

Thermal Formulae

$$\Phi_{Total} = \Phi_{Fabric} + \Phi_{Vent} \quad W$$

$$\Phi_{Fabric} = \sum A_n U_n (T_H - T_L) \quad W, \quad \Phi_{Vent.} = \frac{NV}{3} (T_H - T_L) \quad W$$

$$U_n = \frac{1}{\sum R} = \frac{1}{R_{Si} + R_1 + R_2 + R_G + R_3 + R_{So}} \quad Wm^{-2}K^{-1}, \quad \frac{\sum R_i}{R_{Layer}} = \frac{T_{in} - T_{out}}{\Delta T_{Layer}}$$

$$C = \frac{\lambda}{x} \quad W/m^2K, \quad R = \frac{1}{C} \quad m^2K/W, \quad R = \frac{x}{\lambda} \quad m^2K/W, \quad R = r \quad x \quad m^2K/W$$

Lighting Formulae

$$\Phi_V = 683 \sum_{\lambda=400}^{\lambda=700} V_\lambda P_\lambda \quad lm, \quad E_{Av} = \frac{\Phi}{A_T (1 - \rho_{Av})} \quad lx, \quad DF_{Av} \cong \frac{\theta^\circ A_G \tau MF GBC}{2A_T (1 - \rho_{Av})} \%$$

$$\gamma_{Noon} = 90^\circ - Lat. + Dec., \quad \gamma_{Midnight} = Lat. + Dec. - 90^\circ, \quad \cos Z_{\gamma=0} = -\frac{\sin D}{\cos L}$$

$$R_\gamma = R_0 \tan\left(\frac{90^\circ - \gamma}{2}\right)$$

Acoustic Formulae

$$I = \frac{P_{RMS}^2}{\rho c} \quad Wm^{-2}, \quad I_{Total} = I_1 + I_2 + I_3 + \dots + I_N \quad Wm^{-2}$$

$$SIL_1 = 10 \log_{10} \left(\frac{I_1}{I_0} \right) \quad dB, \quad I_0 = 10^{-12} \quad Wm^{-2}$$

$$SPL_1 = 10 \log_{10} \left(\frac{P_1}{P_0} \right)^2 \quad dB, \quad SPL_1 = 20 \log_{10} \left(\frac{P_1}{P_0} \right) \quad dB, \quad P_0 = 2 \times 10^{-5} \quad Nm^{-2}$$

$$SWL_1 = 10 \log_{10} \left(\frac{W_1}{W_0} \right) \quad dB, \quad W_0 = 10^{-12} \quad W$$

$$A = \log_{10} B, \quad \text{taking antilogarithms both sides, } 10^A = B$$

$$SIL_{Total} = 10 \log_{10} \left(10^{\frac{SIL_1}{10}} + 10^{\frac{SIL_2}{10}} + 10^{\frac{SIL_3}{10}} + \dots + 10^{\frac{SIL_N}{10}} \right) \quad dB$$

$$SRI = 10 \log_{10} \left(\frac{1}{\tau} \right) \quad dB, \quad \tau_{Total} = \frac{A_1 \tau_1 + A_2 \tau_2}{A_1 + A_2}, \quad RT = \frac{0.16V}{\sum_{n=1}^{n=N} A_n \alpha_n} \quad \text{sec}$$