



Test method T128

Apparent density of soils containing coarse particles

OCTOBER 2012



Revision Summary

Ed/Rev Number	Clause Number	Description of Revision	Authorisation	Date
		Reformatted and Revision Summary Added	D.Dash	May 1999
		Date on Test Method Revised to Agree with Date on Revision	D.Dash	Feb 2001
Ed 2/ Rev 0		Reformatted RMS template	J Friedrich	October 2012

Note that Roads and Maritime Services is hereafter referred to as 'RMS'.

The most recent revision to Test method T128 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T128

Apparent density of soils containing coarse particles

1. Scope

This test method sets out the procedure for the determination of the density of soil particles where at least some of the soil particles are of a size greater than 4.75 mm and is carried out in conjunction with Test Method T127. It may be used to determine the density of the coarse particles only. The test is based on the method set out in Australian Standard 1289.

2. Definition

Term	Definition
Apparent Density	The apparent density is the density of the impermeable portion of a permeable material (i.e., the solid matter plus pores and voids impermeable to water) at a stated temperature.

3. Apparatus

- A balance of 5 kg capacity accurate and readable to 0.5 g within the operating range.
- A wire basket approximately 200 mm in diameter and 400 mm high with mesh aperture less than 4.75 mm.
- A water bath of sufficient dimensions that the wire basket may be completely immersed in it with a clearance of at least 75 mm round the circumference and 50 mm from the bottom, with an overflow pipe or similar provision to maintain the water at a constant level.
- Suitable apparatus for suspending the basket from the hook or device supporting the scale pan of the balance.
- A thermostatically controlled oven with good air circulation maintaining a temperature within the range 105-110°C.
- Thermometer having a range of 8-32°C and conforming to the requirements for thermometers 63 C as prescribed in ASTM Designation E1 for ASTM Thermometers.

4. Test Portion

- Allow the sample to dry sufficiently to enable it to be crumbled. If there is any reason to believe that this will change the apparent density of the soil particles due to water of hydration, the soil must not be oven dried prior to test (See *Technique*).
- Determine the mass of the sample and sieve on the 4.75 mm sieve. Use the fraction retained on the sieve for this test and keep the fraction passing the 4.75 mm sieve for use in Test Method T127, Apparent Density of Fine Soil Particles. Determine the mass of material retained on the 4.75 mm sieve and record as a percentage of the total mass.

5. Procedure

- Obtain by riffing or quartering the material retained on the 4.75 mm sieve, a sub-sample of approximately 5 kg.
- Thoroughly wash the sub-sample to remove dust and other coatings from the surface of the particles. Oven-dry the sub-sample at a temperature between 105°C and 110°C. Cool and determine the mass of the sub-sample to within 0.5 g (M_5). (See *Technique*).
- Immerse the sub-sample in water at room temperature for a period of 24 hours.
- Determine the apparent mass of the wire basket immersed in water to within 0.5 g (M_6).

- (e) Place the saturated sub-sample in the wire basket, jiggle the material to remove any entrapped air and determine its apparent mass in water to within 0.5 g (M_7).
- (f) Repeat the procedure using a separate sub-sample.

6. Calculations

Calculate the apparent density of the soil particles retained on the 4.75 mm sieve as follows:-

$$D_2 (+ 4.75 \text{ mm}) = \frac{M_5 \times D_1}{M_5 - (M_7 - M_6)} \text{ g/mL}$$

Where

$D_2 (+4.75 \text{ mm})$ = apparent density of soil particles retained on 4.75 mm sieve.

M_5 = mass of dry soil particles.

M_6 = apparent mass of wire basket immersed in water.

M_7 = apparent mass of wire basket and soil particles immersed in water.

If the two results differ by more than 0.03 g/cm³ repeat the tests.

- (a) Calculate the apparent density of a soil containing particles both larger and smaller than 4.75 mm as follows:-

$$D_{at} = \frac{100}{D_a} + \frac{100 - X}{D_a (+ 4.75 \text{ mm})} \text{ g/mL}$$

Where

D_{at} = apparent density of total soil sample.

X = percentage by mass of soil passing 4.75 mm sieve as determined by Test Method T127.

D_a = apparent density of that portion of the soil passing 4.75 mm sieve as determined by Test Method T127.

$D_a (+4.75 \text{ mm})$ = apparent density of that portion of the soil retained on 4.75 mm sieve as determined above.

7. Reporting

- (a) Report the apparent density of the soil particles retained on the 4.75 mm sieve to the nearest 0.01 g/mL obtained by averaging the results obtained above.
- (b) Report the apparent density of the soil particles to the nearest 0.01 g/mL.

8. Technique

If there is any reason to believe that oven drying of the sample would change the apparent density of the soil particles due to loss of water of hydration, test the soil in its natural condition and determine the mass of soil used by oven-drying at the end of the test. To obtain the correct apparent density of the soil particles amend the mass of oven-dried soil to allow for any chemically-held water that has been removed by oven-drying.

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