

GEONOR

GEONOR Direct Simple Shear Apparatus



NEW!

The new Geonor Direct Simple Shear Apparatus

FEATURES:

- K_0 conditions during consolidation
- Drained or undrained conditions during shear
- Monotonic or cyclic shear loading
- Motorized operation (easily automated)
- Designed and used by the Norwegian Geotechnical Institute

Soil Testing

GEONOR DIRECT SIMPLE SHEAR APPARATUS

The Direct Simple Shear (DSS) apparatus is designed for testing soil specimens with conditions of simple shear and plane strain throughout the specimen. These conditions are representative for a number of field problems (e.g., horizontal portions of failure planes), and cannot be obtained with other standard laboratory testing methods. The apparatus is designed for drained or undrained (constant volume) shear tests on undisturbed or reconstituted specimens of clay, silt or sand. Deformation-controlled monotonic or load controlled cyclic shear tests can be performed.

The soil specimen is mounted inside a rubber membrane of circular cross section and reinforced by a spiral wire winding. This membrane prevents radial deformation of the specimen, but allows vertical deformations during consolidation (K_0 condition) and shear deformation during simple shear with very little resistance. With this membrane, constant volume conditions during shear are attained by simply keeping the height of the specimen constant. The change in stress (load/area) required to keep the specimen volume constant is equal to the pore pressure measured in an undrained test.

The standard DSS apparatus consists of a direct simple shear device with vertical and horizontal motors, load cells and a control unit for

- consolidation load, constant load or height during shear for the vertical motor

- shear deformation rate and direction for the horizontal motor
- pneumatic control for the cyclic loading cylinder.

THE NEW GEONOR DSS APPARATUS

The original Geonor h-12 DSS apparatus was developed by Landva and Bjerrum in the mid 1960's, and has been used extensively at NGI and by others throughout the world.

The following is a list of some of the features and capabilities which distinguishes the new Geonor DSS apparatus from the previous one:

- **Stiffer frame**
- **Easier to automate operation**
- **Greater load capacity**
- **Easier access to the specimen**
- **All motor driven**
- **Built-in cyclic testing (pneumatic) capability**

The wire reinforced membranes and soil specimen trimming apparatus are still the same as for the h-12 DSS device (optional). As before, piezoelectric bender elements for determining G_{max} of the soil specimen can be supplied (optional).

TECHNICAL SPECIFICATIONS

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| Circular soil specimen area: | 35 cm ² standard / 24, 50 or 104 cm ² (optional) |
| Typical sample height: | 16 mm |
| Maximum vertical load (motor): | 10 kN |
| Maximum horizontal shear load (motor): | 5 kN |
| Maximum horizontal shear load (pneumatic cyclic cylinder): | +/- 3.3 kN at +/- 3.5 bars |
| Range of vertical motor speed: | approx. 0.2 - 60 mm/min |
| Range of horizontal motor speed: | approx. 0.001 - 0.2 mm/min |
| Lower limit cyclic loading period: | approx. 1 sec. |
| Load cell capacities: | as required |

REFERENCES

- Direct simple shear tests on a Norwegian quick clay - L. Bjerrum and A. Landva, 1966, Norwegian Geotechnical Institute, Publication No. 70
- Comparison of truly undrained and constant volume direct simple shear tests - R. Dyvik, T. Berre, S. Lacasse and B. Raadim, 1987, Norwegian Geotechnical Institute, Publication No. 170

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