calculatoratoz.com

unitsconverters.com

Unit Weight of Soil Formulas

Calculators! Examples! Conversions!

Bookmark **calculatoratoz.com**, **unitsconverters.com**

Widest Coverage of Calculators and Growing - **30,000+ Calculators!**
Calculate With a Different Unit for Each Variable - **In built Unit Conversion!**
Widest Collection of Measurements and Units - **250+ Measurements!**

Feel free to SHARE this document with your friends!

Please leave your feedback here...

List of 28 Unit Weight of Soil Formulas

Unit Weight of Soil

1) Average Unit Weight of Soil given Effective Surcharge

Open Calculator

fx $$\gamma = \frac{\sigma_s}{D_{footing}}$$

ex $$18.07087\text{kN/m}^3 = \frac{45.9\text{kN/m}^2}{2.54\text{m}}$$

2) Average Unit Weight of Soil given Net Pressure Intensity

Open Calculator

fx $$\gamma = \frac{q_g - q_n}{D_{footing}}$$

ex $$18.07087\text{kN/m}^3 = \frac{60.9\text{kN/m}^2 - 15.0\text{kN/m}^2}{2.54\text{m}}$$

3) Average Unit Weight of Soil given Net Ultimate Bearing Capacity

Open Calculator

fx $$\gamma_{avg} = \frac{q_{sa} - \left(\frac{q_{net}}{F_s}\right)}{D_{footing}}$$

ex $$8.921822\text{kN/m}^3 = \frac{36.34\text{kN/m}^2 - \left(\frac{38.3\text{kN/m}^2}{2.8}\right)}{2.54\text{m}}$$

4) Average Unit Weight of Soil given Safe Bearing Capacity

Open Calculator

fx $$\gamma_{avg} = \frac{q_{sa} - q_{nsa}}{D_{footing}}$$

ex $$8.051181\text{kN/m}^3 = \frac{36.34\text{kN/m}^2 - 15.89\text{kN/m}^2}{2.54\text{m}}$$

5) Bulk Unit Weight given Degree of Saturation

Open Calculator

fx $$\gamma_{bulk} = \gamma_{dry} + \left(S \cdot \left(\gamma_{saturated} - \gamma_{dry}\right)\right)$$

ex $$20.8912\text{kN/m}^3 = 6.12\text{kN/m}^3 + \left(2.56 \cdot \left(11.89\text{kN/m}^3 - 6.12\text{kN/m}^3\right)\right)$$

6) Bulk Unit Weight of Soil

Open Calculator

fx $$\gamma_t = \frac{W_t}{V}$$

ex $$6.52848\text{kg/m}^3 = \frac{80\text{kg}}{12.254\text{m}^3}$$

7) Density in Relation with Unit Weight

Open Calculator

fx $$\rho_s = \frac{\gamma_{soilds}}{9.8}$$

ex $$1530.612\text{kg/m}^3 = \frac{15\text{kN/m}^3}{9.8}$$

8) Dry Unit Weight of Soil

Open Calculator

fx $$\rho_d = \frac{W_s}{V}$$

ex $$0.049127\text{kg/m}^3 = \frac{0.602\text{kg}}{12.254\text{m}^3}$$

9) Gross Pressure Intensity given Average Unit Weight of Soil

Open Calculator

fx $$q_g = q_n + (\gamma \cdot D_{footing})$$

ex $$60.72\text{kN/m}^2 = 15.0\text{kN/m}^2 + (18\text{kN/m}^3 \cdot 2.54\text{m})$$

10) Gross Pressure Intensity given Net Pressure Intensity

Open Calculator

fx $$q_g = q_n + \sigma_s$$

ex $$60.9\text{kN/m}^2 = 15.0\text{kN/m}^2 + 45.9\text{kN/m}^2$$

11) Saturated Unit Weight given Bulk Unit Weight and Degree of Saturation

Open Calculator

fx $$\gamma_{saturated} = \left(\frac{\gamma_{bulk} - \gamma_{dry}}{S}\right) + \gamma_{dry}$$

ex $$11.88953\text{kN/m}^3 = \left(\frac{20.89\text{kN/m}^3 - 6.12\text{kN/m}^3}{2.56}\right) + 6.12\text{kN/m}^3$$

12) Saturated Unit Weight of Soil given Submerged Unit Weight

Open Calculator

fx $\gamma_{saturated} = y_S + \gamma_{water}$

ex $10.77\text{kN/m}^3 = 0.96\text{kN/m}^3 + 9.81\text{kN/m}^3$

13) Saturated Unit Weight of Soil given Water Content

Open Calculator

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

ex $73.26286\text{kN/m}^3 = \left(\frac{(1 + 8.3) \cdot 2.65 \cdot 9.81\text{kN/m}^3}{1 + 2.3}\right)$

14) Saturated Unit Weight of Soil with Saturation 100 Percent

Open Calculator

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

ex $14.715\text{kN/m}^3 = \left(\frac{(2.65 \cdot 9.81\text{kN/m}^3) + (2.3 \cdot 9.81\text{kN/m}^3)}{1 + 2.3}\right)$

15) Submerged Unit Weight

Open Calculator

fx $\gamma_{su} = \frac{W_d}{V}$

ex $8\text{kg/m}^3 = \frac{98.032\text{kg}}{12.254\text{m}^3}$

16) Submerged Unit Weight of Soil given Porosity

Open Calculator

fx $$y_S = \gamma_{dry} - (1 - \eta) \cdot \gamma_{water}$$

ex $$1.215\text{kN/m}^3 = 6.12\text{kN/m}^3 - (1 - 0.5) \cdot 9.81\text{kN/m}^3$$

17) Submerged Unit Weight with respect to Saturated Unit Weight

Open Calculator

fx $$y_S = \gamma_{saturated} - \gamma_{water}$$

ex $$2.08\text{kN/m}^3 = 11.89\text{kN/m}^3 - 9.81\text{kN/m}^3$$

18) Submerged Weight of Soil given Submerged Unit Weight

Open Calculator

fx $$W_d = \gamma_{su} \cdot V$$

ex $$98.032\text{kg} = 8\text{kg/m}^3 \cdot 12.254\text{m}^3$$

19) Total Volume given Saturated Unit Weight of Soil

Open Calculator

fx $$V = \frac{W_{sat}}{\gamma_{saturated}}$$

ex $$1.679563\text{m}^3 = \frac{19.97\text{kg}}{11.89\text{kN/m}^3}$$

20) Total Volume given Submerged Unit Weight

Open Calculator

fx $$V = \frac{W_d}{\gamma_{su}}$$

ex $$12.254\text{m}^3 = \frac{98.032\text{kg}}{8\text{kg/m}^3}$$

21) Total Volume of Soil given Bulk Unit Weight of Soil

Open Calculator

fx $$V = \frac{W_t}{\gamma_{bulk}}$$

ex $$3.829584\text{m}^3 = \frac{80\text{kg}}{20.89\text{kN/m}^3}$$

22) Total Volume of Soil given Dry Unit Weight of Soil

Open Calculator

fx $$V = \frac{W_s}{\rho_d}$$

ex $$12.28571\text{m}^3 = \frac{0.602\text{kg}}{0.049\text{kg/m}^3}$$

23) Total Weight of Soil given Bulk Unit Weight of Soil

Open Calculator

fx $$W_t = \gamma_t \cdot V$$

ex $$79.89608\text{kg} = 6.52\text{kg/m}^3 \cdot 12.254\text{m}^3$$

24) Unit Weight of Solids

Open Calculator

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

ex $$14.9989\text{kN/m}^3 = 6.12\text{kN/m}^3 \cdot \frac{12.254\text{m}^3}{5.0\text{m}^3}$$

25) Unit weight of Solids in Relation with Specific Gravity

Open Calculator

fx $$\gamma_{soilds} = 9.81 \cdot G_s$$

ex $$25.9965\text{kN/m}^3 = 9.81 \cdot 2.65$$

26) Unit Weight of Water given Submerged Unit Weight

Open Calculator

fx $$\gamma_{water} = \frac{\gamma_{soilds}}{G_s}$$

ex $$5.660377\text{kN/m}^3 = \frac{15\text{kN/m}^3}{2.65}$$

27) Volume of Solids given Unit Weight of Solids

Open Calculator

fx $$Vs = \frac{W_s}{\rho_s}$$

ex $$0.000393\text{m}^3 = \frac{0.602\text{kg}}{1530\text{kg/m}^3}$$

28) Weight of Solids given Dry Unit Weight of Soil

Open Calculator

fx $W_s = V \cdot \rho_d$

ex $0.600446\text{kg} = 12.254\text{m}^3 \cdot 0.049\text{kg/m}^3$

Variables Used

- $D_{footing}$ Depth of Footing in Soil *(Meter)*
- e_s Void Ratio of Soil
- F_s Factor of Safety in Soil Mechanics
- G_s Specific Gravity of Soil
- q_g Gross Pressure *(Kilonewton per Square Meter)*
- q_n Net Pressure *(Kilonewton per Square Meter)*
- q_{net} Net Ultimate Bearing Capacity in Soil *(Kilonewton per Square Meter)*
- q_{nsa} Net Safe Bearing Capacity in Soil *(Kilonewton per Square Meter)*
- q_{sa} Safe Bearing Capacity *(Kilonewton per Square Meter)*
- S Degree of Saturation
- V Total Volume in Soil Mechanics *(Cubic Meter)*
- Vs Volume of Solids *(Cubic Meter)*
- W_d Submerged Weight of Solids *(Kilogram)*
- w_s Water Content of Soil from Pycnometer
- W_s Weight of Solids in Soil Mechanics *(Kilogram)*
- W_{sat} Saturated Weight of Soil *(Kilogram)*
- W_t Total Weight of Soil *(Kilogram)*
- γ_S Submerged Unit Weight in KN per Cubic Meter *(Kilonewton per Cubic Meter)*
- γ Unit Weight of Soil *(Kilonewton per Cubic Meter)*
- γ_{avg} Average Unit Weight *(Kilonewton per Cubic Meter)*

- 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_{su} Submerged Unit Weight of Water *(Kilogram per Cubic Meter)*
- γ_{t} Bulk Density of Soil *(Kilogram per Cubic Meter)*
- γ_{water} Unit Weight of Water *(Kilonewton per Cubic Meter)*
- η Porosity in Soil Mechanics
- ρ_{d} Dry Density *(Kilogram per Cubic Meter)*
- ρ_{s} Density of Solids *(Kilogram per Cubic Meter)*
- σ_{s} Effective Surcharge in Kilopascal *(Kilonewton per Square Meter)*

Constants, Functions, Measurements used

- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Weight** in Kilogram (kg)
  Weight Unit Conversion
- Measurement: **Volume** in Cubic Meter (m^3)
  Volume Unit Conversion
- Measurement: **Pressure** in Kilonewton per Square Meter (kN/m^2)
  Pressure Unit Conversion
- Measurement: **Density** in Kilogram per Cubic Meter (kg/m^3)
  Density 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**

Feel free to SHARE this document with your friends!

PDF Available in

English Spanish French German Russian Italian Portuguese Polish Dutch

7/12/2024 | 6:28:11 AM UTC

Please leave your feedback here...