THERMAL
CORPORATION

A Division of Nailor International, Inc.

Engineering Data

Contents

Psychrometric Chart

Below Psychrometric Charts are only provided for demonstration purposes.

DEFINITIONS:

Dry Bulb Temperature (DB measured as °F or °C):

Dry bulb temperature is the technical name used to designate the air temperature measured by a room thermometer or thermostat. "Dry Bulb" is used because the air temperature indicated by a thermometer is not affected by the moisture in the air. The dry bulb temperature can be plotted on a Psychrometric chart (D1) as follows:

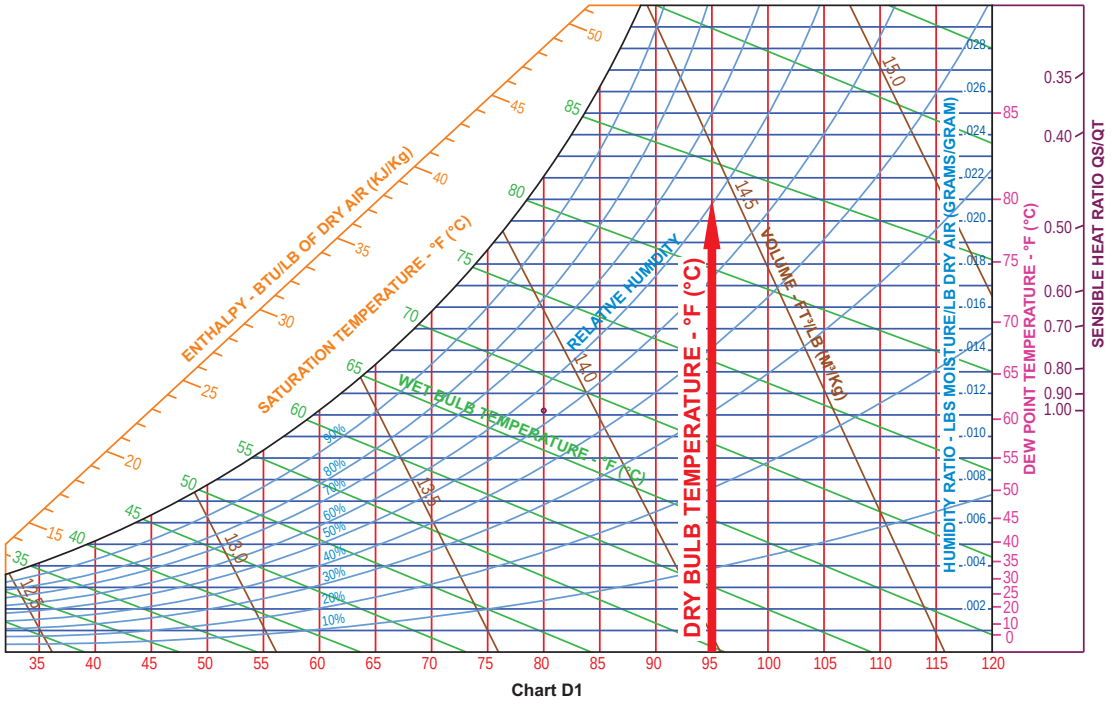

Chart D1

Wet Bulb Temperature (WB measured as °F or °C):

Wet bulb temperature can be measured by using a sling psychrometer, which contains a with thermometer bulb wrapped in a wet wick. The rate of evaporation on the thermometer bulb and temperature difference between dry and wet bulbs, depends on the humidity of the air. The evaporation rate will reduce when the air contains more water vapor. The wet bulb temperature can be plotted on a Psychrometric chart (D2) like this:

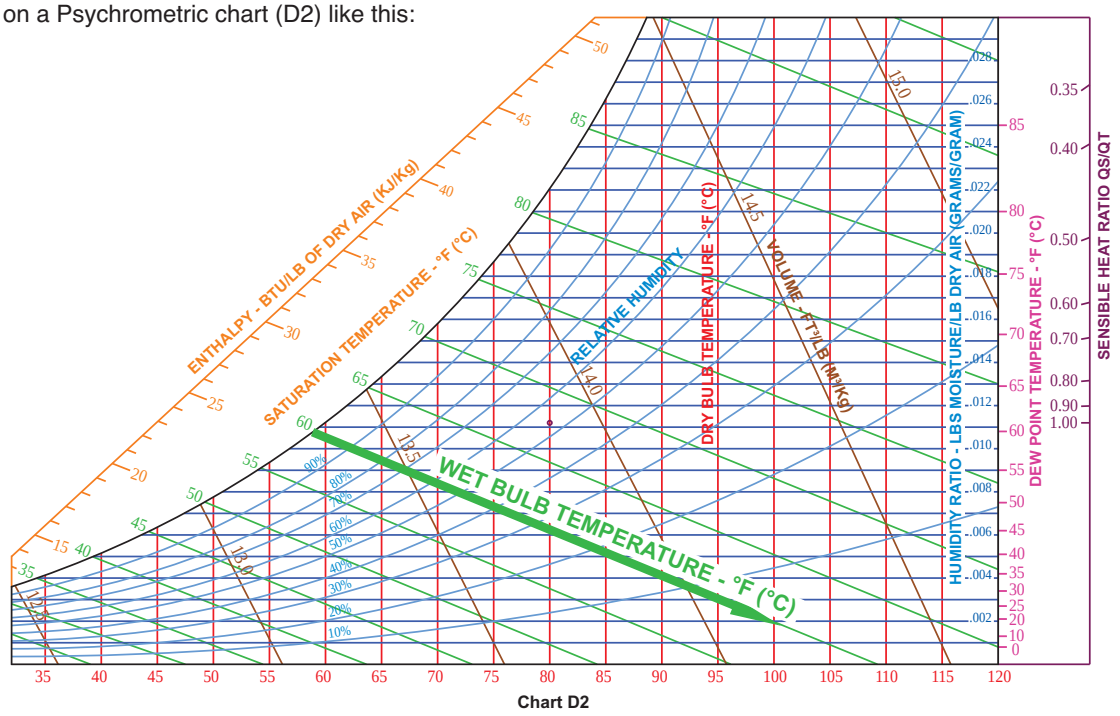

Chart D2

Psychrometric Chart

Humidity Ratio (W measured in LBS water/LB dry air or Grams water/Gram dry air):

Grain is the unit of measure for the weight of moisture in air and is expressed in terms of grains of moisture per pound of air (7,000 grains equals 1 pound). Humidity Ratio is expressed as:

$W = M_W / M_{da}$ or

$W = .622\ x_W / x_{da}$

Here is how to plot it on the Psychrometric chart (D3):

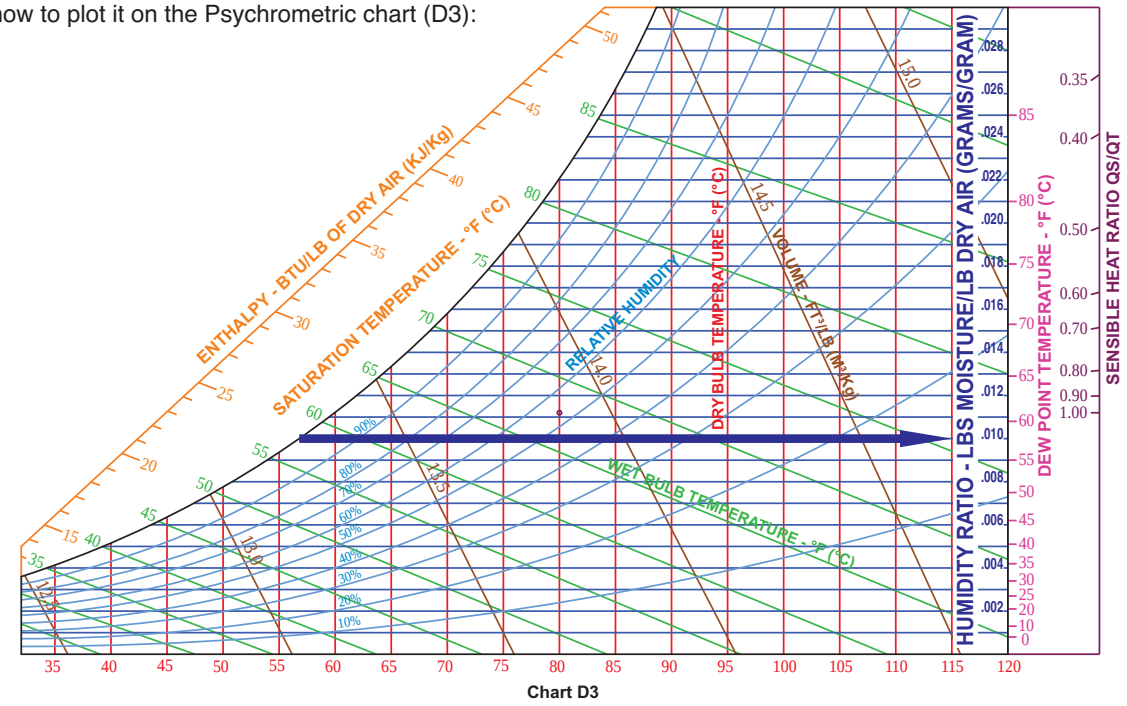

Chart D3

Relative Humidity (RH measured as %):

RH compares the amount of moisture in the air to the maximum amount of moisture air could hold at a given temperature. Relative humidity is expressed as a percentage and plotted on the Psychrometric chart as shown on chart (D4):

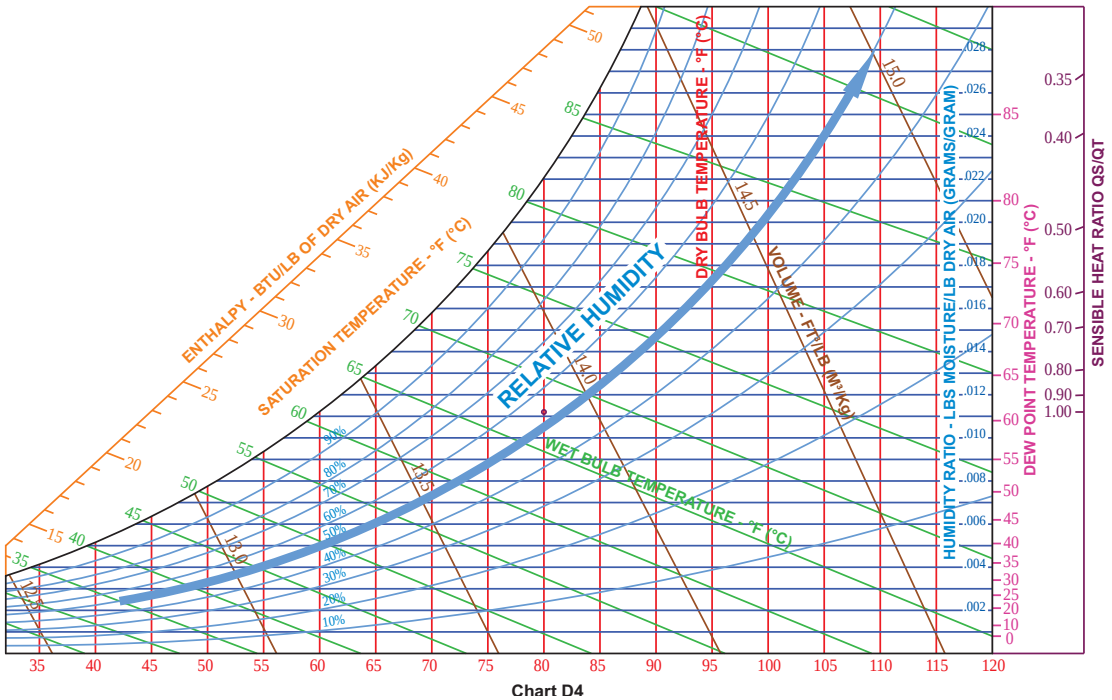

Chart D4

Psychrometric Chart

Enthalpy or heat content per unit mass (H measured as BTU/LB or KJ/Kg):

Enthalpy is a measure of the total energy of a thermodynamic system. Total enthalpy cannot be measured directly and is dependent on both dry bulb temperature and air moisture content. The change in enthalpy (ΔH) is a more useful quantity than its absolute value. Enthalpy can be plotted on Psychrometric chart (D5) as follows:

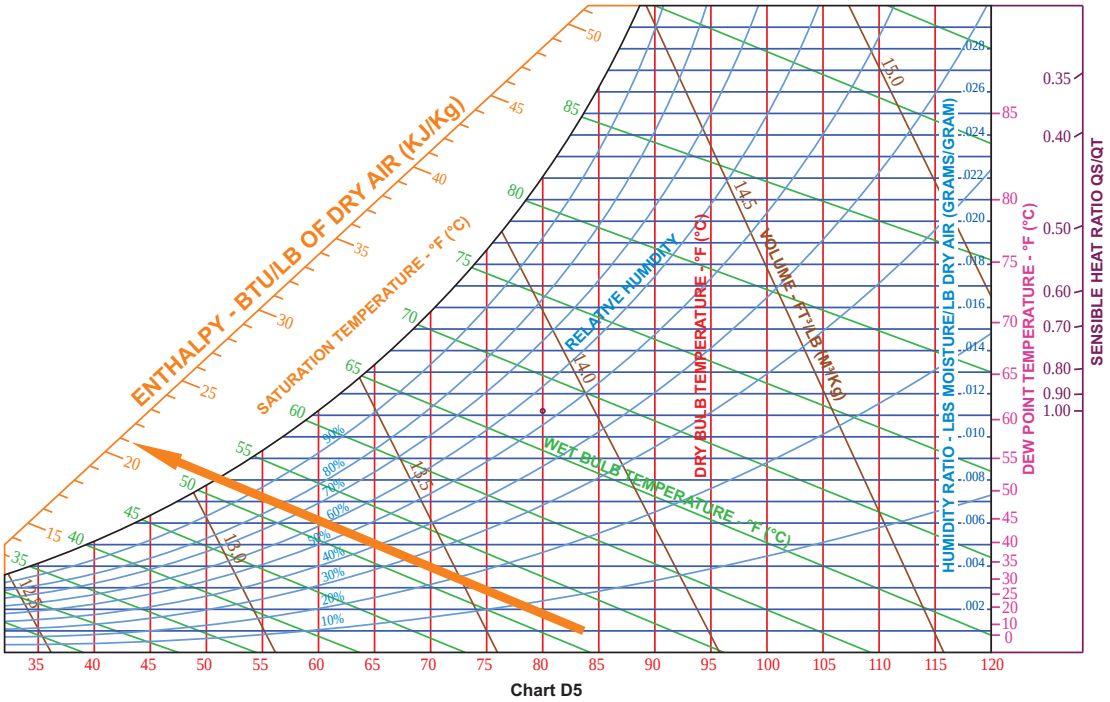

Chart D5

Dew Point (DP measured as °F or °C):

Dew point is the temperature at which moisture begins to condense and is associated with relative humidity in the environment. A 100% relative humidity indicates that the dew point is equal to the current temperature and air is saturated with water. The dew point scale is the same as the Wet Bulb scale, but the line of constant dew point follows the moisture content lines.

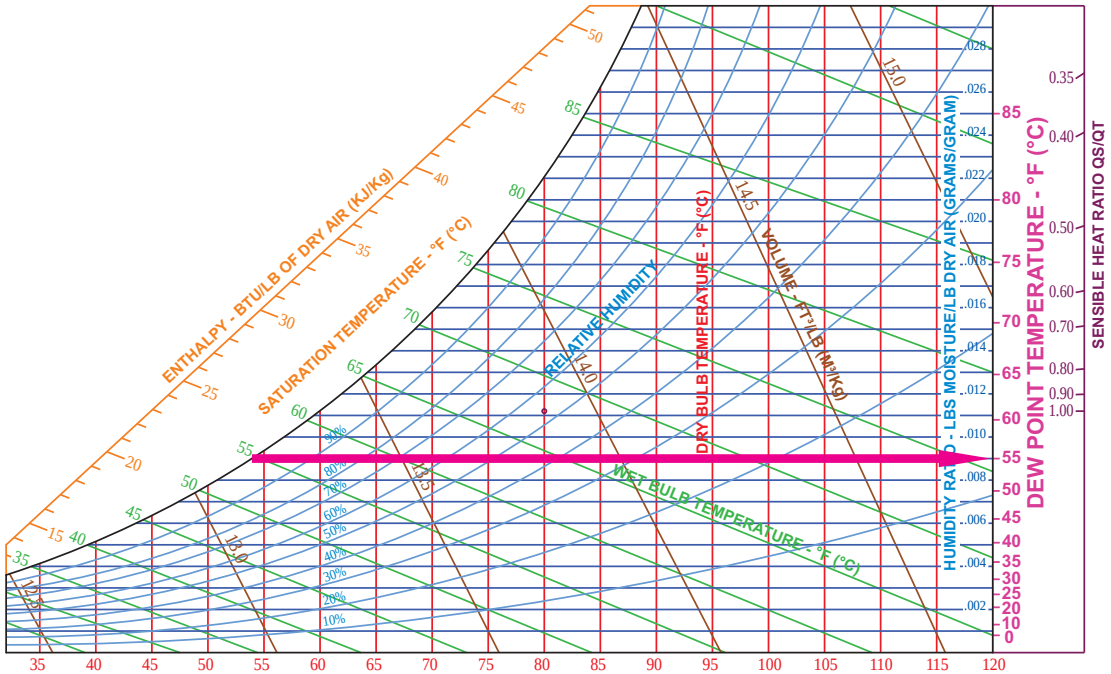

Chart D6

Psychrometric Chart

Specific Volume (*V* measured in FT³/LB or M³/Kg):

The specific volume on the Psychrometric chart represents the volume of a mixture occupied by one pound of dry air at sea level.

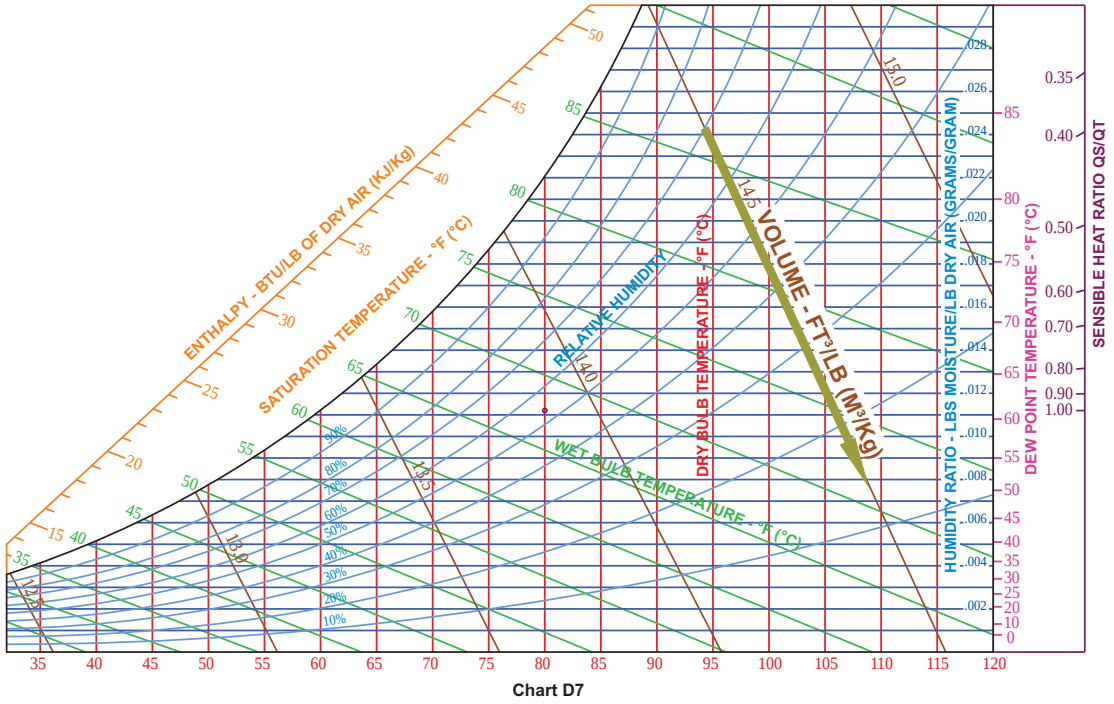

Chart D7

Psychrometric Chart

Sensible Heat:

When an object is heated, its temperature rises as heat (energy) is added. The increase in heat is described as sensible heat. Similarly, when heat is removed from an object and its temperature falls, the heat removed is also called sensible heat. When referring to air conditioning, sensible heat refers to a change in dry bulb temperature, but not in the moisture content, of the processed air. This is often used to describe the capacity of a system to lower or raise the temperature. Sensible Heat can be calculated as follows:

Qs (Btu/Hr.) = 1.085 (Constant) x SCFM (Volumetric Flow) x ΔT°FDB (Temperature)

or

Qs (KJ/Hr.) = 72.42 (Constant) x SCMM (Volumetric Flow) x ΔT°CDB (Temperature)

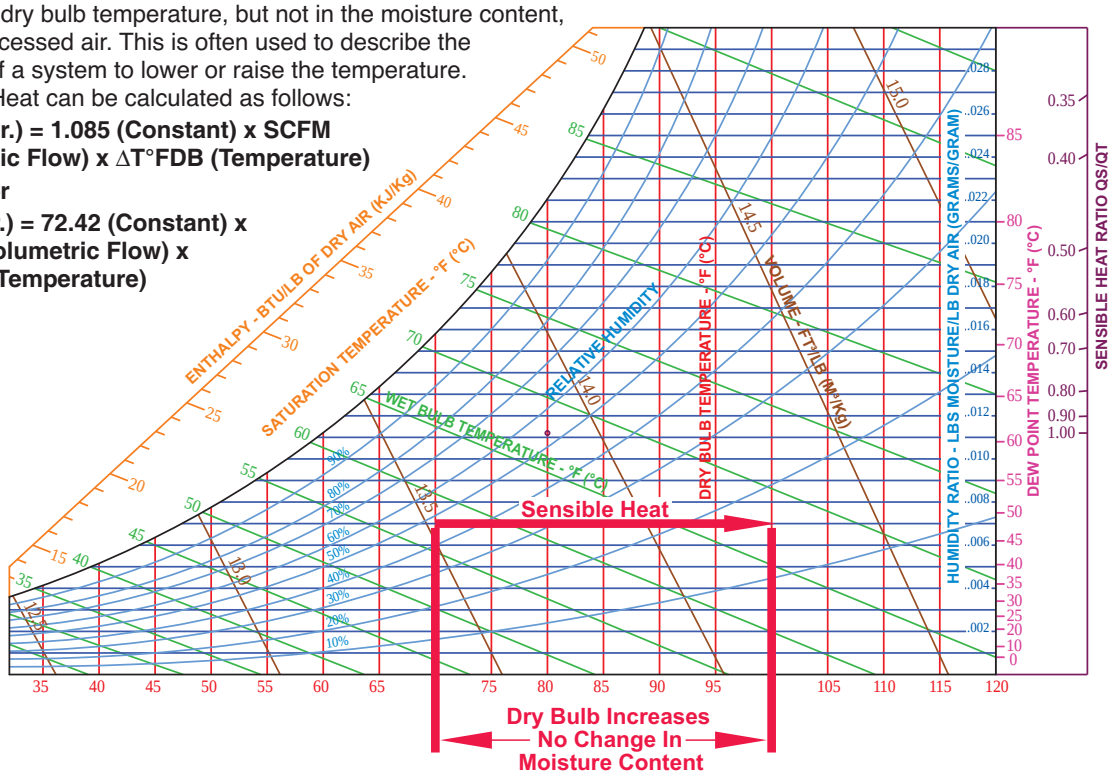

Chart D8

Latent Heat:

Latent heat is the energy used to change the state of a substance without changing the dry bulb temperature.

When supplied to or removed from air, latent heat results in a change of moisture content; therefore, dry bulb temperature of the air is not changed. In air conditioning processes, this term is typically used to describe the work of removing moisture from the processed air. Latent Heat, due to moisture in the air, can be calculated as follows:

Q_L (Btu/Hr.) = .68 (Constant) x SCFM (Volumetric Flow) x ΔW_{gr} (Humidity Ratio Difference)

or

Q_L (KJ/Hr.) = 177,734.8 (Constant) x SCMM (Volumetric Flow) x ΔW_{gr} (Humidity Ratio Difference)

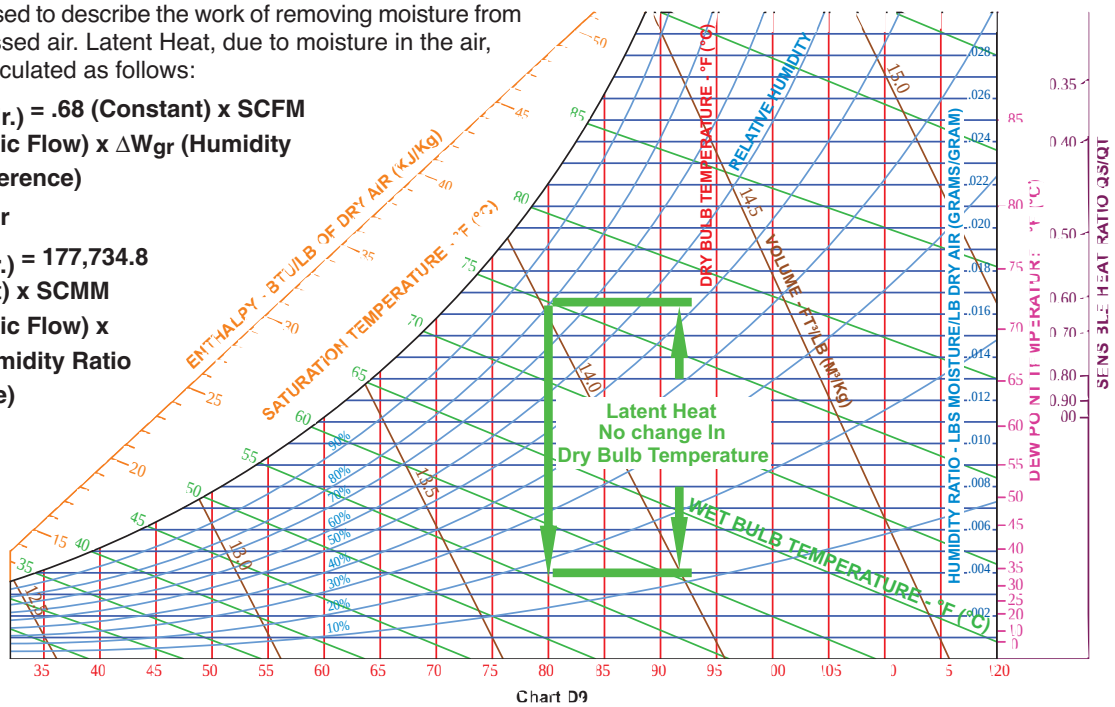

Chart D9

Psychrometric Chart

Total Heat:

The total heat content of air is the sum of the sensible heat of the air and the latent heat of the air. Thus, Total heat of the air = Qs + QL. Total heat is also referred to as enthalpy.

For most air conditioning applications, the air will consist of both sensible and latent components; although in some applications, the latent component will be very small. Total heat can be calculated as follows:

Q_T (Btu/Hr.) = 4.5 (Constant) x SCFM (Volumetric Flow) x ΔH (Enthalpy)

or

Q_T (KJ/Hr.) = 72.09 (Constant) x SCMM (Volumetric Flow) x ΔH (Enthalpy)

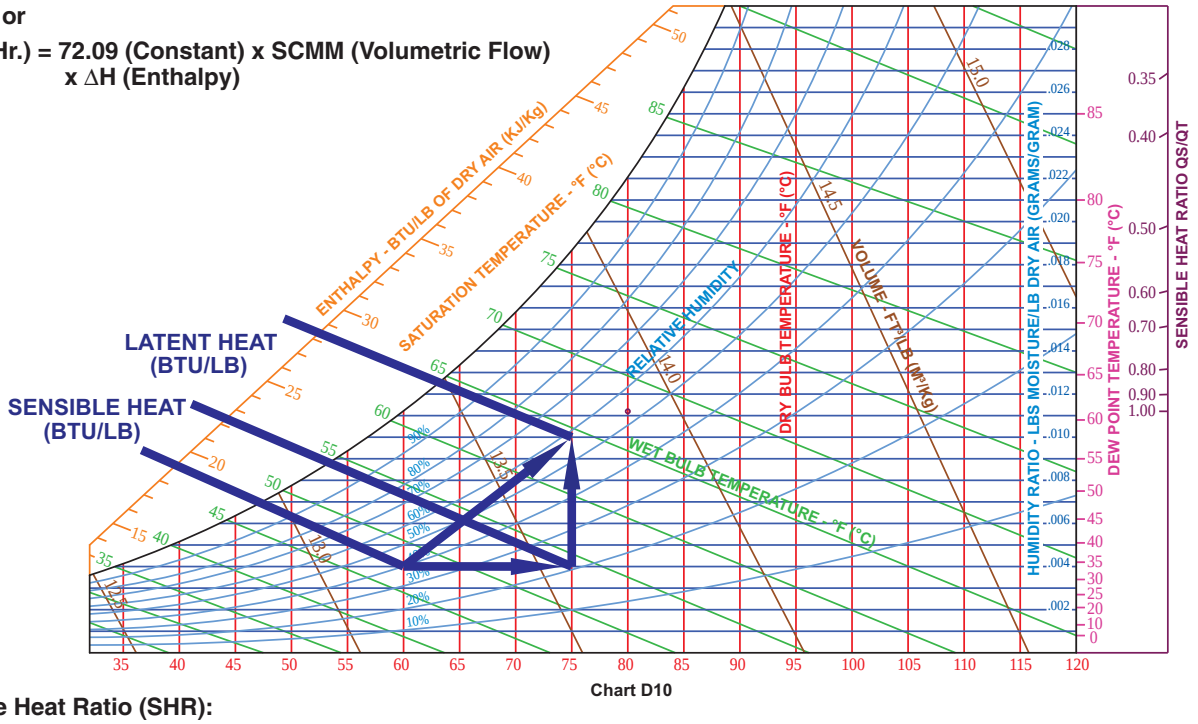

Chart D10

Sensible Heat Ratio (SHR):

Many air conditioning processes involve both sensible and latent heat. The relationship between sensible and total heat is expressed as the Sensible Heat Ratio. The Psychrometric Chart has a scale for sensible heat ratio which makes it possible to find this factor graphically on the chart. This example uses a reference point 80°F DB & 67°F WB.

Sensible Heat Ratio (SHR) = Sensible Heat (Q_S) / Total Heat (Q_T)

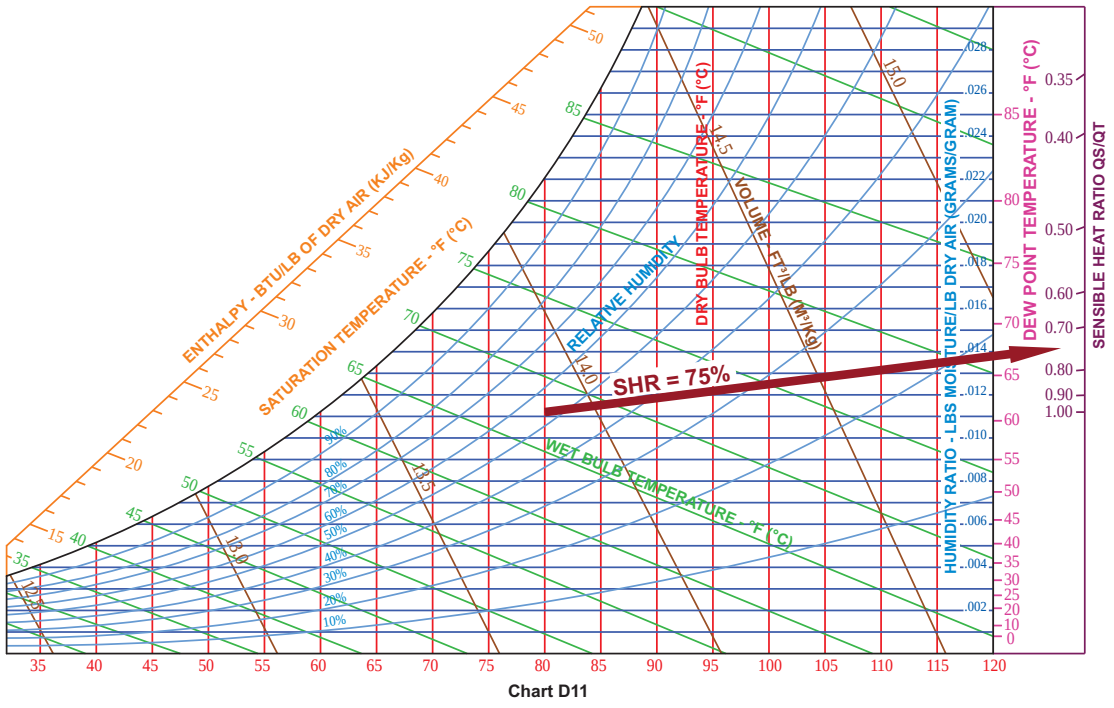

Chart D11

Psychrometric Chart

APPLICATION:

When two characteristics of the air are known, all other characteristics of the air can be determined on the Psychrometric chart.

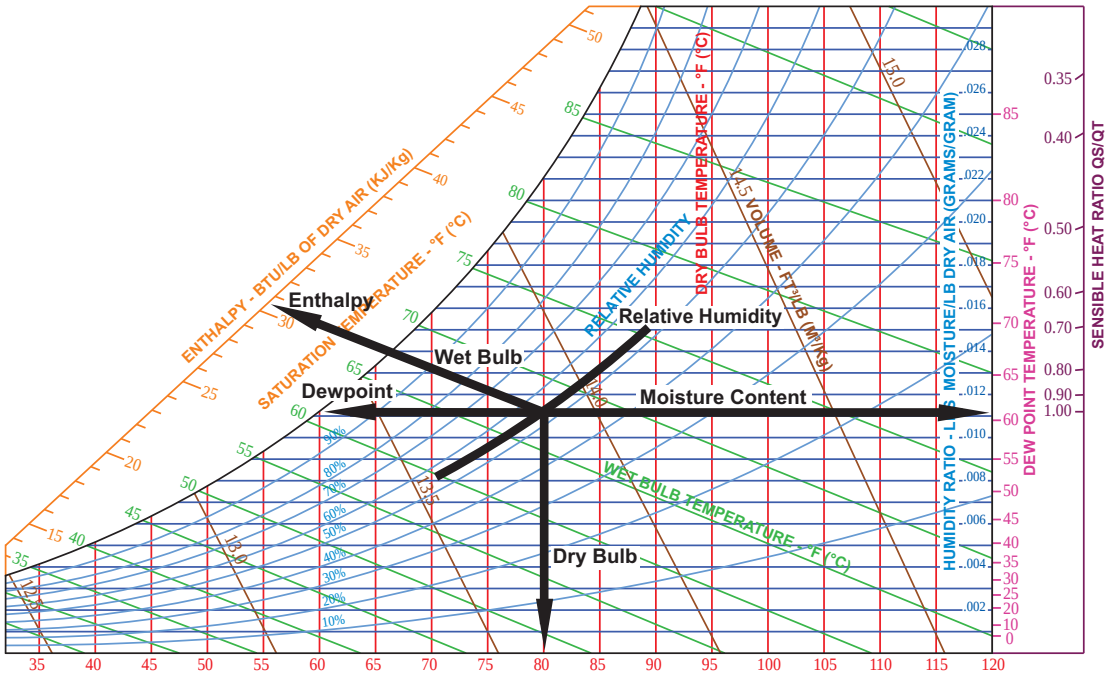

Chart A1

Winter air conditioning and humidification Example:

Increasing the dry bulb temperature while keeping the moisture content the same will reduce relative humidity ratio during heating season, therefore it is recommended for winter indoor thermal comfort to add a moisture source to the heated air. See Psychrometric charts (A2 & A3) below for example:

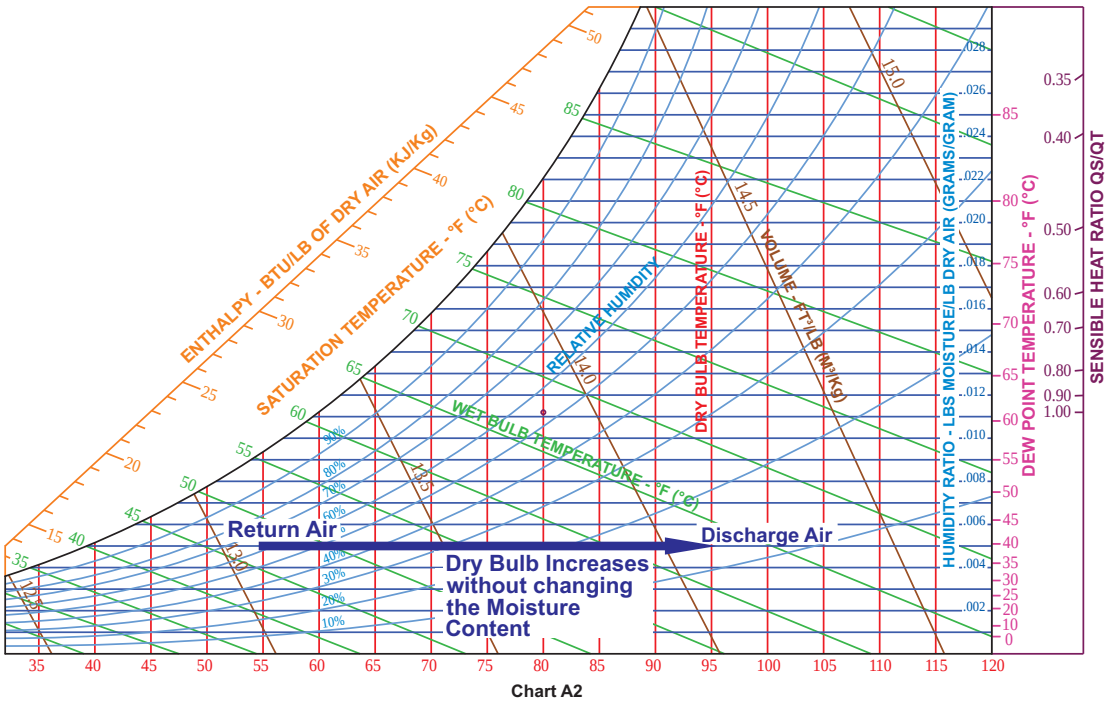

Chart A2

Psychrometric Chart

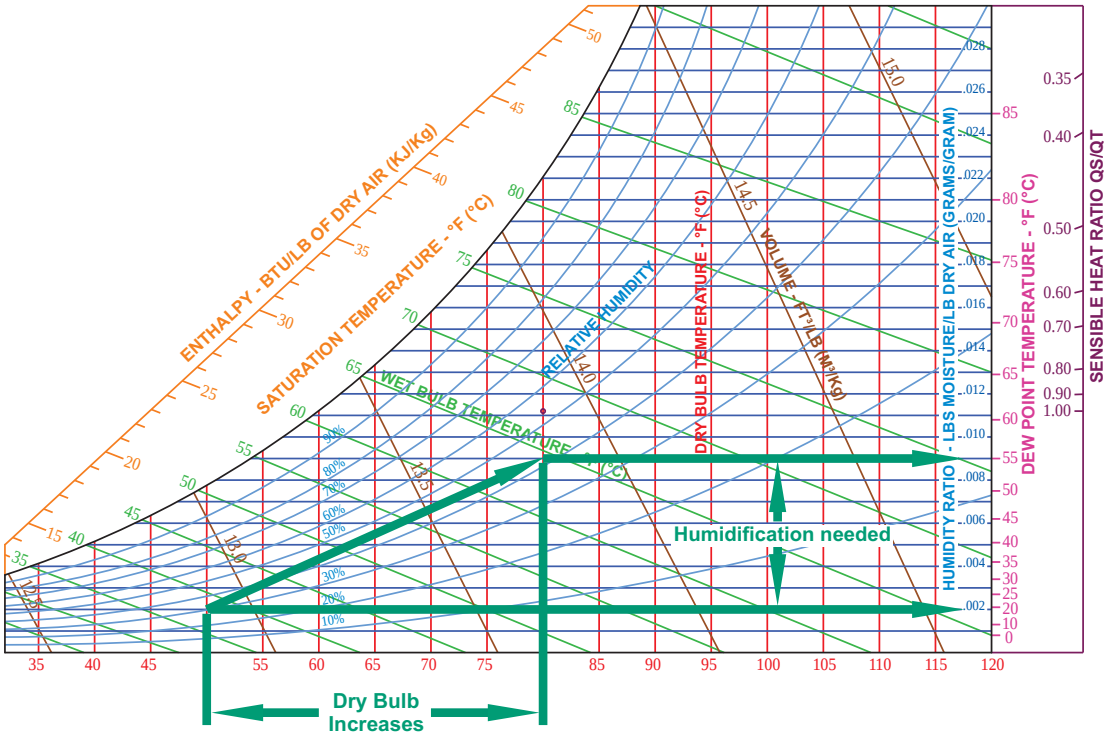

Chart A3

Mixed Air:

Mixing two different quantities of air, in an air conditioning system can be calculated by using the Psychrometric Chart.

Example:
Return air: 8 pounds air @ DB = 60°F & WB = 50°F
Outside air: 2 pounds air @ DB = 80°F & WB = 70°F
Mixed air: 10 pounds air @ DB = 64°F & WB = 54.7°F (RH = 57%)
See example on chart A4:

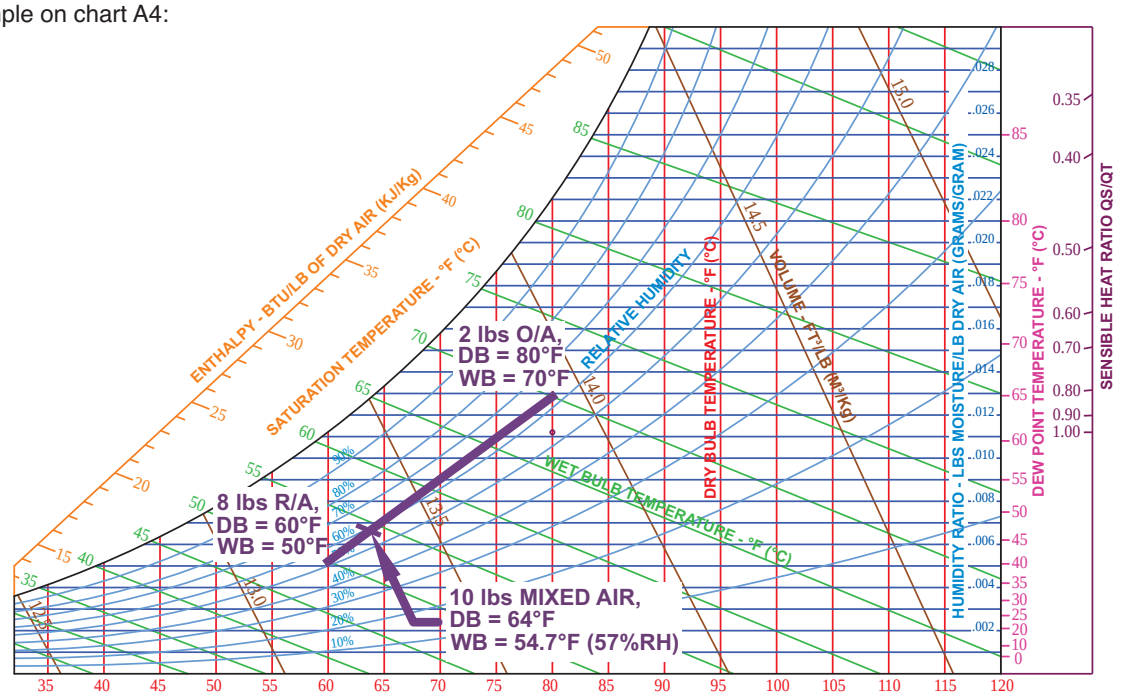

Chart A4

Total Heat

(ENTHALPY - H) BTU CONTENT OF 1 POUND OF DRY AIR WITH WATER VAPOR TO SATURATE IT*

(Standard Atmospheric Pressure 29.291" HG.)

WET BULB °F**	TENTH OF DEGREES									
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
35	13.009	13.054	13.096	13.139	13.181	13.224	13.267	13.310	13.353	13.396
36	13.439	13.482	13.525	13.569	13.612	13.656	13.699	13.743	13.787	13.830
37	13.877	13.918	13.962	14.006	14.050	14.095	14.139	14.184	14.228	14.273
38	14.321	14.362	14.407	14.452	14.497	14.542	14.587	14.632	14.677	14.723
39	14.772	14.814	14.859	14.905	14.951	14.997	15.043	15.089	15.135	15.181
40	15.232	15.274	15.320	15.367	15.413	15.460	15.507	15.554	15.601	15.648
41	15.669	15.742	15.789	15.837	15.884	15.932	15.979	16.027	16.075	16.123
42	16.175	16.219	16.267	16.315	16.363	16.412	16.460	16.509	16.558	16.606
43	16.659	16.704	16.753	16.802	16.851	16.901	16.950	16.999	17.049	17.099
44	17.151	17.198	17.248	17.298	17.348	17.398	17.449	17.499	17.549	17.600
45	17.653	17.701	17.752	17.803	17.854	17.905	17.956	18.008	18.059	18.111
46	18.164	18.214	18.266	18.317	18.369	18.421	18.474	18.526	18.578	18.631
47	18.684	18.736	18.789	18.841	18.894	18.947	19.000	19.054	19.107	19.160
48	19.214	19.268	19.321	19.375	19.429	19.483	19.537	19.591	19.646	19.700
49	19.755	19.809	19.864	19.919	19.974	20.029	20.084	20.140	20.195	20.250
50	20.306	20.362	20.418	20.473	20.530	20.586	20.642	20.698	20.755	20.811
51	20.867	20.925	20.982	21.039	21.096	21.153	21.210	21.268	21.325	21.383
52	21.440	21.499	21.557	21.615	21.673	21.732	21.790	21.849	21.907	21.966
53	22.024	22.084	22.144	22.203	22.262	22.322	22.381	22.441	22.501	22.561
54	22.621	22.682	22.742	22.803	22.863	22.924	22.985	23.046	23.107	23.168
55	23.229	23.291	23.353	23.414	23.476	23.538	23.600	23.663	23.725	23.788
56	23.850	23.913	23.976	24.039	24.102	24.165	24.229	24.292	24.356	24.420
57	24.484	24.548	24.612	24.677	24.741	24.806	24.871	24.935	25.000	25.066
58	25.131	25.196	25.262	25.328	25.394	25.460	25.526	25.592	25.658	25.725
59	25.792	25.859	25.926	25.993	26.060	26.127	26.195	26.263	26.331	26.399
60	26.467	26.535	26.603	26.672	26.741	26.810	26.879	26.948	27.017	27.087
61	27.157	27.226	27.296	27.366	27.436	27.507	27.577	27.648	27.719	27.790
62	27.861	27.932	28.004	28.075	28.147	28.219	28.291	28.363	28.436	28.508
63	28.581	28.654	28.727	28.800	28.874	28.947	29.021	29.095	29.169	29.243
64	29.318	29.392	29.466	29.541	29.616	29.691	29.767	29.842	29.918	29.994
65	30.070	30.146	30.222	30.299	30.376	30.453	30.530	30.607	30.684	30.762
66	30.840	30.917	30.995	31.074	31.152	31.231	31.310	31.389	31.468	31.547
67	31.626	31.706	31.786	31.866	31.946	32.027	32.107	32.188	32.269	32.350
68	32.431	32.513	32.595	32.676	32.759	32.841	32.923	33.006	33.089	33.172
69	33.255	33.338	33.422	33.506	33.590	33.674	33.758	33.843	33.927	34.012
70	34.097	34.183	34.268	34.354	34.440	34.526	34.612	34.699	34.785	34.872
71	34.959	35.047	35.134	35.222	35.310	35.398	35.486	35.575	35.663	35.752
72	35.841	35.931	36.020	36.110	36.200	36.290	36.381	36.471	36.562	36.653
73	36.744	36.836	36.927	37.019	37.111	37.204	37.296	37.389	37.482	37.575
74	37.668	37.762	37.856	37.950	38.044	38.139	38.234	38.328	38.424	38.519
75	38.615	38.711	38.807	38.903	39.000	39.096	39.193	39.291	39.388	39.486
76	39.584	39.682	39.780	39.879	39.978	40.077	40.176	40.276	40.376	40.476
77	40.576	40.677	40.777	40.878	40.980	41.081	41.183	41.285	41.387	41.490
78	41.593	41.695	41.799	41.902	42.006	42.110	42.214	42.319	42.424	42.529
79	42.634	42.739	42.845	42.951	43.057	43.164	43.271	43.378	43.485	43.593
80	43.701	43.809	43.917	44.026	44.135	44.244	44.353	44.463	44.573	44.683
81	44.794	44.905	45.016	45.127	45.239	45.351	45.463	45.575	45.688	45.801
82	45.914	46.028	46.142	46.256	46.370	46.485	46.600	46.715	46.831	46.946
83	47.062	47.179	47.296	47.412	47.530	47.647	47.765	47.883	48.001	48.120
84	48.239	48.358	48.478	48.598	48.718	48.838	48.959	49.080	49.201	49.323
85	49.445	49.567	49.689	49.812	49.935	50.059	50.182	50.306	50.430	50.555

* Compiled from data in ASHRAE Handbook of Fundamentals, 2009.
* * Use wet bulb temperature only in determining total heat. Total Cooling = SCFM x 4.5 x (H1 - H2)

Total Heat

(ENTHALPY - H) KILOJOULE CONTENT OF 1 KILOGRAM OF DRY AIR WITH WATER VAPOR TO SATURATE IT*

(Standard Atmospheric Pressure 101.04 KPa)

WET BULB °C**	TENTH OF DEGREES									
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	27.351	27.519	27.689	27.860	28.033	28.206	28.380	28.554	28.730	28.906
1	29.082	29.259	29.436	29.613	29.791	29.969	30.147	30.325	30.504	30.683
2	30.859	31.043	31.223	31.403	31.584	31.765	31.947	32.129	32.311	32.494
3	32.681	32.862	33.047	33.232	33.418	33.604	33.791	33.979	34.167	34.356
4	34.563	34.736	34.927	35.119	35.312	35.505	35.699	35.894	36.090	36.286
5	36.446	36.681	36.879	37.079	37.279	37.480	37.681	37.883	38.086	38.290
6	38.513	38.700	38.905	39.112	39.319	39.527	39.736	39.945	40.155	40.366
7	40.585	40.789	41.002	41.215	41.430	41.644	41.860	42.076	42.292	42.510
8	42.727	42.947	43.166	43.386	43.607	43.828	44.051	44.273	44.497	44.721
9	44.941	45.172	45.398	45.625	45.853	46.081	46.311	46.541	46.772	47.003
10	47.232	47.469	47.702	47.937	48.173	48.409	48.646	48.884	49.123	49.363
11	49.603	49.845	50.087	50.330	50.574	50.819	51.065	51.311	51.559	51.807
12	52.059	52.307	52.559	52.811	53.064	53.318	53.573	53.829	54.086	54.344
13	54.606	54.863	55.124	55.386	55.649	55.913	56.178	56.444	56.710	56.978
14	57.248	57.517	57.788	58.060	58.333	58.607	58.882	59.158	59.435	59.713
15	59.992	60.273	60.554	60.837	61.120	61.405	61.690	61.977	62.265	62.554
16	62.842	63.135	63.427	63.721	64.015	64.311	64.608	64.906	65.205	65.505
17	65.805	66.109	66.413	66.718	67.024	67.332	67.640	67.950	68.261	68.574
18	68.888	69.202	69.518	69.836	70.154	70.474	70.796	71.118	71.442	71.767
19	72.095	72.422	72.751	73.082	73.414	73.747	74.082	74.418	74.755	75.094
20	75.435	75.776	76.119	76.463	76.809	77.156	77.505	77.855	78.207	78.560
21	78.915	79.271	79.628	79.987	80.348	80.709	81.073	81.438	81.804	82.172
22	82.541	82.913	83.285	83.659	84.035	84.412	84.791	85.171	85.553	85.937
23	86.321	86.709	87.097	87.487	87.879	88.272	88.667	89.064	89.462	89.862
24	90.264	90.668	91.073	91.480	91.889	92.299	92.712	93.126	93.542	93.959
25	94.380	94.800	95.223	95.649	96.075	96.504	96.935	97.368	97.802	98.238
26	98.677	99.117	99.559	100.003	100.449	100.897	101.347	101.799	102.253	102.709
27	103.166	103.627	104.088	104.552	105.018	105.486	105.956	106.428	106.902	107.379
28	107.857	108.337	108.820	109.305	109.791	110.280	110.772	111.265	111.761	112.259
29	112.759	113.261	113.766	114.273	114.782	115.294	115.808	116.324	116.843	117.363
30	117.886	118.411	118.938	119.467	119.997	120.529	121.062	121.597	122.132	122.667

* Compiled from data in ASHRAE Handbook of Fundamentals, 2009.
** Use wet bulb temperature only in determining total heat. Total Cooling = SCFH x 1.2 x (H1 - H2)

Velocity vs. Velocity Pressure

Imperial

V (FPM)	Vp (in. H O)	V (FPM)	Vp (in. H O)	V (FPM)	Vp (in. H O)
300	0.0056	2050	0.2620	3800	0.9002
350	0.0076	2100	0.2749	3850	0.9241
400	0.0100	2150	0.2882	3900	0.9483
450	0.0126	2200	0.3017	3950	0.9727
500	0.0156	2250	0.3156	4000	0.9975
550	0.0189	2300	0.3298	4050	1.0226
600	0.0224	2350	0.3443	4100	1.0480
650	0.0263	2400	0.3591	4150	1.0737
700	0.0305	2450	0.3742	4200	1.0997
750	0.0351	2500	0.3897	4250	1.1261
800	0.0399	2550	0.4054	4300	1.1527
850	0.0450	2600	0.4214	4350	1.1797
900	0.0505	2650	0.4378	4400	1.2070
950	0.0563	2700	0.4545	4450	1.2346
1000	0.0623	2750	0.4715	4500	1.2625
1050	0.0687	2800	0.4888	4550	1.2907
1100	0.0754	2850	0.5064	4600	1.3192
1150	0.0824	2900	0.5243	4650	1.3480
1200	0.0898	2950	0.5425	4700	1.3772
1250	0.0974	3000	0.5611	4750	1.4066
1300	0.1054	3050	0.5800	4800	1.4364
1350	0.1136	3100	0.5991	4850	1.4665
1400	0.1222	3150	0.6186	4900	1.4969
1450	0.1311	3200	0.6384	4950	1.5276
1500	0.1403	3250	0.6585	5000	1.5586
1550	0.1498	3300	0.6789	5050	1.5899
1600	0.1596	3350	0.6997	5100	1.6216
1650	0.1697	3400	0.7207	5150	1.6535
1700	0.1802	3450	0.7420	5200	1.6858
1750	0.1909	3500	0.7637	5250	1.7184
1800	0.2020	3550	0.7857	5300	1.7512
1850	0.2134	3600	0.8080	5350	1.7844
1900	0.2251	3650	0.8306	5400	1.8180
1950	0.2371	3700	0.8535	5450	1.8518
2000	0.2494	3750	0.8767	5500	1.8859

Metric

V (m/s)	Vp (Pa)	V (m/s)	Vp (Pa)	V (m/s)	Vp (Pa)
1.52	1.40	10.41	65.17	19.304	223.93
1.78	1.90	10.67	68.39	19.558	229.86
2.03	2.48	10.92	71.68	19.812	235.87
2.29	3.14	11.18	75.06	20.066	241.96
2.54	3.88	11.43	78.51	20.320	248.12
2.79	4.69	11.68	82.04	20.574	254.37
3.05	5.58	11.94	85.64	20.828	260.68
3.30	6.55	12.19	89.32	21.082	267.08
3.56	7.60	12.45	93.09	21.336	273.56
3.81	8.72	12.70	96.92	21.590	280.11
4.06	9.92	12.95	100.84	21.844	286.74
4.32	11.20	13.21	104.83	22.098	293.44
4.57	12.56	13.46	108.90	22.352	300.23
4.83	14.00	13.72	113.05	22.606	307.09
5.08	15.51	13.97	117.28	22.860	314.03
5.33	17.10	14.22	121.58	23.114	321.05
5.59	18.76	14.48	125.96	23.368	328.14
5.84	20.51	14.73	130.42	23.622	335.32
6.10	22.33	14.99	134.96	23.876	342.57
6.35	24.23	15.24	139.57	24.130	349.89
6.60	26.21	15.49	144.26	24.384	357.30
6.86	28.26	15.75	149.03	24.638	364.78
7.11	30.40	16.00	153.88	24.892	372.34
7.37	32.60	16.26	158.80	25.146	379.98
7.62	34.89	16.51	163.80	25.400	387.69
7.87	37.26	16.76	168.88	25.654	395.49
8.13	39.70	17.02	174.04	25.908	403.36
8.38	42.22	17.27	179.27	26.162	411.30
8.64	44.82	17.53	184.58	26.416	419.33
8.89	47.49	17.78	189.97	26.670	427.43
9.14	50.25	18.03	195.44	26.924	435.61
9.40	53.08	18.29	200.98	27.178	443.87
9.65	55.98	18.54	206.60	27.432	452.21
9.91	58.97	18.80	212.30	27.686	460.62
10.16	62.03	19.05	218.08	27.940	469.11

Notes: All numbers corrected to standard air, .075 lbs/ft.^{3} (1.204 kg/m^3)
Equations:

$$V_P \text{ (in } H_20) = \left(\frac{V \text{ (fpm)}}{4005}\right)^2$$

$$V_P \text{(Pa)} = \left(\frac{V \text{ (m/s)}}{1.29}\right)^2$$

Property of Saturated Steam

Imperial

Temp. °F	Pressure PSIG	Sat. Liquid Btu/lbm	Sat. Vapor Btu/lbm	Latent HeatBtu/lbm
212	0.00	180.16	1150.49	970.33
215	0.89	183.19	1151.59	968.40
220	2.49	188.24	1153.41	965.17
225	4.22	193.29	1155.23	961.94
230	6.09	198.34	1157.04	958.69
235	8.11	203.40	1158.82	955.43
240	10.29	208.46	1160.59	952.13
245	12.63	213.52	1162.33	948.81
250	15.14	218.59	1164.05	945.46
255	17.84	223.67	1165.74	942.07
260	20.74	228.75	1167.41	938.65
265	23.84	233.84	1169.04	935.20
270	27.16	238.94	1170.65	931.71
275	30.71	244.05	1172.24	928.19
280	34.50	249.16	1173.79	924.63
285	38.54	254.29	1175.32	921.03
290	42.84	259.42	1176.82	917.40
295	47.42	264.56	1178.29	913.73
300	52.29	269.71	1179.73	910.02
305	57.47	274.87	1181.14	906.27
310	62.95	280.04	1182.52	902.48
315	68.77	285.22	1183.86	898.64
320	74.93	290.41	1185.18	894.77
325	81.45	295.61	1186.46	890.85
330	88.33	300.82	1187.71	886.88
335	95.61	306.04	1188.92	882.87
340	103.28	311.28	1190.09	878.82
345	111.38	316.52	1191.23	874.71
350	119.90	321.78	1192.33	870.55
355	128.88	327.05	1193.38	866.34
360	138.31	332.33	1194.40	862.07
365	148.23	337.62	1195.38	857.75
370	158.65	342.93	1196.31	853.38
375	169.58	348.25	1197.20	848.94
380	181.00	353.59	1198.04	844.45
385	193.05	358.94	1198.84	839.90
390	205.63	364.31	1199.59	835.28
395	218.80	369.69	1200.30	830.61
400	232.57	375.09	1200.96	825.86
405	246.97	380.51	1201.57	821.06
410	262.01	385.95	1202.13	816.18
415	277.71	391.41	1202.64	811.23
420	294.09	396.89	1203.10	806.22
425	311.17	402.38	1203.51	801.13
430	328.98	407.90	1203.87	795.97
435	347.53	413.45	1204.17	790.72
440	366.84	419.01	1204.41	785.40
445	386.94	424.60	1204.60	780.00
450	407.84	430.22	1204.73	774.51
455	429.57	435.86	1204.79	768.94
460	452.15	441.52	1204.79	763.27
465	475.61	447.22	1204.73	757.51
470	499.96	452.94	1204.59	751.65
475	525.23	458.69	1204.38	745.69
480	551.44	464.47	1204.10	739.63
485	578.61	470.29	1203.74	733.46
490	606.78	476.13	1203.31	727.18
495	635.96	482.00	1202.79	720.79
500	666.17	487.91	1202.20	714.29

Metric

Temp. °C	Pressure barG	Sat. Liquid Kj/Kg	Sat. Vapor Kj/Kg	Latent Kj/Kg
100.0	0.00	419.05	2676.04	2256.99
101.7	0.06	426.10	2678.60	2252.49
104.4	0.17	437.84	2682.84	2245.00
107.2	0.29	449.59	2687.07	2237.48
110.0	0.42	461.34	2691.26	2229.92
112.8	0.56	473.10	2695.42	2222.32
115.6	0.71	484.87	2699.53	2214.66
118.3	0.87	496.65	2703.58	2206.93
121.1	1.04	508.44	2707.58	2199.13
123.9	1.23	520.25	2711.51	2191.26
126.7	1.43	532.07	2715.38	2183.31
129.4	1.64	543.92	2719.20	2175.28
132.2	1.87	555.77	2722.94	2167.17
135.0	2.12	567.65	2726.62	2158.97
137.8	2.38	579.55	2730.24	2150.69
140.6	2.66	591.47	2733.79	2142.32
143.3	2.95	603.41	2737.28	2133.87
146.1	3.27	615.37	2740.70	2125.34
148.9	3.61	627.34	2744.04	2116.70
151.7	3.97	639.35	2747.32	2107.98
154.4	4.34	651.37	2750.53	2099.16
157.2	4.74	663.42	2753.67	2090.24
160.0	5.17	675.49	2756.72	2081.23
162.8	5.62	687.59	2759.70	2072.12
165.6	6.10	699.71	2762.60	2062.89
168.3	6.59	711.86	2765.42	2053.56
171.1	7.12	724.03	2768.15	2044.12
173.9	7.68	736.23	2770.80	2034.57
176.7	8.27	748.46	2773.35	2024.89
179.4	8.88	760.71	2775.81	2015.10
182.2	9.53	773.00	2778.18	2005.18
185.0	10.22	785.31	2780.44	1995.13
187.8	10.94	797.66	2782.61	1984.95
190.6	11.70	810.04	2784.68	1974.64
193.3	12.47	822.45	2786.64	1964.19
196.1	13.30	834.90	2788.50	1953.60
198.9	14.18	847.38	2790.25	1942.87
201.7	15.09	859.91	2791.90	1931.99
204.4	16.02	872.47	2793.43	1920.96
207.2	17.02	885.08	2794.85	1909.77
210.0	18.06	897.72	2796.16	1898.43
212.8	19.15	910.42	2797.35	1886.93
215.6	20.29	923.16	2798.42	1875.26
218.3	21.43	935.94	2799.37	1863.43
221.1	22.67	948.78	2800.20	1851.42
223.9	23.96	961.67	2800.90	1839.23
226.7	25.30	974.62	2801.47	1826.85
229.4	26.65	987.62	2801.90	1814.28
232.2	28.10	1000.68	2802.20	1801.52
235.0	29.61	1013.80	2802.35	1788.55
237.8	31.18	1026.98	2802.35	1775.36
240.6	32.81	1040.23	2802.19	1761.96
243.3	34.44	1053.54	2801.88	1748.34
246.1	36.19	1066.92	2801.39	1734.47
248.9	38.01	1080.37	2800.74	1720.37
251.7	39.90	1093.88	2799.91	1706.02
254.4	41.79	1107.47	2798.90	1691.42
257.2	43.81	1121.14	2797.70	1676.56
260.0	45.91	1134.87	2796.32	1661.44

Formulae

Sensible Heat
Qs (Btu/Hr.) = 1.08 x SCFM x ΔT (Dry Bulb)

Latent Heat
Q_L (Btu/Hr.) = .68 x SCFM x ΔW (Humidity Ratio)

Total Heat
Q_T (Btu/Hr.) = 4.5 x SCFM x ΔH (Enthalpy)

Moisture Added or Removed
M (Lbs./Hr.) = 4.5 x SCFM x ΔW (Humidity Ratio)

Motor Heat
M.H. = BHP x 2545 / Motor Eff. x 1.08 x SCFM

Motor HP
HP = RPM x Torque / 5252

Motor Torque
Torque = HP x 5252 / RPM

Synchronous RPM
Ns = 120 x Frequency / # of poles

Shaft Stress (PSI)
S = HP x 321,000 / RPM x Shaft Dia.^{3}

Fan laws
$CFM_1/CFM_2 = RPM_1/RPM_2$
$P_1/P_2 = (RPM_1/RPM_2)^2$
$BHP_1/BHP_2 = (RPM_1/RPM_2)^3$

Belt Size Calculation
$L = 2C + 1.57 (D+d) + (D-d)^2/4C$

Electric Heat
Kw x 3414 = BTUH
T(°F) = BTUH / SCFM x 1.08

Velocity Pressure
$Vp = (V/4005)^2$

Rectangle to Round Duct Conversion
De = (1.27 x L x W)0.5

Water Velocity in a Pipe
$V = (0.4085 \times GPM)/d^2$

GPM Calculation
GPM = Q /500 x (EWT-LWT)

Temperature
°F = (°C x 1.8) + 32
°C = (°F – 32) x (5/9)

Velocity, Area, Volume
V(FPM) = Volume(CFM)/Area(FT^2)
Volume(CFM) = Area(FT^2) x V(FPM)
Area(FT^2) = Volume(CFM)/V(FPM)

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