

Solution: TDN°2

Exercice 1:

$$1) \phi = K \times (T_1 - T_2) \times S$$

$$\phi_m = 707 \text{ W}$$

$$\phi_v = 323 \text{ W} \Rightarrow \phi = \phi_m + \phi_v = 1030 \text{ W}$$

$$2) K = \frac{\sum K_i \times S_i}{\sum S_i} \Rightarrow K = \frac{K_m \times S_m + K_v \times S_v}{S_m + S_v} = 1.493 \text{ W/m}^2 \cdot \text{K}$$

$$\phi = K \times S \times \Delta T = 1.493 \times (30) \times 23 = 1030 \text{ W}$$

Ponts thermiques

$$3) \phi_p = (\psi \times L + \chi) \times \Delta T = 389 \text{ W}$$

$$\phi' = \phi_p + \phi = 1419 \text{ W}$$

$$4) K_{global} = \frac{\sum K_i \times S_i + \sum \psi_j \times L_j + \sum \chi_k}{\sum S_i}$$

$$K_{global} = \frac{K_m \times S_m + K_v \times S_v + \psi \times L + \chi}{S_m + S_v} = 2.06 \text{ W / m}^2 \cdot \text{K}$$

$$\phi' = K_{global} \times (S_m + S_v) \times \Delta T = 1419 \text{ W}$$

$$5) \phi_{air} = \rho \times \dot{V}_{air} \times C_{air} \times \Delta T = \rho \times \frac{V}{t} \times C_{air} \times \Delta T$$

Avec, $t=1\text{h}$

En multipliant par le pourcentage 0.9, on trouve

$$\phi_{air} = 1784 \text{ W}$$

$$6) \phi'' = 1030 + 389 + 1784 = 3203 \text{ W}$$

$$7) \phi'' = GV \times (T_i - T_e)$$

$$GV = \frac{\phi''}{(T_i - T_e)} = 139.26 \text{ W/K}$$

$$G = \frac{GV}{V} = \frac{139.26}{240} = 0.58 \text{ W/m}^3 \cdot \text{K}$$

Exercice 2 :

1)

$$K = \frac{K_m \times S_m + K_v \times S_v}{S_m + S_v} = 3.32 \text{ W/m}^2 \cdot \text{K}$$

2)

$$G_{paroi} = \frac{K_m \times S_m + K_v \times S_v}{V} = 0.553 \text{W/K.m}^3$$

3)

$$G = G_{paroi} + G' + G'' = 1.193 \text{W/K.m}^3$$

4) Puissance de chauffage du studio

$$P = GV \times \Delta T = 1.6 \text{KW}$$