floXlab

Your supplier of high-pressure laboratory instruments

and advanced geotechnical testing equipment

SHEARTEST

Automated Rock Direct Shear Testing System

ASTM D 5607 **ISRM**

ROCK MECHANICS TESTERS • DIRECT SHEAR SYSTEMS

SHEARTEST SERIES

Direct Shear Apparatus

KEY CAPABILITIES

- Versatile direct-shear system for rock specimens
- Conventional, incremental and residual shear tests
- Closed-loop, servo-controlled hydraulic system
- Simultaneous application of normal and shear forces
- Real-time force and displacement data acquisition
- Determines cohesion (c) and friction angle (Ø)
- Customizable load capacity and specimen size
- Complies with ASTM D 5607 and ISRM standards

SHEARTEST 300
Direct Shear Apparatus

PURPOSE & OPERATING MODES

PURPOSE

Determines the shear strength parameters of rock specimens:

Cohesion (c)	**Friction angle (Ø)**	**Peak shear strength**	**Residual shear strength**

STANDARDS

ASTM D 5607

Standard Test Method for Performing Laboratory Direct Shear Strength Tests of Rock Specimens Under Constant Normal Force

ISRM

International Society for Rock Mechanics — Suggested Methods for determining the shear strength of rock joints

OPERATING MODES

CNL — **Constant Normal Load**

Applies a constant normal stress while shearing progresses.

CNS — **Constant Normal Stiffness**

Normal stress varies proportionally with normal displacement.

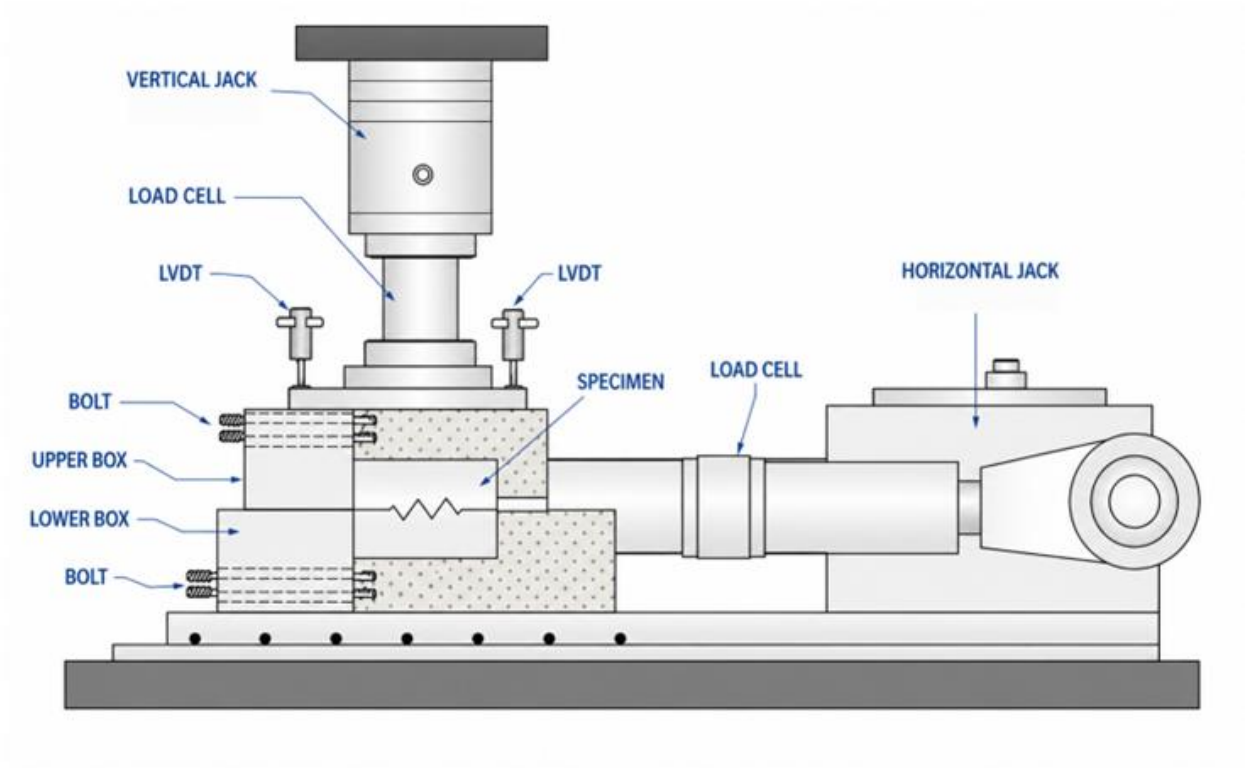
CND — **Constant Normal Displacement**

Maintains a fixed normal displacement during shear.

+ constant, incremental or ramped shear loads / displacements

KEY FEATURES

Cross-section view of the SHEARTEST direct shear apparatus



TECHNICAL FEATURES

- Servo-controlled hydraulic jacks (normal & shear)
- Normal and shear load cells — 0.05% full-scale precision
- Normal and shear LVDT transducers — 0.5 µm resolution
- Specimen shear upper and lower box

- Normal load reaction frame — high rigidity
- Hydraulic power unit — 21 MPa max pressure
- Specimen extruder
- Computer control & data acquisition station

TYPICAL TEST PROCEDURES

01 CONVENTIONAL SHEAR TEST

Applies a constant normal load while the specimen is sheared at a controlled displacement rate. The resulting shear stress–displacement curve reveals the material's peak shear strength, from which cohesion (c) and friction angle (Ø) are derived.

Application: *Essential for designing slopes, foundations and retaining structures.*

02 INCREMENTAL SHEAR TEST

Applies shear load in controlled increments (e.g. 20 kPa per step), maintaining each level for a defined duration to observe creep, relaxation and stiffness evolution. Precise step management and long-term monitoring.

Application: *Ideal for studying progressive failure and time-dependent behavior — natural slopes, underground excavations.*

03 RESIDUAL SHEAR TEST

After reaching peak strength, shearing continues over large displacements, allowing asperities and interlocks to wear away. Accurately measures the point where shear stress stabilizes — the residual shear strength.

Application: *Crucial for evaluating post-failure or long-term stability in reactivated landslides and sheared rock joints.*

SHEAR STRENGTH DETERMINATION

The SHEARTEST measures shear stress under different normal stresses to derive the rock's fundamental shear strength parameters.

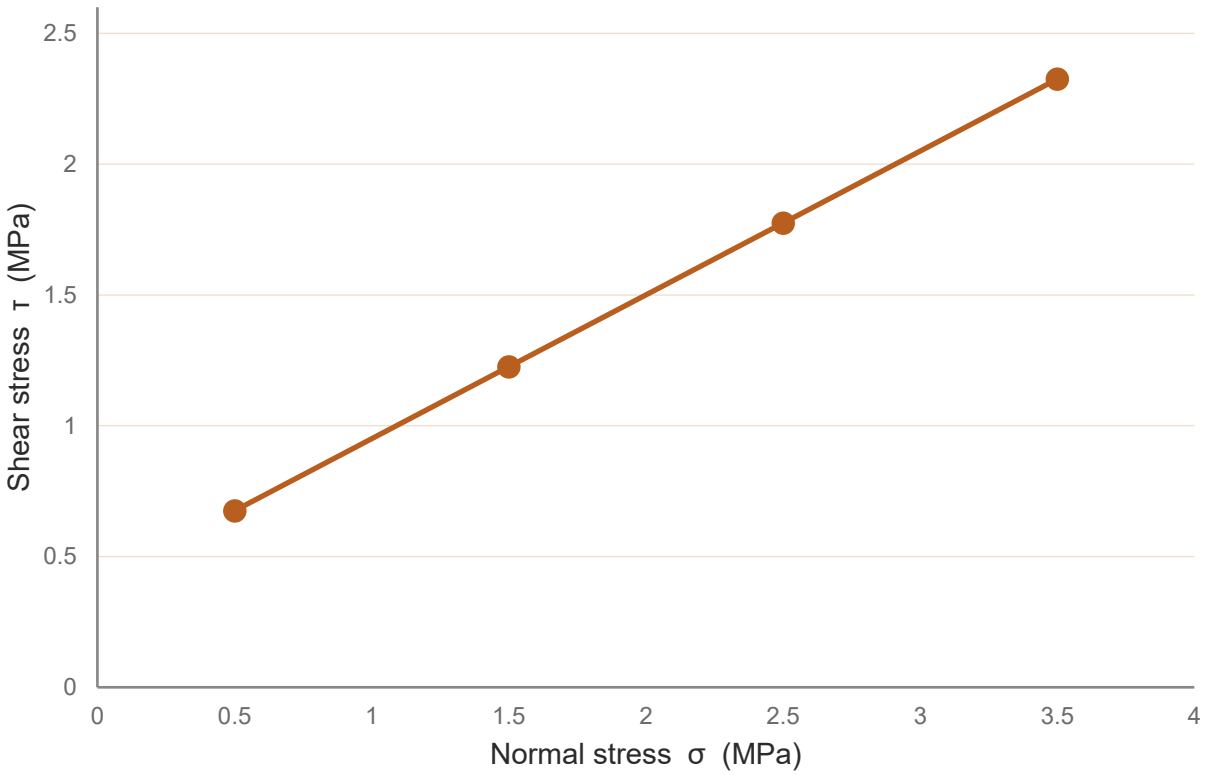
STEP 1 — Peak Shear Stress

Apply constant normal stresses **(N_1, N_2, N_3)** on identical specimens and shear them at a controlled rate.
→ Record the shear stress vs. shear displacement curves and extract the peak shear stress for each test.

STEP 2 — Cohesion & Friction Angle

Plot peak shear stresses against the corresponding normal stresses.
→ **c** (cohesion) = y-intercept **Ø** (friction angle) = slope of the line

Mohr–Coulomb failure criterion: $\tau = c + \sigma \cdot \tan(\varnothing)$



SHEARTEST MODELS

Four standard models available, each customizable to specific project needs.

MODEL	SHEAR LOAD (kN)	NORMAL LOAD (kN)	SPECIMEN DIAM / SIDES (mm)	SPECIMEN HEIGHT (mm)	WEIGHT (kg)
SHEARTEST 200-10	200	10	150	150	400
SHEARTEST 100-50	100	50	150	150	500
SHEARTEST 500-300	500	300	150	150	1,250
SHEARTEST 1000-500-L	1,000	500	300 × 300	100	2,000

COMMON SPECIFICATIONS — ALL MODELS

Standard	**ASTM D 5607, ISRM**	Max. shear displacement	**± 50 mm**
Max. normal displacement	**50 – 100 mm**	Power supply	**230 VAC, 1-Ph, 50/60 Hz**
Required air pressure	**100 psi**	Precision (load cells)	**0.05% of full scale**
LVDT resolution	**0.5 µm**	Hydraulic max. pressure	**21 MPa**

SUPERVISION, CONTROL & REPORTING

SOFTWARE CAPABILITIES

Synoptic view	Live visualization of the complete test system
Component status	Real-time monitoring of actuators and sensors
Measurements display	Continuous reading of forces and displacements
Trends display	Real-time curves during the test
Set-point entry	Direct control of target values
Automated macros	Pre-programmed test sequences
Professional reports	Automatic generation of test reports

INTELLIGENT DATA ANALYSIS

Automatic calculation of shear strength parameters:

$Ø_a$	$Ø^b$	$Ø_r$	C_a	C
apparent friction angle	basic friction angle	residual friction angle	apparent cohesion	cohesion

Graphs of peak and residual strength vs. normal stress are plotted from combined results across all specimens.

GET IN TOUCH

We look forward to discussing your project.

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SCAN ME

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