

Consolidation Testing System (Rowe & Barden Type) (GDSCTS)



The GDS Consolidation Testing System (GDSCTS) is a state-of-the-art, fully-automated consolidation testing system designed for soil. GDSCTS can run classic tests such as step loading to more advanced tests such as automated testing rate by controlled hydraulic gradient or cyclic loading, all under PC control. In fact, using the flexibility of GDSLAB software, almost any user-defined test may be performed. The GDSCTS has the option of vertical drainage or radial & vertical drainage.

Key Features:

Benefits to the User:

Rowe and Barden type cell:	Direct stress control on specimen via either a flexible porous disc (constant stress) or rigid porous disk (constant strain).
Flexibility in the capacity of the system:	Specimen size, load, pressures can be chosen to ensure the system is created specifically to suit the testing required and the budget.
Advanced testing (ADVCTS):	Remains the leading Rowe & Barden type consolidation system for research testing throughout the world. All elements of the ADVCTS system are biased towards achieving the greatest resolution and accuracy, for the highest quality test achievable in a research environment.
Standard testing (STDCTS):	Provides a low cost alternative with all the features of the ADVCTS system with slightly reduced accuracies by using GDS standard pressure/volume controllers rather than advanced pressure/volume controllers.

Technical Specification:

Pressure Range:	3MPa
Accuracy of pressure measurement:	<0.1% full range (ADVCTS) or <0.15% full range (STDCTS)
Resolution of pressure measurement:	0.1kPa (ADVCTS) or 1kPa (STDCTS)
Accuracy of volume measurement:	<0.1% measured value (ADVCTS) or <0.25% measured value (STDCTS)
Resolution of volume measurement:	0.5mm ³ (ADVCTS) or 1mm ³ (STDCTS)
Sample size:	50, 63.5, 76.2 or 100mm
Transducer resolution:	16bit

Optional Extras:

Permeability	Available
Unsaturated Testing	Available

How does it work?

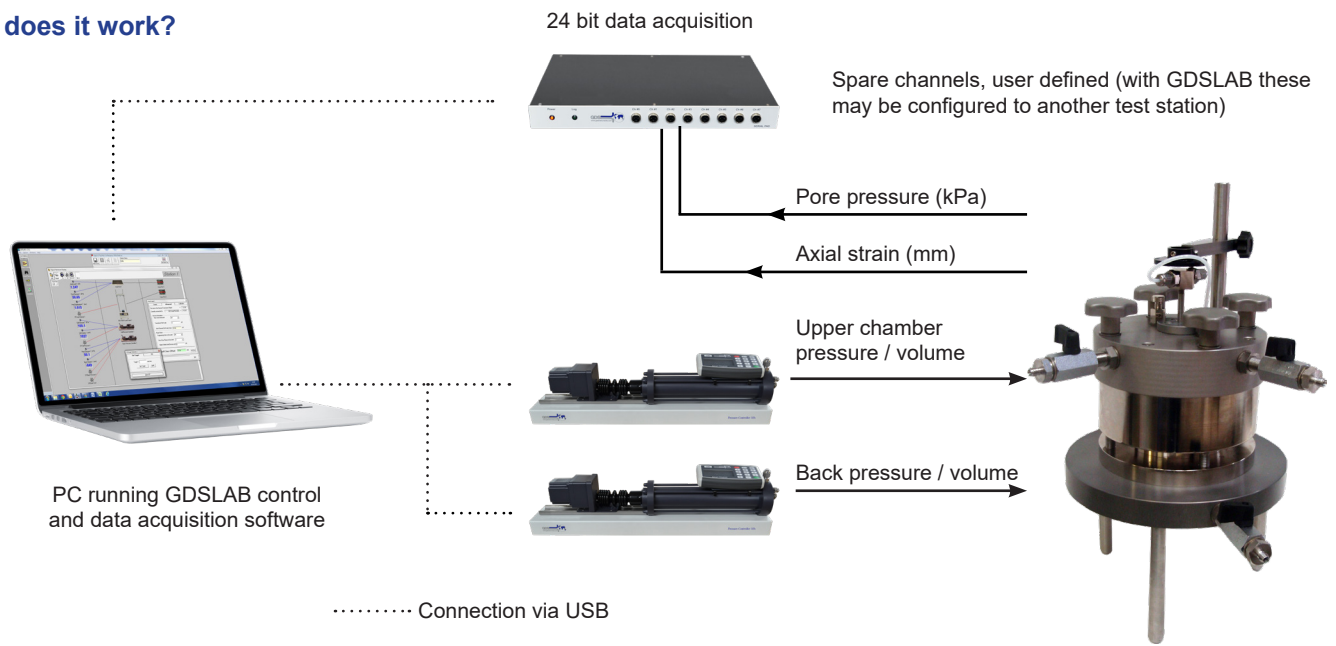


Fig.1 Diagram of the STDCTS hardware elements

The GDS Rowe and Barden Consolidation Cell

The GDS Rowe & Barden consolidation cell can be used with either a rigid porous disk for constant strain (see Fig 2a) or flexible porous disk for constant stress (see Fig. 2b).

The cell is available in a range of sizes for test specimens of 50, 63.5, 76.2, and 100mm diameter. Back pressure is applied to the top drain of the cell so that field hydraulic gradients can be modeled. The bottom drain is provided with a tapping for a pressure transducer. The cell incorporates the novel Bishop and Skinner floating ring which allows the top bag to move with the specimen vertically. The main advantage of this method is that it allows measurement of the upper chamber volume change to be used as a calculation of axial strain.

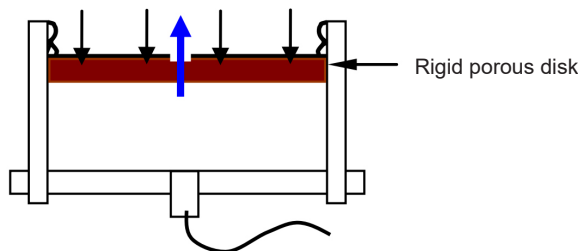


Fig. 2a GDS Rowe and Barden cell showing rigid porous disk for constant axial strain.

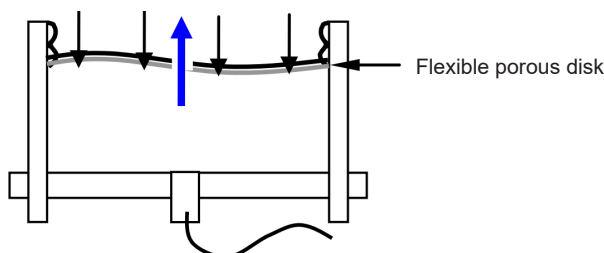


Fig. 2b GDS Rowe and Barden cell showing the flexible porous disk for constant stress tests.



Fig. 3 GDS Rowe and Barden consolidation cell external axial displacement measurement point



Fig. 4 GDS Rowe and Barden Consolidation Cell

GDSLAB Control Software

The GDSLAB control and acquisition software is a highly developed, yet extremely flexible software platform. Starting with the Kernel module and the ability to perform data acquisition only, additional modules may be chosen for your testing requirements. Some currently available modules are as follows:

Consolidation:

- SATCON (saturation and consolidation)
- Advanced Rowe/Rowe and Barden consolidation

Triaxial:

- SATCON (saturation and consolidation)
- Standard triaxial
- Stress path testing (p, q and s, t)
- Advanced loading tests (cyclic, user defined)
- Unsaturated testing
- K0 consolidation
- Permeability

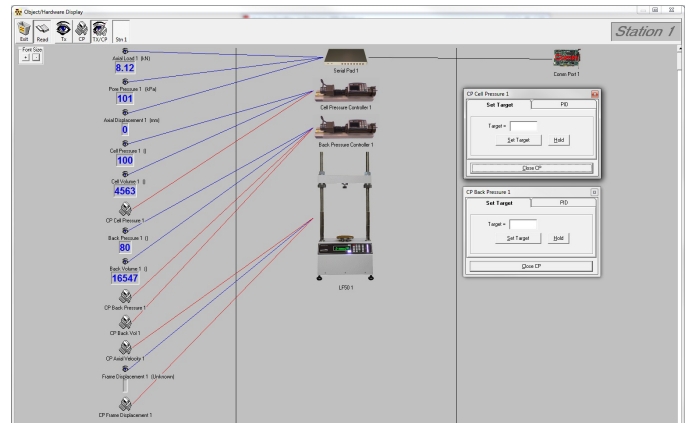


Fig. 5 Object display showing a standard STDTAS arrangement (Load Frame based stress path system)

GDSLAB has the ability to be configured to your hardware of choice, no matter how unique the arrangement. A text file (*.ini) or initialisation file is created that describes the hardware connectivity to the PC. The hardware layout is available in graphical format via the GDSLAB 'object display'. This makes setting up the devices and checking the connectivity extremely simple (see Fig. 5).

Pressure/volume Controllers

The cell pressure and back pressure controllers may be mixed and matched. There is the Standard Pressure/Volume Controller with pressure ranges from 1 to 4MPa, serial PC connectivity and 200 cc volumetric capacity. Or there is the Advanced Pressure/Volume Controller with pressure ranges of 2MPa, 3MPa, 4MPa, 8MPa, 16MPa, 32MPa, 64MPa and 100MPa with serial or IEEE PC connectivity and 200cc volumetric capacity. (Also, the ADVDPCC 2MPa controller can be bought as 1000cc volumetric capacity item).

The back pressure controller, which applies back pressure, also measures volume change of the test specimen.

Upgrade to Unsaturated Testing

Any GDSCTS system may be upgraded to perform unsaturated triaxial testing with the addition of the following items:

- Replacement base plate with high air entry porous stone.
- Pneumatic controller or Advanced air controller required (The advanced controller can be used instead of the pneumatic controller to provide a secondary measurement of volume change).



Fig. 7 GDS' Pneumatic Controller (GDSPPC)

USB 8 Channel Logger Used in GDSCTS

Overview: The USB 8 channel logger is a 24 bit digital acquisition system developed specifically for use with transducers likely to be used in a geotechnical laboratory.

The device provides eight fully independent channels of simultaneously sampled high resolution data. Each channel has 22 software selectable gain ranges with precision ratiometric transducer excitation and input. Industry standard DIN connectors allow the full-range of GDS transducers to be quickly and easily connected and configured.



A standard USB interface provides direct PC connectivity and is fully supported by the GDSLab test software allowing seamless integration into new and existing test setups. With the ability to connect multiple USB Pads per PC it is possible to build, expand and customise data acquisition systems by using multiple devices to suit requirements.

Technical Specification:

Connection to PC:	USB
Acquisition Channels:	8
Multi Box Capability:	x10
Max Number of Channels:	Up to 80
Sample Rate:	1Hz
Resolution:	24 Bit: 16,777,216
Gain Ranges:	22 (User defined in software)
Software:	GDSLAB
Voltage Resolution:	~ 0.000003 mVolts (3 nanovolt) at +/-22mV range
Voltage Input Type:	Fully Differential, Balanced Precision Inputs with Integrated Signal Conditioning
Transducer Excitation Voltage:	10V DC, differential +/-5V independent excitation
Input Ranges:	22 Independently Selectable Ranges Per Channel from (-22...+22mV) to +/-23.5V
Excitation Fault Tolerance:	Independent per channel, if any channel is shorted the other channels will continue to operate normally
Excitation/Transducer Fault Detection:	Overvoltage, Overcurrent, Absent Transducer
Data Acquisition Options:	Digital filtering for noise reduction from 300Hz oversampled source
Transducer Calibration:	Linear
Display and Monitoring:	Data acquisition in GDSLab via USB interface

GDS have supplied equipment to over 86% of the world's top 50 Universities:

GDS have supplied equipment to over 86% of the world's top 50 Universities who specialise in Civil & Structural Engineering, according to the "QS World University Ranking 2020" report.

GDS also work with many commercial laboratories including BGC Canada, Fugro, GEO, Geolabs, Geoteko, Golder Associates, Inpijn Blokpoel, Klohn Crippen, MEG Consulting, Multiconsult, Statens Vegvesen, NGI, Ramboll, Russell Geotechnical Innovations Ltd, SA Geolabs, SGS, Wiertsema and Partners to name a few.

**TOP
50**

Would you recommend GDS equipment to your colleague, friend or associate?

100% of our customers answered "YES"

Results from our post-delivery survey asked customers for feedback on their delivery, installation (if applicable), supporting documentation, apparatus and overall satisfaction with GDS. The survey ran for two years.



Made in the UK:

All GDS products are designed, manufactured and assembled in the UK at our offices in Hook. All products are quality assured before they are dispatched.

GDS are an ISO9001:2015 accredited company. The scope of this certificate applies to the approved quality administration systems relating to the "Manufacture of Laboratory and Field Testing Equipment".

**40 YEARS OF
BRITISH
INNOVATION**



Extended Warranties:

All GDS apparatus are covered by a 12 month manufacturers warranty. In addition to the standard warranty, GDS offer comprehensive extended warranties for 12, 24 and 36 months, for peace of mind against any repairs in the future. The extended warranties can be purchased at any time during the first 12 months of ownership.



GDS Training & Installation:

All installations & training are carried out by qualified engineers. A GDS engineer is assigned to each order throughout the sales process. They will quality assure the apparatus prior to shipping, if installation has been purchased, install the apparatus on the customers site & provide the training.



Technical Support:

GDS understand the need for ongoing after sales support, so much so that they have their own dedicated customer support centre. Alongside their support centre GDS use a variety of additional support methods including remote PC support, product helpsheets, video tutorials, email and telephone support.

