Important Pavement Materials Formulas PDF

Formulas
Examples
with Units

List of 14
Important Pavement Materials Formulas

1) Fuller law Formulas

1.1) Coarseness of Aggregates in Fuller Law Formula

Evaluate Formula

Formula

$$n = \frac{\log10\left(\frac{P_{weight}}{100}\right)}{\log10\left(\frac{d}{D}\right)}$$

Example with Units

$$0.25 = \frac{\log10\left(\frac{78.254}{100}\right)}{\log10\left(\frac{33\,mm}{88\,mm}\right)}$$

1.2) Percent by Weight in Fuller Law Formula

Evaluate Formula

Formula

$$P_{weight} = 100 \cdot \left(\frac{d}{D}\right)^{n}$$

Example with Units

$$78.2542 = 100 \cdot \left(\frac{33\,mm}{88\,mm}\right)^{0.25}$$

1.3) Size of Largest Particle in Fuller Law Formula

Evaluate Formula

Formula

$$D = \frac{d}{\left(\frac{P_{weight}}{100}\right)^{\frac{1}{n}}}$$

Example with Units

$$88.001\,mm = \frac{33\,mm}{\left(\frac{78.254}{100}\right)^{\frac{1}{0.25}}}$$

1.4) Size of Smallest Particle in Fuller Law Formula

Evaluate Formula

Formula

$$d = D \cdot \left(\frac{P_{weight}}{100}\right)^{\frac{1}{n}}$$

Example with Units

$$32.9996\,mm = 88\,mm \cdot \left(\frac{78.254}{100}\right)^{\frac{1}{0.25}}$$

2) Plate Load Test Formulas

2.1) Bearing Pressure given Modulus of Subgrade Reaction Formula

Evaluate Formula

Formula

$$P = K_{sr} \cdot 0.125$$

Example with Units

$$50\,N/m^2 = 400\,N/m^3 \cdot 0.125$$

2.2) Modulus of Subgrade Reaction for Plate Load Test Formula

Evaluate Formula

Formula

$$K_{sr} = \frac{P}{0.125}$$

Example with Units

$$400\,\text{N/m}^3 = \frac{50\,\text{N/m}^2}{0.125}$$

3) Specific Gravity and Water Absorption Formulas

3.1) Apparent Specific Gravity Formula

Evaluate Formula

Formula

$$G_{app} = \frac{\frac{M_D}{V_N}}{W}$$

Example with Units

$$2.5 = \frac{\frac{2\,\text{kg}}{0.0008\,\text{m}^3}}{1000\,\text{kg/m}^3}$$

3.2) Bulk Specific Gravity given Dry Mass and Net Volume Formula

Evaluate Formula

Formula

$$G_{bulk} = \frac{\frac{M_D}{V_{total}}}{W}$$

Example with Units

$$2.2222 = \frac{\frac{2\,\text{kg}}{0.0009\,\text{m}^3}}{1000\,\text{kg/m}^3}$$

3.3) Density given Apparent Specific Gravity Formula

Evaluate Formula

Formula

$$W = \frac{\frac{M_D}{V_N}}{G_{app}}$$

Example with Units

$$1000\,\text{kg/m}^3 = \frac{\frac{2\,\text{kg}}{0.0008\,\text{m}^3}}{2.5}$$

3.4) Density given Bulk Specific Gravity Formula

Evaluate Formula

Formula

$$W = \frac{\frac{M_D}{V_{total}}}{G_{bulk}}$$

Example with Units

$$1001.001\,\text{kg/m}^3 = \frac{\frac{2\,\text{kg}}{0.0009\,\text{m}^3}}{2.22}$$

3.5) Dry Mass given Apparent Specific Gravity Formula

Evaluate Formula

Formula

$$M_D = G_{app} \cdot W \cdot V_N$$

Example with Units

$$2\,\text{kg} = 2.5 \cdot 1000\,\text{kg/m}^3 \cdot 0.0008\,\text{m}^3$$

3.6) Dry Mass given Bulk Specific Gravity and Net Volume Formula

Evaluate Formula

Formula

$$M_D = G_{bulk} \cdot W \cdot V_{total}$$

Example with Units

$$1.998\,\text{kg} = 2.22 \cdot 1000\,\text{kg/m}^3 \cdot 0.0009\,\text{m}^3$$

3.7) Net Volume given Apparent Specific Gravity Formula

Evaluate Formula

Formula

$$V_N = \frac{M_D}{G_{app} \cdot W}$$

Example with Units

$$0.0008\,\text{m}^3 = \frac{2\,\text{kg}}{2.5 \cdot 1000\,\text{kg/m}^3}$$

3.8) Total Volume given Bulk Specific Gravity and Dry Mass Formula

Evaluate Formula

Formula

$$V_{total} = \frac{M_D}{G_{bulk} \cdot W}$$

Example with Units

$$0.0009\,\text{m}^3 = \frac{2\,\text{kg}}{2.22 \cdot 1000\,\text{kg/m}^3}$$

Variables used in list of Pavement Materials Formulas above

- **d** Smallest Particle *(Millimeter)*
- **D** Largest Particle *(Millimeter)*
- G_{app} Apparent Specific Gravity
- G_{bulk} Bulk Specific Gravity
- K_{sr} Modulus of Subgrade Reaction *(Newton per Cubic Meter)*
- M_D Dry Mass *(Kilogram)*
- **n** Coarseness of Aggregates
- **P** Bearing Pressure *(Newton per Square Meter)*
- P_{weight} Percentage of Weight
- V_N Net Volume *(Cubic Meter)*
- V_{total} Total volume *(Cubic Meter)*
- **W** Density *(Kilogram per Cubic Meter)*

Constants, Functions, Measurements used in list of Pavement Materials Formulas above

- Functions: **log10**, log10(Number)
  The common logarithm, also known as the base-10 logarithm or the decimal logarithm, is a mathematical function that is the inverse of the exponential function.
- Measurement: **Length** in Millimeter (mm)
  Length Unit Conversion
- Measurement: **Weight** in Kilogram (kg)
  Weight Unit Conversion
- Measurement: **Volume** in Cubic Meter (m^3)
  Volume Unit Conversion
- Measurement: **Pressure** in Newton per Square Meter (N/m^2)
  Pressure Unit Conversion
- Measurement: **Density** in Kilogram per Cubic Meter (kg/m^3)
  Density Unit Conversion
- Measurement: **Specific Weight** in Newton per Cubic Meter (N/m^3)
  Specific Weight Unit Conversion

Download other Important Transportation System PDFs

- Important Design of Superelevation Formulas
- Important Pavement Materials Formulas

Try our Unique Visual Calculators

- Percentage increase
- HCF calculator
- Mixed fraction

Please SHARE this PDF with someone who needs it!

This PDF can be downloaded in these languages

English Spanish French German Russian Italian Portuguese Polish Dutch

7/9/2024 | 5:43:16 AM UTC