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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

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

[Open Calculator !\[\]\(a870788d6ed9b8fd294b7654a8c8526b_img.jpg\)](#)

$$ex \quad 5.66433MPa = (7.5MPa \cdot 0.74 \cdot 0.81 \cdot 0.8 \cdot 1.05 \cdot 1.5)$$

2) Adjusted Design Value for Compression Perpendicular to Grain

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

[Open Calculator !\[\]\(c50c8b7b2cc2cf9ff925edec0ee94c0d_img.jpg\)](#)

$$ex \quad 5.87574MPa = 9MPa \cdot 0.81 \cdot 0.8 \cdot 1.0075$$

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

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

[Open Calculator !\[\]\(f60b7a900783ac3fd531bfd9c111be6d_img.jpg\)](#)

$$ex \quad 10.064MPa = 17MPa \cdot 0.74 \cdot 0.8$$

4) Adjusted Design Value for Shear

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

[Open Calculator !\[\]\(83bbbd261710c59db0214aa27b2edc0d_img.jpg\)](#)

$$ex \quad 9.35064MPa = 30MPa \cdot 0.74 \cdot 0.81 \cdot 0.8 \cdot 0.65$$



5) Adjusted Design Value for Tension

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

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

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

Bearing Area Factor

6) Bearing Area Factor

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

[Open Calculator !\[\]\(5361750c22c4e047a52f4eac1ec2d4cc_img.jpg\)](#)

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

7) Bearing Length given Bearing Area Factor

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

[Open Calculator !\[\]\(b792654f2cef9719eabeb6c5be00811e_img.jpg\)](#)

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



Column Stability and Buckling Stiffness Factor

8) Buckling Stiffness Factor

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

[Open Calculator !\[\]\(23d9fc146e83b5c3013cfa32c784f8d5_img.jpg\)](#)

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

9) Slenderness Ratio for Beams

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

[Open Calculator !\[\]\(aa53ad6fea213b8b2226d3077e30533a_img.jpg\)](#)

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

Radial Stresses and Curvature Factor

10) Bending Moment given Radial Stress in Member

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

[Open Calculator !\[\]\(a8f9309f944226d1420f5fed22e2b6e6_img.jpg\)](#)

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



11) Cross Section Depth given Radial Stress in Member

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

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a_img.jpg\)](#)

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

12) Cross Section Width given Radial Stress in Member

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

[Open Calculator !\[\]\(0b5e7e25e8775f7e7e80906ada4f0021_img.jpg\)](#)

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

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

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

[Open Calculator !\[\]\(bd3b31712ad9bab5a241210fa6925cdd_img.jpg\)](#)

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



14) Radial Stress Induced by Bending Moment in Member

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

[Open Calculator !\[\]\(d3fb9f94af8b26d1c844efa9a98805b0_img.jpg\)](#)

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

15) Radius of Curvature given Radial Stress in Member

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

[Open Calculator !\[\]\(e1d6102fe77919492c04879c8450f1f5_img.jpg\)](#)

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

16) Size Factor for Adjustment in Design Value for Bending

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

[Open Calculator !\[\]\(ab4e2b3fc7e7887b7a72f548aa6f5e60_img.jpg\)](#)

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



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](#) 
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