

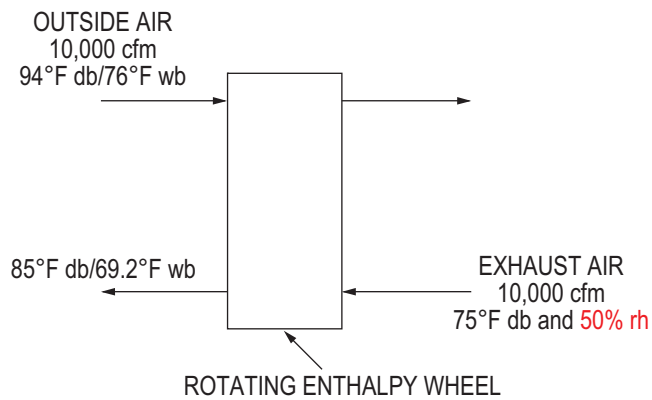
ERRATA for
PE Mechanical Engineering: HVAC and Refrigeration Practice Exam
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Revisions are shown in red.

Question 136, p. 30:

A building air-conditioning system requires 10,000 cfm of outside air for ventilation. An enthalpy wheel, as shown, exchanges both sensible and latent heat energy to reduce the design load on the building refrigeration system. If the enthalpy wheel has 2% losses, the reduction in design load (tons) on the refrigeration system is most nearly:

- (A) 8.4
- (B) 19.1
- (C) 24.4
- (D) 54.2



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Solution 136, p. 84:

Using sea level psychrometric chart:

$$Q_{in(EXH)} = 4.5 \times \text{cfm} \times \Delta h;$$

$$h \text{ of } 85^\circ\text{F db}/69.2^\circ\text{F wb} = 33.4 \text{ Btu/lb};$$

$$h \text{ of } 75^\circ\text{F db and } 50\% \text{ rh} = 28.2 \text{ Btu/lb}$$

$$Q_{in(EXH)} = 4.5 \times 10,000(33.4 - 28.2) = 234,000 \text{ Btu/hr}$$

$$= \frac{234,000 \text{ Btu/hr}}{12,000 \text{ Btu}/(\text{hr-ton})} = 19.5 \text{ tons}$$

$$Q_{out(OA)} = 0.98 \times 19.5 = 19.1 \text{ tons}$$

Alternate solution:

$$\dot{m} = \frac{V}{v} = \frac{10,000 \text{ cfm}}{13.68 \text{ ft}^3 / \text{lb} (75^\circ\text{F db} / 50\% \text{ rh})} = 750 \text{ lb/min}$$

$$= 750 \text{ lb/min} \times 60 \text{ min/hr} = 45,000 \text{ lb/hr}$$

$$Q_{in(EXH)} = 45,000 \text{ lb/hr} (33.4 - 28.2) \text{ Btu/lb}$$

$$= 234,000 \text{ Btu/hr} = 19.5 \text{ tons}$$

$$Q_{out(OA)} = 0.98 \times 19.5 = 19.1 \text{ tons}$$

THE CORRECT ANSWER IS: (B)

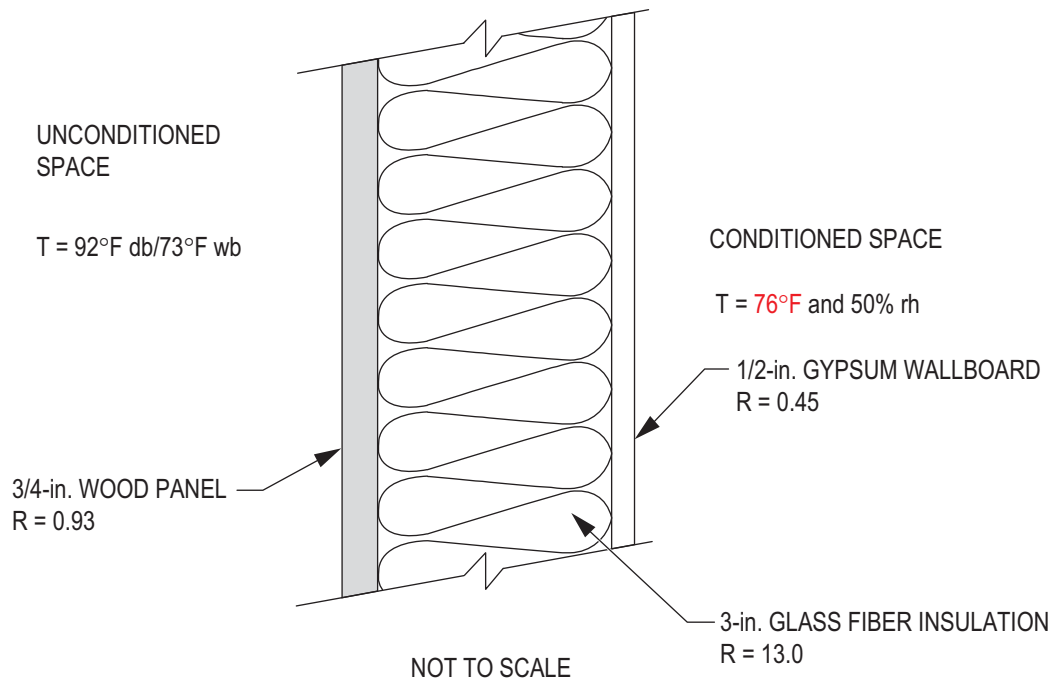
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Question 506, p. 40:

The figure should be shown as follows:



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Solution 110, p. 75:

The solution should read as follows:

Reference: 2013 *ASHRAE Handbook—Fundamentals*, Chapter 18

The sensible heat equation at standard air conditions (sea level and 59°F) is given by:

$$Q_s = \text{cfm} \times 1.10 \times \Delta T$$

This needs to be adjusted to allow for the change in air density from standard conditions (0.075 lb/ft³) to the 5,000-ft elevation. On a psychrometric chart for 5,000 ft at a 55°F saturated supply air temperature, the specific volume of air is 15.8 ft³/lb, which gives a density of 0.063 lb/ft³.

The revised sensible heat equation becomes:

$$Q_s = \text{cfm} \times 1.10 \times (0.063/0.075) \times \Delta T$$

This becomes: $Q_s = \text{cfm} \times 0.92 \times \Delta T$

$$\text{cfm} = Q_s / (0.92 \times \Delta T)$$

$$\text{cfm} = \frac{23 \text{ tons} \times 12,000 \text{ Btu/hr/ton}}{0.92 \times (75 - 55)} = 15,000 \text{ cfm}$$

THE CORRECT ANSWER IS: (C)

Solution 509, p. 91:

Line 6 of the solution should read as follows:

$$Q = 4.5 \times 112,250 \times (43.6 - 34.8) = 4,445,100 \text{ Btu/hr}$$

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Solution 529, p. 97:

The solution should read as follows:

$$Q_{\text{evap}} = \dot{m}(h_{\text{out}} - h_{\text{in}})_{\text{evap}} = 23.2 \text{ tons}$$

Suction saturated vapor, $h_{\text{out}} = 106.2 \text{ Btu/lb}$

Saturated liquid at discharge pressure, $h_{\text{in}} = 47.03 \text{ Btu/lb}$

$$\therefore \dot{m} = \frac{23.2 \text{ tons} \left(200 \frac{\text{Btu}}{\text{min} \cdot \text{ton}} \right)}{(106.2 - 47.03) \text{ Btu/lb}} = 78.4 \text{ lb/min}$$

THE CORRECT ANSWER IS: (B)

Revisions are shown in red.

Solution 530, p. 98:

Line 1 of the solution should read as follows:

$$\text{Refrigerant flow} = \frac{\text{tons} \times 12,000 \text{ Btu/hr/ton}}{(60 \text{ min/hr})(\Delta h, \text{ Btu/lb})}$$

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p. 102:

The correct psychrometric chart is shown on the next page.

