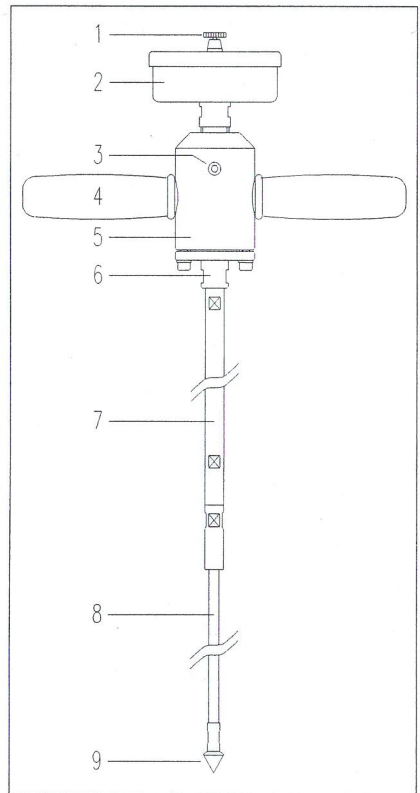


06.01 HAND PENETROMETER EIJKELKAMP

Using the penetrometer

Before starting the measurements, check whether the black pointer of the manometer (2) is at zero. Because of internal friction the pointer may sometimes not return to zero. By turning the plunger and pulling it out a little the pointer must return to zero. If the black pointer is not at zero, no soundings can be made (the apparatus must be returned to the factory for control). The red maximum pointer can be turned to zero with the help of the adjusting screw (1). If both pointers are at zero, select a cone (9) appropriate for the expected density of the soil that is to be sounded.

The hand penetrometer is an instrument for indicative measurement of maximal resistance to penetration. The apparatus has a mean deviation of + and - 8%. For a long term and accurate use a measuring range of 200 - 700 N is advised (green zone on manometer). Measurements in the range of 0 to 100 N are not possible. In the range 100 to 200 N the deviation is +/- 15%. The large deviation can be avoided by choosing another cone. Measurements in the range 700 to 1000 N must be avoided because they shorten the life cycle of the manometer. When temperature is below 5°C, deviation will be larger as a result of thickening of the oil.



Fit the cone to the rod (8) and connect the rod, via an extension rod (7) and the plunger (6), to the measuring instrument (5). Next apply uniform pressure to the hand grips (4), push the cone into the ground at a constant rate of 2 cm/sec. During the measurement, the resistance can be read under the black pointer of the manometer. The maximum resistance, while measuring that section, is indicated by the red maximum pointer. Before starting the following section, turn the maximum pointer once again to zero. The apparatus is withdrawn by pulling with one hand on the measuring instrument (5) and one hand on the rod (8). When applying the nylon quick-coupler use the push/pull handle to withdraw the rods from the soil. With cones 1 and 2, the maximum sounding depth, without augering, for a single sounding is 50 cm. The resistance is read in N (Newton) and noted for the appropriate depth. The base area of the cone should also be noted because the cone resistance is expressed in N/cm².

$$\text{Cone resistance} = \frac{\text{manometer reading}}{\text{base area of cone}}$$

Example:

A manometer reading of 300 N and a cone base area of 5 cm² means a cone resistance of: 300/5 = 60 N/cm². Or: 60 N/cm² = 600 kN/m² = 0.6 MPa (mega pascal = 106 pascal).

See other side for table of cone resistance in N/cm²

