Direct Shear

## Automatic Direct / Residual Shear Test Machine

UTS-2060

The test covers the determination of consolidated drained shear strength of a soil or sand material in direct shear. The Automatic Direct / Residual Shear Test Machine is supplied complete with load hanger, carriage assembly and an integral 9:1, 10:1 and 11:1 lever loading device. The apparatus is also motorized and floor mounted. The beam loading device, which is used to strengthen the vertical load on the shear box assembly, can hold up to 50 kg of weight. The total load on the specimen can reach up to 5 kN.

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

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

The required Shear Box Assembly, Slotted Weight Set and other optional accessories including specimen's cutter and extrusion dolly should be ordered separately.

Both the maximum and resilient shear stress can be calculated by the Software. After three runs, the software is able to use the best straight line to calculate the cohesion value "c" and the shear resistance angle "φ".
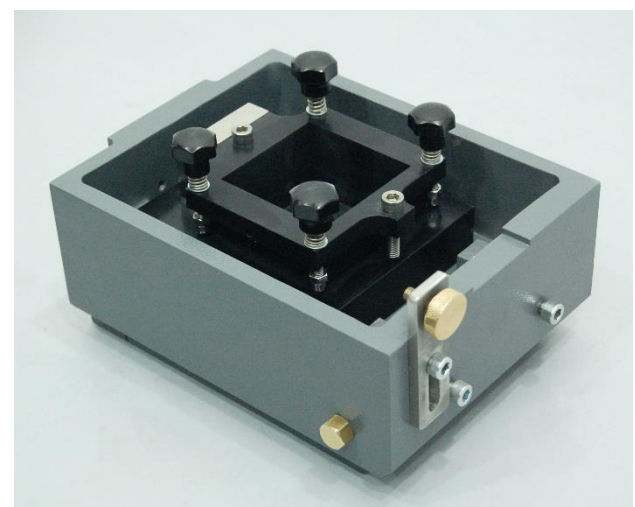
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Main Features

Consolidation

- 25 pairs of time-vertical displacement values are written to memory.
- The memory is configured as saving a maximum of 1000 tests.
- The vertical displacement value can be tared prior to recording.
- The analogical channel reading vertical displacement has 260000 points effective resolution.
- The memory can be exported to PC software.
- **Shear**
- User can select 3 different test types
- Can make tests with displacement and load control
- The screen continuously shows load, shear stress and horizontal displacement
- CPU card with 32-bit ARM RISC architecture
- Permanent storage capacity up to 10000 test results
- 3 analogue channels for load cell, vertical displacement and horizontal displacement transducer (one for each)
- 1/256000 points resolution per channel
- 10 data per second sample rate for each channel
- Ethernet connecting for computer interface
- 800x480 resolution 65535 colour TFT-LCD industrial touchscreen
- 4 main function keys
- Multi-language support
- 3 different unit system selection; kN, Ton and lb
- Real-time clock and date
- Test result visualization and memory management interface
- Remote connection through Ethernet
- USB flash disc for importing test results and for firmware
- USB printer support for inkjet and laser printers (ask for compatible models)
- Camera support for real-time video recording during test (ask for compatible models)
- Free of charge PC software for the test control and advanced report generation

Shear Box Assemblies

A range of shear box assemblies are available as sets or individual components. Dedicated Specimen cutters and extrusion dollies are available for sample preparation.

Test Method

- As per AS1289.6.2.2 section 5, the sample is prepared in the shear box assembly.
- To allow pore pressures to equalise during testing, the rate of shearing must be placed on a low level.
- Shear displacement, vertical displacement and shear force are logged while testing
- For cohesive solids testing is continued until after the peak shear force is reached. For other materials test until ultimate shear strength or the limit of travel of the shear box.
- Testing should be performed on two other samples with different direct loads.
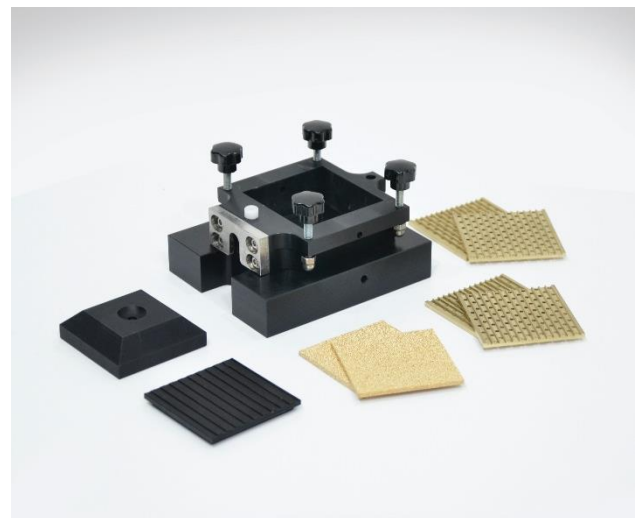
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Data Acquisition & PC Software

The Utest Direct and Residual shear software is developed to standard to use with UTS-2060 Machine. Direct residual and shear software comprises of two sections. The first section is used for the consolidation of the sample prior to shear and the second section is used during shearing.

5 different normal load values are supported by the software, in order to calculate cohesion values. Prior to the test, the normal load value must be entered to the software. The normal stress value will be calculated automatically, as a result of the normal load and sample size.

The software supports both square type and round type samples. For both samples the area may be calculated directly, or by using the net area caused by horizontal displacement. It is important to use the net area method for critical samples on academic literature. Once the test is finished, the max and resilient stress values will be recorded. The normal load versus max stress pair is used for calculating the cohesion value and angle. This property requires at least 3 test samples with different normal loads. The user can set the test speed, axis values etc. via the setup of the software.

The results can be submitted as a report or can be exported to Microsoft Excel for advanced re-analyse procedures.
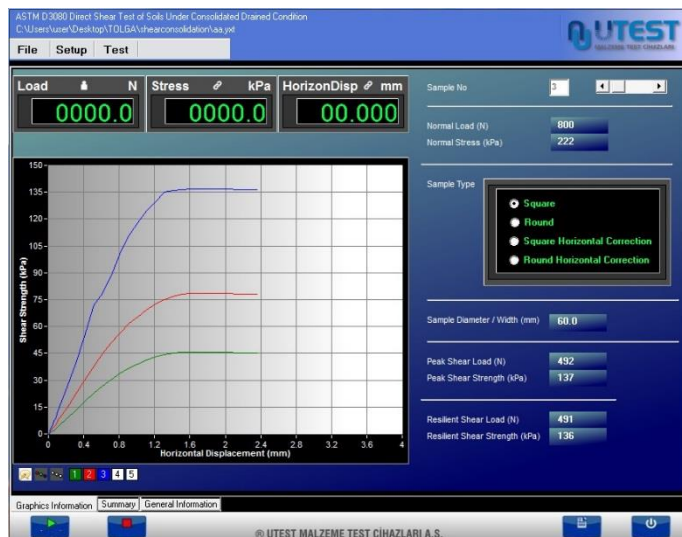
About PCTE

PCTE have over 30 years' experience in the measurement and testing of construction materials. PCTE can provide more than just the equipment, they can provide expert training. PCTE have a service centre in Sydney in which they can provide calibration, repairs and warranty repairs.

Other Equipment

PCTE supply three main ranges: NDT, Lab and Geotech Instrumentation.

NDT includes: Rebound Hammers, Covermeters, Ultrasonics, GPR, Corrosion Testing, Coating Testing and Foundation Testing

Lab includes equipment for: Concrete, Cement, Aggregate, Soil, Asphalt and Metal

Geotech Instrumentation includes: Strain Gauges, Piezometers, Inclinometers, Extensometers, Tiltmeters, Load Cells and Dataloggers

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