Wykeham Farrance | CONTROLS GROUP

SOIL MECHANICS TESTING MADE EASY

RESONANT COLUMN

Combined resonant column and torsional shear device

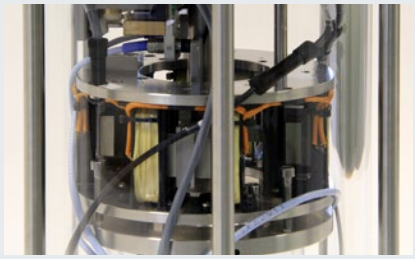
Standards ASTM D4015

RESONANT COLUMN

Double wall cell with stainless steel columns and acrylic transparent cylinder with 170 mm internal diameter and 200 mm external diameter, for cylindrical specimen from 38 to 50 mm diameter.

Highly accurate LVDT axial displacement transducer.

ELECTROMAGNETIC DRIVE SYSTEM with eight coils for dynamic excitation from the top of the specimen. It includes two proximity transducers to monitor the rotation of the top cap assembly.



Internal floating frame for assembling the electrical motor that applies torsional loads.

High-sensitivity volume change device with high-precision LVDT transducer.

Pressure transducers for the measurement of cell, pore and back pressure.

Compact Control Panel connects to the PC and includes all control, power supply and pneumatic devices. This system also includes air actuators (I/P converters) and all necessary amplification equipment.

Technical specifications

Maximum torque: 1.2 Nm

Maximum angular deformation: 10°

Maximum cell and back pressure: 1 MPa.

8 channels signal conditioning unit

USB data acquisition and signal generation board

Two electro-pneumatic converters for cell and back pressure

Excitation frequency: Dynamic (RC) 1-300 Hz;
Cyclic (TS) from 0 to 50 Hz

Dimension: Control Box 51 x 45 x 35 cm (h x w x d); Cell 55 x 27 cm (h x diam.)

Weight: approx. 50 kg

Ordering information

31-WF8500

Combined resonant column/torsional shear device for the automatic determination of damping ratio from half power bandwith and free vibration decay method.*

*Air compressor and accessories are required for a complete system.

Software

The complete system includes a high quality PC supplied with pre-installed intuitive Windows-based software that allows you to perform both Resonant Column and Torsional shear tests. The test stages are as follows:

SATURATION

Ramp of cell pressure/back pressure is applied facilitating the air to dissolve for a complete saturation of the specimen.

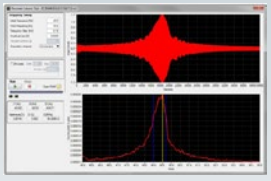
ISOTROPIC CONSOLIDATION

The confining pressure is applied through the cell pressure until the soil is consolidated when pore pressure is dissipated and volume change is negligible.

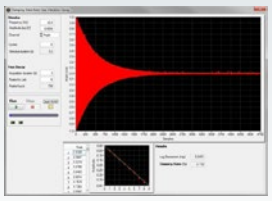
RESONANT FREQUENCY

The soil specimen is restrained at the bottom and dynamically excited at the top. The generated frequency is up to 300 Hz and is increased automatically in "steady-state" mode by steps (RC discrete) or continously (RC chirp), or in "free-decay" mode by only an initial frequency. Since the frequency of the input signal varies, the dynamic response of the specimen results in a varying motion amplitude. The secant shear modulus G is determined by the resonant frequency. The damping ratio D can be evaluated with two methods:

- In the domain of frequency, from the complete frequency response of the soil specimen (half-power bandwidth)
- In the domain of time, from free-vibration decay curve that is generated by shutting off the driving power (logarithmic decrement method).



Resonant frequency stage: "steady-state"



Resonant frequency stage: "free-decay"

RC DISCRETE SWEEP

The technique used is the stimulation of the sample with a signal consisting of a fixed number (20) periods of the sinusoidal signal, for each of the frequency step chosen.

RC CONTINUOUS SWEEP — CHIRP

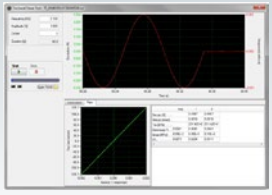
The technique used is the stimulation of the sample with a signal in which the frequency increase linearly with time.

FREE DECAY

The technique used is the stimulation of the sample with a signal of frequency equal to or near the resonant frequency. After a certain period of time the specimen is left free to oscillate and acquires the resulting transition.

TORSIONAL SHEAR

The soil specimen is deformed cyclically at low frequency (maximum 10 Hz), whilst continously monitoring torque and deformation. A constant sinusoidal current is applied while amplitude is increased. The system records the torsional stress and strain values for each amplitude and displays Hysteresis cycle from which secant shear modulus G and damping ratio D are determined.



Cyclic torque application in Torsional shear

TORSIONAL SHEAR

The technique used is the input torsional rotation through a sinusoidal current applied to the coils.

Cyclic Simple Shear

DYNATRIAX EMS TECH

Dynamic Triaxial System

Wykeham Farrance Customer Care

At Wykeham Farrance, we are proud of our products.

As a valued customer of Wykeham Farrance, you will receive continuous, expert support and advice for your instrument. Furthermore, we offer full installation and training in the correct operation of your soil testing equipment.

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