Errata (Dec 2017)

Heating and Cooling of Buildings: Principles and Practice of Energy Efficient Design
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Chapter 1

- Page 16, right column, Pr. 1.4, *Helpful hint* para should be deleted since it is irrelevant to the problem

Chapter 2

- Page 22, Fig. 2.2 in two places, the symbol for velocity "v" should be replaced by "v*" to denote maximum velocity
- Page 29, Fig. 2.8, the figure nomenclature should be "$z_{in,}$ $v_{in,}$ h_{in}, u_{in}" and "$z_{out,}$ $v_{out,}$ h_{out}, u_{out}"
- Page 46 right column, Example 2.14, 11th line, unit of k_{wood} is wrong, should be k_{wood} = 0.010 Btu/(h.ft. ^{o}F)
- Page 59 right column, Pr. 2.3. Assume sea level condition
- Page 62, left column, Pr. 2.24. Assume the flat roof to be square
- Page63, left column, Pr. 2.33, 4th line should read: "... transfer from her to the room surfaces,..."

Chapter 3

- Page 70, Table 3.2 The last two values "ft/min" and "m/s" listed under **Units of Velocity** column and on the **Active person in still air** rows should be deleted
- Page 77, right column, Eq. (3.21 SI), the last term should read (M - 1.2) and not (M +1.2)
- Page 92, right column, 2 para, 9th line, $MP_{2.5}$ should read $PM_{2.5}$
- Page 96, Pr. 3.9. Modify problem to read:
  (a) Calculate the 1-hr and 3-hr PMV and PPD values for the indoor conditions specified by a dry-bulb temperature of 21 ^{o}C and a dew point temperature of 12 ^{o}C. Assume clo = 0.9, Met = 0.9 and mixed occupancy. The MRT is taken to be equal to the room air temperature.

Chapter 4

- Page 104, left column, Example 4.1, under *Solution*, - sign to be replaced by a + sign
  t_{std} = 12:00 – 4 x [105 – 112] **+** (- 6 min) = 12:22
- Page 106, Fig 4.6 (a) incorrect label, instead of "Jan/Oct 21" it should read "Jan/Nov 21"
- Page 114, left column, Eq. 4.24, τ_{dir} should be τ_{beam}
- Page 115- left column, Example 4.9, after *"Given*". It should read $I_{0,norm}$ = 1322.6 W/m^2 and not I_0 =1322.6 W/m^2

Chapter 5

- Page 127, under Nomenclature left column, the symbol for Emissivity should be "e" and not the Greek symbol ε
- Page 134, right column, last sentence of first para should read: This type of glass is referred to as "selective low-e" or less ambiguously as "low-solar-gain low-e" glazing system.
- Page 146. Left column, line 13. Add sentence after "… without external shades (see Example 5.3)". *Note that the treatment of the solar sky diffuse heat gain component is simplified since the window overhang also blocks some of the sky diffuse radiation.*
- Page 150, right column, Pr. 5.8, part (c) "... as in part (c)..." should read "... as in part (b)..."

Chapter 6

- Page 175, right column, last two of table, should read 0.024 in^2/ft^2 instead of 0.023

- Page 176, left column, under **Solution** should read-

$$\dot{V} = 449\ \text{cm}^2 \times [0.000145(\text{L/s})^2(\text{cm}^{-4}\cdot \text{K}) \times 20\ \text{K} + 0.000104(\text{L/s})^2 / [\text{cm}^4 \cdot (\text{m/s})^2] \times (6.7\ \text{m/s})^2]^{1/2}$$

$$= 39.1\ \text{L/s} = 140.6\ \text{m}^3/\text{h}$$

- Page 184-185, Pr. 6.6. Additional information: U value of roof= 0.24 W/m^2 .K , U value of opaque portion of walls (all four sides) = 0.40 W/m^2 .K, U-value of glazing (assume 20% of wall area) = 3.0 W/m^2 .K

Chapter 7

- Page 207, Pr. 7.4, Assume indoor air temperature T_i = 21 ^{o}C

Chapter 8

- Page 208, Pr. 7.10. Also assume that window U = 0.50Btu/(h.ft^2 .^{o} F)
- Page 228, right column 18th line. Should read: *Then the thickness of the internal nodes is* $\Delta x_{\text{int}} = L/(N-1)$ *and that of a surface node is* $\Delta x_{surf} = L/[2(N-1)]$ *where L is the thickness of the wall*
- Page 228, right column, second expression of Eq. 8.37 should read $R_{surf} = \dfrac{\Delta x_{surf}}{kA} \times 2 = R_{\text{int}}$.
- Same correction in caption of Fig. 8.13
- Page 230, left column, the expressions at the top should read:

$$R_1 = R_{E0} + R_{A6} = 0.152\ \text{m}^2.\text{K/W}$$

$$R_2 = R_3 = R_{C5}/2 = 0.0295\ \text{m}^2.\text{K/W}$$

$$R_4 = R_{B3} + R_{A3} + R_{A0} = 1.232\ \text{m}^2.\text{K/W}$$

Chapter 9

Chapter 10

- Page 274, Table 10.1, last row for Phoenix for February, value should read "13/55" and not 13/555
- Page 288, right column, under **Solution**, 9th line, should read "would be (-13.9 + 2.8/2 = -12.5 ^{o}C)..."
- Page 288, Table at bottom of page, second column θ should be moved up one line

Chapter 11

- Page 316, right column, Figure 11.19 caption, should read "Heat recovery device" (should not be plural)

Chapter 12

- Page 329, right column, under *Lookup values:* 4th line should read h_i = 80 kJ/kg 9and not 10.42 kJ/kg)
- Same Example, under Solution: the equation should read

$$Q_{in} = \dot{m}(h_o - h_i)/\eta = 50\ \text{kg/s} \times (2761.0\text{-}80)\ \text{kJ/kg}/0.9 = 148.9\ \text{kW}$$

- Page 336, left column, under **Solution** should read $\text{Re} = \dfrac{\rho \text{v} D}{\mu} = ...$

Chapter 13

- Page 353, footnote (a) under Table 13.3 should read "... mass of moist air mixture" and not dry air
- Page 359, left column, Eq. (13.23), the term $h_{\text{liq-vap,ref}}$ should be $h_{\text{vap,ref}}$. Same change in the nomenclature below the equation: $h_{\text{vap,ref}}$ is the specific enthalpy of saturated water vapor at reference temperature
- Page 365, right column, under **Solution,** should read v_1 = 12.65 and not 122.65 ...

Chapter 14

- Page 397, right column, para should read:

  These trends can be gleaned from Figs. 14.13 and 14.14 which show how the standard VC cycle changes with variation in the evaporator and the condenser temperatures respectively. As the evaporator temperature decreases with fixed condenser temperature (Fig. 14.13), compression work ($h_{2a} - h_1$) is markedly greater than that of ($h_2 - h_1$), and so the refrigerant flow rate will decrease. The cooling effect is reduced a little due to the shape of the saturation dome (from 4a-1a to 4-1); and so the effect of the increased refrigerant flow rate is to decrease the cooling capacity.

- Page 419, left column, line under **Solution**: should read $\dot{V}\rho c_p$ instead of $\dot{V}_\rho c_p$
- Page 425, Pr. 14.2, Assume that superheat at compressor inlet is provided by a HX coupled to the condenser exit
- Page 427, Pr. 14.25. Add part (b): If the design outdoor air temperature is 0° F, what capacity auxiliary heaters should be installed for each heat pump

Chapter 15

- Page 457, Pr. 15.9. Assume that the warehouse is kept at 60° F and the winter design temperature is 0° F.
- Page 459, Pr. 15,22. Discard the fact that the problem stipulates New York. Assume the thermal load is needed during occupied periods only and that CHP is operated only during occupied periods.
- Page 499, last sentence of caption16.29 should read "Since the density of air is much less than the manometer fluid, namely water".

Chapter 16

- Page 487. Caption for Fig. 16.19 should read: Piping system with two equal size pumps (or fans) connected in parallel (a) Sketch, (b) pump and system curves and operating points

Chapter 17

- Page 532, right column, label in figure Fig. 17.24 (a) should read "$m_w - m_a - dW$" and not "$m_w - m_a - d_w$"

Chapter 18

- Page 545, Table 18.2. the units for Velocity column should be "ft/s" and not "ft/min"
- Page 552, right column, 4th line, relative humidity should be 48% and not 45%
- Page 562, Table 18.6, under "Effective Pipe Length, ft " column, the last entries should be "200, 55..., 277" and not "300, 55,...,377"; also under last column "Total Head, ft", the last three entries should be 1.94, 8.76 and 10.7 and not 2.64, 8.76 and 11.4
- Page 562, right column, last but one line should now read " to overcome is (27.5 + 10.7 =) 28.2 ft of water"
- Page 575, Fig 18.33., the captions are reversed, should read: (a) External melt and (b) Internal melt

Chapter 19

- Page 604, symbols in Figure 19.16, the mass flow rate at point 5B should read $\dot{m}_{a,\mathrm{B}}$ and not $\dot{m}_{a1,\mathrm{B}}$

  Also, the mass flow rate at point 4 should read $\dot{m}_{a,\mathrm{hc,A}}$ and not $\dot{m}_{a,\mathrm{hc,B}}$ and refers not to flow at point A but thru the duct leading to mixing box of Zone A

  Finally, the flows shown such as $\dot{m}_{a,\mathrm{cc,A}}$ and $\dot{m}_{a,\mathrm{cc,B}}$ refer to the flow rates which passed thru the cooling coil and flowing thru the ducts leading to the mixing boxes

- Page 611, right column, 8th line, should read "...cold deck temperature T_3=54 °F plus fan..." and not 55 °F

- Page 614, right column, 2nd line should read “Boiler capacity” and not “Boiler size”; also under (1), the equation should read: W_{fan} = 14 hp x (0.371 + 0.973 x PLR_{fan} – 0.342 x PLR_{fan}^2)
- Page 615, Table 19.3, last but third column should read “Zone Flow, lb/min” and not “Zone flow.,Btu/h”
- Page 630, Pr. 19.12, the problem should be totally reframed as:
  The boiler system in Example 19.10 is oversized by 100%. What would be the annual boiler energy input if we wish to evaluate two alternative scenarios (a) only one boiler with half of the total capacity is installed, i.e., with boiler size of 250,000 Btu/hr, (b) two identical boilers of 150,000 Btu/hr each were installed?

Chapter 20

- Page 634, under Subscripts, the symbol “wb” should be moved to the end of the section.
- Page 647, right column, under (4), should read “... for circular diffusers **is** 0.8,...”
- Page 649, left column, first line should read “1. Variable area square **VA** directional diffuser”
- Page 662, left column, last but one line should read “ple paybacks of less than ...” and not “ple payback s of less than...”

Chapter 21

- Page 678, Problem 20.23, first line should read “Consider the chiller in Problem **14.6** to be ...” and not Problem 10.8

Chapter 22

Chapter 23

Chapter 24

- Page 779, right column, 9th and 11th lines, symbols for ventilation rate and volumetric flow rate should be $\dot{V}$ and not V
- Page 793, caption for Fig 24.4, the phrase “as a result of increasing the primary window area from 0 to 18.39 m^2 (198 ft^2)” should be deleted