Pocket Shear Vane
SL820

Impact Test Equipment Ltd
www.impact-test.co.uk & www.impact-test.com

User Guide
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Impact Test Equipment Ltd.
Building 21 Stevenston Ind. Est.
Stevenston
Ayrshire
KA20 3LR

T: 01294 602626
F: 01294 461168

E: sales@impact-test.co.uk

Test Equipment Web Site
www.impact-test.co.uk

Test Sieves & Accessories Web Site
www.impact-test.com

Description

The pocket shear vane device is a simple instrument used to obtain an approximate measurement of the undrained shear strength cu of a cohesive or semi-cohesive soil.

The measurement is obtained from the torque required to rotate the blades inserted into the soil to cause the failure of a cylindrical portion of undisturbed cohesive soil. The undrained shear strength is directly shown on the graduated scale in kg/cm2 or in tons/ft2.

The measurements obtained from the pocket shear vane is useful for the description and classification of cohesive soils and are a preliminary simple method for the evaluation of the shear strength in terms of total stress.

The pocket shear vane, complete with accessories; can be used either in the field or in the laboratory from very soft to light stiff soils in a range of undrained shear strength Cu up to 2.50 kg/cm2.

Specification

The measurement device consists of a spiral steel spring, with torque applied by the operator. The technical characteristics of the instrument are listed below:

Number of blades	8
Single blade dimensions	5.2 x 8x 0.8 mm
Spring length	43 mm
Spring diameter	27 mm
Torque require0.5 kg/cm$_2$	341.96 ±17.1 N x mm
Nominal spring torque	108.849 N x mm/rad ± 5%
Standard measurement scale	0 -1.00 kg/cm$_2$
Measurement scale for soft soils	0 -0.20 kg/cm$_2$
Measurement scale for higher strength	1 -2.50 kg/cm$_2$
Net weight	0.20 kg

Accuracy

The shear strength of a cohesive soil is dependent upon many factors, including:

- Rate of loading
- Progressive failure
- Orientation of the failure plane
- Pore water migration during testing.

The vane shear tester does not eliminate the effects of any of these variables. However this device, if correctly used in homogeneous and saturated clays, can minimise these effects and give repeatable values: extensive laboratory testing indicates excellent agreement between the unconfined compression tests and the shear tester to measure the unconfined shear strength Cu (see the diagram at the end).

Application in the field

The pocket shear vane represents a valid mean of investigations for the geologist or for the geotechnical engineer during the investigation campaigns for the evaluation of the shear strength of a soil in terms of total stresses. Some typical applications are listed below:

- Base surface of undisturbed samples contained in Shelby tubes
- Semi-disturbed samples taken from the bore holes
- Larger samples (cube samples) taken from explorative pits or excavation fronts
- Direct measurement on excavation walls or explorative pits.

Application in the laboratory

It is important to consider that the instrument should be generally used in quite completely saturated cohesive soils, where the undrained shear strength does not depend from the normal applied pressure. For this application the suggested test procedure is described below:

Use a wire saw to remove a thin layer of soil along the lateral surface of the sample. At a constant distance of about 10 cm perform a shear vane test to measure the undrained shear strength along the sample and evaluate the homogeneity and quality of sampling.

Where possible cut the sample along a plane perpendicular to its axis and again measure the shear strength to evaluate the hysotropy of the soil.

Use the vane shear test as a reference guide for any other measurement of the shear strength of the soil.

Instructions for testing undisturbed samples

The basic instrument has a measurement range of undrained shear strength from 0 to 1.00 kg/ cm2, capable to be measured with a torque easily applied by the hand.

The instrument is supplied complete of a set of two adapters that can be assembled on the standard blades to measure the shear strength of softer or stiffer soils

To perform the test on an undisturbed sample extruded from a Shelby tube, operate as follows:

Ensure that the soil surface is undisturbed and flat, without free soil particles. If necessary, cut a thin layer of the surface as described above.
Ensure that the instrument is clean and the torque spring is released. Keep the blades and handle still with one hand, whilst rotating the measurement disc anti-clockwise with the thumb of the other hand so that the zero reading aligns with the reference mark on the handle.

Firstly, hold the lower part of the instrument (i.e. the blades); firmly with one hand and with the other hand rotate the handle clockwise. Release the torque so that the reference mark on the handle rotates anti-clockwise on the graduated scale. Take the reading on the disc in the position where the mark stops.

Again, rotate the measurement disc anti-clockwise to position the reference mark on zero and start measurements on the soil.

If possible apply a drop of oil to the blades, so that when the test is complete the blades can be extracted easily from the soil with minimum disturbance.

Operate with caution and apply an axial pressure to press the blades into the soil to a depth equal to the height of the blades.

Maintain the axial pressure and at the same time slowly rotate the handle to apply an increasing torque at constant rate. The test speed should be adjusted to obtain shear failure within 5-10 sec.

Once the failure has been reached, extract the blades from the soil and record the reading of the reference mark; as indicated above. This measurement represents the undrained shear strength of the soil, expressed in kg/cm2.

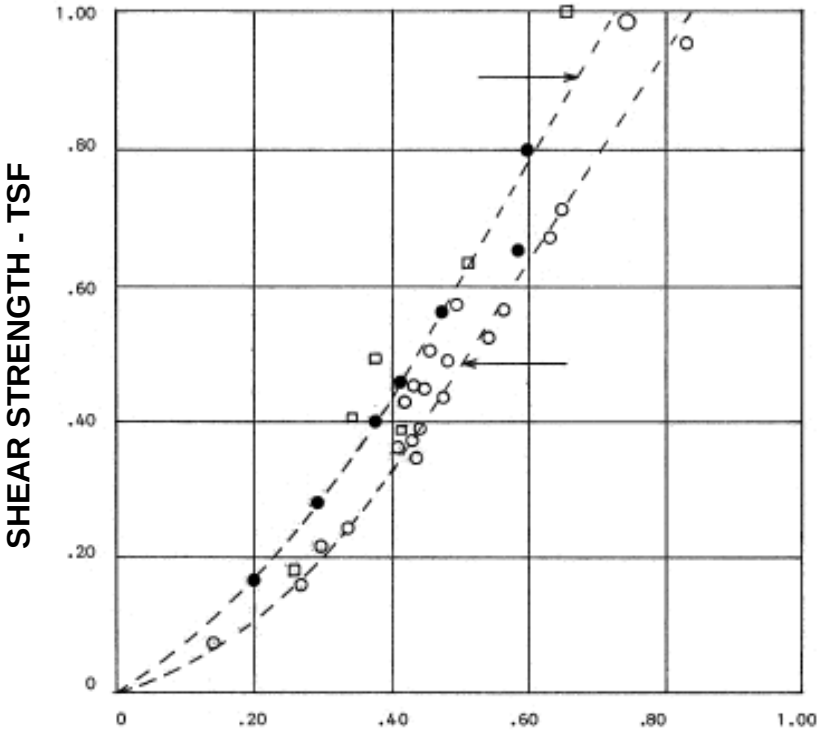
Rotate the reference mark to zero and clean the blades.

If soil failure is not reached with the standard blades or the measurement is less than 0.20 kg/cm2, it is necessary to repeat the test with the proper adapter: The adapters are easily inserted and locked on the standard blades.

- For measurements between **0 and 0.20 kg/cm2**. When this adapter is used, the reading on the gauge must be multiplied by **0.20** to obtain the undrained shear strength.

- For measurements between **1 and 2.50 kg/cm2**. When this adapter is used, the reading on the gage must be multiplied by **2.50** to obtain the undrained shear strength.

Shear Strength Relationships



○ **Unconfined Slow Tests**
● **Unconfined Fast Tests**
□ **CU Triaxial Tests**

SHEAR STRENGTH FROM VANE TEST – TSF
(Load rate = 0.1 TSF/sec.)