Important Load Distribution to Bents and Shear Walls Formulas PDF

Formulas Examples with Units

List of 11
Important Load Distribution to Bents and Shear Walls Formulas

1) Concentrated Load given Deflection at Top Formula

Evaluate Formula

Formula

$$P = \frac{\delta \cdot E \cdot t}{4 \cdot \left(\left(\left(\frac{H}{L}\right)^3\right) + \left(0.75 \cdot \left(\frac{H}{L}\right)\right)\right)}$$

Example with Units

$$516.5165\,\text{kN} = \frac{0.172\,\text{m} \cdot 20\,\text{MPa} \cdot 0.4\,\text{m}}{4 \cdot \left(\left(\left(\frac{15\,\text{m}}{25\,\text{m}}\right)^3\right) + \left(0.75 \cdot \left(\frac{15\,\text{m}}{25\,\text{m}}\right)\right)\right)}$$

2) Concentrated Load given Deflection at Top Due to Fixed against Rotation Formula

Evaluate Formula

Formula

$$P = \frac{\delta \cdot E \cdot t}{\left(\frac{H}{L}\right)^3 + \left(3 \cdot \left(\frac{H}{L}\right)\right)}$$

Example with Units

$$682.5397\,\text{kN} = \frac{0.172\,\text{m} \cdot 20\,\text{MPa} \cdot 0.4\,\text{m}}{\left(\frac{15\,\text{m}}{25\,\text{m}}\right)^3 + \left(3 \cdot \left(\frac{15\,\text{m}}{25\,\text{m}}\right)\right)}$$

3) Deflection at Top due to Concentrated Load Formula

Evaluate Formula

Formula

$$\delta = \left(\frac{4 \cdot P}{E \cdot t}\right) \cdot \left(\left(\frac{H}{L}\right)^3 + 0.75 \cdot \left(\frac{H}{L}\right)\right)$$

Example with Units

$$0.172\,\text{m} = \left(\frac{4 \cdot 516.51\,\text{kN}}{20\,\text{MPa} \cdot 0.4\,\text{m}}\right) \cdot \left(\left(\frac{15\,\text{m}}{25\,\text{m}}\right)^3 + 0.75 \cdot \left(\frac{15\,\text{m}}{25\,\text{m}}\right)\right)$$

4) Deflection at Top due to Fixed against Rotation Formula

Evaluate Formula

Formula

$$\delta = \left(\frac{P}{E \cdot t}\right) \cdot \left(\left(\frac{H}{L}\right)^3 + 3 \cdot \left(\frac{H}{L}\right)\right)$$

Example with Units

$$0.1302\,\text{m} = \left(\frac{516.51\,\text{kN}}{20\,\text{MPa} \cdot 0.4\,\text{m}}\right) \cdot \left(\left(\frac{15\,\text{m}}{25\,\text{m}}\right)^3 + 3 \cdot \left(\frac{15\,\text{m}}{25\,\text{m}}\right)\right)$$

5) Deflection at Top due to Uniform Load Formula

Evaluate Formula

Formula

$$\delta = \left(\frac{1.5 \cdot w \cdot H}{E \cdot t}\right) \cdot \left(\left(\frac{H}{L}\right)^3 + \left(\frac{H}{L}\right)\right)$$

Example with Units

$$0.1721\,\text{m} = \left(\frac{1.5 \cdot 75\,\text{kN} \cdot 15\,\text{m}}{20\,\text{MPa} \cdot 0.4\,\text{m}}\right) \cdot \left(\left(\frac{15\,\text{m}}{25\,\text{m}}\right)^3 + \left(\frac{15\,\text{m}}{25\,\text{m}}\right)\right)$$

6) Modulus of Elasticity given Deflection at Top Due to Concentrated Load Formula

Evaluate Formula

Formula

$$E = \left(\frac{4 \cdot P}{\delta \cdot t}\right) \cdot \left(\left(\frac{H}{L}\right)^3 + 0.75 \cdot \left(\frac{H}{L}\right)\right)$$

Example with Units

$$19.9997\,\text{MPa} = \left(\frac{4 \cdot 516.51\,\text{kN}}{0.172\,\text{m} \cdot 0.4\,\text{m}}\right) \cdot \left(\left(\frac{15\,\text{m}}{25\,\text{m}}\right)^3 + 0.75 \cdot \left(\frac{15\,\text{m}}{25\,\text{m}}\right)\right)$$

7) Modulus of Elasticity given Deflection at Top Due to Fixed against Rotation Formula

Evaluate Formula

Formula

$$E = \left(\frac{P}{\delta \cdot t}\right) \cdot \left(\left(\frac{H}{L}\right)^3 + 3 \cdot \left(\frac{H}{L}\right)\right)$$

Example with Units

$$15.1349\,\text{MPa} = \left(\frac{516.51\,\text{kN}}{0.172\,\text{m} \cdot 0.4\,\text{m}}\right) \cdot \left(\left(\frac{15\,\text{m}}{25\,\text{m}}\right)^3 + 3 \cdot \left(\frac{15\,\text{m}}{25\,\text{m}}\right)\right)$$

8) Modulus of Elasticity of Wall Material given Deflection Formula

Evaluate Formula

Formula

$$E = \left(\frac{1.5 \cdot w \cdot H}{\delta \cdot t}\right) \cdot \left(\left(\frac{H}{L}\right)^3 + \left(\frac{H}{L}\right)\right)$$

Example with Units

$$20.0145\,\text{MPa} = \left(\frac{1.5 \cdot 75\,\text{kN} \cdot 15\,\text{m}}{0.172\,\text{m} \cdot 0.4\,\text{m}}\right) \cdot \left(\left(\frac{15\,\text{m}}{25\,\text{m}}\right)^3 + \left(\frac{15\,\text{m}}{25\,\text{m}}\right)\right)$$

9) Wall Thickness given Deflection Formula

Evaluate Formula

Formula

$$t = \left(\frac{1.5 \cdot w \cdot H}{E \cdot \delta}\right) \cdot \left(\left(\frac{H}{L}\right)^3 + \left(\frac{H}{L}\right)\right)$$

Example with Units

$$0.4003\,\text{m} = \left(\frac{1.5 \cdot 75\,\text{kN} \cdot 15\,\text{m}}{20\,\text{MPa} \cdot 0.172\,\text{m}}\right) \cdot \left(\left(\frac{15\,\text{m}}{25\,\text{m}}\right)^3 + \left(\frac{15\,\text{m}}{25\,\text{m}}\right)\right)$$

10) Wall Thickness given Deflection at Top due to Concentrated Load Formula

Evaluate Formula

Formula

$$t = \left(\frac{4 \cdot P}{E \cdot \delta}\right) \cdot \left(\left(\frac{H}{L}\right)^3 + 0.75 \cdot \left(\frac{H}{L}\right)\right)$$

Example with Units

$$0.4\,\text{m} = \left(\frac{4 \cdot 516.51\,\text{kN}}{20\,\text{MPa} \cdot 0.172\,\text{m}}\right) \cdot \left(\left(\frac{15\,\text{m}}{25\,\text{m}}\right)^3 + 0.75 \cdot \left(\frac{15\,\text{m}}{25\,\text{m}}\right)\right)$$

11) Wall Thickness given Deflection at Top due to Fixed against Rotation Formula

Evaluate Formula

Formula

$$t = \left(\frac{P}{E \cdot \delta}\right) \cdot \left(\left(\frac{H}{L}\right)^3 + 3 \cdot \left(\frac{H}{L}\right)\right)$$

Example with Units

$$0.3027\,\text{m} = \left(\frac{516.51\,\text{kN}}{20\,\text{MPa} \cdot 0.172\,\text{m}}\right) \cdot \left(\left(\frac{15\,\text{m}}{25\,\text{m}}\right)^3 + 3 \cdot \left(\frac{15\,\text{m}}{25\,\text{m}}\right)\right)$$

Variables used in list of Load Distribution to Bents and Shear Walls Formulas above

- **E** Modulus of Elasticity of Wall Material *(Megapascal)*
- **H** Height of the Wall *(Meter)*
- **L** Length of Wall *(Meter)*
- **P** Concentrated Load on Wall *(Kilonewton)*
- **t** Wall Thickness *(Meter)*
- **w** Uniform Lateral Load *(Kilonewton)*
- **δ** Deflection of Wall *(Meter)*

Constants, Functions, Measurements used in list of Load Distribution to Bents and Shear Walls Formulas above

- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Pressure** in Megapascal (MPa)
  Pressure Unit Conversion
- Measurement: **Force** in Kilonewton (kN)
  Force Unit Conversion

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