

AC Example
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This is the answer for Q6-10 from chapter 6, it involves both chapter 5 and six joined together, but I took Jordan design temperature instead. The total load is the summation of all separate loads. Floor has been included for the purpose of illustration, but not required from you as I have not explained it.

Q 6-10

For Jordan $t_o = 30^\circ\text{F}$ $t_i = 70^\circ\text{F}$

Transmission heat loss = $qUA(t_i - t_o)$

Windows: $A_{\text{win}} = (3 \times 4) \times 12 = 144 \text{ ft}^2$

3 windows at each side, we have 4 sides

so total windows = $3 \times 4 = 12$

From table 5-5a, $U = 0.33 \text{ Btu}/(\text{hr}\cdot\text{ft}^2\cdot\text{F})$

$$q = 0.33(144)(70 - 30) =$$

Doors: $A = (3 \times 6.75) \times 12 = 243 \text{ ft}^2$

From table 5-8, $U = 0.28 \text{ Btu}/(\text{hr}\cdot\text{ft}^2\cdot\text{F})$

(panel with metal storm door)

$$q = (0.28)(243)(70 - 30)$$

walls: $A = 8[(36 + 64) \times 2] - 144 - 60.75$

$$= 1395.25 \text{ ft}^2$$

From table 5-4a, $U = 0.14 \text{ Btu}/(\text{hr}\cdot\text{ft}^2\cdot\text{F})$

$$q = 0.14(1395.25)(70 - 30) =$$

Roof/Ceiling: $A = 36 \times 64 = 2304 \text{ ft}^2$

From example 5-3, $U = 0.083 \text{ Btu}/(\text{hr}\cdot\text{ft}^2\cdot\text{F})$

$$q = 0.083(2304)(70 - 30) =$$

Floor (Not required) from you

Assum $R = 4.17$, $d = 2$ m but just to know

$$A = 36 \times 64 = 2304 \text{ ft}^2$$

from table S-9 $U = 0.134 (h_i - t_i - E) / R$

$R = 2.17 \times 0.20$

$$\therefore U = \frac{1}{R} = \frac{1}{0.134} =$$

$$\dot{q} = \frac{1}{0.134} (2304) (70 - 30) =$$