Options available for GDSHLF

Axial Load Ranges

28kN ✓   100kN ✓

250kN ✓   Custom ✓

Axial frequency range (max)

10Hz ✓

Optional Radial frequency range (max)

10Hz ✓

GDS Hydraulic Axial/Radial Loading Frame (GDSHLF)

What is it?

The GDS Hydraulic Axial/Radial Loading Frame (GDSHLF) can be synchronised with the cell pressure (radial stress) to give an advanced capability of dynamic stress paths. A number of optional advanced transducers can be added to the standard system to give measurement of local axial strains and mid-plane pore pressures.

The GDSHLF dynamic load frame system consists of a dynamic load frame with 28, 100 or 250kN load capacity and either +/- 25 mm or +/- 50 mm stroke capability. The load frame can contain a dynamic cell pressure actuator built into the base. To give the very advanced capability of dynamic stress paths, the axial force/displacement can be synchronised with the cell pressure (radial stress). Also, the system is capable of dynamic tests and quasi-static (low speed/creep) tests.

These outstanding features, coupled with GDSLAB control and data acquisition software, GDS digital pressure controllers, and the GDS data acquisition system, give you unlimited possibilities in conventional and advanced PC-controlled triaxial testing of soil and rock.

Technical specification

- **Load ranges**: 28kN (2.8ton), 100kN (10ton) and 250kN (25ton). Custom ranges available on request
- **Axial force accuracy** = <0.1% of load cell range (i.e. 1N for 10kN load cell)
- **Axial force resolution** = 16 bit (i.e. <0.4N for 10kN load cell, <1.5N for 40kN load cell)
- **Displacement range:** 50 or 100mm
- **Displacement resolution:** <0.001mm or 0.002mm
- **Displacement accuracy:** 0.05% of full range
- **Control data points** = 10,000 pts/sec
- **Maximum saved data points** = 100 pts/cycle
- **Data acquisition =** 4, 8 or 16 channel, 16bit
- **Control modules =** closed-loop control feedback system integrated with each independent actuator control unit (shear and axial).
- **Weight***:* approx. 200 to 2000kg (depending on model)

How does it work?

Axial force and axial deformation are applied through an oil filled hydraulic actuator mounted on the cross beam of the load frame, where the pressure is supplied from a separate hydraulic power unit. The system dynamically controls axial displacement or axial force. The cell is also provided with a built-in hydraulic actuator to dynamically control cell pressure. The cell fluid is hydraulic oil. The radial pressure (cell pressure) actuator is made without seals in order to be maintenance-free and very low friction. Oil is allowed to seep past the actuator piston and is recycled using an oil make-up system.

GDSLAB control and data acquisition software

The user interface for the 10Hz GDSHLF is via GDSLAB control and data acquisition software (see Fig. 1). GDSLAB provides sinusoidal cyclic control of axial displacement or axial force for dynamic cyclic loading tests at frequencies up to 10Hz. It also provides complex cyclic loading control with axial load and radial stress changing simultaneously with a user-defined phase relationship.
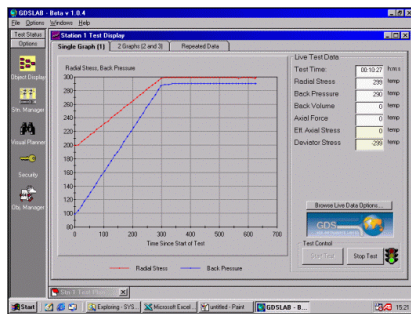

Fig. 1 GDSLAB control and data acquisition software

Hydraulic power unit

Pressure for the system is provided by a separate hydraulic power unit, which provides a constant source of pressure at 25MPa (see Fig. 2). This pressure source is used by the axial and radial actuators to control pressure and displacement. It is also used to raise and lower the top beam (in high pressure only). Noise specifications of power pack, <75 dB(A) at >5m, and <90 dB(A) at >1m.

Fig. 2 GDS 25MPa hydraulic power unit

System features

- Optional: Dynamic control of axial displacement or axial force to 10Hz, sinusoidal waveform
- Optional: Dynamic control of radial stress to 10Hz, sinusoidal waveform. The dynamic control of cell pressure means that for those tests where the cell pressure is constant but the axial actuator is moving dynamically the cell pressure actuator automatically adjusts the volume of oil in the cell to maintain a constant cell pressure
- Performance specification conforming to the requirements of ASTM Designation D3999-91 "Standard Test Methods for the Determination of the Modulus and Damping Properties of Soils Using the Cyclic Triaxial Apparatus"
- Optional interchangeable (internal submersible) load cells to accommodate very soft to very stiff soils with ranges of 2, 4, 8, 16, 25, 32, 64, 100 and 250kN are available. The load frame is supplied with an external load cell to match the model maximum load range as standard (i.e. 20, 40, 60, 100 or 250kN)
- Optional local strain measurement and mid-plane pore pressure measurement
- Optional precise control of low consolidation stresses by differential pressure transducer
- Optional acquisition of Gmax using s-wave and/or p-wave pedestals and top-caps
- Direct (dynamic, 10Hz) closed loop control of axial displacement, axial force and optionally cell pressure
- Quasi static closed loop control of back pressure
- 38,50,70,100 and 150mm diameter test specimen sizes can be catered for by interchangeable base pedestals and triaxial extension top caps. Other test specimen sizes can be accommodated by special order
- 4 or 8 channels of 16bit data acquisition as standard, additional channels available on request

Why buy GDSHLF?

- GDS load frames are extremely stiff and are designed to allow minimum backlash at the point of sample shearing (other, less stiff, load frames do not give good results at this critical point in the test due to the stretch of the load frame under high load)
- Compatible with the well-developed GDSLAB control and data acquisition and reporting software which provides a consistent interface across all of your geotechnical laboratory testing
- GDS worldwide technical support for peace of mind (see testimonials at www.gdsinstruments.com)