

DIRECT / RESIDUAL SHEAR TEST APPARATUS, DIGITAL TOUCH-SCREEN

STANDARDS: ASTM D3080 | BS 1377:7 | NF P94-071-1, NF P094-071-2 | AASHTO T235 | CEN-ISO-TS 17892-10

This apparatus is used to determine the resistance to shearing of all types of soil specimens including both consolidated and drained, undisturbed or remolded. The machine can accommodate round specimens \varnothing 50, 60, 63.5, 100 mm and square 60x60, 10x100 mm.

The machine has an integral closed loop control motor with epicycloid reducers.

At the beginning of each test the machine performs an automatic and complete internal check including a position reset resulting in the elimination of all position errors.

A user-friendly microprocessor controlled touch screen is used to input all test patterns providing an efficient and flexible interface.

(All data are input and stored when the machine is in stand-by, without affecting the specimen under test with quick machine setting.)

Facility for shear box maximum extension detection, to automatically stop the test.

Facility to input a different return speed (residual shear) in relation to the one used for the shear test, thus allowing a quick playback of the residual shear test, saving a lot of time.

The effects of the primary consolidation can be identified directly on the consolidation curve, only with data acquisition version. Automatic calculation of the appropriate shear velocity with selection of optimal consolidation parameters for t50, t90 and t100 (only with data acquisition version). This provides efficiency and cost effectiveness.

Frame Specifications:

- Maximum shear load: 5000 N possible on the whole speed range.
- Shear speed: 0.00001 to 15,0000 mm/min.
- Display of both speed and displacement with 0.00001 mm resolution.
- Possibility of direct vertical load, or with a lever arm ratio 10:1
- Max vertical direct load: 500N; lever arm: 5500N
- Box group mounted on ball track with high quality antifriction system.
- Extremely easy and practical use, not requiring qualified staff.

Firmware:

- Electronic control unit Cyber-plus Evolution with Touch-Screen color graphic display ¼ VGA, that runs like a standard PC based on Windows operating system, for the management of the data. (Analysis of the data, test results, graphs with S277-40N Software; optional accessory).
- The Touch-Screen icon interface allows an easy set-up of all the parameters and prompt execution of the test. Read value results are immediate and of extreme accuracy.
- The machine can perform the tests without any external PC, because of the Cyber-Plus grants performances like a PC.
- Direct connection to Intranet (connection to a LAN network) and Internet to establish a remote communication and receive an immediate diagnosis from Matest technicians, or for upgrades of the Firmware.
- Unlimited memory storage with: 2 USB ports, 1 SD card.
- Possibility to select different languages.
- Hardware technical details: see page 24
- The machine is equipped with 8 connectors for the acquisition and data processing system (3 analogical/digital channels are activated with the S277-31 optional firmware for load cell and transducers; and 5 channels can be activated with the S277-32 optional firmware).

Power supply: 230V 1ph 50-60Hz 200W

Dimensions: 1040x420xh1350 mm

Weight: 120 kg approx.



Detail of the 8 connectors

MAIN FEATURES

- Automatic calculation of the appropriate shear velocity based on optimal consolidation parameters.
- Shear speed: 0.00001 to 15,0000 mm/min
- Different return speed facility for residual shaer test.
- Integral closed loop control motor.
- User-friendly microprocessor controlled touch screen.
- 8 connectors for acquisition and data processing system.



S276 KIT + S284

THE DIRECT/RESIDUAL SHEAR TESTING MACHINE IS AVAILABLE IN THREE VERSIONS

S276 KIT

SHEARLAB DIGITAL BASIC VERSION DIGITAL SHEAR TESTING MACHINE

comprising:

- S276-10** Shear Frame, with digital Touch-Screen microprocessor, complete with beam loading device, shear box case with adaptors, dial gauge supports.
- S370-03S** Load Ring, 3000N capacity with electric safety stop device (load rings of different capacities up to 5000N available on request).
- S377** Dial indicator 25mm x 0.01mm for horizontal displacement.
- S376** Dial indicator 10mm x 0.01mm for vertical displacement.
- S273 KIT** Set of 50 kg of slotted weights.

 **Note:** Shear box, hollow punch, tamper **are not included** and have to be ordered separately (see accessories)

S276-01

AUTO SHEARLAB DATA ACQUISITION VERSION

DIGITAL SHEAR TESTING MACHINE WITH INCORPORATED DATA ACQUISITION SYSTEM AND BASIC FIRMWARE

comprising:

- S276-10** Shear Frame with digital Touch-Screen microprocessor, complete with beam loading device, shear box case with adaptors, transducers supports.
- S277-20** Load Cell, electric, 3000N capacity, complete with cable.
- S336-11** Linear vertical transducer, 10 mm travel.
- S336-12** Linear horizontal transducer, 25 mm travel.
- S277-31** Firmware activating 3 connectors for basic data acquisition.
- S273 KIT** Set of 50 kg of slotted weights.

 **Note:** Shear box, hollow punch, tamper and Software (see next pages) **are not included** and have to be ordered separately.

ACCESSORIES

- S277-40N** SOFTWARE SHEAR-LAB REPORTS - **MATEST MADE**
Technical data: see p. 539
- S277-32** FIRMWARE activating 5 connectors foreseen on the shear frame S276-10. They can be used as data acquisition and processing system for geotechnical tests. Technical data: see S334 p. 559

 **Note:** these 5 channels can be used alternatively (not simultaneously) to the 3 channels of the shear frame.

GAUGE BLOCKS. Grade 1

Used to calibrate the linear displacement transducers (see p. 541)

SPARES

- S335-15** Universal coupling pliers for dial gauge/transducer. It accepts all Matest displacement transducers and dial gauges (\emptyset from 8 to 20 mm)
- S280-15** Mounting device between the universal coupling pliers S335-15 and the shear machine to fix the vertical displacement transducer or dial gauge.
- S280-16** Mounting device between the universal coupling pliers S335-15 and the shear machine to fix the horizontal displacement transducer or dial gauge.



S276-01 + S284



ACCESSORIES

SHEAR BOX assemblies, made from brass, accurately machined, complete with carriage, walled round or square hole, base plate, two grids, two perforated grids, two porous stones, adapters to fit the box holder.

Models	Shear box	Spare couple of porous stones
Round specimens Ø 50 mm	S282	S286-03 KIT
Round specimens Ø 60 mm	S283	S286 KIT
Round specimens Ø 63.5	S283-01	S286-05 KIT
Round specimens Ø 100 mm	S281	S286-04 KIT
Square specimens 60x60 mm	S284	S286-01 KIT
Square specimens 100x100 mm	S285	S286-02 KIT

HOLLOW PUNCH (sample cutter) and TAMPER (extrusion tool)

The hollow punch with cutting rim is used to prepare the soil sample, and the tamper ejects the specimen filling it directly into the shear box without disturbing it.

Models	Hollow punch	Tamper
Ø 50xh 23 mm	S122-08	S123-08
Ø 60xh 23 mm	S122-09	S123-09
Ø 63.5xh 23 mm	S122-21	S123-17
Ø 100xh 23 mm	S122-10	S123-10
Square 60x60xh 23 mm	S122-11	S123-11
Square 100x100xh 23 mm	S122-12	S123-12



S290

CONSOLIDATION FRAME

It accepts up to 3 shear boxes or consolidation cells. Used to apply a constant load on the specimen in the shear box, so as to shorten the test duration when a lot of specimens have to be tested and just few shear machines are available. The frame can also be used to consolidate oedometric cells. Produced in a rugged steel structure, it is supplied complete with three lever arms ratio 10:1 having each max. load up to 550 kg, centering devices and dial gauge holders. Supplied without weights, water container, cells and dial gauges to be ordered separately.

Dimensions: 2300x450x900 mm

Weight: 150 kg approx.



S290 with accessories

 **Note:** On request the shear machine can be equipped with load rings or load cells having capacity from 500 N to 5000 N:

ACCESSORIES for S290

- S291** WATER CONTAINER, made from plexiglass and aluminium, it accommodates the shear box up to max size Ø 60 mm or 60 mm during the consolidation test, by keeping the specimen deep into the water.
- S291-01** WATER CONTAINER, it accommodates all the shear boxes up to Ø 100 mm or 100 mm size.
- S273 KIT** Set of 50 kg of slotted weights
- S376** Dial gauge 10x0.01 mm



S291-01

S291

S277-40N SOFTWARE SHEARLAB REPORTS

STANDARDS: ASTM D3080-72 | NF P94-071-1 | NF P94-071-2
BS 1377:7

To be used with the shear testing machine, data acquisition processing version, mod. S276-01

ShearLab Reports is the new informatic tool which allows geotechnical laboratories to process data and to view the results obtained from direct and residual shear tests.

The new features of this software allow the users to:

- Create a test file from data entered manually or imported
- Create a project to perform calculations according to the selected standard
- Integrate test files to a project
- Elaborate, customize and print their test reports which can be read without the need of a specific software

The program can be used in a very simple and intuitive way. A dedicated window allows the user to import data in the test file.

ShearLab Reports provides the user with a simple and flexible graphical interface giving the possibility to view, edit and print all the parameters involved in shear tests.

The input information is the following:

- Settlement in mm
- Time in min
- Horizontal displacement in mm
- Force in kN

In the project management window, the Software automatically calculates the shear parameters:

- Peak strength in kPa
- Residual strength in kPa
- Peak displacement in mm
- Residual displacement in mm

Laboratory coefficients of:

- Water content
- Densities
- Void ratio

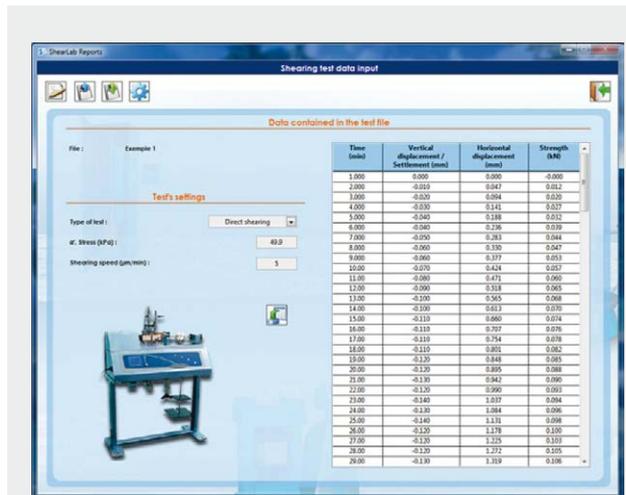
ShearLab Reports automatically draws the curves of shear and compaction, hence performing all the calculations required by the standard. Comments on the current project can also be added if necessary.

CHARTS:

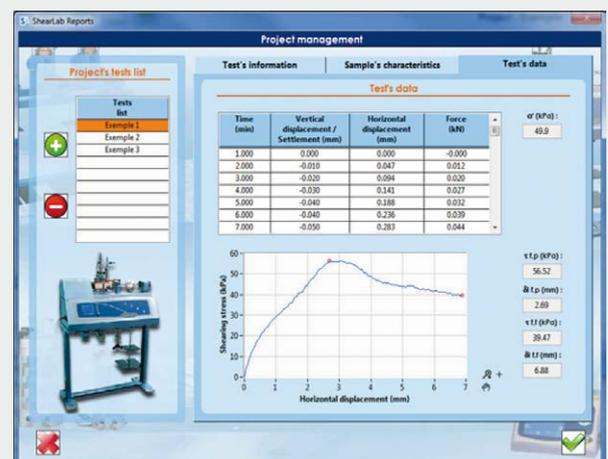
- Shear stress (kPa) / Horizontal displacement (mm)
- Settlement (mm) / Horizontal displacement (mm)
- Shear strength (kPa) / Normal stress (kPa)

PC specification:

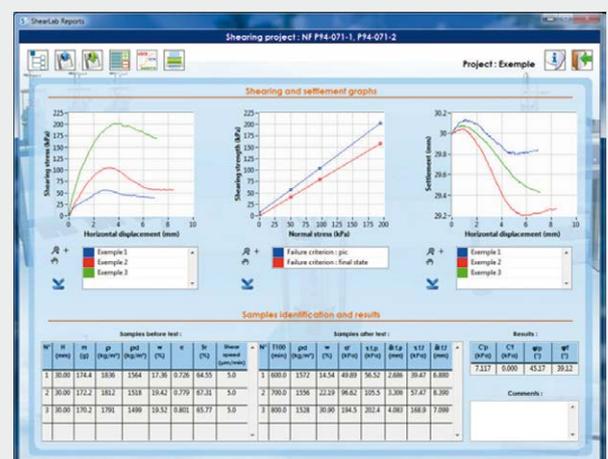
- Operating system: Windows XP or more recent.
- Supplied complete with connection cable



S277-40N Data import



S277-40N Test data calculation



S277-40N Results preview