

Additions and Corrections

This report includes additional information, and technical errors found between June 15, 2004, and March 29, 2007, in the inch-pound (I-P) editions of the 2004, 2005, and 2006 *ASHRAE Handbook* volumes. Occasional typographical errors and nonstandard symbol labels will be corrected in future volumes. The most current list of Handbook additions and corrections is on the ASHRAE Web site (www.ashrae.org).

The authors and editor encourage you to notify them if you find other technical errors. Please send corrections to: Handbook Editor, ASHRAE, 1791 Tullie Circle NE, Atlanta, GA 30329, or e-mail mowen@ashrae.org.

2004 HVAC Systems and Equipment

p. 2.5, Fig. 8. The caption for Figure 8 should read “Chemical Dehumidification.”

p. 8.5, Fig. 5. The top two figures, for air/air and water/air refrigerant changeover, were cut off and are provided here.

p. 12.9, Fig. 16. The figure for reverse-return two-pipe systems was incorrect; the corrected version is provided here.

p. 20.4. Under Additional Moisture Losses, the reference should be to Chapter 12, not Chapter 11.

p. 25.4, Eq. (5). There should be an equals symbol after D_{pc} .

p. 35.19, 1st col., 4th line from bottom. Change “Chapters 35 and 38 of this volume” to “Chapter 38 of this volume.”

p. 36.3, Fig. 4. The figure was partially cut off; it is supplied in complete form on p. A.2.

p. 44.3-44.4, Example 1, Solution. Correct the following values: $h_1 = 30.6$, $h_3 = 28.15$, and $w_3 = 0.0093$. Thus, $w_2 = 0.0082$ lb/lb, $w_4 = 0.0082$ lb/lb, $q_L = -799$ Btu/min, and $q = 785$ Btu/min. In the last paragraph in the example, change 0.00795 to 0.0082, change 21.9 to 29.4, and change “to be” to “is.”

p. 44.10, Fig. 5. Replace with the correct figure, provided on p. A.2.

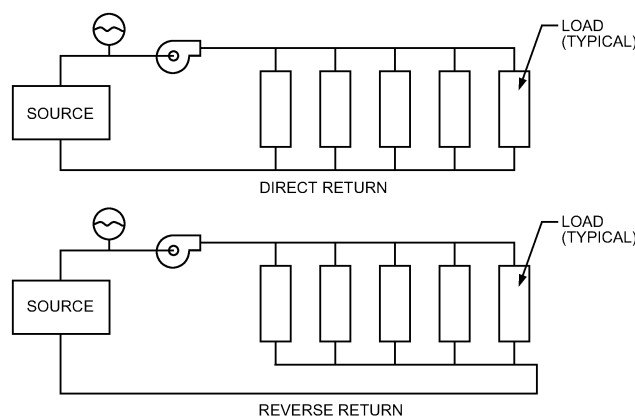


Fig. 16 Direct- and Reverse-Return Two-Pipe Systems
(2004 HVAC Systems and Equipment, Ch. 12, p. 9)

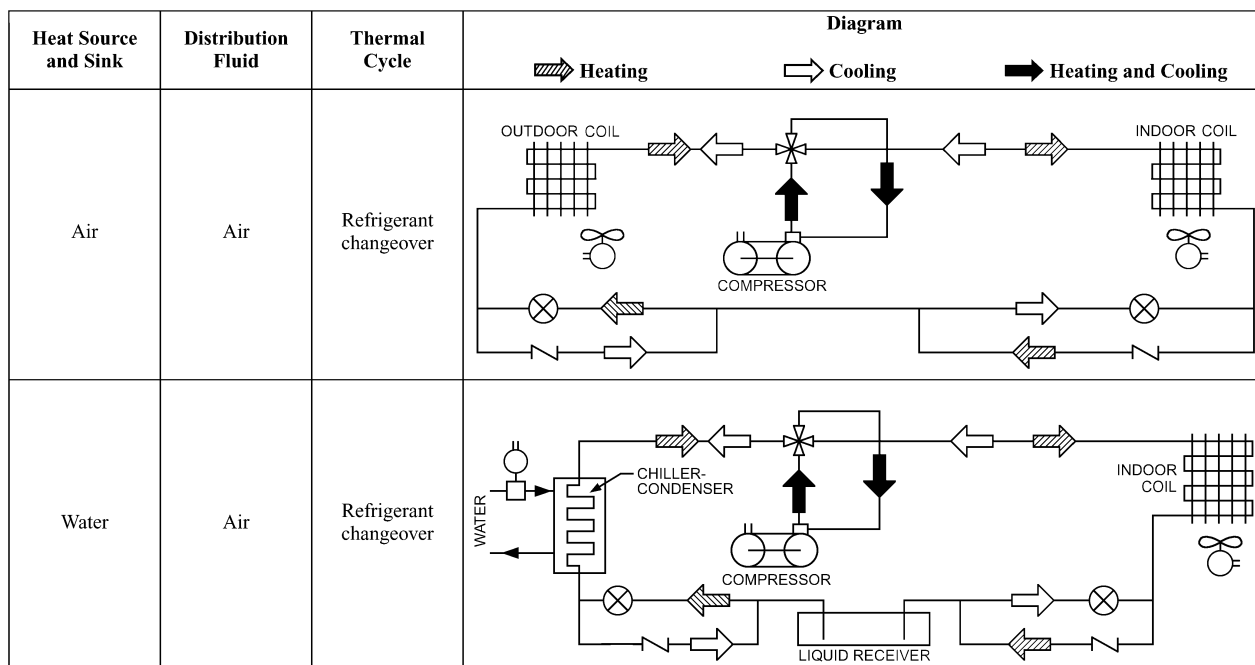


Fig. 5 Heat Pump Types (first two rows)
(2004 HVAC Systems and Equipment, Ch. 8, p. 5)

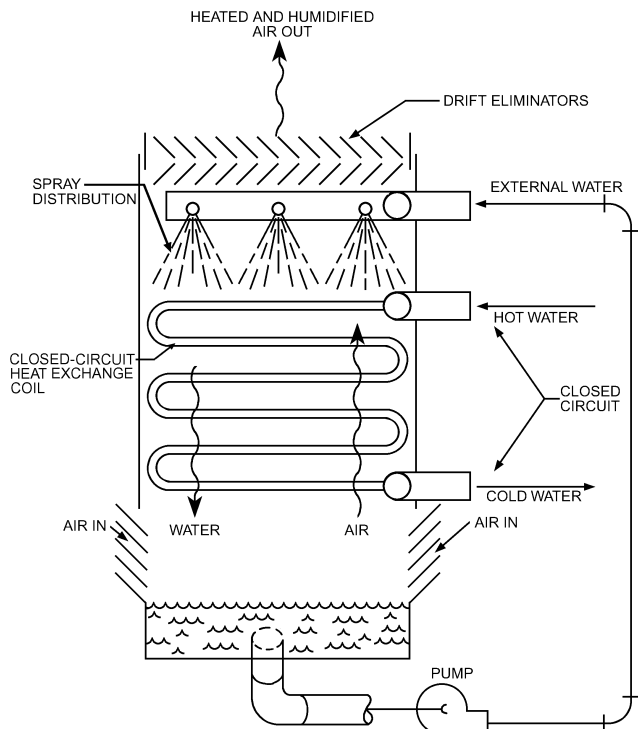


Fig. 4 Indirect-Contact or Closed-Circuit Evaporative Cooling Tower
(2004 HVAC Systems and Equipment, Chapter 36, p. 3)

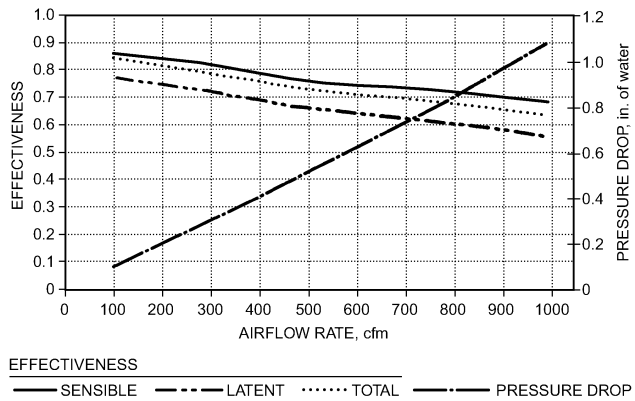


Fig. 5 Variation of Pressure Drop and Effectiveness with Air Flow Rates for a Membrane Plate Exchanger
(2004 HVAC Systems and Equipment, Ch. 44, p. 10)

- Heat recovery (all subentries with S1 should be S8)
- Industrial applications, heat pumps, S8.8
- Net positive suction, S39.9
- Refrigerant control devices, R45
- heat pumps, system, S8.7
- Solar energy, heat pump systems, S8.4

2005 Fundamentals

p. 44.19, Example 4, Step 7. The reference to Figure 17 should be to Figure 19.

p. 44.19, Example 5. Correct the following values: $h_3 = 23.7$ and $w_3 = 0.0052$. Thus, $h_4 = 13.43$ Btu/lb, $t_4 = 35.7^\circ\text{F}$, $w_4 = 0.0044$ lb/lb, $m_w = 38.4$ lb/h, and $q_e = 505,900$ Btu/h.

pp. 44.19-44.20, Example 6. Correct the following values: $h_1 = 44.6$ Btu/lb, $w_1 = 0.0198$ lb/lb, $h_3 = 28.5$ Btu/lb, and $w_3 = 0.0096$ lb/lb. Thus, q_{max} (total) = 566,000 Btu/h, $q_t = 321,000$, $q_{lat} = 203,000$ Btu/h, $h_2 = 35.5$ Btu/lb, $t_{w2} = 71.6^\circ\text{F}$, $t_4 = 86.2^\circ\text{F}$, $h_4 = 35.4$ Btu/lb, $w_4 = 0.0134$, and $t_{w4} = 71.6^\circ\text{F}$. In step 6, second equation, $q_t = 319,000$ Btu/h.

pp. 44.20-44.21, Example 7, Solution. Correct the following values: $h_1 = 44.6$ Btu/lb, $w_1 = 0.0198$ lb/lb, $h_3 = 28.5$ Btu/lb, and $w_3 = 0.0096$ lb/lb. Thus, $h_2 = 33.16$ Btu/lb, $w_2 = 0.0129$, $t_{w2} = 69.2^\circ\text{F}$, $h_4 = 39.5$ Btu/lb, and $t_{w4} = 76.1^\circ\text{F}$. In step 6, second equation, $q_t = 41,460$ Btu/h.

pp. 44.22-44.23, Example 9, Solution. In step 5a, entering enthalpy should be 44.6 Btu/lb. Thus, $h_3 = 38.6$ Btu/lb; two lines below this equation, change the wet-bulb temperature for saturated air to 75°F . In step 5b, entering enthalpy is 21.3 Btu/lb; thus, $h_4 = 27.3$ Btu/lb.

p. 44.25, Bibliography. The correct entry for the ASHRAE (1974) source is as follows:

ASHRAE. 1974. Symposium on heat recovery. *ASHRAE Transactions* 80(1):302-332.

Index. The following chapter references are correct for these entries:

- Compressors, heat pump systems, S8.6
- Control, heat recovery systems, S8.18
- Defrosting, air-source heat pump coils, S8.7, 8; S45.9
- Heat balance (HB), studies, S8.19
- Heat pumps (all subentries with S1 should be S8)

p. 1.17, Eq. (63). \dot{Q}_{evap} should be \dot{Q}_{cond} .

p. 1.20, Symbols. Units for V should be ft/s.

p. 2.7, Table 2. Values for ϵ (right column) should be 60, 1800, 6000, and 10,200 μin .

p. 2.11, definitions for Eq. (38). In the definition for Δh , there should be parentheses around $p_1 - p_2$.

p. 3.1, definitions for Eq. (1a). Units for thermal conductivity k should be Btu/h \cdot ft \cdot $^\circ\text{F}$.

p. 3.2, Thermal Conduction, 2nd line from bottom. Change "steady" to "steady-state."

p. 3.5, Eq. (10). The equation should be as follows:

$$c_1 = \frac{2 \text{ Bi}}{(\mu_1^2 + \text{Bi}^2) J_0(\mu_1)}$$

p. 3.13, 1st col. Delete first repeated paragraph after Equation (30).

p. 3.21, 2nd col., last full sentence. Change to, "Depending on frequency and amplitude of vibration, forced convection from a wire to air is enhanced by up to 300% (Nesis et al. 1994)."

p. 3.28, Eq. (44). Delete second equals sign and second fraction.

p. 7.20, 1st col., last full paragraph. Change third sentence to read, "the resonance frequency of the system is maintained at 3.13 Hz, and the force transmitted to the structure remains at 12.5 lb_F." Change sixth sentence to read, "where a is acceleration, the maximum dynamic displacement of the mounted equipment is reduced by a factor of (M_1/M_2) , where M_1 and M_2 are the masses before and after mass is added, respectively."

p. 15.3, Eq. (3) and following text. Change K_d to K_d in the equation, definitions, and following paragraph (three places total).

Table 7 Comparative Refrigerant Performance per Ton of Refrigeration
(2005 Fundamentals, Ch. 19, p. 8)

Refrigerant	Evaporator Pressure, psia	Condenser Pressure, psia	Compression Ratio	Net Refrigerating Effect, Btu/lb	Refrigerant Circulated, lb/min	Liquid Circulated, gal/min	Specific Volume of Suction Gas, ft ³ /lb	Compressor Displacement, ft ³ /min	Power Consumption, hp	Coefficient of Performance	Compressor Discharge Temp., °F	
170	Ethane	233.2	672.8	2.88	69.5	2.85	1.22	0.541	1.54	1.72	2.70	121.73
744	Carbon dioxide	326.9	1041.4	3.19	57.3	1.79	0.36	0.269	0.48	0.91	2.69	157.73
1270	Propylene	51.9	189.1	3.64	123.0	1.62	0.39	2.081	3.37	1.04	4.50	107.33
290	Propane	41.5	155.9	3.76	119.5	1.65	0.41	2.502	4.13	1.03	4.50	96.53
502	R-22/115 (48.8/51.2)	49.7	190.3	3.83	45.6	4.40	0.44	0.814	3.58	1.08	4.38	100.13
507A	R-125/143a (50/50)	55.0	211.6	3.85	47.4	4.22	0.50	0.814	3.44	1.13	4.18	94.73
404A	R-125/143a/134a (44/52/4)	52.9	206.0	3.89	49.1	4.08	0.48	0.860	3.51	1.12	4.21	96.53
410A	R-32/125 (50/50)	69.3	271.5	3.92	72.2	2.71	0.31	0.873	2.37	1.05	4.41	123.53
125	Pentafluoroethane	58.5	226.4	3.87	36.7	5.31	0.55	0.631	3.35	1.15	3.99	87.53
22	Chlorodifluoromethane	42.8	172.2	4.02	69.9	2.85	0.29	1.248	3.56	1.01	4.66	127.13
12	Dichlorodifluoromethane	26.3	107.5	4.09	50.3	3.94	0.37	1.479	5.83	1.00	4.70	100.13
500	R-12/152a (73.8/26.2)	31.0	127.1	4.09	60.1	3.31	0.35	1.504	4.98	1.00	4.66	105.53
407C	R-32/125/134a (23/25/52)	41.8	182.7	4.38	70.2	2.85	0.30	1.289	3.67	1.05	4.50	118.13
600a	Isobutane*	12.8	58.5	4.58	113.5	1.76	0.39	6.524	11.48	1.01	4.62	85.73
134a	Tetrafluoroethane	23.6	111.2	4.71	63.6	3.13	0.31	1.945	6.09	1.02	4.60	98.33
124	Chlorotetrafluoroethane*	12.8	64.3	5.03	50.7	3.90	0.35	2.741	10.69	1.01	4.62	85.73
717	Ammonia	34.1	168.5	4.94	474.3	0.42	0.08	8.197	3.44	1.00	4.76	209.93
600	Butane*	8.1	41.0	5.05	125.6	1.65	0.35	10.325	17.04	1.03	4.74	85.73
11	Trichlorofluoromethane	2.9	18.1	6.25	67.0	2.95	0.24	12.317	36.34	0.93	5.02	109.13
123	Dichlorotrifluoroethane	2.3	15.8	6.81	61.2	3.27	0.27	14.279	46.69	0.96	4.90	91.13
113	Trichlorotrifluoroethane*	1.0	7.8	7.71	52.7	3.66	0.28	26.940	98.60	0.94	4.81	85.73

*Superheat required.

p. 16.11, Symbols. Add the following definitions:

h_e = exhaust stack height (typically above roof unless otherwise specified), ft (see Figure 3, and Chapter 44 in the 2003 ASHRAE Handbook—HVAC Applications)

S = stretched-string distance; shortest distance from exhaust to intake over obstacles and along building surface, ft [see Figure 3, and Equation (22) in the 2003 ASHRAE Handbook—HVAC Applications]

p. 19.8, Table 7. Replace the table with the one supplied here.

p. 23.6, Fig. 1. Change caption from “Adsorption Isotherms” to “Typical Adsorption.”

p. 26.3, Eq. (2). The correct equation is

$$R_T = 12 \ln(D_3/D_2) / (2\pi k)$$

p. 27.14, Figure 9. Air leakage should be at 0.2 in. of water.

p. 28.2, Table 1 (and all data tables), cols. 13a, c, and e. Because of a data processing error, the enthalpy values in these columns are systematically low by 7.687 Btu/lb. Thus, all enthalpy values in Table 1 and in all design climatic condition tables on the accompanying CD-ROM should be increased by that amount.

p. 29.8, Table 7. Units for OF_b should be °F.

p. 29.9, Table 9. The correct numbers for the last line of the table are as follows:

E_i 326 325 321 314 305 293 279 262 243

p. 29.9, Eq. (23). Units for CF_{slab} should be Btu/h·ft²; 0.51 is a constant with units of Btu/h·ft²; and 2.5 is a factor with units of °F.

p. 30.2, 2nd col., 6th para., last line. Change “with” to “without.”

p. 30.4, bottom of 2nd col. The reference to Equation (3) should be to Equation (4).

p. 30.27, Table 19. Footnote 7 should refer to Table 3 in Chapter 39.

p. 30.32, Central Plant, Piping. The cross reference should be to Chapter 26, not Chapter 23.

p. 30.34, Part 1, Solution. In the equations, change all “1500 W” to “440 W” (1500 is correct for the solutions for q_7 to q_{18}).

p. 31.6, Table 2. In the footnote for Winter Conditions, add the following: $h_i = h_{ic} + h_{iR} = 0.30(\Delta T/L)^{0.25} + \epsilon\Gamma(T_i^4 - T_g^4)/\Delta T$, where $\Delta T = T_i - T_g$, °R; L = glazing height, ft; T_g = glass temperature, °R.

p. 31.26, Table 13. For ID 1b, change the following values:

T	0.77	0.75	0.73	0.68	0.58	0.35	0.69
R^f	0.07	0.08	0.09	0.13	0.24	0.48	0.13
R^b	0.07	0.08	0.09	0.13	0.24	0.48	0.13

p. 31.40, Table 16, last two rows, center column. Change “0.42” to “0.16,” and “0.44” to “0.10.”

p. 32.5, 1st col. Cross references to the following equations in Chapter 30 should be as follows (the chapter number should stay the same; only the equation numbers should be updated):

Equation (36) Equation (27)
Equation (35) Equation (26)
Equation (34) Equation (25)

p. 40.26. The URL for CSA America should be csa-america.org.

p. 38.1, 1st col. The definition of an acre should be 43,560 ft². The conversion factor for ft of water to Pa should be 2989.

(None.)

2006 Refrigeration