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Dry Unit Weight of Soil Formulas

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List of 7 Dry Unit Weight of Soil Formulas

Dry Unit Weight of Soil

1) Dry Unit Weight given Bulk Unit Weight and Degree of Saturation

Open Calculator

fx $$\gamma_{dry} = \frac{\gamma_{bulk} - (S \cdot \gamma_{saturated})}{1 - S}$$

ex $$6.120769\text{kN/m}^3 = \frac{20.89\text{kN/m}^3 - (2.56 \cdot 11.89\text{kN/m}^3)}{1 - 2.56}$$

2) Dry Unit Weight given Percentage of Air Voids

Open Calculator

fx $$\gamma_{dry} = (1 - n_a) \cdot G_s \cdot \frac{\gamma_{water}}{1 + w_s \cdot G_s}$$

ex $$0.904423\text{kN/m}^3 = (1 - 0.2) \cdot 2.65 \cdot \frac{9.81\text{kN/m}^3}{1 + 8.3 \cdot 2.65}$$

3) Dry Unit Weight given Submerged Unit Weight of Soil and Porosity

Open Calculator

fx $$\gamma_{dry} = W_{su} + (1 - \eta) \cdot \gamma_{water}$$

ex $$16.705\text{kN/m}^3 = 11.8\text{kN} + (1 - 0.5) \cdot 9.81\text{kN/m}^3$$

4) Dry Unit Weight given Unit Weight of Solids

Open Calculator

fx $$\gamma_{dry} = \gamma_{soilds} \cdot \frac{Vs}{V}$$

ex $$6.12045 kN/m^3 = 15 kN/m^3 \cdot \frac{5.0 m^3}{12.254 m^3}$$

5) Dry Unit Weight given Water Content

Open Calculator

fx $$\gamma_{dry} = G_s \cdot \frac{\gamma_{water}}{1 + \frac{w_s}{S}}$$

ex $$6.128088 kN/m^3 = 2.65 \cdot \frac{9.81 kN/m^3}{1 + \frac{8.3}{2.56}}$$

6) Dry Unit Weight given Water Content at Full Saturation

Open Calculator

fx $$\gamma_{dry} = G_s \cdot \frac{\gamma_{water}}{1 + w_s \cdot G_s}$$

ex $$1.130528 kN/m^3 = 2.65 \cdot \frac{9.81 kN/m^3}{1 + 8.3 \cdot 2.65}$$

7) Dry Unit Weight of Soil when Saturation is 0 Percent

Open Calculator

fx $$\gamma_{dry} = \left(\frac{G_s \cdot \gamma_{water}}{1 + e_s} \right)$$

ex $$7.877727 kN/m^3 = \left(\frac{2.65 \cdot 9.81 kN/m^3}{1 + 2.3} \right)$$

Variables Used

- e_s Void Ratio of Soil
- G_s Specific Gravity of Soil
- n_a Percentage of Air Voids
- **S** Degree of Saturation
- **V** Total Volume in Soil Mechanics *(Cubic Meter)*
- **Vs** Volume of Solids *(Cubic Meter)*
- w_s Water Content of Soil from Pycnometer
- W_{su} Submerged Weight of Soil *(Kilonewton)*
- γ_{bulk} Bulk Unit Weight *(Kilonewton per Cubic Meter)*
- γ_{dry} Dry Unit Weight *(Kilonewton per Cubic Meter)*
- $\gamma_{saturated}$ Saturated Unit Weight of Soil *(Kilonewton per Cubic Meter)*
- γ_{soilds} Unit Weight of Solids *(Kilonewton per Cubic Meter)*
- γ_{water} Unit Weight of Water *(Kilonewton per Cubic Meter)*
- η Porosity in Soil Mechanics

Constants, Functions, Measurements used

- Measurement: **Volume** in Cubic Meter (m^3)
  Volume Unit Conversion
- Measurement: **Force** in Kilonewton (kN)
  Force Unit Conversion
- Measurement: **Specific Weight** in Kilonewton per Cubic Meter (kN/m^3)
  Specific Weight Unit Conversion

Check other formula lists

- **Density of Soil Formulas**
- **Dry Unit Weight of Soil Formulas**
- **Unit Weight of Soil Formulas**
- **Water Content and Volume of Solids in Soil Formulas**

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