14 Particle Density

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14-1 INTRODUCTION

Particle density of soils refers to the density of the solid particles collectively. It is expressed as the ratio of the total mass of the solid particles to their total volume, excluding pore spaces between particles. Convenient units for particle density are megagrams per cubic meter (Mg m$^{-3}$), or the numerically equal grams per cubic centimeter (g cm$^{-3}$).

Particle density is used in most mathematical expressions where volume or weight of a soil sample is being considered. Thus interrelationships of porosity, bulk density, air space, and rates of sedimentation of particles in fluids depend on particle density. Particle-size analyses that employ sedimentation rate, as well as calculations involving particle movement by wind and water, require information on particle density.

14-2 PRINCIPLES

Particle density of a soil sample is calculated from two measured quantities, namely, the mass and volume of the sample. The mass is determined by weighing; the volume, by calculation from the mass and density of water (or other fluid) displaced by the sample. The pycnometer and the submersion methods are based on the same principle. Both have long been in use. They are simple, direct, and accurate if done carefully.

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