METHOD AND APPARATUS FOR DETERMINING VOLUME AND DENSITY OF SOIL PARTICLES

Description
This invention applies to building industry, particularly, to quality assessment methods for solid inorganic materials, and can be used in building, geology and mineralogy for determining the volume and density of soil solids.
The method is based on the change of pressure of compressed air with a change in its volume.

The apparatus (Fig.) is comprised of a compressor (1), a pressure-tight tank (3) with a pressure gage (4), and a tank for soil specimen (5) with a lid (6) connected by an air tube (8) with valves (2) and (9).
The procedure for determining the soil volume is as follows:
Dried soil (7) is placed in the tank (5), the tank is closed with the air-tight lid (6), the valve (9) is closed, the valve (2) is opened so that compressed air is delivered from the compressor (1) to the tank (3), the valve (2) is closed, a reading of the pressure gage (4) is observed and recorded, the valve (9) is opened to deliver compressed air from the tank (3) to the tank (5), pressure gage (4) reading is taken, the volume of soil particles is determined by the following equation:

\[ p_1 V_1 = p_2 (V_2 + V_1 - V_0) \]

\[ V_0 = V_2 - V_1 \left( \frac{p_1}{p_2} - 1 \right) \]

where \( p_1 \) is the excess pressure in volume \( V_1 \); \( p_2 \) is the excess pressure in the system of volume \( (V_1 + V_2 - V_0) \); and then the density of particles is determined by the equation:

\[ \rho_s = \frac{m_0}{V_2 - V_1 \left( \frac{p_1}{p_2} - 1 \right) } \]

where \( m_0 \) is the mass of the dried soil.

Technical appraisal and economic benefits
The method and apparatus reduces labour inputs in determination of volume and density of soil particles.
**Application areas**
Scientific investigations, engineering, geology and mineralogy for determining volume and density of soil particles.

**Development stage**
Prototype model.

**Patent situation**
Patent of the RF for invention (2010).

**Commercial offers**
License agreement.

**Estimated cost**
To be negotiated.

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