALIBRATION AND SERVICE SUPPORT

Quality is our business. We understand that the quality of your product depends not only on the testing equipment that you purchase, but also on the quality and commitment of the support that stands behind that equipment.

Tinius Olsen has been manufacturing, calibrating and servicing physical testing equipment of the highest quality for decades. We have established an enviable record of reliability, by building highquality machines, encouraging customer programs of proper preventativemaintenance and a trained field staff that are committed to maximizing equipment performance and longevity.

Our calibration equipment and software has been developed for the exclusive use of our calibration and service personnel, and it demonstrates our continuing commitment to your quality assurance and support needs. The software ensures our customers of our strict compliance with the requirements of the applicable ISO and ASTM standards. Our quality program has also been recognized and approved by companies in the aerospace, nuclear, steel, and other quality critical industries.

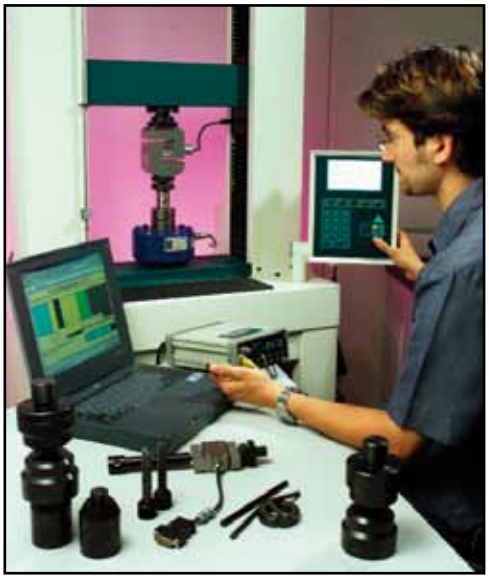
Tinius Olsen's calibration service is accredited in accordance with the International Standard ISO/IEC 17025:2005 by A2LA (American Association for Laboratory Accreditation) for our United States location and UKAS (United Kingdom Accreditation Service) for our Surrey, UK location for a variety of calibration standards.

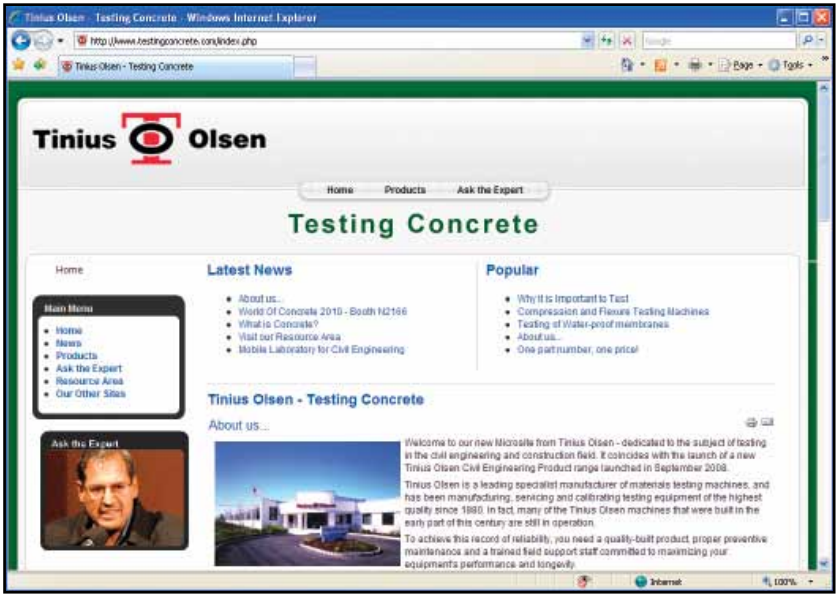
A2LA and UKAS are signatories to the ILAC (International Laboratory

Accreditation Cooperation) Mutual Recognition Arrangement, whose aim is to develop international cooperation for facilitating trade by promoting the acceptance of accredited tests and calibration results from accredited laboratories by industry, as well as government, including results from laboratories in other countries. For a complete listing of our Accreditation Scopes, please check our website at www.TiniusOlsen.com for more details.

We are also able to calibrate a variety of other manufacturers' tensile and compression equipment, as well as their extensometry and other instrumentation. This truly translates into one source for all your certification needs. Please check with your local representative for calibration and service capabilities.

In addition to equipment calibration and service capabilities, Tinius Olsen can help you with your application questions. As one of the founding companies of the materials testing industry in the 19th century, we have a wealth of application experience and expertise. This knowledge base is available to everyone through our application based websites where users can ask questions of our experts regarding their unique testing issues. Check the address below to see the kinds of questions and answers.





OTHER SYSTEMS FROM TINIUS OLSEN

Tinius Olsen also manufactures other types of physical testing equipment that can be used by governmental or commercial civil engineering test labs an universities. Examples of these lines of equipment include, but are not limited to, benchtop materials testing machines, laser or video extensometers, high force electromechanical testers, impact testers, and drop dart testers,

Benchtop Materials Testing Machines

Tinius Olsen manufactures two key lines of benchtop testers, namely the S series and the T series. These machines are available in a variety of frame capacities, namely 1 kN (200 lbf), 5 kN (1,100 lbf), 10 kN (2,200 lbf), 25 kN (5,500 lbf), 50 kN (11,000 lbf) and 75 kN (16,500 lbf). The primary difference between the S series and T series is the display options; the T series is strictly controlled by a PC and software, whereas the S series has a built in display which allows quick simple tests to be performed, in addition to being able to be controlled from a PC and software.

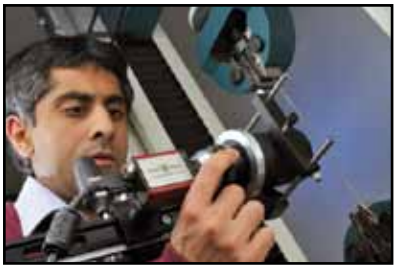
These machines are ideally suited for the testing of geotextiles, waterproof membranes, sealants, tiles, insulation material and other kinds of plastic materials.

High Force Electromechanical Testers

Tinius Olsen has several options available in this category of tester, namely the LoCap series, the U series or the Electomatic series. These machines each their own unique place in the market and are perfectly suited to a wide variety of applications and budgets.

Extensometry

For those demanding applications where long travel or elevated temperature



testing is being being used, Tinius Olsen has a couple of solutions to offer. The first one is a laser extensometer and the other is a video extensometer; both are non-contact methods and suited to a wide range of temperature limits and can still maintain extremely high accuracy.

Impact Testing

Tinius Olsen can offer pendulum impact testers capable of performing eith Charpy or Izod impact tests at a variety of capacities, namely 2J, 25J, 50J, 406J or 542J; ideal for testing plastic or metallic specimens.

The higher capacity pendulum impact testers can be motorized to allow safer and quicker testing.

Drop Dart Testers

Ideally suited for the rapid testing of plastic sheet or geotextile materials. The systems work on a simple concept where a the height at which a defined falling weight penetrates the clamped specimen.

These systems represent just a part of the product offerings from Tinius Olsen. Be sure to check with your local representative about all the appropriate products from Tinius Olsen for your applcations.

Contact your local representative

Tinius Olsen

Corporate Headquaters
1065 Easton Road,
Horsham,
PA 19044 USA
Tel +1 (215) 675-7100
Fax +1 (215) 441-0899

www.TiniusOlsen.com
www.TestingConcrete.com

info@TiniusOlsen.com

Tinius Olsen Ltd.
6 Perrywood Business Park,
Honeycrock Lane,
Salfords, Redhill,
Surrey, RH1 5DZ, England
Tel +44 1737 765001
Fax +44 1737 764768

Tinius Olsen India Private Ltd
J3 SDF, NSEZ,
Noida Phase 2,
U.P. 201305, India