



# Standard Test Procedures Manual

Section: SOILS

Subject: LUMP DENSITY

## 1. SCOPE

### 1.1. Description of Test

This method describes the procedure for determining the density of an undisturbed soil sample.

## 2. APPARATUS AND MATERIALS

### 2.1. Equipment Required

Balance - .01 g accuracy equipped with holder for weighing samples in water.  
Oven - capable of 50°C to 150°C.  
Containers - aluminum tares with lids.  
Paraffin wax.  
Melting pot for wax.  
Knife.

## 3. PROCEDURE

### 3.1. Test Procedure

Trim sample to appropriate size; usually about a rounded cube about 70 mm in diameter. Specimens should be reasonably smooth and rounded.

Weigh sample in air.

Coat sample with paraffin wax by briefly dipping one or more times in molten wax. Hot wax should be brushed over pin holes or imperfections.

Weigh sample and wax in air.

Weigh sample and wax in water.

Remove approximately 150 g of material from centre of sample for moisture determination as per STP 205-3.

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## 4. RESULTS AND CALCULATIONS

### 4.1. Calculations

Calculate moisture and density using the following tabulation and formula.

#### Wax Density

Wt. Sample + Wax \_\_\_\_\_  
Wt. Sample \_\_\_\_\_  
Wt. Wax \_\_\_\_\_  
Wt. Sample + Wax \_\_\_\_\_  
Wt. Sample + Wax \_\_\_\_\_  
in H<sub>2</sub>O \_\_\_\_\_  
Vol. Sample + \_\_\_\_\_  
Wax \_\_\_\_\_

#### Water Tabulation

Tare # \_\_\_\_\_  
Wet.Wt.+Tare \_\_\_\_\_  
Dry Wt.+Tare \_\_\_\_\_  
Wt. H<sub>2</sub>O \_\_\_\_\_  
Tare Wt. \_\_\_\_\_  
Wt. of Dry \_\_\_\_\_  
Sample \_\_\_\_\_

#### Wax Density

#### Water Content

Wt. Wax            % H<sub>2</sub>O  
0.88

Vol. Sample  
Wet Density  
Dry Density

% Moisture =  $\frac{\text{weight moisture}}{\text{weight dry soil}} \times 100$

Wet Density in kg/m<sup>3</sup> =  $\frac{\text{weight soil}}{\text{volume sample}} \times 1000$

Dry Density in kg/m<sup>3</sup> =  $\frac{\text{wet density}}{100 + \% \text{ moisture}} \times 1000$

### 4.2. Reporting Results

Report test results on MR-84 or MR-78.

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## 5. ADDED INFORMATION

### 5.1. General

This test is most often used for density determination of foundation samples obtained by shelly tubes or by coring. However, it is also useful for making independent checks of other density test methods used in subgrades. In some cases the subgrade may have to be frozen with dry ice in order to obtain undisturbed samples.

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## APPROVAL SHEET

New    Revision   X   Date of Previous Document 85-04-07  
Effective Date:   -  -

Description of Revision (Reason for Revision):  
Format of test procedure updated.

Review/Implementation Process:  
Reviewed by the Materials Section of the Technical Standards and Policies  
Branch.

Other Manuals/Policies Affected:  
Nil

Follow Up/Training Required:  
Nil

Comments/Concerns/Implications (Budget/Environment/Stakeholders):

Prepared and Recommended by D. MacLeod 93-11-26  
Materials Standards Engineer Date

Approval Recommended by R.A. Widger   -  -  
Senior Materials Engineer Date

Approval Recommended by A.R. Gerbrandt   -  -  
Dir., Technical Standards & Policies Br. Date

Approved by D.G. Metz   -  -  
Assistant Deputy Minister, Infrastructure Date

Electronic File Updated   -  -  
Update Mailed   -  -