

Triaxial Testing Apparatus

BS 1377-7,8 1924-2, ASTM D2850 D4767
AASHTO T296 T297



DESCRIPTION:

In a Triaxial Shear test, stress is applied to a sample of the material being tested in a way, which results in stresses along one axis being different from the stresses in perpendicular directions.

This is typically achieved by placing the sample between two parallel platens, which apply stress in one (usually vertical) direction and applying fluid pressure to the specimen to apply stress in the perpendicular directions.

This is done by our testing apparatus which allows the application of different levels of stress in each of three orthogonal directions X, Y, Z-Axis are discussed below, under "True Triaxial test").

The application of different compressive stresses in the test apparatus causes shear stress to develop in the sample; the loads can be increased and deflections monitored until failure of the sample.

From the Triaxial Test data, it is possible to extract fundamental material parameters about the sample, including its angle of shearing resistance, apparent cohesion, and dilatancy angle.

These parameters are then used in computer models to predict how the material will behave in a larger-scale engineering application. An example would be to predict the stability of the soil on a slope, whether the slope will collapse or whether the soil will support the shear stresses of the slope and remain in place.

TECHNICAL SPECIFICATIONS:

Product Code	Dimension	Description	Weight	Power
SL 0875	550x650x1100 mm	Triaxial Universal Electromechanic Test Machine	95 kg	750 W

Product Code	Description
SL 0876	Multispeed Electromechanic Test Machine Frame only, 50 kN capacity, used for making uniaxial, CBR and Marshall tests. Two testing speed can be set. Digital display data acquisition and controls system, Supplied complete with a 50 kN load cell and a 25mm x 0.001mm linear potentiometric displacement transducer. 220-240V, 50-60Hz, 1ph

There are several variations of the Triaxial test:

Consolidated Drained (CD)

In a ‘consolidated drained’ test the sample is consolidated and sheared in compression slowly to allow pore pressures built up by the shearing to dissipate. The rate of axial deformation is kept constant, i.e., the strain is controlled. The idea is that the test allows the sample and the pore pressures to fully consolidate (i.e., adjust) to the surrounding stresses. The test may take a long time to allow the sample to adjust, in particular, low permeability samples need a long time to drain and adjust strain to stress levels.

Consolidated Undrained (CU)

In a ‘consolidated undrained’ test the sample is not allowed to drain. The shear characteristics are measured under undrained conditions and the sample is assumed to be fully saturated. Measuring the pore pressures in the sample (sometimes called Cupp) allows approximating the consolidated-drained strength. Shear speed is often calculated based on the rate of consolidation under a specific confining pressure (whilst saturated). Confining pressures can vary anywhere from 1 psi to 100 psi or greater, sometimes requiring special load cells capable of handling higher pressures.



TECHNICAL SPECIFICATIONS:

Product code	Description
SL 0877	Software to Perform CU-CD Triaxial Tests
SL 0877-1	Software to Perform UU Triaxial Tests

Unconsolidated Undrained (UU)

In an ‘unconsolidated undrained’ test the loads are applied quickly, and the sample is not allowed to consolidate during the test. The sample is compressed at a constant rate (strain-controlled).

Our Triaxial Test System provides automated triaxial compression tests on cylindrical undisturbed and remoulded soil samples. Unconsolidated undrained (UU), consolidated drained (CD) and consolidated undrained (CU) compression tests can be automatically run, controlled and reported using this apparatus.

The Triaxial Testing Apparatus consists of a 50 KN capacity Load Frame, Platen adaptors, dial gauge or digital transducer assembly, Triaxial Cell, Base and pressure system.

The Triaxial Testing Apparatus provides variable speed from 0.399999”(9.99999 mm) per minute to as low as 0.000001” (0.00001 mm) per minute.

An electronic control system with touch-sensitive keypad for precise setting, control and viewing of all load frame functions.

The Data Acquisition and Controls System (DA/CS) for automated data acquisition and recording of test parameters supplied with a complete set of Electronic Measurement, Transducers for load, displacement, pressure and volume change.

The Triaxial Software for recording, analysis and report generation, master control panel and de-aired water tank system for precise applications of confining, back and saturation pressures.

Oil and Water Constant Pressure System

The Oil and Water Constant Pressure Unit is extremely versatile and can be used in conjunction with a wide range of test equipment. The unit provides continuous variable pressure up to 1700kPa. The pressure is increased or decreased simply by turning a control knob.

The Unit is used for providing cell/backpressure in triaxial tests. The apparatus is supplied without a gauge for those customers who have suitable pressure monitoring equipment.

As optional equipment for monitoring the pressure:

- The Digital Pressure Gauge
- The pressure transducer

The machine features a clear hydraulic/water interface reservoir and up to 1-litre capacity of water is available under pressure.

Supplied complete with 2 litres of No.46 regular hydraulic oil.



TECHNICAL SPECIFICATIONS:

Product Code	Dimension	Description	Weight
SL 0878	300x250x250 mm	Oil and Water Constant Pressure Unit	7.5 kg
SL 0879	150x150x100 mm	Digital Vacuum and Pressure Gauge	0.6 kg

Automatic Volume Change Unit

The Unit consists of a piston connected to a 25 mm travel linear transducer which is sealed against a precision machined calibration chamber so that the linear movement of the piston is exactly proportional to the volume of water in the calibration chamber.

The apparatus creates an electrical signal proportional to the volume of water flowing through the unit. By connecting it to the data acquisition system the measured volume change will be used by software during the test and in the final report.

Capacity : 100 cm³

Transducer Input : up to 12 V DC

Accuracy : ± 0.1 ml

TECHNICAL SPECIFICATIONS:

Description	Automatic Volume Change Unit
Product code	SL 0880
Dimensions	260x260x400 mm
Weight	5 kg



Pressure Transducer and Block for Triaxial Test Cells

The Pressure Transducer is used for the measurement of cell or back or pore pressure of water in triaxial test systems and also should be used with a Control Unit or a data logger

The Block for triaxial test cells is used for connection of the pressure transducers and de-airing in the water hoses.



TECHNICAL SPECIFICATIONS:

Product Code	Description
SL 0881	Pressure Transducer, 2000 kPa
SL 0882	Block with One Connection Line for Triaxial Test
SL 0883	Block with Three Connection Line for Triaxial Test

De-Airing Water Systems

The De-Airing Water Apparatus is compact and self-contained equipment which can de-air water quickly and efficiently down to levels of dissolved oxygen acceptable for geotechnical test methods. The apparatus used in conjunction with the de-airing tank. Air is removed from the water by a vacuum system. The de-airing tank should be ordered separately.

The first option for de-airing water;

- De-Airing Water Apparatus
- De-Airing Water Tank
- Vacuum Control and Water Connection Panel with Regulator and Vacuum Gage Manometer or Connection Panel for Vacuum and Water with Vacuum Gage (These panels are optional)
- Plastic Hose



The second option for de-airing water:

- Vacuum Pump
- Filter Flask or Air Drying Unit / Water Trap
- De-Airing Water Tank
- Vacuum Control and Water Connection Panel with Regulator and Vacuum Gage Manometer or Connection Panel for Vacuum and Water with Vacuum Gage (These panels are optional)
- Plastic Hose



By using Vacuum Control and Water Connection Panel, vacuum pressure degree can be regulated.

By using de-airing water equipment can be used without repeated assembling the hoses.

TECHNICAL SPECIFICATIONS:

Product code	Description	Dimensions	Weight (approx.)
SL 0884	De-Airing Water Apparatus	465x240x340 mm	15 kg
SL 0885	Vacuum Control and Water Connection Panel with Regulator and Vacuum Gage Manometer	450x150x500 mm	7 kg
SL 0886	De-Airing Water Tank, 7 L.	250x250x250 mm	2.7 kg
SL 0887	Vacuum Pump 51 L/min. Capacity	300x150x240 mm	8.5 kg
SL 0888	Air Drying Unit / Water Trap, Vacuum Type	70x80x170 mm	0.5 kg

Product Code	Description	UU	UU-CU-CD
SL 0875	Triaxial Universal Electromechanic Test Machine	1	1
SL 0891	Load Cell 5 kN	1	1
SL 0889	Triaxial cell for 38 mm and 50 mm samples	1	1
SL 0890	Triaxial cell for 70 mm and 100 mm samples	1	1
SL 0882	Block with one connection line for triaxial test cells	1	-
SL 0883	Block with 3 connection lines for triaxial test cells	-	1
SL 0881	Pressure transducer	1	3
SL 0878	Oil and water constant pressure system	1	2
SL 0880	Automatic volume change unit	-	1
SL 0892	Static unilogger 4 channels	-	1
SL 0877	Software to perform UU triaxial tests	1	1
SL 0876	Software to perform CU-CD triaxial tests	-	1
SL 0886	De-Airing water tank, 7L. and hose	1	1

TECHNICAL SPECIFICATIONS:

Triaxial Cells

The cell has been designed and treated to minimize corrosion. Particular attention has been paid to the quality of finish between the piston and the head. Final assembly includes the fitting of an O-ring seal and the use of a special lubricant to reduce friction to a minimum and eliminate water leakage. The piston load capacity is designed to accept high axial loads which may be present during the final stages of a test.

Each cell has five take-off positions drilled in the base for top drainage/back pressure, pore water pressure and bottom drainage. Three no volume change valves and anvil for displacement transducer are supplied complete with the cell.

Each cell will accept a range of base adaptors and various accessories for testing a wide range of specimens.



For cell accessories and sample preparation accessories see next page.

The cell capacity is designed to tolerate confining pressures as high as 1700 kPa which is enough for simulating most in-situ conditions.

TECHNICAL SPECIFICATIONS:

Product Code	Dimension	Description	Weight
SL 0889	160x160x400 mm	Triaxial cell for 38 mm and 50 mm samples	4.5 kg
SL 0890	210x210x550 mm	Triaxial cell for 70 mm and 100 mm samples	12 kg

Sample Preparation Accessories

Sample Diameter	38 mm	50 mm	70 mm	100 mm
Split Sand Former	SL 0893	SL 0894	SL 0895	SL 0896
Split Mould	SL 0897	SL 0898	SL 0899	SL 0900
Cutter	SL 0901	SL 0902	SL 0903	SL 0904
Aluminium Dolly	SL 0905	SL 0906	SL 0907	SL 0908

For cell accessories see next page.

Cell Accessories

Sample Diameter(mm)	38	50	70	100	UUtest	CU CD test
Base Adaptor	SL 0909	SL 0910	SL 0911	SL 0912	YES	YES
Porous Top Cap	SL 0913	SL 0914	SL 0915	SL 0916	YES	YES
Nylon Tubing for Drainage	SL 0917	SL 0918	SL 0919	SL 0920	-	YES
Pair of Porous Discs	SL 0921	SL 0922	SL 0923	SL 0924	-	YES
Rubber Membrane	SL 0925	SL 0926	SL 0927	SL 0928	YES	YES
Membrane Placing Tool (Strecher)	SL 0929	SL 0930	SL 0931	SL 0932	YES	YES
O Ring (10pcs.)	SL 0933	SL 0934	SL 0935	SL 0936	YES	YES
O Ring Placing Tool	SL 0937	SL 0938	SL 0939	SL 0940	YES	YES
Filter Drain Paper (50 pcs.)	SL 0941	SL 0942	SL 0943	SL 0944	-	YES
Filter Paper Discs (100 pcs.)	SL 0945	SL 0946	SL 0947	SL 0948	-	YES
Plastic Discs (2 pcs.)	SL 0949	SL 0950	SL 0951	SL 0952	YES	-

Soil Lathe / Trimmer and Extruder

BS1377-7, BS1377-8

DESCRIPTION:

The Soil Lathe, Trimmer and Extruder is used to extrude and trim soil samples from 35 mm to 100 mm diameter to reduce samples.

Wire Saw, Trimming Knife, Porcelain Mortar with Pestle. The Rubber Headed Pestle can be ordered separately.

TECHNICAL SPECIFICATIONS:

Specimen Lathe	35x70 mm to 100x200 mm
Specimen Trimming and Extrusion	35x70 mm to 50x100 mm
Vertical Daylight	260 mm

Dimensions	220x300x450 mm
Weight	15 kg



ORDERING:

SL 0953
Soil Lathe / Trimmer and Extruder

ACCESSORIES:

- SL 0953-1**
Wire Saw
- SL 0953-2**
Trimming Knife
- SL 0953-3**
Porcelain Mortar with Pestle 130 mm dia
- SL 0953-4**
Rubber Headed Pestle

Microspear, Moisture and Temperature

BS1377-7, BS1377-8

DESCRIPTION:

The instrument measures moisture and temperature of minerals and building materials at depths up to six feet (nearly 2 meters) – simply by insertion. The digital readings are shown instantly. It has a built-in computer which gives it the flexibility to handle a wide range of materials and water contents.

This instrument will give you quick results and an alternative for sampling and testing using balances or ovens.

Any environment where minerals or building materials are being shipped, stored or processed.

ORDERING:

- SL 0954**
Microspear, 1 meter long
- SL 0955**
Microspear, 2 meter long



TECHNICAL SPECIFICATIONS:

Measurement Response	2 seconds
Moisture Range	0-25%
Moisture Resolution	±0.1%
Moisture Accuracy	±0.5% of reading
Temperature Range	-20°C to 60°C
Temperature Resolution	0.1°C
Temperature Accuracy	<0.5°C
Weight	1500g
Material Selections	6 (user configurable)
Power Requirements	4 x 1.5v AA alkaline cells (or equivalent)
Shaft Colour Options	Grey / Orange / Yellow / Blue