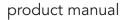# Soil Penetrometer, Pocket Style

General

The Pocket Penetrometer is designed as a lightweight instrument for use by field personnel to check visual classification of soils. It can be used to verify whether excavation side walls require shoring, based on OSHA cohesive soils classifications.

It indicates consistency, shear strength, and approximate unconfined shear strength. Direct-reading scale—in tons/sq ft, or kg/sq cm—corresponds to equivalent unconfined compressive strength. The readings obtained from the Penetrometer do not replace laboratory test results due to the fact that a small area of penetration test could give misleading results. The instrument should not be used for obtaining foundation design data.

Instruction

The red ring on the barrel of the penetrometer is designed to maintain the test reading on the scale for easy reading.

To operate, slide the ring down against the handle (knurled portion) of the penetrometer. Grip the handle and push the tip of the penetrometer into the soil so the groove marked on the tip is even with the level of the soil.

Once this is done, you can read the scale to determine the unconfined compression strength directly from the scale in tons per square foot (TSF) or kilograms per square centimeter (kg/cm^2).

The reading should be taken from the lower side of the red ring, i.e. the side closest to the knurled handle.

The scale is calibrated in tons per square foot or kilograms per square centimeter unconfined compressive strength.

Maximum reading of the Penetrometer is 4.5 tons per square foot or 4.5 kilograms per square centimeter. Pocket Penetrometers are not individually calibrated and therefore, no calibration certificates are supplied. An error of up to 1/2 division on the scale, equivalent to 0 to 0.124 TSF, is possible with the instrument.

Notes:

Select test spots with a smooth surface. Hold the pocket penetrometer at right angles to the surface being tested. To minimize errors, take several readings near each other, discard those readings that may vary significantly from the majority and average the readings.

Adapter Foot

The H-4195F Adapter F oot is recommended when testing extremely low strength cohesive soils. 1" (25mm) dia. foot, compared to the 1/4" (6.35mm) penetrometer piston, increases the effective area measured by 16 times. Divide by 16 to obtain correct unconfined compressive strength when the reading in tons per square foot or kilograms per square centimeter is on the low-load side.

OSHA Soil Categories

OSHA categorizes soil and rock deposits into four types, A through D, as follows:

Stable Rock: is natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed. It is usually identified by a rock name such as granite or sandstone. Determining whether a deposit is of this type may be difficult unless it is known whether cracks exist and whether or not the cracks run into or away from the excavation.

Type A Soils: are cohesive soils with an unconfined compressive strength of 1.5 tons per square foot (tsf) (144 kPa) or greater. Examples of Type A cohesive soils are often: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. (No soil is Type A if it is fissured, is subject to vibration of any type, has previously been disturbed, is part of a sloped, layered system where the layers dip into the excavation on a slope of 4 horizontal to 1 vertical (4H:1V) or greater, or has seeping water.

Type B Soils: are cohesive soils with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa). Examples of other Type B soils are: angular gravel; silt; silt loam; previously disturbed soils unless otherwise classified as Type C; soils that meet the unconfined compressive strength or cementation requirements of Type A soils but are fissured or subject to vibration; dry unstable rock; and layered systems sloping into the trench at a slope less than 4H:1V (only if the material would be classified as a Type B soil).

Type C Soils: are cohesive soils with an unconfined compressive strength of 0.5 tsf (48 kPa) or less. Other Type C soils include granular soils such as gravel, sand and loamy sand, submerged soil, soil from which water is freely seeping, and submerged rock that is not stable. Also included in this classification is material in a sloped, layered system where the layers dip into the excavation or have a slope of four horizontal to one vertical (4H:1V) or greater.

Layered Geological Strata: Where soils are configured in layers, i.e., where a layered geologic structure exists, the soil must be classified on the basis of the soil classification of the weakest soil layer. Each layer may be classified individually if a more stable layer lies below a less stable layer, i.e., where a Type C soil rests on top of stable rock.

Penetrometer Adapter Foot

The H-4195F Adapter foot is recommended when testing extremely low strength cohesive soils. 1" (25mm) dia. foot, compared to the .25" (6.35mm) penetrometer piston, increases the effective area measured by 16 times. Divide by 16 to obtain correct unconfined compressive strength when the reading in tons per square foot or kilograms per square centimeter is on the low-load side.

Warranty

Humboldt Mfg. Co. warrants its products to be free from defects in material or workmanship. The exclusive remedy for this warranty is Humboldt Mfg. Co., factory replacement of any part or parts of such product, for the warranty of this product please refer to Humboldt Mfg. Co. catalog on Terms and Conditions of Sale. The purchaser is responsible for the transportation charges. Humboldt Mfg. Co. shall not be responsible under this warranty if the goods have been improperly maintained, installed, operated or the goods have been altered or modified so as to adversely affect the operation, use performance or durability or so as to change their intended use. The Humboldt Mfg. Co. liability under the warranty contained in this clause is limited to the repair or replacement of defective goods and making good, defective workmanship.