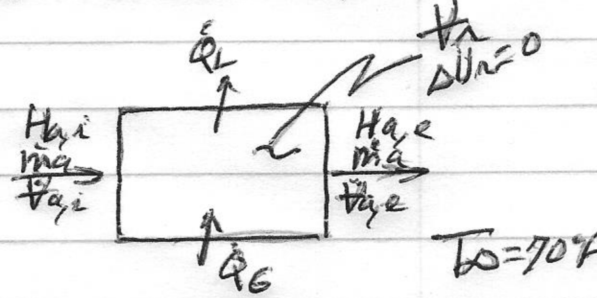
Reply to thread 403-347507

The presentation is in British units as I have a better feel for the numbers. Steady state condition apply, therefore, no change in internal energy of room.
Ambiant air temperature (T_∞) assumed @70°F
Thermal Conductivities of Walls & roof assumed as follows:
$U_{wall} = 1.1$ Btu/hr ft²°F ; $U_{roof} = 0.3$ Btu/hr ft²°F
Discounted are as follows:
Sun radiant heat, winds, infiltration of air; heat transfer thru windows, doors, floor.
Room dimensions assumed as follows: $80' \times 40' \times 20.2' \cong 64,640\ ft^3$
$\cong 1,830\ m^3$

Heat transfer thru building $\dot{Q}_L = \Sigma UA\ \Delta T$; Roof pitch $\frac{1.08''}{6}$
Heat generated $\dot{Q}_G = 136$ kW $\cong 464,053$ Btu/hr
Average temperature in Room: $\begin{matrix}35°C \\ 95°F\end{matrix} \leq T_r \leq \begin{matrix}40°C \\ 104°F\end{matrix} \Rightarrow T_{r,average} = 100°F$
Dry air assumed
$\Sigma UA = 6306$ Btu/hr °F
$\dot{Q}_L = 6306\,(100-70) = 189,180\ \frac{Btu}{hr}$



$\dot{Q}_{net} = \dot{Q}_G - \dot{Q}_L = 274,873$ Btu/hr
$H_{a,e} - H_{a,i} = \dot{Q}_{net} \Rightarrow \dot{m}_a\, c_{p_a} (T_{a,e} - T_{a,i}) = 274,873$
$\dot{m}_a = 274,873 / .241(100-70)$
$= 38,018.4$ lbm/hr

$\dot{V}_{a,i} = [38018.4 * 53.34 * (460+70)] / [14.69 * 144] = 8,468\ ft^3/hr$
$\dot{V}_{a,e} = (8468)(560/530) \simeq 8950\ ft^3/hr$; $AE = \frac{64,640}{8468} \cong 8$ air change/hr.