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Adjustment Factors for Design Values Formulas

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List of 16 Adjustment Factors for Design Values Formulas

Adjustment Factors for Design Values

1) Adjusted Design Value for Compression Parallel to Grain

Open Calculator

fx $$F' = (F_c \cdot C_D \cdot C_m \cdot C_t \cdot C_F \cdot C_p)$$

ex $$5.66433\text{MPa} = (7.5\text{MPa} \cdot 0.74 \cdot 0.81 \cdot 0.8 \cdot 1.05 \cdot 1.5)$$

2) Adjusted Design Value for Compression Perpendicular to Grain

Open Calculator

fx $$F' = F_{c\perp} \cdot C_m \cdot C_t \cdot C_b$$

ex $$5.87574\text{MPa} = 9\text{MPa} \cdot 0.81 \cdot 0.8 \cdot 1.0075$$

3) Adjusted Design Value for End Grain in Bearing Parallel to Grain

Open Calculator

fx $$F' = F_g \cdot C_D \cdot C_t$$

ex $$10.064\text{MPa} = 17\text{MPa} \cdot 0.74 \cdot 0.8$$

4) Adjusted Design Value for Shear

Open Calculator

fx $$F' = F_v \cdot C_D \cdot C_m \cdot C_t \cdot C_H$$

ex $$9.35064\text{MPa} = 30\text{MPa} \cdot 0.74 \cdot 0.81 \cdot 0.8 \cdot 0.65$$

5) Adjusted Design Value for Tension

Open Calculator

fx $$F' = (F_t \cdot C_D \cdot C_m \cdot C_t \cdot C_F)$$

ex $$8.408383\text{MPa} = (16.70\text{MPa} \cdot 0.74 \cdot 0.81 \cdot 0.8 \cdot 1.05)$$

Bearing Area Factor

6) Bearing Area Factor

Open Calculator

fx $$C_b = \left(\frac{l_{b1} + 0.375}{l_{b1}}\right)$$

ex $$1.0075 = \left(\frac{50.0\text{mm} + 0.375}{50.0\text{mm}}\right)$$

7) Bearing Length given Bearing Area Factor

Open Calculator

fx $$l_{b1} = \left(\frac{0.375}{C_b - 1}\right)$$

ex $$50\text{mm} = \left(\frac{0.375}{1.0075 - 1}\right)$$

Column Stability and Buckling Stiffness Factor

8) Buckling Stiffness Factor

Open Calculator

$$C_T = 1 + \left(\frac{K_M \cdot L_e}{K_T \cdot E} \right)$$

$$97.81356 = 1 + \left(\frac{1200 \cdot 2380\text{mm}}{0.59 \cdot 50\text{MPa}} \right)$$

9) Slenderness Ratio for Beams

Open Calculator

$$R_B = \sqrt{\frac{L_e \cdot d}{(w)^2}}$$

$$13.52799 = \sqrt{\frac{2380\text{mm} \cdot 200\text{mm}}{(51\text{mm})^2}}$$

Radial Stresses and Curvature Factor

10) Bending Moment given Radial Stress in Member

Open Calculator

$$M'_b = \frac{2 \cdot \sigma_r \cdot R \cdot w \cdot d}{3}$$

$$800.0003\text{N*m} = \frac{2 \cdot 1.30719\text{MPa} \cdot 90\text{mm} \cdot 51\text{mm} \cdot 200\text{mm}}{3}$$

11) Cross Section Depth given Radial Stress in Member

Open Calculator

$$d = \frac{3 \cdot M'_b}{2 \cdot \sigma_r \cdot R \cdot w}$$

$$199.9999\text{mm} = \frac{3 \cdot 800\text{N*m}}{2 \cdot 1.30719\text{MPa} \cdot 90\text{mm} \cdot 51\text{mm}}$$

12) Cross Section Width given Radial Stress in Member

Open Calculator

$$w = \frac{3 \cdot M'_b}{2 \cdot \sigma_r \cdot R \cdot d}$$

$$50.99998\text{mm} = \frac{3 \cdot 800\text{N*m}}{2 \cdot 1.30719\text{MPa} \cdot 90\text{mm} \cdot 200\text{mm}}$$

13) Curvature Factor for Adjustment in Design Value for Curved Portions of Wood

Open Calculator

$$C_c = 1 - \left(2000 \cdot \left(\frac{t}{R}\right)^2\right)$$

$$0.8 = 1 - \left(2000 \cdot \left(\frac{0.9\text{mm}}{90\text{mm}}\right)^2\right)$$

14) Radial Stress Induced by Bending Moment in Member

Open Calculator

$$\sigma_r = 3 \cdot \frac{M'_b}{2 \cdot R \cdot w \cdot d}$$

$$1.30719\text{MPa} = 3 \cdot \frac{800\text{N*m}}{2 \cdot 90\text{mm} \cdot 51\text{mm} \cdot 200\text{mm}}$$

15) Radius of Curvature given Radial Stress in Member

Open Calculator

$$R = \frac{3 \cdot M'_b}{2 \cdot \sigma_r \cdot w \cdot d}$$

$$89.99997\text{mm} = \frac{3 \cdot 800\text{N*m}}{2 \cdot 1.30719\text{MPa} \cdot 51\text{mm} \cdot 200\text{mm}}$$

16) Size Factor for Adjustment in Design Value for Bending

Open Calculator

$$C_F = \left(\frac{12}{d}\right)^{\frac{1}{9}}$$

$$1.047929 = \left(\frac{12}{200\text{mm}}\right)^{\frac{1}{9}}$$

Variables Used

- C_b Bearing Area Factor
- C_c Curvature Factor
- C_D Load Duration Factor
- C_F Size Factor
- C_H Shear Stress Factor
- C_m Wet Service Factor
- C_p Column Stability Factor
- C_t Temperature Factor
- C_T Buckling Stiffness Factor
- **d** Depth of Cross Section *(Millimeter)*
- **E** Modulus of Elasticity *(Megapascal)*
- **F'** Adjusted Design Value *(Megapascal)*
- F_c Design Value for Parallel Compression *(Megapascal)*
- $F_{c\perp}$ Design Value for Compression Perpendicular *(Megapascal)*
- F_g Design Value for Bearing *(Megapascal)*
- F_t Design Value for Tension *(Megapascal)*
- F_v Design Value for Shear *(Megapascal)*
- K_M Stiffness Factor for Wood
- K_T Stiffness Factor for Lumber
- l_{b1} Length of Bearing *(Millimeter)*
- L_e Effective Length *(Millimeter)*

- M'_b Bending Moment for Radial Stress *(Newton Meter)*
- R Radius of Curvature at Centerline of Member *(Millimeter)*
- R_B Slenderness Ratio
- t Lamination Thickness *(Millimeter)*
- w Width of Cross Section *(Millimeter)*
- σ_r Radial Stress *(Megapascal)*

Constants, Functions, Measurements used

- Function: **sqrt**, sqrt(Number)
  Square root function
- Measurement: **Length** in Millimeter (mm)
  Length Unit Conversion
- Measurement: **Pressure** in Megapascal (MPa)
  Pressure Unit Conversion
- Measurement: **Moment of Force** in Newton Meter (N*m)
  Moment of Force Unit Conversion
- Measurement: **Stress** in Megapascal (MPa)
  Stress Unit Conversion

Check other formula lists

- **Adjustment Factors for Design Values Formulas**
- **Adjustment of Design Values for Connections with Fasteners Formulas**
- **Fasteners for Wood Formulas**
- **Laboratory Recommendations, Roof Slope and Oblique Plane Formulas**
- **Solid Rectangular or Square Columns with Flat Ends Formulas**
- **Timber Beams and Columns Formulas**

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