

U.S. Army Corps of Engineers (USACE)

**UNIT WEIGHTS, VOID RATIO, POROSITY, AND DEGREE OF SATURATION (*Displacement Method*)**

For use of this form, see EM 1110-2-1906; the Proponent agency is CECW-EC.

**Purpose:** The purpose of this form is to calculate unit weights, void ratio, porosity, and degree of saturation data by displacement method.

Project	Date
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Boring Number

**WATER CONTENT**

Sample or Specimen Number							
Tare Number							
Weight in Grams	Tare Plus Wet Soil						
	Tare Plus Dry Soil						
	Water	$W_w$					
	Tare						
	Dry Soil	$W_s$					
Water Content	$W$	%	%	%	%	%	%

**WEIGHT - VOLUME RELATIONS**

Sample or Specimen Number							
Tare Temperature of Water, T.C.							
Weight in Grams	Soil and Wax in Air						
	Wet Soil	$W$					
	Wax						
	Wet Soil and Wax in Water						
	Dry Soil ↑	$W_s$					
Specific Gravity of Soil	$G_s$						
Volume in CC	Wet Soil and Wax ↓						
	Wax						
	Wet Soil	$V$					
	Dry Soil = $W_s / G_s$	$V_s$					
Lb Per cu ft	Wet Unit WT = $(W / V) \times 62.4$	$\gamma_m$					
	Dry Soil WT = $(W_s / V) \times 62.4$	$\gamma_d$					
Void Ratio = $(V - V_s) / V_s$	$e$						
Porosity, % = $[(V - V_s) / V] \times 100$	$n$	%	%	%	%	%	%
Degree of Saturation, % = $[W_w / (V - V_s)] \times 100$	$S$	%	%	%	%	%	%

Volume of Wax = Weight of Wax / Specific Gravity of Wax = \_\_\_\_\_  
 ↑ If not measured directly, may be computed as follows:  $W_s = W / 1 + 0.01x$   
 ↓ Volume of Wet Soil and Wax = (Weight of Wet Soil and Wax in Air - Weight of Wet Soil and Wax in Water) / Density of Water at Test Temperature

Remarks

Technician ( <i>Last, First Mi</i> )	Date	Technician's Signature
Computed By ( <i>Last, First Mi</i> )	Date	Computed By Signature
Checked By ( <i>Last, First Mi</i> )	Date	Checked By Signature