

# CYCLIC DIRECT SIMPLE SHEAR TESTING MACHINE (T821)

Category: Soil



**Product Code:** T821

**Category:** SOIL

**Sub-Category:** CYCLIC

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- Designed to characterize soil response under one-dimensional constrained simple shear for seismic, offshore, and transportation loading scenarios, quantifying cyclic strength,

cycles-to-liquefaction, modulus reduction, and damping ratio.

- Executes cyclic shearing in stress or strain control while maintaining constant volume for saturated specimens via active height control, enabling undrained behavior representation and reliable excess-pore-pressure equivalence.
  - Supports programmable loading scripts with amplitude, frequency, dwell/hold, ramp, and multi-stage sequences, enabling repeatable research workflows and project-specific protocols.
  - Provides a broad waveform set periodic and user-defined sequences to replicate regular and irregular field loading histories with precise synchronization across channels.
  - Automates pre-shear consolidation with incremental loading, creep/hold timing, and end-of-primary detection to establish well-defined initial effective stress conditions.
  - Acquires shear force and displacement, vertical load and displacement, and (optionally) pore water pressure with high resolution; software generates  $\tau$ - $\gamma$  loops, G/Gmax- $\gamma$  and D- $\gamma$  curves, CSR, and Nliq with cycle counting and peak/valley tracking.
  - Uses NGI-type rings and sand-tight membranes to test sands, silts, and clays; interchangeable rings allow specimen optimization for material type and research aims.
  - Built on a rigid, low-compliance frame with backlash-free drives and low-friction guidance to minimize parasitic forces and enhance repeatability across small- to large-strain ranges.
  - Integrates template-based setup, real-time plotting, and auto-report export (CSV/PDF) to streamline training, routine testing, and advanced research.
  - Incorporates safety interlocks, overload/overtravel protections, and soft/hard limits to protect specimens, sensors, and operators during high-cycle programs.
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## STANDARDS

ASTM D6528 • ASTM D8296 • ASTM D2435 • AASHTO T216 • ASTM D4186 • ASTM D4546 • BS 1377-5 • BS 1377-6 • EN ISO 17892-5

## TECHNICAL SPECIFICATIONS

- Vertical Load Capacity: 12 kN (customized up to 300 kN)
- Shear Load Capacity:  $\pm 12$  kN (customized up to 300 kN)
- Shear Displacement Range:  $\pm 25$  mm (larger on request)
- Frequency Range: 0.001–10 Hz (higher on request, actuator-dependent)
- Control Modes: Stress control, strain/displacement control, mixed control; monotonic and cyclic
- Constant-Volume Control: Active Height Control with closed-loop vertical actuator
- Consolidation: Automatic staged 1-D consolidation with creep/hold timing and end-of-primary detection
- Specimen Size:  $\varnothing 38$ –100 mm (standard  $\varnothing 67.5$  mm)
- Transducers: Shear load cell; vertical load cell; horizontal LVDT ( $\leq 0.001$  mm resolution); vertical LVDT for AHC ( $\leq 0.001$  mm); optional pore pressure transducer
- Data & Results:  $\tau$ - $\gamma$  loops; G and D vs  $\gamma$ ; CSR and Nliq; consolidation curves; cycle counters; peak/valley detection
- Software: Template-based test setup; waveform editor; real-time multi-channel plotting; CSV/PDF reporting; calibration utilities
- Safety: Soft/hard limits; overload/overtravel protection; emergency stop; safe-start

interlocks

- Optional ALFA Cloud integration for secure, real-time data upload, centralized storage, and web access to results.

## **EQUIPPED WITH**

- Rigid load frame with integrated vertical and horizontal servo actuators
- Rings set and membranes
- Shear and vertical load cells; horizontal and vertical high-resolution LVDTs
- Active Height Control module for constant-volume shearing
- Multi-channel signal conditioning and data acquisition unit
- Control and analysis software with waveform editor and report generator

## **SUPPLIED WITH**

- Specimen preparation kit for DSS (membranes/rings and O-rings)
- Alignment and assembly tools
- Cabling and interface accessories for DAQ/control

## **ORDERING INFORMATION**

| Item Name                                  | Item Code |
|--------------------------------------------|-----------|
| CYCLIC DIRECT SIMPLE SHEAR TESTING MACHINE | T821A012U |

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*Keywords: Cyclic Direct Simple Shear, CDSS, constant volume, Active Height Control, ASTM D8296, ASTM D6528, undrained simple shear, liquefaction testing, G/Gmax, damping ratio, CSR, cycles to liquefaction, NGI ring, dynamic soil testing, geotechnical lab equipment*