

Dew Point Reference

Dew Point (°F)	Dew Point (°C)	Humidity Ratio (Gr/Lb)	Vapor Pressure (In. Hg)
80	26.7	156.4	1.033
79	26.1	151.1	1.000
78	25.6	146.1	0.967
77	25	141.2	0.936
76	24.4	136.4	0.905
75	23.9	131.8	0.876
74	23.3	127.3	0.847
73	22.8	123.0	0.819
72	22.2	118.8	0.792
71	21.7	114.7	0.765
70	21.1	110.8	0.740
69	20.6	107.0	0.715
68	20	103.3	0.691
67	19.4	99.7	0.667
66	18.9	96.2	0.645
65	18.3	92.9	0.622
64	17.8	89.6	0.601
63	17.2	86.5	0.580
62	16.7	83.4	0.560
61	16.1	80.5	0.541
60	15.6	77.6	0.522
59	15	74.8	0.504
58	14.4	72.2	0.486
57	13.9	69.6	0.469
56	13.3	67.1	0.452
55	12.8	64.6	0.436
54	12.2	62.3	0.420
53	11.7	60.0	0.405
52	11.1	57.8	0.391
51	10.6	55.7	0.376
50	10	53.6	0.363
49	9.4	51.6	0.349
48	8.9	49.7	0.337
47	8.3	47.9	0.324
46	7.8	46.1	0.312
45	7.2	44.3	0.300
44	6.7	42.7	0.289
43	6.1	41.0	0.278
42	5.6	39.5	0.268
41	5	38.0	0.258
40	4.4	36.5	0.248
39	3.9	35.1	0.238
38	3.3	33.7	0.229
37	2.8	32.4	0.220
36	2.2	31.2	0.212
35	1.7	29.9	0.204
34	1.1	28.8	0.196

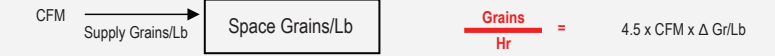
Dew Point (°F)	Dew Point (°C)	Humidity Ratio (Gr/Lb)	Vapor Pressure (In. Hg)
33	0.6	27.6	0.188
32	0.0	26.5	0.180
31	-0.6	25.3	0.172
30	-1.1	24.2	0.165
29	-1.7	23.1	0.157
28	-2.2	22.0	0.150
27	-2.8	21.0	0.143
26	-3.3	20.1	0.137
25	-3.9	19.1	0.130
24	-4.4	18.3	0.124
23	-5.0	17.4	0.119
22	-5.5	16.6	0.113
21	-6.1	15.8	0.108
20	-6.7	15.1	0.103
19	-7.2	14.4	0.098
18	-7.8	13.7	0.093
17	-8.3	13.0	0.089
16	-8.9	12.4	0.085
15	-9.4	11.8	0.081
14	-10.0	11.2	0.077
13	-10.6	10.7	0.073
12	-11.1	10.2	0.070
11	-11.7	9.7	0.066
10	-12.2	9.2	0.063
9	-12.8	8.8	0.060
8	-13.3	8.3	0.057
7	-13.9	7.9	0.054
6	-14.4	7.5	0.051
5	-15.0	7.1	0.049
4	-15.6	6.8	0.046
3	-16.1	6.4	0.044
2	-16.7	6.1	0.042
1	-17.2	5.8	0.040
0	-17.8	5.5	0.038
-1	-18.3	5.2	0.036
-2	-18.9	5.0	0.034
-3	-19.4	4.7	0.032
-4	-20.0	4.5	0.030
-5	-20.6	4.2	0.029
-6	-21.1	4.0	0.027
-7	-21.7	3.8	0.026
-8	-22.2	3.6	0.025
-9	-22.8	3.4	0.023
-10	-23.3	3.2	0.022
-11	-23.9	3.1	0.021
-12	-24.4	2.9	0.020
-13	-25.0	2.7	0.019

Dew Point (°F)	Dew Point (°C)	Humidity Ratio (Gr/Lb)	Vapor Pressure (In. Hg)
-14	-25.6	2.6	0.018
-15	-26.1	2.4	0.017
-16	-26.7	2.3	0.016
-17	-27.2	2.2	0.015
-18	-27.8	2.1	0.014
-19	-28.3	1.9	0.013
-20	-28.9	1.8	0.013
-21	-29.4	1.7	0.012
-22	-30.0	1.6	0.011
-23	-30.6	1.5	0.011
-24	-31.1	1.5	0.010
-25	-31.7	1.4	0.009
-26	-32.2	1.3	0.009
-27	-32.8	1.2	0.008
-28	-33.3	1.2	0.008
-29	-33.9	1.1	0.007
-30	-34.4	1.0	0.007
-31	-35.0	1.0	0.007
-32	-35.6	0.9	0.006
-33	-36.1	0.9	0.006
-34	-36.7	0.8	0.006
-35	-37.2	0.8	0.005
-36	-37.8	0.7	0.005
-37	-38.3	0.7	0.005
-38	-38.9	0.6	0.004
-39	-39.4	0.6	0.004
-40	-40.0	0.6	0.004
-41	-40.6	0.5	0.004
-42	-41.1	0.5	0.003
-43	-41.7	0.5	0.003
-44	-42.2	0.4	0.003
-45	-42.8	0.4	0.003
-46	-43.3	0.4	0.003
-47	-43.9	0.4	0.002
-48	-44.4	0.3	0.002
-49	-45.0	0.3	0.002
-50	-45.6	0.3	0.002
-51	-46.1	0.3	0.002
-52	-46.7	0.3	0.002
-53	-47.2	0.2	0.002
-54	-47.8	0.2	0.002
-55	-48.3	0.2	0.001
-56	-48.9	0.2	0.001
-57	-49.4	0.2	0.001
-58	-50.0	0.2	0.001
-59	-50.6	0.2	0.001
-60	-51.1	0.1	0.001

Humidity Control Design Logic

Dehumidification Capacity

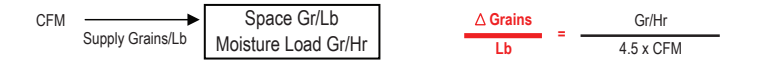
What is the dehumidification capacity of the supply air? Said another way; how much moisture can a known amount of air with a known humidity ratio remove from the conditioned space every hour?



$$\frac{\text{Grains}}{\text{Hr}} = 4.5 \times \text{CFM} \times \Delta \text{Gr/Lb}$$

Required Supply Air Humidity Ratio

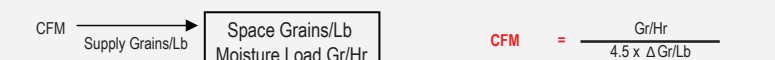
If the supply air flow rate and the indoor humidity ratio are fixed, how dry does the supply air have to be in order to remove a known internal moisture load?



$$\frac{\Delta \text{Grains}}{\text{Lb}} = \frac{\text{Gr/Hr}}{4.5 \times \text{CFM}}$$

Required Supply Air Flow Rate

If the supply air flow humidity ratio and the indoor humidity ratio are both fixed, how much supply air is needed to remove a known internal moisture load?



$$\text{CFM} = \frac{\text{Gr/Hr}}{4.5 \times \Delta \text{Gr/Lb}}$$

Mixed-air humidity Ratio

When two air flows with different humidity ratios are blended, what will be the humidity ratio of the resulting mixture?

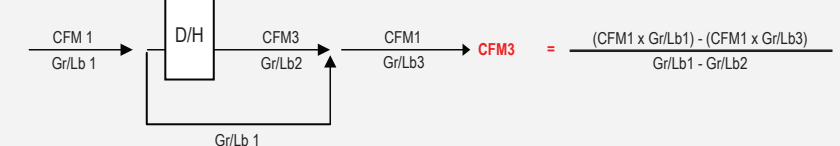


$$\text{Gr/Lb3} = \frac{(\text{CFM1} \times \text{Gr/Lb1}) + (\text{CFM2} \times \text{Gr/Lb2})}{\text{CFM3}}$$

Conversion: 7000 Grains = 1 Pound

Dehumidified Air vs. Bypass Air

A dehumidifier might need to dry only part of the supply air rather than its entire volume. How much of the supply air should be dried by the dehumidifier in order to bring the entire supply air flow to the required humidity ratio?



$$\text{CFM3} = \frac{(\text{CFM1} \times \text{Gr/Lb1}) - (\text{CFM1} \times \text{Gr/Lb3})}{\text{Gr/Lb1} - \text{Gr/Lb2}}$$

Sensible Heat BTUH

When there is temperature difference absorbed or transmitted that is not accompanied with a change of state how many BTUs are being used?



$$\text{BTUH} = 1.08 \times \text{CFM} \times \Delta T$$

BTUH = BTU/Hour

Latent Heat BTUH

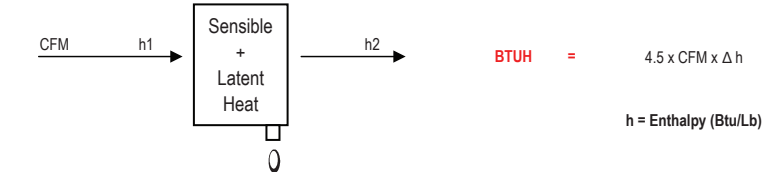
When there is a temperature difference which is released or absorbed by a substance during a change of state (i.e solid, liquid, gas) how many BTUs are being used?



$$\text{BTUH} = .68 \times \text{CFM} \times \Delta \text{Gr/Lb}$$

Total Heat

How does one calculate the total amount of heat being used in a system?

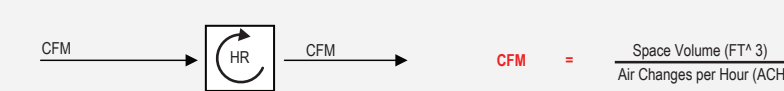


$$\text{BTUH} = 4.5 \times \text{CFM} \times \Delta h$$

h = Enthalpy (Btu/Lb)

Air Change Rate (per hour) – ACH

What CFM is needed in a space to exchange the air at a specified rate (per hour)?



$$\text{CFM} = \frac{\text{Space Volume (FT}^3\text{)}}{\text{Air Changes per Hour (ACH)}}$$

Vapor Pressure Differential

What is the pressure differential due to the vapor of moisture in the air?



$$\Delta P_{\text{vapor (in Hg)}} = P_{\text{high}} - P_{\text{low}}$$

Conversion: 1 in. Hg = 13.609 in W.C.