

**Options available for GDSCTS**

**Rowe and Barden cell sample sizes:**

|       |                                     |        |                                     |
|-------|-------------------------------------|--------|-------------------------------------|
| 50mm  | <input checked="" type="checkbox"/> | 63.5mm | <input checked="" type="checkbox"/> |
| 70mm  | <input checked="" type="checkbox"/> | 76.2mm | <input checked="" type="checkbox"/> |
| 100mm | <input checked="" type="checkbox"/> |        |                                     |

**Axial or back pressure ranges:**

|         |                                     |         |                                     |
|---------|-------------------------------------|---------|-------------------------------------|
| 500kPa  | <input checked="" type="checkbox"/> | 2000kPa | <input checked="" type="checkbox"/> |
| 1000kPa | <input checked="" type="checkbox"/> | 3500kPa | <input checked="" type="checkbox"/> |

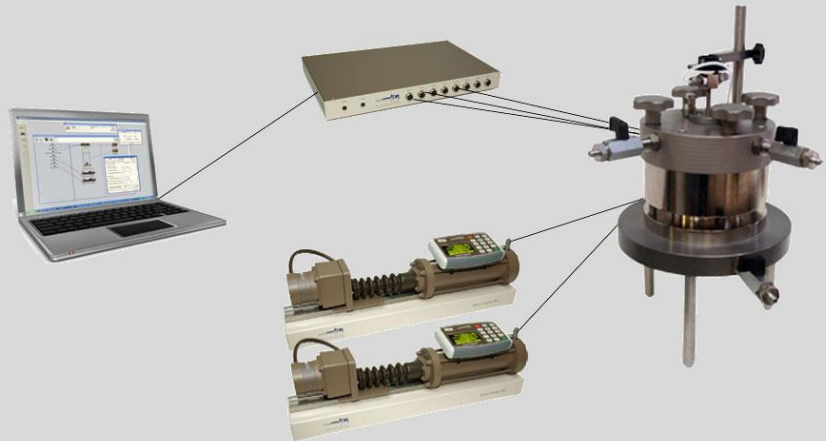
**Unsaturated testing upgrade**

**Bender elements testing**

**Drainage Options:**

|                   |                                     |
|-------------------|-------------------------------------|
| Radial            | <input checked="" type="checkbox"/> |
| Radial & Vertical | <input checked="" type="checkbox"/> |

# Consolidation Testing Systems (GDSCTS) including STDCTS and ADVCTS



## What is it?

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 radial drainage or radial & vertical drainage.

## Overview

The system is based on the Rowe and Barden type consolidation cell using GDS pressure/volume controllers. Two of these pressure controllers link the computer to the test cell as follows:

- one for axial stress and axial displacement control.
- one for setting back pressure and measuring volume change.

## System Elements

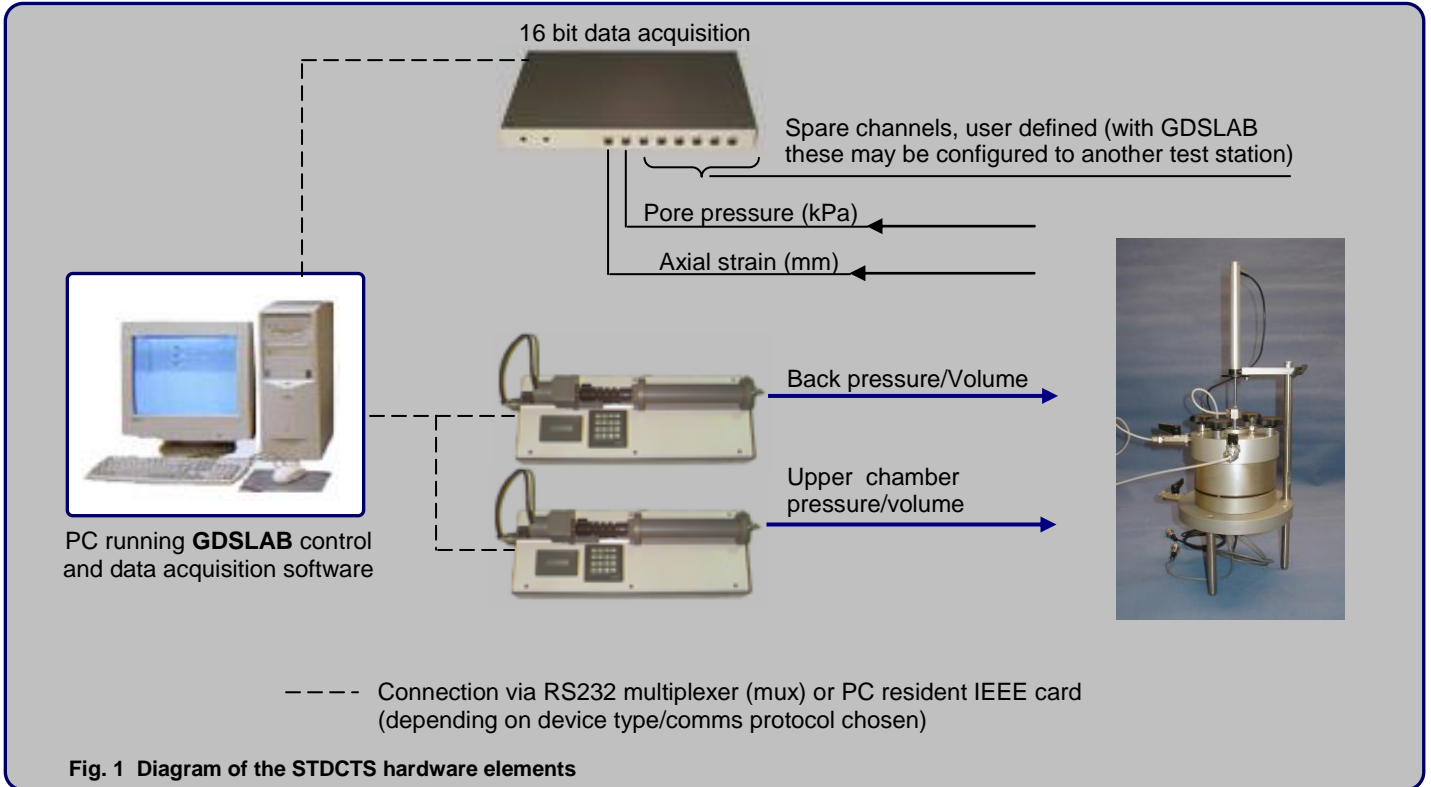
The fundamental system hardware elements are shown in Fig. 1 on the following page. In fact, the hardware used may be chosen to suit your testing and budgetary requirements. Common arrangements are as follows:

- Standard Consolidation Testing System (STDCTS) which is based on 2 x 3MPa Standard Pressure/Volume Controllers (STDDPC)
- Advanced Consolidation Testing System (ADVCTS) which is based on 2 x 2MPa Advanced Pressure/Volume Controllers (ADVDPCC)

In particular, all elements of the ADVCTS system are biased towards achieving the greatest resolution and accuracy, for the highest quality tests achievable in a research environment. The STDCTS system is a low cost version of ADVCTS. The GDS consolidation system can become a GDS stress path triaxial testing system by changing the test cell and adding a further 200cc pressure/volume controller.

### Technical specification

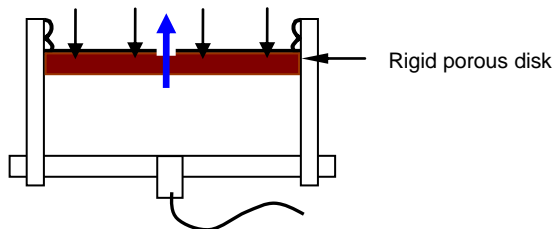
- Accuracy of pressure measurement = <0.1% full range (ADVCTS) or <0.15% full range (STDCTS)
- Resolution of pressure measurement = 0.5kPa (ADVCTS) or 1kPa (STDCTS).
- Accuracy of volume measurement = <0.1% measured value (ADVCTS) or <0.25% measured value (STDCTS)
- Resolution of volume measurement = 0.5mm<sup>3</sup> (ADVCTS) or 1mm<sup>3</sup> (STDCTS)
- Sample Size = diameter 50mm - height nominal 18mm, diameter 76mm – height nominal 28mm, diameter 100mm – height nominal 31mm.
- Transducer resolution = 16bit
- Computer-automated control of testing - not just data logging
- MS Windows® software (GDSLAB) for test control and post-test processing
- Fully expandable 'future-proof' software to allow multiple test stations or additional hardware to be incorporated at any time.



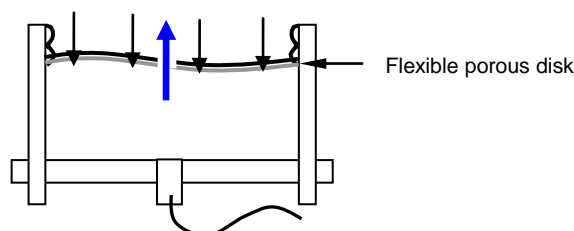
### The GDS Rowe and Barden consolidation cell

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).

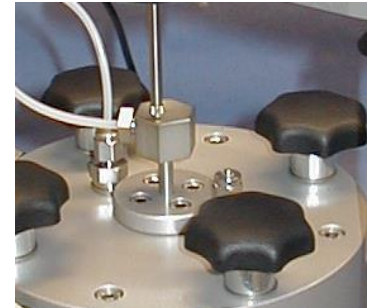
The cell (Figs 3 and 4) is available in a range of sizes for test specimens of 50, 63.5, 70, 76.2 and 100mm diameter. Back pressure is applied to the top drain of the cell so that field hydraulic gradients can be modeled. The bottom drain is provided with a tapping for a pressure transducer. The cell 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 (above) GDS Rowe and Barden cell showing rigid porous disk for constant axial strain.**



**Fig. 2b (above) 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:

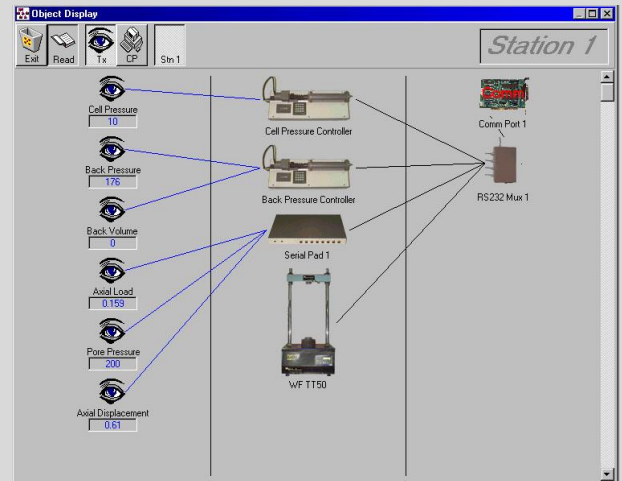
### Consolidation:

- 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

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).



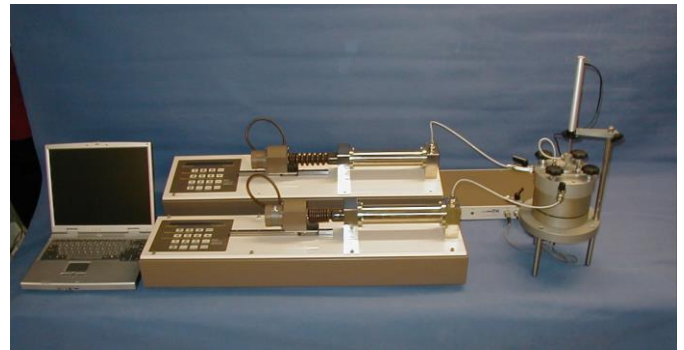
**Fig. 5 Object display showing a standard STDTAS arrangement (Load Frame based stress path system)**

*For further information on GDSLAB, please refer to the dedicated GDSLAB datasheet.*

## 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 (ADVDPCC – see Fig. 6) with pressure ranges of 2MPa, 3MPa, 4MPa, 8MPa, 16MPa, 32MPa, 64MPa and 128MPa 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.



**Fig. 6 Advanced Consolidation Testing System (ADVCTS) utilizes the GDS ADVDPCC controllers (shown above)**

### 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
- 1000cc Advanced Pressure/Volume Controller, ADVDP, (for application of pore air pressure and measurement of air volume change) as in Fig. 7.

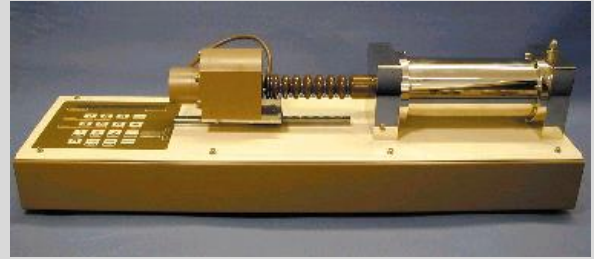


Fig. 7 1000cc Advanced Pressure/Volume Controller (ADVDP)

*For further information on unsaturated testing, please refer to the dedicated Unsaturated datasheet.*

### Why buy GDSCTS?

- ADVCTS remains the leading Rowe type consolidation system for research testing throughout the world
- STDCTS provides a low cost alternative with all the features of the ADVCTS system
- Resolution of measurement of volume change in all systems = 0.5 or 1mm<sup>3</sup> (see specification on page 1)
- Flexibility in the capacity of the system (specimen size, load, pressures etc) ensures a system is created to specifically suit the testing required and the budget
- May be upgraded at any time for additional transducers, software modules, triaxial testing, unsaturated testing and more – i.e. future proof!
- GDS worldwide technical support for peace of mind (see testimonials at [www.gdsinstruments.com](http://www.gdsinstruments.com))

**Due to continued development, specifications may change without notice.**