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product manual

H-4200

Soil Penetrometer

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 scale indicator must be fully inserted into the Penetrometer body until the "0.0" mark only is showing. The stainless steel piston (opposite end of the scale indicator) has a tip area of 0.05 square inch (0.32 sq. cm). In use, it is pressed into the soil until the engraved line, 1/4" (6.35 mm) from the tip, reaches the soil level. A reading can now be taken from the scale indicator. 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.

Adapter Foot

The H-4200F Adapter foot 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.

Warranty

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