

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

Question 8, p. 12:

Leaving-Air Temperatures should read as follows:

Leaving-Air Temperature	55.0°F db/47.3°F wb
	55.0°F db/ 50.8°F wb
	55.0°F db/53.2°F wb
	55.0°F db/54.1°F wb

Question 36, p. 12:

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 **final reduced** design load (tons) on the refrigeration system is most nearly:

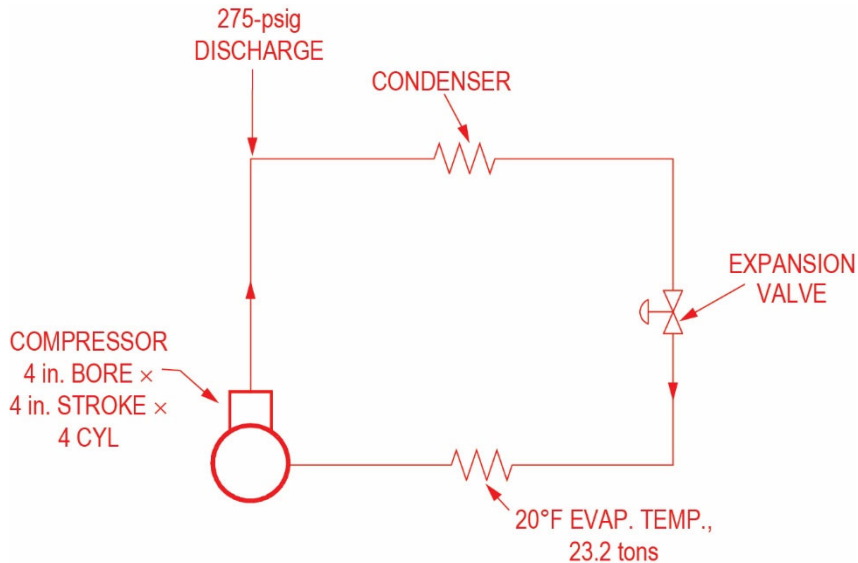
Question 52, p. 36:

A house is conditioned with an air-to-air heat pump. Electric supplemental heating is used when the heat pump cannot provide sufficient heat. The design heat loss of the house is 60,000 Btu/hr at 70°F indoors and 0°F outdoors. At 17°F, the heat pump has a heating capacity of 40,000 Btu/hr and a COP of 2.64. The required supplemental electric heat (kW) at 17°F is most nearly:

- ☐ A. **1.59**
- ☐ B. **6.0**
- ☐ C. **10.3**
- ☐ D. **13.3**

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Question 69, p. 44:



Solution 8, p. 60:

LAT db is given as 55°F.

LAT wb is calculated.

EAT db is calculated.

$$\text{EAT} = \text{Mixed Air Temperature (MAT)} = \frac{78^\circ\text{F}(2,900 \text{ cfm}) + 92^\circ\text{F}(700 \text{ cfm})}{3,600 \text{ cfm}} = 80.7^\circ\text{F db}$$

From sea level psychrometric chart at 80.7°F db: MAT wb = 66.2°F; h = 30.99 Btu/lb

At outdoor air conditions of 92°F db/76°F wb, h = 39.4 Btu/lb

$$\begin{aligned} Q_T \text{ for outdoor air} &= (4.5) \text{ cfm } (\Delta h) \text{ where cfm} = 700 \text{ and } h = h_{\text{oa}} - h_{\text{ra}}, \\ &= (4.5)(700)(39.4 - 28.5) = 34,335 \text{ Btu/hr} \end{aligned}$$

$$Q_T \text{ for system} = \text{SH} + \text{LH} + \text{OA} = 90,000 + 40,000 + 34,335 = 164,335 \text{ Btu/hr}$$

$$Q_T \text{ for system} = (4.5) \text{ cfm } (\Delta h); \text{ solve for } \Delta h$$

$$\Delta h = \frac{164,335}{4.5(3,600)} = 10.14 \text{ Btu/lb}$$

$$\text{Therefore, leaving air } h = 30.9 - 10.14 = 20.76 = h_{\text{la}}$$

From sea level psychrometric chart at h = 20.76 Btu/lb and 55°F db: 50.8°F wb

EAT = 80.7°F db/66.2°F wb; LAT = 55°F db/50.8°F wb

THE CORRECT ANSWER IS SHOWN ABOVE.

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Solution 52, p. 75:

Heat loss at 17°F is $60,000 \times \left(\frac{70-17}{70-0} \right) = 45,429 \text{ Btu/hr}$

Heat pump capacity at 17°F is 40,000 Btu/hr

Auxiliary heat capacity required is $45,429 - 40,000 = 5,429 \text{ Btu/hr}$

1 Btu/hr = 0.00029307 kW = 1.59 kW

~~Heat pump energy usage 40,000/2.64 = 15,152 Btu/hr~~

~~= 4.43 kW~~

~~1.59 + 4.43 = 6.02 kW~~

THE CORRECT ANSWER IS: A