



Laboratory equipment co.,limited

FIELD VANE SHEAR TESTER 16-T0174

PRODUCT MANUAL



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I. PURPOSE

The inspection vane tester is used to measure the in situ undrained shear strength in clays. It is primarily intended for use in trenches and excavations at a depth not influenced by drying and excavation procedure.

The range of the instrument is from 0 to 260 kPa when three different sized vanes are used.

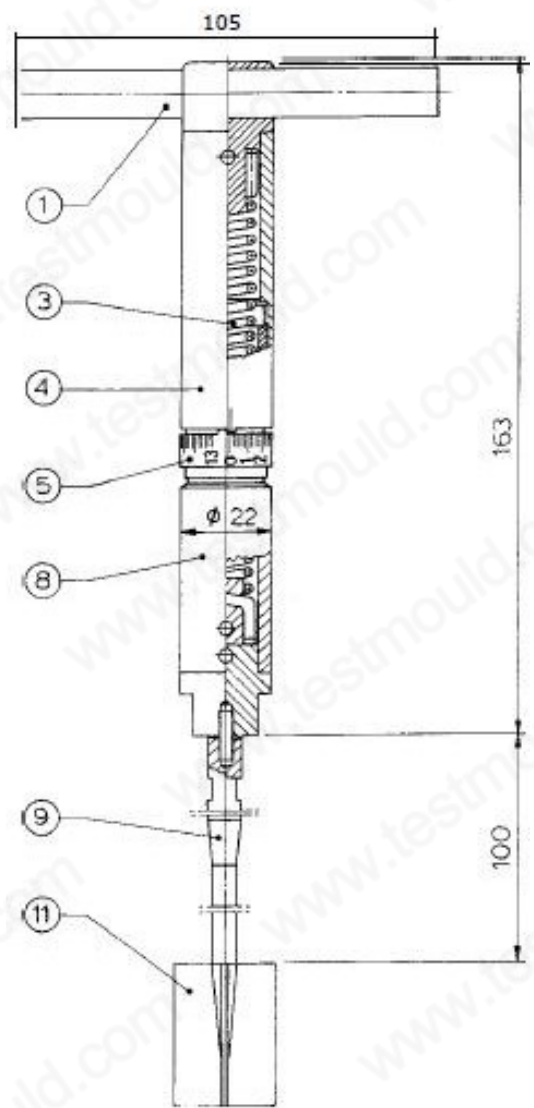
The accuracy of the instrument should be within 10% of the reading.

II. DESCRIPTION

The measuring part of the instrument is a spiral-spring (3), (max. torque transmitted 38 kgcm). When the handle (1) is turned, the spring deforms and the upper part (4) and the lower part (8) of the instrument get a mutual angular displacement. The size of this displacement depends on the torque which is necessary to turn the vane (11). By means of a graduated scale (5) the shear strength of the clay is obtained.

The lower and upper halves of the instrument are connected by means of threads. The scale (5) is also supplied with threads and follows the upper part of the instruments by means of two lugs. The 0-point is indicated by a line on the upper part (4). When torque is applied, the scale-ring follows the upper part of the instrument and when failure is obtained, the scale-ring (5) will remain in its position due to friction in the threads.

Three sizes of four-bladed vanes (11) are used:



inspection Vaneborer



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NO.	Vane size	Range (kPa)	READING MULTIPLIED BY = VALUE IN kPa
16-T0174/31	32×16 mm	0 - 260	2
16-T0174/32(standard)	40×20 mm	0 - 130	1
16-T0174/33	50.8×25.4 mm	0 - 65	0.5

which makes it possible to measure shear strength of 0 to 260, 0 to 130 and 0 to 65 kPa respectively.

The area ratios of the vanes are 14, 16.5 and 24% (ratio of cross sectional area of vane to the area to be sheared).

The vane blades are soldered to a vane shaft (9) which again is extended by one or more 0.5m (0.49 m) long rods. The connection between the shaft-rods and the instrument is made by threads. To make the connection as straight as possible, the rods have to be screwed tightly together and the threads are to be cleaned.

The maximum shear strength that can be measured with the inspection vane tester is 260 kPa.

In clays with this shear strength a force of about 40 to 50 kilos is required to press the vane down into the clay. The vane shaft is designed to take this force, but if extension rods are used, precautions against buckling are required.

III. INSTRUCTIONS FOR USE

General procedure

- ①. Connect required vane (11) and extension rods to the inspection vane instrument.

NB: While screwing vane or rods to instrument, hold onto the lower part

- ②. Push the vane into the ground to required position. NB: Do not twist inspection vane during penetration
- ③. Make sure that the graduated scale (5) is set to 0 position.
- ④. Turn handle (1) clockwise.

NB: Turn as slowly as possible with constant speed



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⑤. When the lower part (8) follows the upper part (4) around or even falls back, failure and maximum shear strength is obtained in the clay at the vane.

⑥. Holding handle firmly, allow it to return to 0 position.

NB: Do not allow handle to spring back uncontrolled

⑦. Note the reading on the graduated scale.

NB: Do not touch or in any way disturb the position of the graduated ring till the reading is taken

⑧. Write down the reading together with position of hole and depth.

⑨. Turn the graduated scale anti-clockwise back to 0 position.

⑩. To determine the remoulded shear strength, the following procedure is used:

Turn the vane quickly at least 25 revolutions. Zero the scale and take at least two measurements by turning the instrument as slowly as possible. The minimum value is considered the correct one.

⑪. Push the vane down to next position. If necessary, screw on another extension rod.

⑫. Repeat the above measurement procedure (3-10).

⑬. When the last reading is taken pull the vane up. If the clay is comparatively soft, this can be done by hand, gripping the handle. In harder clays, some mechanical device might be necessary. It is then advisable to connect this device directly to the connection rod (not to the instrument).

Special procedure

When measuring shear strength at greater depth, the friction between the clay and the extension rods can be appreciable, and must be taken into consideration.

To measure this friction, extension rods and a vane shaft without vane (dummy) are pushed into the ground to the depth required for shear force measurements. The friction is then measured in the same way as when using vanes (3-9 in chapter A). The friction value thus obtained is used to evaluate the actual shear strength from the measured shear strength.



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To penetrate through firm layers a preboring using a rod with the same diameter as the vane may be helpful.

IV. MAINTENANCE

The inspection vane tester is very simply designed and does not require much attention. But it is most important that it is kept as clean as possible.


The field vane shear test (FVST) is the most commonly used method for measuring the undrained shear strength of soft to stiff clays. For this reason, a preliminary investigation of soft clays with a hand-held vane tester is both economic and fully relevant. It also has good repeatability and is quick in providing valuable information for the planning of more detailed surveys.


However, results with systematic errors can occur if the testing equipment used is inaccurate or unreliable. Such errors can result in high costs if they are incorporated in the final design parameters.


The 16-T0174 hand-held vane tester is a fully professional instrument for preliminary FVST investigations. Delivered with the calibration certificate.



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