

Passive Triaxial Cells

Sample size range:

25 mm ✓ to 500 mm ✓

Pressure range:

1 MPa ✓ to 100 MPa ✓

Active (Stress Path) Cells

Sample size range:

25 mm ✓ to 100 mm ✓

Pressure range:

1 MPa ✓ to 20 MPa ✓

Balanced Ram Options: ✓

GDS Triaxial Cell Range



What is it?

GDS produce an extensive range of triaxial cells in order to satisfy the complex range of tests required by today's modern geotechnical laboratories (see Fig. 1 for a typical triaxial cell schematic). Traditional passive triaxial cells (known as passive due to the fact that they are used with an external actuator such as a load frame to apply axial loads), large diameter triaxial cells (up to 500mm sample diameter), active triaxial cells (based on Bishop's and Wesley's original hydraulic stress path apparatus and include an actuator 'built in'), as well as cells specifically designed for dynamic triaxial testing with low friction bearings and seals are available from GDS. In addition, there are a number of features such as balanced ram triaxial cells, access ports and access rings for internal transducers that are offered.

In summary, the cells are grouped into the following categories:-

- Traditional Passive Triaxial Cells
 - Low Pressure (< 5 MPa)
 - High Pressure (> 5MPa with balanced ram)
 - High Pressure (> 5MPa without balanced ram)
- Active Triaxial Cells (Hydraulically Actuated Triaxial)

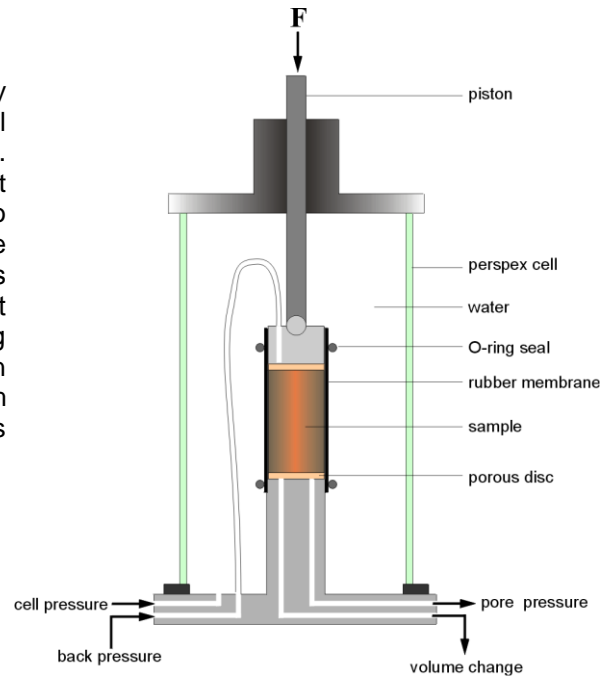


Fig. 1: Typical triaxial cell arrangement

Technical specification

- **Low Pressure (<5MPa) Passive cells; max sample size/pressure range:**
50mm/1.7MPa, 70mm/2MPa, 76mm/3.5MPa, 100mm/2MPa, 150mm/1.7MPa, 200mm/1MPa, 250mm/1MPa, 300mm/1MPa,
- **High Pressure (>5MPa) Passive cells with balanced ram; max sample size/pressure range:**
54mm/64MPa, 100mm/64MPa,
- **High Pressure (>5MPa) Passive cells without balanced ram; max sample size /pressure range:**
50mm/14MPa, 50mm/64MPa, 70mm/100MPa, 100mm/14MPa, 100mm/20MPa
- **Hydraulically Actuated cells pressure max sample size /pressure range:**
50mm/2MPa, 100mm/2MPa, 50mm/10MPa

Traditional Passive Triaxial Cells (Low Pressure <5MPa)

The Traditional Passive Triaxial Cells range in sample size from 50mm (see Fig. 2) through to 500mm, as used in our Large Diameter Cyclic Triaxial Testing System (see Fig. 3). All passive triaxial cells have ports to enable the measurement of cell, back and pore pressure, specimen volume change and a top entry ram for application of axial stress and displacement. All passive cells can also be expanded using an access ring to allow additional transducers to be fed through into the cell.

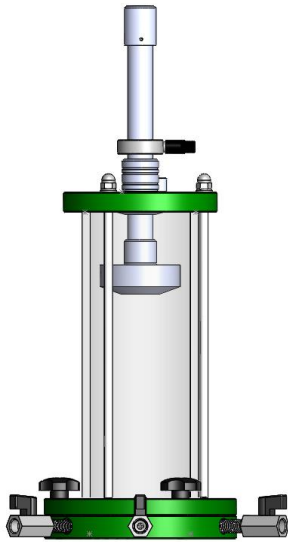


Fig. 2, 50mm Triaxial Cell



Fig. 3, 500mm Triaxial Cell

| Product Code | Max Sample Diameter | Max Pressure Rating | Cell Height | Max Sample Height | Outer Cell Diameter | Ram Diameter | Max Sample Diameter with Hall Effects | Max Sample Diameter with LVDT | Cell Description |
|--------------|---------------------|---------------------|-------------|-------------------|---------------------|--------------|---------------------------------------|-------------------------------|--|
| 50TCEL* | 50mm | 2MPa | 528mm | 100mm | 190mm | 25mm | - | - | The smallest triaxial cell in the GDS range. |
| 70TC62* | 70mm | 2MPa | 610mm | 140mm | 270mm | 25mm | Up to 70mm | 70mm is tight – ok smaller | Hybrid Triaxial Cell with fixed cell top, base and overcell. |
| 76TC35* | 76mm | 3.5MPa | 530mm | 152mm | 230mm | 25mm | Up to 50mm | Up to 50mm | One of the most commonly used triaxial cells within a load frame for samples up to 76mm. |
| 100TC2* | 100mm | 2MPa | 610mm | 200mm | 270mm | 25mm | Up to 70mm | Up to 76mm | Only 100mm Axial Hall Effects set will fit a 100mm cell. Radial mounting set does not fit. |
| 100TC4 | 100mm | 4MPa | 528mm | 200mm | 279mm | 25mm | Up to 100mm | Up to 100mm | |

| Product Code | Max Sample Diameter | Max Pressure Rating | Cell Height | Max Sample Height | Outer Cell Diameter | Ram Diameter | Max Sample Diameter with Hall Effects | Max Sample Diameter with LVDT | Cell Description |
|--------------|---------------------|---------------------|-------------|-------------------|---------------------|--------------|---------------------------------------|-------------------------------|---|
| 150TC2* | 150mm | 1.7MPa | 725mm | 300mm | 330mm | 25mm | Up to 100mm | Up to 150mm | Complete with five hydraulic ports and valves. Supplied complete with load ram and pillar for connection of displacement Gauge. Excludes Pedestal and top cap set. |
| 200TC1* | 200mm | 1MPa | 910mm | 400mm | 410mm | 25mm | Up to 200mm | Up to 200mm | Complete with five hydraulic ports and valves. Supplied complete with load ram and pillar for connection of displacement Gauge. Excludes Pedestal and top cap set. |
| 200TC2* | 250mm | 1MPa | 910mm | 500mm | 500mm | 25mm | Up to 200mm | Up to 200mm | Complete with five hydraulic ports and valves. Supplied complete with load ram and pillar for connection of displacement Gauge. Excludes Pedestal and top cap set. (No upward movement) |
| 300TC1* | 300mm | 1MPa | 1200mm | 600mm | 575mm | 50mm | Up to 300mm | Up to 300mm | Complete with five hydraulic ports and valves. Supplied complete with load ram and pillar for connection of displacement Gauge. Excludes Pedestal and top cap set. |
| 300TC1/T* | 300mm | 1MPa | 1330 mm | 600mm | 575mm | 50mm | Up to 300mm | Up to 300mm | Taller version of the 300TC1. |
| 500TC1 | 500mm | 1MPa | 1500mm | 1000mm | 750mm | 50mm | N/A | N/A | Complete with five hydraulic ports and valves. Supplied complete with load ram and pillar for connection of displacement gauge. Includes Pedestal and top cap set. |

* All cells with a star next to them can be modified to a Dynamic Triaxial Cell. These cells have low friction seals and linear ball bearing for dynamic testing.

Horizontal bender elements are generally only suggested up to the same maximum sample diameters as Hall Effect sensors. Please contact GDS for clarification of compatible sizes before ordering.

Traditional Passive Triaxial Cells (*High Pressure >5MPa with balanced ram*)

The difference between active and passive triaxial cells is in the manner in which the axial load is applied. Active cells have a built in system (usually hydraulic or electro-mechanical) to apply the axial loads, passive cells derive their axial loads from being placed into load frames.

What is a Balanced Ram?

The balanced ram is a system that compensates for the up thrust on the ram exerted by the cell pressure. Our system utilises a secondary chamber around the ram that balances the pressure in the cell against a second piston seal such that the pressure load is not exerted onto the loadframe. This system usually means that a smaller range loadframe can be used to achieve the same deviator loadings on the sample. For example if a cell has a 50mm diameter ram and a cell pressure of 32MPa the up thrust would be approximately 63kN on the frame. This would have to be deducted from the maximum achievable deviator loading that a given frame can apply. With a balanced ram, the full load frame capacity may be used to apply axial force on the sample as there is zero ram upthrust. In addition, a balanced ram within a high pressure passive cell eliminates disturbance to constant cell pressure during axial loading.



Fig. 4, 64MPa Triaxial Cell with balanced ram (HP64CL)

| Product Code | Max Sample Diameter | Max Pressure Rating | Cell Height | Max Sample Height | Outer Cell Diameter | Ram Diameter | Cell Description |
|--------------|---------------------|---------------------|-------------|-------------------|---------------------|--------------|--|
| Code: HP64CL | 100mm | 64MPa | 1048mm | 200mm | 382mm | 25mm | High pressure cell for samples up to 100mm diameter. Includes balanced ram and feedthrough ports for electrical connections. |

Traditional Passive Triaxial Cells (High Pressure >5MPa without balanced ram)

For triaxial cells that do not have balanced rams, accommodation needs to be made for the potential maximum ram upthrust (in particular high pressure triaxial cells). The load frame that the cell is being used in must be capable of taking the maximum ram upthrust. If this is not the case, a balanced ram solution can be considered. Porting is provided for local instrumentation.



Fig. 5, 14MPa Passive Triaxial Cell



Fig. 6, 100MPa Triaxial Cell



Fig. 7, 14MPa Triaxial Cell with 80mm sample height



Fig. 8, 14MPa Triaxial Cell with 300mm sample height

| | Max Sample Diameter | Max Pressure Rating | Cell Height | Max Sample Height | Outer Cell Diameter | Ram Diameter | Cell Description |
|------------------|---------------------|---------------------|--------------------|-------------------|---------------------|--------------|---|
| Code: HP32CL/50 | 50mm | 32Mpa | 1048mm | 100mm | 375mm | 25mm | 32MPa cell for samples up to 50mm diameter. Includes feed through ports for electrical connections. |
| Code: HP70CL/70 | 70mm | 70Mpa | 690mm | 140mm | 310mm | 25mm | 70MPa cell for samples up to 54mm diameter. Includes feedthrough ports for electrical connections. |
| Code: HP100MPA | 50mm | 100MPa | 760mm | 100mm | 400mm | 50 mm | 100MPa cell for samples up to 50mm diameter. Includes feedthrough ports for electrical connections. |
| Code: HP14CL | 100mm | 14MPa | 560mm | 200mm | 266mm | 25mm | 14MPa cell for samples up to 100mm diameter. Includes feedthrough ports for electrical connections. |
| Code: HP20CL | 100mm | 20MPa | 750mm ¹ | 200mm | 290mm | 25/50mm | ¹ Nominal, excludes fitment & adapters. |
| Code: 14MPAC/GA2 | 150mm | 14MPa | 735mm | 80mm | 480mm | 50mm | Cell top weight approximately 130kg, see fig 7. |
| Code: 14MPAC/GA1 | 150mm | 14MPa | 1015mm | 30 mm | 480mm | 50mm | Cell top weight approximately 205kg, see fig 8. |
| Code: 10MPACGA1 | 200mm | 10MPa | 642mm | 400mm | 212mm | 55mm | For Samples up to 200mm diameter. |

Hydraulically Actuated Triaxial Cells (No Load Frame)

GDS manufactures 3 hydraulically actuated (Bishop and Wesley) stress path cells as follows:

- 7kN/2000kPa, for specimens up to 50mm (38mm and 50mm as standard). See Fig. 9.
- 25kN/2000kPa, for specimens up to 101.8mm (38, 50, 70 and 100mm as standard).
- 20kN/10MPa, for specimens up to 50mm (38mm and 50mm as standard). See Fig. 10.



Fig. 9 GDS 38/50mm Bishop and Wesley Cell



Fig. 10 GDS 10MPa Bishop and Wesley Cell

| Product Code | Max Sample Diameter | Max Pressure Rating | Max Axial Load | Max Sample Diameter with Hall Effects | Max Sample Diameter with LVDT | Cell Description |
|--------------|---------------------|---------------------|----------------|---------------------------------------|-------------------------------|---|
| Code: BW038 | 50mm | 2MPa | 7kN | Up to 50mm | Up to 50mm | Complete with four hydraulic ports and valves. Supplied complete with load ram and pillar for connection of displacement Gauge. |
| Code: BWHTCL | 50mm | 10MPa | 128kN | Up to 50mm | Up to 50mm | High Temperature Bishop & Wesley_Triaxial Cell, with porting for heating coil. |
| Code: BW7010 | 100mm | 2MPa | 20kN | Up to 70mm | Up to 76mm | Includes access ports for internal instrumentation as standard. |
| Code: HP64AC | 150mm | 64MPa | 2500kN | Up to 150mm | Up to 150mm | 10 off electrical feed through's, accommodates 200kN submersible load cell. |

Why buy GDS Triaxial Cells?

- GDS is the leading supplier of stress path systems for research and commercial testing apparatus.
- New improved GDS designed triaxial cells based on the original Bishop and Wesley concept.
- 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, bender element testing, unsaturated testing and more – i.e. future proof!
- Peace of mind with GDS worldwide technical support,
- **Note: Due to continued developments specifications are subject to change without notice. Please contact us direct, if you have a requirement that is not shown above.**