Section X

REFERENCE DATA

CONVENIENT DATA AND REFERENCE TABLES

POWER, WORK AND HEAT

1 Btu	= 778.2 ft-lb
1 watt hour	= 2,655.4 ft-lb or 3.413 Btu
1 kilowatt (1,000 watts)	= 1.3405 horsepower or 56.9 Btu per min
1 horsepower	= .746 kilowatts
1 pound (force)	= 32.2 poundals (ft-lb per sec²)
1 mechanical horsepower	= 42.4 Btu per min or 2,544 Btu per hr or 33,000 ft-lb per min
1 boiler horsepower	= 33,479 Btu per hr or the evaporation of 34.5 lb per hr of water at 212 F
1 ton of refrigeration	= 200 Btu per min or 12,000 Btu per hr
Latent heat of ice	= 144 Btu per lb

PRESSURE

1 psi equals
- 144 lbs per sq ft
- 2.0416 in. of mercury at 62 F
- 2.309 ft of water at 62 F
- 27.71 in. of water at 62 F

1 atmosphere (14.7 psi absolute) equals
- 2,116.8 lb per sq ft absolute
- 33.542 ft of water at 62 F
- 30.0 in. of mercury at 62 F
- 29.92 in. of mercury at 32 F
- 760 mm of mercury at 32 F

1 oz per sq in. equals
- .1276 in. of mercury at 62 F
- 1.732 in. of water at 62 F

1 in. water at 62 F equals
- .03609 lb or .5774 oz per sq in.
- 5.196 lb per sq ft

1 ft water at 62 F equals
- .433 psi
- 62.355 lb per sq ft

1 in. mercury at 62 F equals
- .491 lb or 7.86 oz per sq in.
- 1.132 ft water at 62 F
- 13.58 in. water at 62 F

WEIGHT AND VOLUME

1 gal (U.S.)	= 231.0 cu in. or .13368 cu ft (3,785 cu cm)
1 gal (British or Imperial)	= 277.274 cu in.
1 cu ft	= 7.4805 gal or 1,728 cu in.
1 cu ft water at 60 F	= 62.37 lb or 7.4805 gal
1 cu ft water at 212 F	= 59.76 lb
1 gal water at 60 F	= 8.34 lb
1 gal water at 212 F	= 7.99 lb
1 pound (avoirdupois)	= 16 oz or 7,000 grains
1 bushel	= 1.244 cu ft
1 short ton	= 2,000 lb
1 long ton	= 2,240 lb
1 cu ft of free air at 65 F	= .07203 lb
1 lb of free air at 65 F	= 13.88 cu ft
1 grain	= .06480 grams

METRIC UNITS

1 cm	= .3937 in.
1 in.	= 2.54 cm
1 meter	= 3.281 ft
1 ft	= .3048 meter
1 sq cm	= .155 sq. in.
1 sq in.	= 6.45 sq cm
1 sq meter	= 10.765 sq ft
1 sq ft	= .0929 sq meter
1 cu cm	= .061 cu in. or .03381 oz (liquid)
1 cu in.	= 16.38 cu cm
1 cu meter	= 35.32 cu ft
1 cu ft	= .0283 cu meter
1 kilometer per hr	= .6214 mph
1 liter	= 1,000 cu cm or .264 gal
1 kilogram	= 2.2046 lb
1 lb	= .4536 kilogram
1 metric ton	= 2,205 lb (avdp)
1 gram	= 980.59 dynes or 15.4324 grains
1 oz (liquid)	= 29.574 cu cm
1 oz (avdp)	= 28.3495 grams
1 gram per sq cm	= 0.2896 in. mercury at 0 C or .394 in. water at 15 F
1 kg per sq cm (metric atmosphere)	= 14.23 psi
1 gram per cu cm	= .03613 lb per cu in. or 62.43 lb per cu ft

HEATING AND COOLING CALCULATIONS

STEAM

Condensing capacity of a steam coil:

$$\text{Steam in lb per hr} = \frac{\text{Coil heat load (Btu per hr)}}{\text{Latent heat of steam in Btu per lb}}$$

$$\text{Steam in lb per hr} = \frac{\text{cfm} \times 60 \times \text{weight per cu ft} \times \text{sp ht} \times (T - T_0)}{\text{Latent heat of steam in Btu per lb}} \quad \ldots (1)$$

$$\text{Steam in lb per hr} = \frac{\text{cfm} \times 60 \times .075 \times .24 \times (T - T_0)}{960}$$

$$\text{Steam in lb per hr} = \frac{\text{cfm} \times (T - T_0)}{890} \quad \ldots (2)$$

Equivalent Direct Radiation:

EDR = Btu/240 ..... (3)

lb per hr = EDR/4 ..... (4)

Glossary:

cfm ..... = Cubic Feet of air per minute passing through the coil.
weight per cu ft ..... = Weight of 1 pound (.075).
sp ht ..... = Btu required to raise the temperature of 1 lb of air 1 degree F (.24).
T_0 ..... = Temperature of air entering coil, in degrees F.
T ..... = Temperature of air leaving coil, in degrees F.
1 EDR ..... = Emission 240 Btu per hour.

HOT WATER

Capacity of Hot Water Coil:

$$\text{gpm} = \frac{\text{Coil heat load (Btu per hr)}}{(T_2 - T_1) \times 60 \times 8.34 \text{ lb per gal}} \quad \text{(see equation 1)}$$

$$\text{gpm} = \frac{\text{Coil heat load (Btu per hr)}}{(T_2 - T_1) \times 500} \quad \ldots (5)$$

Equivalent Direct Radiation:

EDR = Btu/150 ..... (6)

Glossary:

T_1 ..... = Temperature of water leaving coil, in degrees F.
T_2 ..... = Temperature of water entering coil, in degrees F.
EDR ..... = Emission 150 Btu per hour.

CHILLED WATER

Capacity of Chilled Water Coil:

$$\text{gpm} = \frac{\text{Total cooling load (Btu per hr)}}{(T_1 - T_2) \times 500} \quad \ldots (7)$$

Total cooling load = $(H_1 - H_2) \times \text{cfm} \times .075 \times 60$ ..... (8)

Glossary:

H_1 ..... = Total heat content of entering air.
H_2 ..... = Total heat content of leaving air.
.075 ..... = Specific weight of standard air in lb per cu ft.

MISCELLANEOUS CALCULATIONS

WORK

W = FD ..... (9)

where, W = work (in.-lb)
F = force (lb)
D = distance (in.)

TORQUE

T = FL ..... (10)

where, T = torque (in. — lb)
F = force (lb)
L = length of lever arm (in.)

AIR DISTRIBUTION SYSTEMS

Pt = Pv + Ps ..... (11)

where, Pt = total pressure
Pv = velocity pressure
Ps = static pressure

$V = 4005 \sqrt{Pv}$ ..... (12)

where, V = velocity (ft per min)
Pv = velocity pressure (in. water)

CONVERSION FACTORS

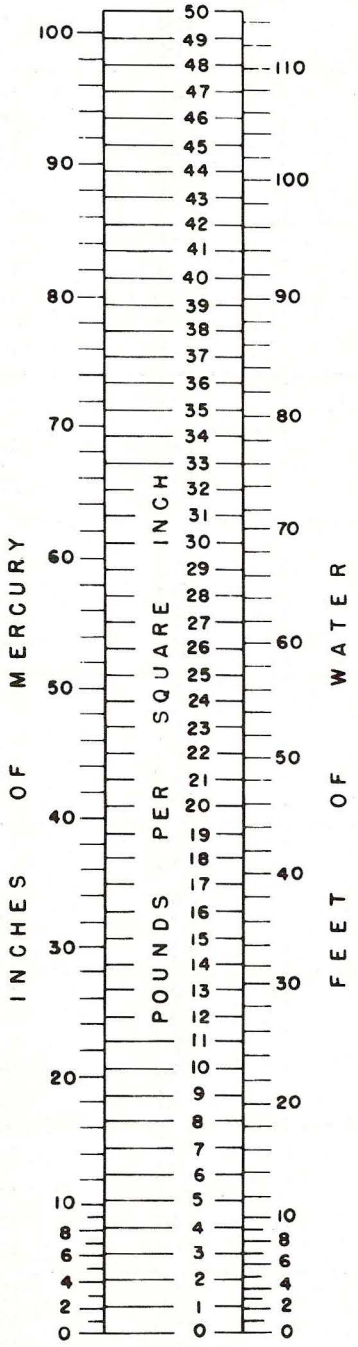
Multiply	By	To Get
atmospheres	76.0	cms of mercury
atmospheres	29.92	inches of mercury
atmospheres	33.90	feet of water
atmospheres	14.70	pounds per sq inch
British thermal units	777.5	foot-pounds
British thermal units	3.927×10^{-4}	horsepower-hours
British thermal units	2.928×10^{-4}	kilowatt-hours
Btu per min	12.96	foot-pounds per sec
Btu per min	0.02356	horsepower
Btu per min	0.01757	kilowatts
Btu per min	17.57	watts
centigrams	0.01	grams
centimeters	0.3937	inches
centimeters	0.01	meters
centimeters	10	millimeters
centimeter-grams	7.233×10^{-5}	pound-feet
centimeters of mercury	0.01316	atmospheres
centimeters of mercury	0.4461	feet of water
centimeters of mercury	27.85	pounds per sq foot
centimeters of mercury	0.1934	pounds per sq inch
centimeters per second	1.969	feet per minute
centimeters per second	0.03281	feet per second
centimeters per second	3.728×10^{-4}	miles per minute
cubic centimeters	3.531×10^{-5}	cubic feet
cubic centimeters	6.10×10^{-2}	cubic inches
cubic centimeters	10^{-6}	cubic meters
cubic centimeters	1.308×10^{-6}	cubic yards
cubic centimeters	2.113×10^{3}	pints (liq)
cubic feet	2.832×10^{4}	cubic cms
cubic feet	1728	cubic inches
cubic feet	0.02832	cubic meters
cubic feet	0.03704	cubic yards
cubic inches	16.39	cubic centimeters
cubic inches	5.787×10^{-4}	cubic feet
cubic inches	1.639×10^{-5}	cubic meters
cubic inches	2.143×10^{-5}	cubic yards
cubic meters	0.01732	quarts (liq)
cubic meters	10^{6}	cubic centimeter
cubic meters	35.31	cubic feet
cubic meters	61.023	cubic inches
cubic meters	1057	quarts (liq)
cubic yards	27	cubic feet
cubic yards	46,656	cubic inches
cubic yards	0.7646	cubic meters
feet	1/3	yards
feet of water	0.02950	atmospheres
feet of water	0.8826	inches of mercury
feet of water	32.43	pounds per sq ft
feet of water	0.4335	pounds per sq inch
feet per minute	0.5080	centimeters per sec
feet per minute	0.01667	feet per sec
feet per minute	0.3048	meters per minute
feet per minute	0.01136	miles per hour
feet per second	30.48	centimeters per sec
feet per second	18.29	meters per minute
feet per second	0.6818	miles per hour
feet per second	0.01136	miles per minute
foot-pounds	1.286×10^{-3}	British thermal units
foot-pounds	5.050×10^{-7}	horsepower hours
foot-pounds	1.286×10^{-3}	kilowatt-hours
foot-pounds per minute	3.766×10^{-7}	Btu per minute
foot-pounds per minute	0.01667	foot-pounds per sec
foot-pounds per minute	3.030×10^{-5}	horsepower
foot-pounds per minute	2.260×10^{-5}	kilowatts
foot-pounds per second	7.717×10^{-2}	Btu per minute
foot-pounds per second	1.818×10^{-3}	horsepower
foot-pounds per second	1.356×10^{-3}	kilowatts
Gallons	0.1337	cubic feet
Gallons	231	cubic inches
gallons per minute	2.228×10^{-3}	cubic feet per second
grams	0.03527	ounces
grams	2.205×10^{-3}	pounds
horsepower	42.44	Btu per min
horsepower	33,000	foot-pounds per min
horsepower	550	foot-pounds per sec
horsepower	1.014	horsepower (metric)
horsepower	0.7457	kilowatts
horsepower	745.7	watts
horsepower (boiler)	33,520	Btu per hour
horsepower (boiler)	9.804	kilowatts
horsepower-hours	2547	British thermal units
horsepower-hours	1.98×10^{6}	foot-pounds
horsepower-hours	0.7457	kilowatt-hours
Inches	2.540	centimeters
Inches of mercury	0.03342	atmospheres
Inches of mercury	1.133	feet of water
Inches of mercury	70.73	pounds per square ft
Inches of mercury	0.4912	pounds per square in

CONVERSION FACTORS (continued)

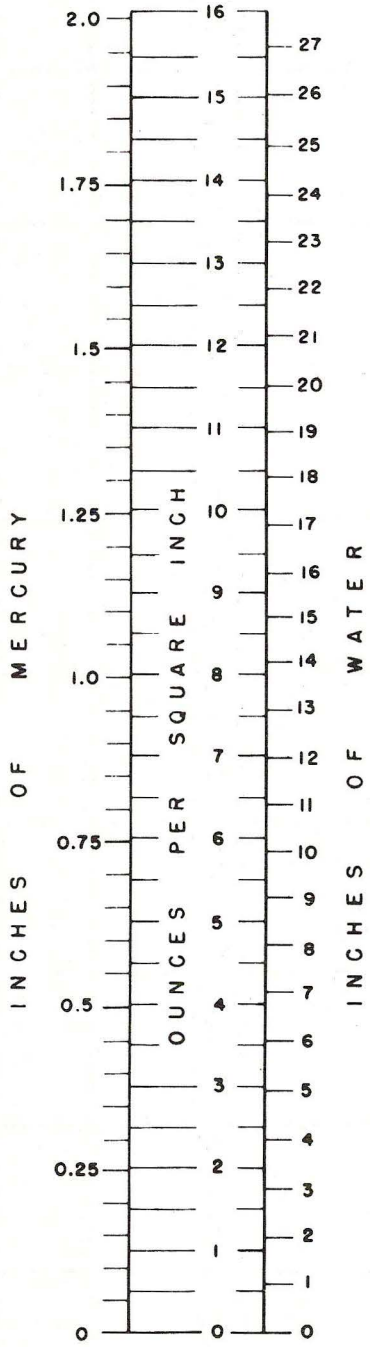
Multiply	By	To Get
decigrams	0.1	grams
decimeters	0.1	meters
degrees (angle)	60	minutes
feet	30.48	centimeters
feet	12	inches
feet	0.3048	meters
kilometers	1093.6	yards
kilometers per hour	0.6214	miles per hour
kilowatts	56.92	Btu per min
kilowatts	4.425×10^4	foot-pounds per min
kilowatts	737.6	foot-pounds per sec
kilowatts	1.341	horsepower
kilowatts	10^3	watts
kilowatt-hours	3415	British thermal units
kilowatt-hours	2.655×10^6	foot-pounds
kilowatt-hours	1.341	horsepower-hours
megohms	10^6	ohms
meters	100	centimeters
meters	3.2808	feet
meters	39.37	inches
meters	10^{-3}	kilometers
meters	1.0936	yards
meters per minute	3.281	feet per minute
meters per minute	0.05468	feet per second
meters per minute	0.03728	miles per hour
miles	5280	feet
miles	1.6093	kilometers
miles	1760	yards
miles per hour	44.70	feet per minute
miles per hour	1.467	feet per second
miles per hour	1.6093	kilometers per hour
miles per hour	26.82	meters per minute
miles per minute	2682	centimeters per sec
miles per minute	88	feet per second
miles per minute	1.6093	kilometers per min
miles per minute	60	miles per hour
millimeters	0.1	centimeters
Ohms	10^{-6}	megohms
ounces	28.35	grams
ounces	0.0625	pounds
ounces (fluid)	1.805	cubic inches
ounces per square inch	0.0625	pounds per sq inch
pounds	453.6	grams
Inches of water	0.002458	atmospheres
Inches of water	0.07355	inches of mercury
Inches of water	5.204	pounds per square ft
Inches of water	0.03613	pounds per square in
Kilograms	2.2046	pounds
kilometers	0.6214	miles
pounds	16	ounces
pound-feet	13,825	centimeter-grams
pounds of water	0.1198	gallons
pounds per square foot	0.01602	feet of water
pounds per square foot	6.944×10^{-6}	pounds per sq inch
pounds per square inch	0.06804	atmospheres
pounds per square inch	2.307	feet of water
pounds per square inch	2.036	inches of mercury
pounds per square inch	144	pounds per sq foot
square centimeters	0.1550	square inches
square feet	144	square inches
square feet	0.09290	square meters
square feet	3.587×10^{-8}	square miles
square feet	1/9	square yards
square inches	6.452	square centimeters
square inches	6.944×10^{-3}	square feet
square meters	10.764	square feet
square miles	27.88×10^6	square feet
square miles	3.098×10^6	square yards
square yards	9	square feet
square yards	3.228×10^{-7}	square miles
temp (degs C) + 273	1	abs temp (degs C)
temp (degs C) + 17.8	1.8	temp (degs F)
temp (degs F) + 460	1	abs temp (degs F)
temp (degs F) − 32	5/9	temp (degs C)
Watts	0.05692	Btu per min
Watts	44.26	foot-pounds per min
Watts	0.7376	foot-pounds per sec
Watts	1.341×10^{-3}	horsepower
Watts	10^{-3}	kilowatts
watt-hours	3.415	British thermal units
watt-hours	2655	foot-pounds
watt-hours	10^{-3}	kilowatt-hours
Yards	3	feet
Yards	36	inches
Yards	0.9144	meters

CONVERSION CHARTS

Mercury — Water — Gauge Pressure



POUNDS PER SQUARE INCH
CONVERTED TO
INCHES OF MERCURY
AND FEET OF WATER



OUNCES PER SQUARE INCH
CONVERTED TO
INCHES OF MERCURY
AND INCHES OF WATER

TABLE OF SQUARE ROOTS: 1 THROUGH 150

n	√n	n	√n	n	√n
1	1.000	51	7.141	101	10.050
2	1.414	52	7.211	102	10.100
3	1.732	53	7.280	103	10.149
4	2.000	54	7.348	104	10.198
5	2.236	55	7.416	105	10.247
6	2.449	56	7.483	106	10.296
7	2.646	57	7.550	107	10.344
8	2.828	58	7.616	108	10.392
9	3.000	59	7.681	109	10.440
10	3.162	60	7.746	110	10.488
11	3.317	61	7.810	111	10.536
12	3.464	62	7.874	112	10.583
13	3.606	63	7.937	113	10.630
14	3.742	64	8.000	114	10.677
15	3.873	65	8.062	115	10.724
16	4.000	66	8.124	116	10.770
17	4.123	67	8.185	117	10.817
18	4.243	68	8.246	118	10.863
19	4.359	69	8.307	119	10.909
20	4.472	70	8.367	120	10.955
21	4.583	71	8.426	121	11.000
22	4.690	72	8.485	122	11.045
23	4.796	73	8.544	123	11.091
24	4.899	74	8.602	124	11.136
25	5.000	75	8.660	125	11.180
26	5.099	76	8.718	126	11.225
27	5.196	77	8.775	127	11.269
28	5.292	78	8.832	128	11.314
29	5.385	79	8.888	129	11.358
30	5.477	80	8.944	130	11.402
31	5.568	81	9.000	131	11.446
32	5.657	82	9.055	132	11.489
33	5.745	83	9.110	133	11.533
34	5.831	84	9.165	134	11.576
35	5.916	85	9.220	135	11.619
36	6.000	86	9.274	136	11.662
37	6.083	87	9.327	137	11.705
38	6.164	88	9.381	138	11.747
39	6.245	89	9.434	139	11.790
40	6.325	90	9.487	140	11.832
41	6.403	91	9.539	141	11.874
42	6.481	92	9.592	142	11.916
43	6.557	93	9.644	143	11.958
44	6.633	94	9.695	144	12.000
45	6.708	95	9.747	145	12.042
46	6.782	96	9.798	146	12.083
47	6.856	97	9.849	147	12.124
48	6.928	98	9.899	148	12.166
49	7.000	99	9.950	149	12.207
50	7.071	100	10.000	150	12.247

PROPERTIES OF SATURATED STEAM

TABLE 1X

Vacuum, Inches of Mercury	Absolute Pressure, psi	Temperature, Fahrenheit	Total Heat Above 32 F: In the Water *h* Heat-Units	Total Heat Above 32 F: In the Steam *H* Heat-Units	Latent Heat, $L = H - h$ Heat-Units	Volume, Cu Ft in 1 Lb of Steam	Weight of 1 Cu Ft Steam, Lb	Entropy of the Water	Entropy of Evaporation
29.74	0.0886	32	0.00	1073.4	1073.4	3294.0	0.000304	0.0000	2.1832
29.67	0.1217	40	8.05	1076.9	1068.9	2438.0	0.000410	0.0162	2.1394
29.56	0.1780	50	18.08	1081.4	1063.3	1702.0	0.000587	0.0361	2.0865
29.40	0.2562	60	28.08	1085.9	1057.8	1208.0	0.000828	0.0555	2.0358
29.18	0.3626	70	38.06	1090.3	1052.3	871.0	0.001148	0.0745	1.9868
28.89	0.505	80	48.03	1094.8	1046.7	636.8	0.001570	0.0932	1.9398
28.50	0.696	90	58.00	1099.2	1041.2	469.3	0.002131	0.1114	1.8944
28.00	0.946	100.00	67.97	1103.6	1035.6	350.8	0.002851	0.1295	1.8505
27.88	1	101.83	69.8	1104.4	1034.6	333.0	0.00300	0.1327	1.8427
25.85	2	126.15	94.0	1115.0	1021.0	173.5	0.00576	0.1749	1.7431
23.81	3	141.52	109.4	1121.6	1012.3	118.5	0.00845	0.2008	1.6840
21.78	4	153.01	120.9	1126.5	1005.7	90.5	0.01107	0.2198	1.6416
19.74	5	162.28	130.1	1130.5	1000.3	73.33	0.01364	0.2348	1.6084
17.70	6	170.06	137.9	1133.7	995.8	61.89	0.01616	0.2471	1.5814
15.67	7	176.85	144.7	1136.5	991.8	53.56	0.01867	0.2579	1.5582
13.63	8	182.86	150.8	1139.0	988.2	47.27	0.02115	0.2673	1.5380
11.60	9	188.27	156.2	1141.1	985.0	42.36	0.02361	0.2756	1.5202
9.56	10	193.22	161.1	1143.1	982.0	38.38	0.02606	0.2832	1.5042
7.52	11	197.75	165.7	1144.9	979.2	35.10	0.02849	0.2902	1.4895
5.49	12	201.96	169.9	1146.5	976.6	32.36	0.03090	0.2967	1.4760
3.45	13	205.87	173.8	1148.0	974.2	30.03	0.03330	0.3025	1.4639
1.42	14	209.55	177.5	1149.4	971.9	28.02	0.03569	0.3081	1.4523
Lbs gauge									
0.0	14.70	212.0	180.0	1150.4	970.4	26.79	0.03732	0.3118	1.4447
0.3	15	213.0	181.0	1150.7	969.7	26.27	0.03806	0.3133	1.4416
1.3	16	216.3	184.4	1152.0	967.6	24.79	0.04042	0.3183	1.4311
2.3	17	219.4	187.5	1153.1	965.6	23.38	0.04277	0.3229	1.4215
3.3	18	222.4	190.5	1154.2	963.7	22.16	0.04512	0.3273	1.4127
4.3	19	225.2	193.4	1155.2	961.8	21.07	0.04746	0.3315	1.4045
5.3	20	228.0	196.1	1156.2	960.0	20.08	0.04980	0.3355	1.3965
6.3	21	230.6	198.8	1157.1	958.3	19.18	0.05213	0.3393	1.3887
7.3	22	233.1	201.3	1158.0	956.7	18.37	0.05445	0.3430	1.3811
8.3	23	235.5	203.8	1158.8	955.1	17.62	0.05676	0.3465	1.3739
9.3	24	237.8	206.1	1159.6	953.5	16.93	0.05907	0.3499	1.3670
10.3	25	240.1	208.4	1160.4	952.0	16.30	0.0614	0.3532	1.3604
11.3	26	242.2	210.6	1161.2	950.6	15.72	0.0636	0.3564	1.3542
12.3	27	244.4	212.7	1161.9	949.2	15.18	0.0659	0.3594	1.3483
13.3	28	246.4	214.8	1162.6	947.8	14.67	0.0682	0.3623	1.3425
14.3	29	248.4	216.8	1163.2	946.4	14.19	0.0705	0.3652	1.3367
15.3	30	250.3	218.8	1163.9	945.1	13.74	0.0728	0.3680	1.3311
16.3	31	252.2	220.7	1164.5	943.8	13.32	0.0751	0.3707	1.3257
17.3	32	254.1	222.6	1165.1	942.5	12.93	0.0773	0.3733	1.3205
18.3	33	255.8	224.4	1165.7	941.3	12.57	0.0795	0.3759	1.3155
19.3	34	257.6	226.2	1166.3	940.1	12.22	0.0818	0.3784	1.3107
20.3	35	259.3	227.9	1166.8	938.9	11.89	0.0841	0.3808	1.3060
21.3	36	261.0	229.6	1167.3	937.7	11.58	0.0863	0.3832	1.3014
22.3	37	262.6	231.3	1167.8	936.6	11.29	0.0886	0.3855	1.2969
23.3	38	264.2	232.9	1168.4	935.5	11.01	0.0908	0.3877	1.2925
24.3	39	265.8	234.5	1168.9	934.4	10.74	0.0931	0.3899	1.2882
25.3	40	267.3	236.1	1169.4	933.3	10.49	0.0953	0.3920	1.2841
26.3	41	268.7	237.6	1169.8	932.2	10.25	0.0976	0.3941	1.2800
27.3	42	270.2	239.1	1170.3	931.2	10.02	0.0998	0.3962	1.2759
28.3	43	271.7	240.5	1170.7	930.2	9.80	0.1020	0.3982	1.2720
29.3	44	273.1	242.0	1171.2	929.2	9.59	0.1043	0.4002	1.2681
30.3	45	274.5	243.4	1171.6	928.2	9.39	0.1065	0.4021	1.2644
31.3	46	275.8	244.8	1172.0	927.2	9.20	0.1087	0.4040	1.2607
32.3	47	277.2	246.1	1172.4	926.3	9.02	0.1109	0.4059	1.2571
33.3	48	278.5	247.5	1172.8	925.3	8.84	0.1131	0.4077	1.2536
34.3	49	279.8	248.9	1173.2	924.4	8.67	0.1153	0.4095	1.2502
35.3	50	281.0	250.1	1173.6	923.5	8.51	0.1175	0.4113	1.2468
36.3	51	282.3	251.4	1174.0	922.6	8.35	0.1197	0.4130	1.2432
37.3	52	283.5	252.6	1174.3	921.7	8.20	0.1219	0.4147	1.2405
38.3	53	284.7	253.9	1174.7	920.8	8.05	0.1241	0.4164	1.2370
39.3	54	285.9	255.1	1175.0	919.9	7.91	0.1263	0.4180	1.2339
40.3	55	287.1	256.3	1175.4	919.0	7.78	0.1285	0.4196	1.2309
41.3	56	288.2	257.5	1175.7	918.2	7.65	0.1307	0.4212	1.2278
42.3	57	289.4	258.7	1176.0	917.4	7.52	0.1329	0.4227	1.2248
43.3	58	290.5	259.8	1176.4	916.5	7.40	0.1350	0.4242	1.2218
44.3	59	291.6	261.0	1176.7	915.7	7.28	0.1372	0.4257	1.2189
45.3	60	292.7	262.1	1177.0	914.9	7.17	0.1394	0.4272	1.2160
46.3	61	293.8	263.2	1177.3	914.1	7.06	0.1416	0.4287	1.2132
47.3	62	294.9	264.3	1177.6	913.3	6.95	0.1438	0.4302	1.2104
48.3	63	295.9	265.4	1177.9	912.5	6.85	0.1460	0.4316	1.2077
49.3	64	297.0	266.4	1178.2	911.8	6.75	0.1482	0.4330	1.2050
50.3	65	298.0	267.5	1178.5	911.0	6.65	0.1503	0.4344	1.2024
51.3	66	299.0	268.5	1178.8	910.2	6.56	0.1525	0.4358	1.1998
52.3	67	300.0	269.6	1179.0	909.5	6.47	0.1547	0.4371	1.1972
53.3	68	301.0	270.6	1179.3	908.7	6.38	0.1569	0.4385	1.1946
54.3	69	302.0	271.6	1179.6	908.0	6.29	0.1590	0.4398	1.1921
55.3	70	302.9	272.6	1179.8	907.2	6.20	0.1612	0.4411	1.1896
56.3	71	303.9	273.6	1180.1	906.5	6.12	0.1634	0.4424	1.1872
57.3	72	304.8	274.5	1180.4	905.8	6.04	0.1656	0.4437	1.1848
58.3	73	305.8	275.5	1180.6	905.1	5.96	0.1678	0.4449	1.1825
59.3	74	306.7	276.5	1180.9	904.4	5.89	0.1699	0.4462	1.1801
60.3	75	307.6	277.4	1181.1	903.7	5.81	0.1721	0.4474	1.1778
61.3	76	308.5	278.3	1181.4	903.0	5.74	0.1743	0.4487	1.1755
62.3	77	309.4	279.3	1181.6	902.3	5.67	0.1764	0.4499	1.1730
63.3	78	310.3	280.2	1181.8	901.7	5.60	0.1786	0.4511	1.1712

TABLE 1X (continued)

Gauge Pressure psi	Absolute Pressure, psi	Temperature, Fahrenheit	Total Heat Above 32 F: In the Water h Heat-Units	Total Heat Above 32 F: In the Steam H Heat-Units	Latent Heat, $L = H - h$ Heat-Units	Volume, Cu Ft in 1 Lb of Steam	Weight of 1 Cu Ft Steam, Lb	Entropy of the Water	Entropy of Evaporation
64.3	79	311.2	281.1	1182.1	901.0	5.54	0.1808	0.4523	1.1687
65.3	80	312.0	282.0	1182.3	900.3	5.47	0.1829	0.4535	1.1665
66.3	81	312.9	282.9	1182.5	899.7	5.41	0.1851	0.4546	1.1644
67.3	82	313.8	283.8	1182.8	899.0	5.34	0.1873	0.4557	1.1623
68.3	83	314.6	284.6	1183.0	898.4	5.28	0.1894	0.4568	1.1602
69.3	84	315.4	285.5	1183.2	897.7	5.22	0.1915	0.4579	1.1581
70.3	85	316.3	286.3	1183.4	897.1	5.16	0.1937	0.4590	1.1561
71.3	86	317.1	287.2	1183.6	896.4	5.10	0.1959	0.4601	1.1540
72.3	87	317.9	288.0	1183.8	895.8	5.05	0.1980	0.4612	1.1520
73.3	88	318.7	288.9	1184.0	895.2	5.00	0.2001	0.4623	1.1500
74.3	89	319.5	289.7	1184.2	894.6	4.94	0.2023	0.4633	1.1481
75.3	90	320.3	290.5	1184.4	893.9	4.89	0.2044	0.4644	1.1461
76.3	91	321.1	291.3	1184.6	893.3	4.84	0.2065	0.4654	1.1442
77.3	92	321.8	292.1	1184.8	892.7	4.79	0.2087	0.4664	1.1423
78.3	93	322.6	292.9	1185.0	892.1	4.74	0.2109	0.4674	1.1404
79.3	94	323.4	293.7	1185.2	891.5	4.69	0.2130	0.4684	1.1385
80.3	95	324.1	294.5	1185.4	890.9	4.65	0.2151	0.4694	1.1367
81.3	96	324.9	295.3	1185.6	890.3	4.60	0.2172	0.4704	1.1348
82.3	97	325.6	296.1	1185.8	889.7	4.56	0.2193	0.4714	1.1330
83.3	98	326.4	296.8	1186.0	889.2	4.51	0.2215	0.4724	1.1312
84.3	99	327.1	297.6	1186.2	888.6	4.47	0.2237	0.4733	1.1295
85.3	100	327.8	298.3	1186.3	888.0	4.429	0.2258	0.4743	1.1277
87.3	102	329.3	299.8	1186.7	886.9	4.347	0.2300	0.4762	1.1242
89.3	104	330.7	301.3	1187.0	885.8	4.268	0.2343	0.4780	1.1208
91.3	106	332.0	302.7	1187.4	884.7	4.192	0.2390	0.4798	1.1174
93.3	108	333.4	304.1	1187.7	883.6	4.118	0.2429	0.4816	1.1141
95.3	110	334.8	305.5	1188.0	882.5	4.047	0.2472	0.4834	1.1108
97.3	112	336.1	306.9	1188.4	881.4	3.978	0.2514	0.4852	1.1076
99.3	114	337.4	308.3	1188.7	880.4	3.912	0.2556	0.4869	1.1045
101.3	116	338.7	309.6	1189.0	879.3	3.848	0.2599	0.4886	1.1014
103.3	118	340.0	311.0	1189.3	878.3	3.786	0.2641	0.4903	1.0984
105.3	120	341.3	312.3	1189.6	877.2	3.726	0.2683	0.4919	1.0954
107.3	122	342.5	313.6	1189.8	876.2	3.668	0.2726	0.4935	1.0924
109.3	124	343.8	314.9	1190.1	875.2	3.611	0.2769	0.4951	1.0895
111.3	126	345.0	316.2	1190.4	874.2	3.556	0.2812	0.4967	1.0865
113.3	128	346.2	317.4	1190.7	873.3	3.504	0.2854	0.4982	1.0837
115.3	130	347.4	318.6	1191.0	872.3	3.452	0.2897	0.4998	1.0809
117.3	132	348.5	319.9	1191.2	871.3	3.402	0.2939	0.5013	1.0782
119.3	134	349.7	321.1	1191.5	870.4	3.354	0.2981	0.5028	1.0755
121.3	136	350.8	322.3	1191.7	869.4	3.308	0.3023	0.5043	1.0728
123.3	138	352.0	323.4	1192.0	868.5	3.263	0.3065	0.5057	1.0702
125.3	140	353.1	324.6	1192.2	867.6	3.219	0.3107	0.5072	1.0675
127.3	142	354.2	325.8	1192.5	866.7	3.175	0.3150	0.5086	1.0649
129.3	144	355.3	326.9	1192.7	865.8	3.133	0.3192	0.5100	1.0624
131.3	146	356.3	328.0	1192.9	864.9	3.092	0.3234	0.5114	1.0599
133.3	148	357.4	329.1	1193.2	864.0	3.052	0.3276	0.5128	1.0574
135.3	150	358.5	330.2	1193.4	863.2	3.012	0.3320	0.5142	1.0550
137.3	152	359.5	331.4	1193.6	862.3	2.974	0.3362	0.5155	1.0525
139.3	154	360.5	332.4	1193.8	861.4	2.938	0.3404	0.5169	1.0501
141.3	156	361.6	333.5	1194.1	860.6	2.902	0.3446	0.5182	1.0477
143.3	158	362.6	334.6	1194.3	859.7	2.868	0.3488	0.5195	1.0454
145.3	160	363.6	335.6	1194.5	858.8	2.834	0.3529	0.5208	1.0431
147.3	162	364.6	336.7	1194.7	858.0	2.801	0.3570	0.5220	1.0409
149.3	164	365.6	337.7	1194.9	857.2	2.769	0.3612	0.5233	1.0387
151.3	166	366.5	338.7	1195.1	856.4	2.737	0.3654	0.5245	1.0365
153.3	168	367.5	339.7	1195.3	855.5	2.706	0.3696	0.5257	1.0343
155.3	170	368.5	340.7	1195.4	854.7	2.675	0.3738	0.5269	1.0321
157.3	172	369.4	341.7	1195.6	853.9	2.645	0.3780	0.5281	1.0300
159.3	174	370.4	342.7	1195.8	853.1	2.616	0.3822	0.5293	1.0278
161.3	176	371.3	343.7	1196.0	852.3	2.588	0.3864	0.5305	1.0257
163.3	178	372.2	344.7	1196.2	851.5	2.560	0.3906	0.5317	1.0235
165.3	180	373.1	345.6	1196.4	850.8	2.533	0.3948	0.5328	1.0215
167.3	182	374.0	346.6	1196.6	850.0	2.507	0.3989	0.5339	1.0195
169.3	184	374.9	347.6	1196.8	849.2	2.481	0.4031	0.5351	1.0174
171.3	186	375.8	348.5	1196.9	848.4	2.455	0.4073	0.5362	1.0154
173.3	188	376.7	349.4	1197.1	847.7	2.430	0.4115	0.5373	1.0134
175.3	190	377.6	350.4	1197.3	846.9	2.406	0.4157	0.5384	1.0114
177.3	192	378.5	351.3	1197.4	846.1	2.381	0.4199	0.5395	1.0095
179.3	194	379.3	352.2	1197.6	845.4	2.358	0.4241	0.5405	1.0076
181.3	196	380.2	353.1	1197.8	844.7	2.335	0.4283	0.5416	1.0056
183.3	198	381.0	354.0	1197.9	843.9	2.312	0.4325	0.5426	1.0038
185.3	200	381.9	354.9	1198.1	843.2	2.290	0.437	0.5437	1.0019
190.3	205	384.0	357.1	1198.5	841.4	2.237	0.447	0.5463	0.9973
195.3	210	386.0	359.2	1198.8	839.6	2.187	0.457	0.5488	0.9928
200.3	215	388.0	361.4	1199.2	837.9	2.138	0.468	0.5513	0.9885
205.3	220	389.9	363.4	1199.6	836.2	2.091	0.478	0.5538	0.9841
210.3	225	391.9	365.5	1199.9	834.4	2.046	0.489	0.5562	0.9799
215.3	230	393.8	367.5	1200.2	832.8	2.004	0.499	0.5586	0.9758
220.3	235	395.6	369.4	1200.6	831.1	1.964	0.509	0.5610	0.9717
225.3	240	397.4	371.4	1200.9	829.5	1.924	0.520	0.5633	0.9676
230.3	245	399.3	373.3	1201.2	827.9	1.887	0.530	0.5655	0.9638
235.3	250	401.1	375.2	1201.5	826.3	1.850	0.541	0.5676	0.9600
245.3	260	404.5	378.9	1202.1	823.1	1.782	0.561	0.5719	0.9525
255.3	270	407.9	382.5	1202.6	820.1	1.718	0.582	0.5760	0.9454
265.3	280	411.2	386.0	1203.1	817.1	1.658	0.603	0.5800	0.9385
275.3	290	414.4	389.4	1203.6	814.2	1.602	0.624	0.5840	0.9316
285.3	300	417.5	392.7	1204.1	811.3	1.551	0.645	0.5878	0.9251

EQUIVALENT TEMPERATURE READINGS FOR FAHRENHEIT AND CENTIGRADE SCALES

TEMPERATURE CONVERSION FORMULA: Fahrenheit = 9/5 Centigrade + 32
Centigrade = 5/9 (Fahrenheit − 32)

TABLE 2X

EQUIVALENT TEMPERATURE READINGS IN DEGREES

Fahrenheit	Centigrade	Fahrenheit	Centigrade	Fahrenheit	Centigrade	Fahrenheit	Centigrade	Fahrenheit	Centigrade
−103.	−75.	−14.80	−26.	16.	−8.89	46.40	8.	77.	25.
−94.	−70.	−14.	−25.56	17.	−8.33	47.	8.33	78.	25.56
−85.	−65.	−13.	−25.	17.60	−8.	48.	8.89	78.80	26.
−76.	−60.	−12.	−24.44	18.	−7.78	48.20	9.	79.	26.11
−67.	−55.	−11.20	−24.	19.	−7.22	49.	9.44	80.	26.67
−58.	−50.	−11.	−23.89	19.40	−7.	50.	10.	80.60	27.
−49.	−45.	−10.	−23.33	20.	−6.67	51.	10.56	81.	27.22
−40.	−40.	− 9.40	−23.	21.	−6.11	51.80	11.	82.	27.78
−39.	−39.44	− 9.	−22.78	21.20	−6.	52.	11.11	82.40	28.
−38.20	−39.	− 8.	−22.22	22.	−5.56	53.	11.67	83.	28.33
−38.	−38.89	− 7.60	−22.	23.	−5.	53.60	12.	84.	28.89
−37.	−38.33	− 7.	−21.67	24.	−4.44	54.	12.22	84.20	29.
−36.40	−38.	− 6.	−21.11	24.80	−4.	55.	12.78	85.	29.44
−36.	−37.78	− 5.80	−21.	25.	−3.89	55.40	13.	86.	30.
−35.	−37.22	− 5.	−20.56	26.	−3.33	56.	13.33	87.	30.56
−34.60	−37.	− 4.	−20.	26.60	−3.	57.	13.89	87.80	31.
−34.	−36.67	− 3.	−19.44	27.	−2.78	57.20	14.	88.	31.11
−33.	−36.11	− 2.20	−19.	28.	−2.22	58.	14.44	89.	31.67
−32.80	−36.	− 2.	−18.89	28.40	−2.	59.	15.	89.60	32.
−32.	−35.56	− 1.	−18.33	29.	−1.67	60.	15.56	90.	32.22
−31.	−35.	− 0.40	−18.	30.	−1.11	60.80	16.	91.	32.78
−30.	−34.44	0.	−17.78	30.20	−1.	61.	16.11	91.40	33.
−29.20	−34.	1.	−17.22	31.	−0.56	62.	16.67	92.	33.33
−29.	−33.89	1.40	−17.	32.	0.	62.60	17.	93.	33.89
−28.	−33.33	2.	−16.67	33.	0.56	63.	17.22	93.20	34.
−27.40	−33.	3.	−16.11	33.80	1.	64.	17.78	94.	34.44
−27.	−32.78	3.20	−16.	34.	1.11	64.40	18.	95.	35.
−26.	−32.22	4.	−15.56	35.	1.67	65.	18.33	96.	35.56
−25.60	−32.	5.	−15.	35.60	2.	66.	18.89	96.80	36.
−25.	−31.67	6.	−14.44	36.	2.22	66.20	19.	97.	36.11
−24.	−31.11	6.80	−14.	37.	2.78	67.	19.44	98.	36.67
−23.80	−31.	7.	−13.89	37.40	3.	68.	20.	98.60	37.
−23.	−30.56	8.	−13.33	38.	3.33	69.	20.56	99.	37.22
−22.	−30.	8.60	−13.	39.	3.89	69.80	21.	100.	37.78
−21.	−29.44	9.	−12.78	39.20	4.	70.	21.11	100.40	38.
−20.20	−29.	10.	−12.22	40.	4.44	71.60	21.67	101.	38.33
−20.	−28.89	10.40	−12.	41.	5.	71.60	22.	102.	38.89
−19.	−28.33	11.	−11.67	42.	5.56	72.	22.22	102.20	39.
−18.40	−28.	12.	−11.11	42.80	6.	73.	22.78	103.	39.44
−18.	−27.78	12.20	−11.	43.	6.11	73.40	23.	104.	40.
−17.	−27.22	13.	−10.56	44.	6.67	74.	23.33	105.	40.56
−16.60	−27.	14.	−10.	44.60	7.	75.	23.89	105.80	41.
−16.	−26.67	15.	−9.44	45.	7.22	75.20	24.	106.	41.11
−15.	−26.11	15.80	−9.	46.	7.78	76.	24.44	107.	41.67

EQUIVALENT TEMPERATURE READINGS FOR FAHRENHEIT AND CENTIGRADE SCALES (Continued)

TABLE 2X (continued)

Fahrenheit	Centigrade	Fahrenheit	Centigrade	Fahrenheit	Centigrade	Fahrenheit	Centigrade	Fahrenheit	Centigrade
107.60	42.	136.40	58.	165.20	74.	194.	90.	222.80	106.
108.	42.22	137.	58.33	166.	74.44	195.	90.56	223.	106.11
109.	42.78	138.	58.89	167.	75.	195.80	91.	224.	106.67
109.40	43.	138.20	59.	168.	75.56	196.	91.11	224.60	107.
110.	43.33	139.	59.44	168.80	76.	197.	91.67	225.	107.22
111.	43.89	140.	60.	169.	76.11	197.60	92.	226.	107.78
111.20	44.	141.	60.56	170.	76.67	198.	92.22	226.40	108.
112.	44.44	141.80	61.	170.60	77.	199.	92.78	227.	108.33
113.	45.	142.	61.11	171.	77.22	199.40	93.	228.	108.89
114.	45.56	143.	61.67	172.	77.78	200.	93.33	228.20	109.
114.80	46.	143.60	62.	172.40	78.	201.	93.89	229.	109.44
115.	46.11	144.	62.22	173.	78.33	201.20	94.	230.	110.
116.	46.67	145.	62.78	174.	78.89	202.	94.44	231.	110.56
116.60	47.	145.40	63.	174.20	79.	203.	95.	231.80	111.
117.	47.22	146.	63.33	175.	79.44	204.	95.56	232.	111.11
118.	47.78	147.	63.89	176.	80.	204.80	96.	233.	111.67
118.40	48.	147.20	64.	177.	80.56	205.	96.11	233.60	112.
119.	48.33	148.	64.44	177.80	81.	206.	96.67	234.	112.22
120.	48.89	149.	65.	178.	81.11	206.60	97.	235.	112.78
120.20	49.	150.	65.56	179.	81.67	207.	97.22	235.40	113.
121.	49.44	150.80	66.	179.60	82.	208.	97.78	236.	113.33
122.	50.	151.	66.11	180.	82.22	208.40	98.	237.	113.89
123.	50.56	152.	66.67	181.	82.78	209.	98.33	237.20	114.
123.80	51.	152.60	67.	181.40	83.	210.	98.89	238.	114.44
124.	51.11	153.	67.22	182.	83.33	210.20	99.	239.	115.
125.	51.67	154.	67.78	183.	83.89	211.	99.44	240.	115.56
125.60	52.	154.40	68.	183.20	84.	212.	100.	240.80	116.
126.	52.22	155.	68.33	184.	84.44	213.	100.56	241.	116.11
127.	52.78	156.	68.89	185.	85.	213.80	101.	242.	116.67
127.40	53.	156.20	69.	186.	85.56	214.	101.11	242.60	117.
128.	53.33	157.	69.44	186.80	86.	215.	101.67	243.	117.22
129.	53.89	158.	70.	187.	86.11	215.60	102.	244.	117.78
129.20	54.	159.	70.56	188.	86.67	216.	102.22	244.40	118.
130.	54.44	159.80	71.	188.60	87.	217.	102.78	245.	118.33
131.	55.	160.	71.11	189.	87.22	217.40	103.	246.	118.89
132.	55.56	161.	71.67	190.	87.78	218.	103.33	246.20	119.
132.80	56.	161.60	72.	190.40	88.	219.	103.89	247.	119.44
133.	56.11	162.	72.22	191.	88.33	219.20	104.	248.	120.
134.	56.67	163.	72.78	192.	88.89	220.	104.44	249.	120.56
134.60	57.	163.40	73.	192.20	89.	221.	105.	249.80	121.
135.	57.22	164.	73.33	193.	89.44	222.	105.56	250.	121.11
136.	57.78	165.	73.89						

TABLE 3X RELATIVE HUMIDITY TABLES

Temperature Readings in Degrees Fahrenheit. Relative Humidity Readings in Per Cent. Barometric Pressure 29.92 inches.

DIFFERENCE BETWEEN READINGS OF "WET-BULB" AND "DRY-BULB" THERMOMETERS — PERCENTAGE

FAHRENHEIT DEGREES

Readings of "Dry-Bulb" Thermometer	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
20	85	70	55	40	26	12																			
21	85	71	56	42	28	15	1																		
22	86	71	58	44	31	17	4																		
23	86	72	59	46	33	20	7																		
24	87	73	60	47	35	22	10																		
25	87	74	62	49	37	25	13	1																	
26	87	75	63	51	39	27	16	4																	
27	88	76	64	52	41	29	18	7																	
28	88	76	65	54	43	32	21	10																	
29	88	77	66	55	44	34	23	13	3																
30	89	78	67	56	46	36	26	16	6																
31	89	78	68	58	47	37	28	18	8																
32	89	79	69	59	49	39	30	20	11	2															
33	90	80	70	60	51	41	32	23	14	5															
34	90	81	71	62	52	43	34	25	16	8															
35	91	81	72	63	54	45	36	27	19	10	2														
36	91	82	73	64	55	46	38	29	21	13	5														
37	91	83	74	65	57	48	40	31	23	15	7														
38	91	83	75	66	58	50	42	33	25	17	10	2													
39	92	83	75	67	59	51	43	35	27	20	12	5													
40	92	83	75	68	60	52	45	37	29	22	15	7													
41	92	84	76	69	61	54	46	39	31	24	17	10	3												
42	92	85	77	69	62	55	47	40	33	26	19	12	5												
43	92	85	77	70	63	55	48	42	35	28	21	14	8	1											
44	93	85	78	71	63	56	49	43	36	30	23	16	10	4											
45	93	86	78	71	64	57	51	44	38	31	25	18	12	6											
46	93	86	79	72	65	58	52	45	39	32	26	20	14	8	2										
47	93	86	79	72	66	59	53	46	40	34	28	22	16	10	5										
48	93	86	79	73	66	60	54	47	41	35	29	23	18	12	7	1									
49	93	86	80	73	67	61	54	48	42	36	31	25	19	14	9	3									
50	93	87	80	74	67	61	55	49	43	38	32	27	21	16	10	5									
51	94	87	81	75	68	62	56	50	45	39	34	28	23	17	12	7	2								
52	94	87	81	75	69	63	57	51	46	40	35	29	24	19	14	9	4								
53	94	87	81	75	69	63	58	52	47	41	36	31	26	20	16	10	6	1							
54	94	88	82	76	70	64	59	53	48	42	37	32	27	22	17	12	8	3							
55	94	88	82	76	70	65	59	54	49	43	38	33	28	23	19	14	9	5							
56	94	88	82	76	71	65	60	55	50	44	39	34	30	25	20	16	11	7	2						
57	94	88	82	77	71	66	61	55	50	45	40	35	31	26	22	17	13	8	4						
58	94	88	83	77	72	66	61	56	51	46	41	37	32	27	23	18	14	10	6	1					
59	94	89	83	78	72	67	62	57	52	47	42	38	33	29	24	20	16	11	7	3					
60	94	89	83	78	73	68	63	58	53	48	43	39	34	30	26	21	17	13	9	5	1				
61	94	89	84	78	73	68	63	58	54	49	44	40	35	31	27	22	18	14	10	7	3				
62	94	89	84	79	74	69	64	59	54	50	45	41	36	32	28	24	20	16	12	8	4	1			
63	95	89	84	79	74	69	64	60	55	50	46	42	37	33	29	25	21	17	13	10	6	2			
64	95	90	84	79	74	70	65	60	56	51	47	43	38	34	30	26	22	18	15	11	7	4			
65	95	90	85	80	75	70	66	61	56	52	48	44	39	35	31	27	24	20	16	12	9	5	2		
66	95	90	85	80	75	71	66	61	57	53	48	44	40	36	32	29	25	21	17	14	10	7	3		
67	95	90	85	80	75	71	66	62	58	53	49	45	41	37	33	30	26	22	19	15	12	8	5	2	
68	95	90	85	80	76	71	67	62	58	54	50	46	42	38	34	31	27	23	20	16	13	10	6	3	
69	95	90	85	81	76	72	67	63	59	55	51	47	43	39	35	32	28	24	21	18	14	11	8	5	1

To find the Relative Humidity, assume the reading of the "Dry-Bulb" is 45 and the "Wet-Bulb" is 40; subtract the "Wet-Bulb" reading (40) from the "Dry-Bulb" reading (45), which gives a difference of 5°. Follow down the column headed (5°) and read across the table from "Dry-Bulb" reading (45). We find the relative humidity is 64%, where the two lines intersect.

TABLE 3X RELATIVE HUMIDITY TABLES (Continued)

Temperature Readings in Degrees Fahrenheit. Relative Humidity Readings in Per Cent. Barometric Pressure 29.92 inches.

DIFFERENCE BETWEEN READINGS OF "WET-BULB" AND "DRY-BULB" THERMOMETERS — PERCENTAGE

FAHRENHEIT DEGREES

Readings of "Dry-Bulb" Thermometer	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
70	95	90	86	81	77	72	68	64	59	55	51	48	44	40	36	33	29	25	22	19	15	12	9	6	3																										
71	95	90	86	81	77	72	68	64	60	56	52	48	45	41	37	33	30	27	23	20	17	13	10	7	4	1																									
72	95	91	86	82	77	73	69	65	61	57	53	49	45	42	38	34	31	28	24	21	18	15	12	9	6	3																									
73	95	91	86	82	78	73	69	65	61	57	53	50	46	42	39	35	32	29	25	22	19	16	13	10	7	4	1																								
74	95	91	86	82	78	74	69	65	61	58	54	50	47	43	39	36	33	29	26	23	20	17	14	11	8	5	3																								
75	96	91	86	82	78	74	70	66	62	58	54	51	47	44	40	37	34	30	27	24	21	18	15	12	9	7	4	1																							
76	96	91	87	82	78	74	70	66	62	59	55	51	48	44	41	38	34	31	28	25	22	19	16	13	11	8	5	3																							
77	96	91	87	83	79	74	71	67	63	59	56	52	48	45	42	39	35	32	29	26	23	20	17	14	12	9	6	4	1																						
78	96	91	87	83	79	75	71	67	63	60	56	53	49	46	43	39	36	33	30	27	24	21	18	16	13	10	8	5	3																						
79	96	91	87	83	79	75	71	68	64	60	57	53	50	46	43	40	37	34	31	28	25	22	19	17	14	11	9	6	4																						
80	96	91	87	83	79	75	72	68	64	61	57	54	50	47	44	41	38	35	32	29	26	23	20	18	15	12	10	7	5	3																						
82	96	92	88	84	80	76	72	69	65	61	58	55	51	48	45	42	39	36	33	30	28	25	22	20	17	14	12	10	7	5	2																				
84	96	92	88	84	80	76	73	69	66	62	59	56	52	49	46	43	40	37	35	32	29	26	24	21	19	16	14	12	9	7	5	3																			
86	96	92	88	84	81	77	73	70	66	63	60	57	53	50	47	44	42	39	36	33	31	28	26	23	21	18	16	14	11	9	7	5	3	1																	
88	96	92	88	85	81	77	74	70	67	64	61	57	54	51	48	46	43	40	37	35	32	30	27	25	22	20	18	15	13	11	9	7	5	3	1																
90	96	92	89	85	81	78	74	71	68	65	61	58	55	52	49	47	44	41	39	36	34	31	29	26	24	22	19	17	15	13	11	9	7	5	3	1															
92	96	92	89	85	82	78	75	72	68	65	62	59	56	53	50	48	45	42	40	37	35	32	30	28	25	23	21	19	17	15	13	11	9	7	5	3	1														
94	96	93	89	85	82	79	75	72	69	66	63	60	57	54	51	49	46	43	41	38	36	33	31	29	27	24	22	20	18	16	14	12	10	9	7	5	3	1													
96	96	93	89	86	82	79	76	73	69	66	63	61	58	55	52	50	47	44	42	39	37	35	32	30	28	26	24	22	20	18	16	14	12	10	8	7	5	3	2												
98	96	93	89	86	82	79	76	73	70	67	64	61	58	55	53	50	48	45	43	40	38	36	34	32	29	27	25	23	21	19	17	15	14	12	10	8	7	5	3	2											
100	96	93	89	86	83	80	77	73	70	68	65	62	59	56	54	51	49	46	44	41	39	37	35	33	30	28	26	24	22	21	19	17	15	13	12	10	8	7	5	4	2	1									
102	96	93	90	86	83	80	77	74	71	68	65	62	60	57	55	52	49	47	45	42	40	38	36	34	32	30	28	26	24	22	20	18	16	15	13	11	10	8	7	5	4	2	1								
104	97	93	90	87	83	80	77	74	71	69	66	63	60	58	55	53	50	48	46	43	41	39	37	35	33	31	29	27	25	23	21	20	18	16	14	13	13	10	8	7	5	4	2	1							
106	97	93	90	87	84	81	78	75	72	69	66	64	61	58	56	53	51	49	46	44	42	40	38	36	34	32	30	28	26	24	23	21	19	17	16	14	13	11	10	8	7	5	4	3	1						
108	97	93	90	87	84	81	78	75	72	70	67	64	62	59	57	54	52	49	47	45	43	41	39	37	35	33	31	29	27	25	24	22	20	19	17	16	14	12	11	10	8	7	5	4	3	2					
110	97	93	90	87	84	81	78	75	73	70	67	65	62	60	57	55	52	50	48	46	44	42	40	38	36	34	32	30	28	26	25	23	21	20	18	17	15	14	12	11	10	8	7	6	4	3	2	1			
112	97	94	90	87	84	81	79	76	73	70	68	65	63	60	58	55	53	51	49	47	44	42	40	38	36	35	33	31	29	27	26	24	23	21	19	18	16	15	14	12	11	9	8	7	6	4	3	2	1		
114	97	94	91	88	85	82	79	76	74	71	68	66	63	61	58	56	54	52	49	47	45	43	41	39	37	35	34	32	30	28	27	25	24	22	20	19	18	16	15	13	12	11	9	8	7	6	5	3	2	1	
116	97	94	91	88	85	82	79	76	74	71	69	66	64	61	59	57	54	52	50	48	46	44	42	40	38	36	34	33	31	29	28	26	25	23	22	20	19	17	16	14	13	12	11	9	8	7	6	5	4	2	
118	97	94	91	88	85	82	79	77	74	72	69	67	64	62	59	57	55	53	51	49	47	45	43	41	39	37	35	34	32	30	29	27	25	24	23	21	20	18	17	16	14	13	12	11	9	8	7	6	5	4	
120	97	94	91	88	85	82	80	77	74	72	69	67	65	62	60	58	55	53	51	49	47	45	43	41	40	38	36	34	33	31	29	28	26	25	23	22	21	19	18	17	15	14	13	12	10	9	8	7	6	5	
122	97	94	91	88	85	83	80	77	75	72	70	67	65	63	60	58	56	54	52	50	48	46	44	42	40	39	37	35	34	32	30	29	27	26	24	23	22	20	19	18	16	15	14	13	11	10	9	8	7	6	
124	97	94	91	88	85	83	80	78	75	73	70	68	65	63	61	59	57	54	52	50	48	47	45	43	41	39	38	36	34	33	31	30	28	27	25	24	22	21	20	18	17	16	15	14	12	11	10	9	8	7	
126	97	94	91	88	86	83	80	78	75	73	70	68	66	64	61	59	57	55	53	51	49	47	45	44	42	40	38	37	35	33	32	30	29	27	26	25	23	22	21	19	18	17	16	15	13	12	11	10	9	8	
128	97	94	91	89	86	83	81	78	76	73	71	68	66	64	62	60	58	56	54	52	50	48	46	44	42	41	39	37	36	34	33	31	30	28	27	25	24	23	22	20	19	18	17	16	14	13	12	11	10	9	
130	97	94	91	89	86	83	81	78	76	73	71	69	67	64	62	60	58	56	54	52	50	48	47	45	43	41	40	38	37	35	33	32	30	29	28	26	25	24	22	21	20	19	19	16	15	14	13	12	11	10	
132	97	94	92	89	86	84	81	79	76	74	71	69	67	65	63	61	58	56	55	53	51	49	47	45	44	42	40	39	37	36	34	33	31	30	28	26	25	24	22	21	21	20	19	17	16	15	14	13	12	11	
134	97	94	92	89	86	84	81	79	76	74	72	69	67	65	63	61	59	57	55	53	51	49	48	46	44	43	41	39	38	36	35	33	32	30	29	27	26	25	24	22	21	20	19	18	17	16	15	14	13	12	
136	97	94	92	89	86	84	81	79	77	74	72	70	68	65	63	61	59	57	55	54	52	50	48	46	45	43	41	40	38	37	35	34	33	31	30	28	27	26	25	23	22	21	20	19	18	17	16	15	14	13	
138	97	94	92	89	87	84	82	79	77	75	72	70	68	66	64	62	60	58	56	54	52	50	49	47	45	44	42	40	39	37	36	34	33	32	30	29	28	27	25	24	23	22	21	20	19	17	16	15	14	14	
140	97	95	92	89	87	84	82	79	77	75	73	70	68	66	64	62	60	58	56	54	53	51	49	47	46	44	43	41	40	38	36	35	34	32	31	30	29	27	26	25	24	23	22	20	19	18	17	16	15	14	
142	97	95	92	90	87	84	82	80	78	75	73	71	69	67	65	63	60	59	57	55	53	52	50	48	46	45	43	42	40	39	37	36	34	33	32	31	29	28	27	26	25	24	23	22	21	20	19	18	16	15	
144	97	95	93	90	87	84	82	80	78	75	73	71	69	67	65	63	61	59	57	55	54	52	50	48	47	45	43	42	40	39	37	36	35	34	33	31	30	29	28	27	26	25	24	23	22	21	20	19	17	16	
146	98	95	93	90	87	85	82	80	78	76	73	71	69	67	65	63	61	59	57	55	54	53	51	49	47	46	44	43	41	40	38	37	36	34	33	32	31	29	28	27	26	25	24	23	22	21	20	19	18	16	
148	98	95	93	90	87	85	82	80	78	76	73	71	70	68	65	64	61	60	58	56	54	53	51	49	48	46	44	43	41	40	39	37	36	35	34	33	32	30	29	28	27	26	25	24	23	22	21	20	19	17	
150	98	95	93	90	87	85	82	80	78	76	73	71	70	68	65	64	62	60	58	56	55	53	52	49	48	46	45	43	42	41	39	38	37	35	34	33	32	30	29	28	28	27	26	25	24	23	22	21	19	18	
152	98	95	93	90	87	85	83	81	79	76	74	72	71	68	66	64	62	60	59	57	56	54	52	50	49	47	46	44	43	41	40	38	37	36	35	34	32	31	30	29	28	27	26	25	24	23	22	21	20	18	
154	98	95	93	90	87	85	83	81	79	76	74	72	71	69	66	65	63	61	59	57	56	54	52	50	49	47	46	44	43	42	40	39	38	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	20	19	
156	98	95	93	90	88	85	83	81	79	77	74	72	71	69	66	65	63	61	59	57	56	54	53	50	50	47	46	44	43	42	41	39	38	37	36	35	34	32	31	30	29	28	27	26	25	24	23	22	21	19	
158	98	95	93	90	88	85	83	81	79	77	74	72	71	69	66	65	63	61	59	57	57	55	53	51	50	48	47	45	44	43	41	40	39	38	37	35	34	33	32	31	30	29	28	27	26	25	24	23	22	20	

DEW POINT AND WET BULB TEMPERATURES FOR VARIOUS RELATIVE HUMIDITIES

(25 to 100 degrees Dry Bulb)

TABLE 4X

DRY BULB TEMPERATURES (DEGREES FAHRENHEIT)

RELATIVE HUMIDITY IN PER CENT	25		30		35		40		45		50		55		60		
	D. P.	W. B.	D. P.	W. B.	D. P.	W. B.	D. P.	W. B.	D. P.	W. B.	D. P.	W. B.	D. P.	W. B.	D. P.	W. B.	
95	24.0	24.9	28.9	29.4	33.9	34.5	38.8	39.4	43.6	44.3	48.9	49.3	53.6	54.1	58.5	59.1	95
90	22.5	24.2	27.3	28.7	32.3	33.8	37.0	38.7	42.0	43.5	47.2	48.4	51.9	53.1	56.9	58.2	90
85	21.5	23.8	26.2	28.3	31.0	33.2	35.6	38.2	40.5	42.8	45.5	47.7	50.0	52.2	55.3	57.3	85
80	20.2	23.3	24.9	27.8	29.7	32.7	34.0	37.5	39.0	42.3	44.0	47.0	48.9	51.4	53.9	56.3	80
75	19.1	23.0	23.5	27.4	28.2	32.2	32.9	36.9	37.5	41.6	42.5	46.3	47.2	50.6	52.1	55.4	75
70	17.6	22.6	22.2	27.0	26.8	31.6	31.1	36.4	35.8	40.9	40.8	45.5	45.3	49.7	50.2	54.5	70
65	16.3	22.2	21.0	26.4	25.3	31.1	29.6	35.7	34.0	40.0	38.8	44.7	43.4	48.9	48.5	53.6	65
60	14.5	21.7	19.3	26.0	23.7	30.5	27.8	34.9	32.1	39.4	37.0	43.9	41.6	48.2	46.4	52.5	60
55	12.8	21.3	17.3	25.5	21.9	29.9	25.9	34.2	30.0	38.7	34.6	43.1	39.0	47.2	43.9	51.3	55
50	10.8	20.8	15.2	25.0	19.7	29.1	23.7	33.6	27.7	37.9	32.2	42.2	36.7	46.2	41.5	50.2	50
45	8.6	20.3	13.2	24.5	17.6	28.6	21.6	33.1	25.6	37.1	29.9	41.3	34.1	45.2	38.5	49.2	45
40	6.1	19.7	10.9	23.9	15.0	27.9	19.1	32.4	22.9	36.3	27.0	40.3	31.1	44.1	35.6	48.2	40
35	3.8	19.2	8.4	23.4	12.5	27.4	16.6	31.8	20.4	35.5	24.3	39.6	28.2	43.4	32.4	47.0	35
30	0.9	18.6	5.0	22.8	9.2	26.7	13.3	30.7	17.2	34.7	21.2	38.6	24.9	42.3	28.9	45.8	30
25			1.6	22.2	5.6	26.0	9.7	29.7	13.4	33.9	17.4	37.6	21.0	41.3	24.8	44.6	25
20					1.4	25.3	5.1	28.8	9.0	33.0	13.1	36.6	16.5	40.2	20.2	43.5	20
15									3.3	32.1	6.9	35.5	10.5	39.1	14.3	42.3	15

DRY BULB TEMPERATURES (DEGREES FAHRENHEIT)

RELATIVE HUMIDITY IN PER CENT	65		70		75		80		85		90		95		100		
	D. P.	W. B.	D. P.	W. B.	D. P.	W. B.	D. P.	W. B.	D. P.	W. B.	D. P.	W. B.	D. P.	W. B.	D. P.	W. B.	
95	63.5	64.1	68.5	68.9	73.2	73.8	78.5	78.9	83.4	83.7	88.0	88.2	92.8	93.5	98.0	98.3	95
90	61.9	62.9	66.8	67.9	71.6	72.5	76.9	77.8	81.7	82.4	86.2	86.7	91.0	92.0	96.3	96.7	90
85	60.2	61.9	65.1	66.6	69.8	71.5	75.0	76.3	79.8	81.0	84.3	85.5	89.3	90.2	93.9	95.2	85
80	58.4	60.8	63.3	65.6	68.2	70.2	72.9	75.3	78.0	79.8	82.6	84.2	87.5	88.8	91.8	93.9	80
75	56.9	60.0	61.8	64.7	66.6	69.4	71.4	74.1	76.4	78.7	80.7	82.8	85.6	87.4	90.2	92.1	75
70	55.2	59.0	59.8	63.6	64.7	68.2	69.4	72.8	74.3	77.5	78.9	81.5	83.7	85.9	88.3	90.5	70
65	53.1	57.9	57.8	62.3	62.5	66.7	67.3	71.3	72.0	76.0	76.7	79.8	81.1	84.2	85.9	88.6	65
60	51.0	56.8	55.7	61.2	60.4	65.5	65.2	70.0	69.8	74.5	74.0	78.5	78.9	82.7	83.3	86.8	60
55	48.7	55.6	53.2	59.8	57.8	64.2	62.6	68.5	67.3	73.0	71.6	77.0	76.4	80.9	80.8	85.0	55
50	46.0	54.4	50.5	58.4	55.3	62.6	59.9	67.0	64.5	71.1	68.8	75.3	73.1	79.2	77.8	83.0	50
45	43.1	53.1	47.7	57.1	52.2	61.2	56.8	65.4	61.6	69.4	65.7	73.4	70.1	77.5	74.8	81.0	45
40	40.0	51.8	44.6	55.9	49.1	59.7	53.8	63.6	58.0	67.6	62.2	71.3	66.9	75.4	71.0	79.1	40
35	36.9	50.5	41.4	54.4	45.7	58.3	50.0	61.9	54.7	66.0	58.6	69.5	63.0	73.4	67.5	77.2	35
30	33.0	49.4	37.3	52.9	41.7	56.6	46.0	60.2	50.1	63.9	54.5	67.2	58.7	70.9	62.8	74.7	30
25	28.5	48.1	32.6	51.3	36.9	54.8	41.2	58.4	45.3	61.7	49.4	65.1	53.6	68.3	57.6	71.9	25
20	24.0	46.8	27.6	49.8	31.4	53.2	35.5	56.5	39.7	59.8	43.5	62.8	47.7	66.1	51.7	69.1	20
15	17.8	45.4	21.8	48.3	24.8	51.3	28.5	54.4	32.4	57.5	36.1	60.4	39.8	63.3	43.8	66.3	15

"D. P." Indicates Dew-Point Temperature

"W. B." Indicates Wet-Bulb Temperature

DUCT AND DAMPER AREAS

TABLE 5X Areas in Square Feet — Dimensions in Inches

WIDTH

HEIGHT	4"	5"	6"	7"	8"	9"	10"	11"	12"	13"	14"	15"	16"	17"	18"	19"	20"	21"	22"	23"	24"	26"	28"	30"	32"	34"	36"	38"	40"	42"	44"	46"	48"
4"	.11	.14	.16	.19	.22	.25	.28	.30	.33	.36	.39	.42	.44	.47	.50	.53	.56	.58	.61	.64	.67	.72	.78	.83	.89	.94	1.00	1.06	1.11	1.17	1.22	1.28	1.33
5"		.17	.21	.24	.28	.31	.35	.38	.42	.45	.48	.52	.55	.59	.62	.66	.69	.73	.76	.80	.83	.90	.97	1.04	1.11	1.18	1.25	1.32	1.39	1.46	1.53	1.60	1.67
6"			.25	.29	.33	.38	.42	.46	.50	.54	.58	.62	.67	.71	.75	.79	.83	.87	.92	.96	1.00	1.08	1.17	1.25	1.33	1.42	1.50	1.58	1.67	1.75	1.83	1.92	2.00
7"				.34	.39	.44	.48	.54	.58	.63	.68	.73	.78	.83	.88	.94	.97	1.02	1.07	1.12	1.17	1.26	1.36	1.46	1.55	1.60	1.75	1.85	1.94	2.02	2.14	2.24	2.33
8"					.44	.50	.55	.61	.67	.72	.79	.83	.89	.94	1.00	1.05	1.11	1.17	1.22	1.28	1.33	1.44	1.55	1.67	1.78	1.89	2.00	2.11	2.22	2.33	2.44	2.56	2.67
9"						.56	.62	.69	.75	.81	.88	.94	1.00	1.05	1.13	1.19	1.25	1.31	1.38	1.44	1.50	1.62	1.75	1.88	2.00	2.13	2.25	2.38	2.50	2.62	2.75	2.88	3.00
10"							.70	.76	.83	.90	.97	1.04	1.11	1.16	1.25	1.32	1.39	1.46	1.53	1.60	1.66	1.80	1.95	2.08	2.22	2.36	2.50	2.64	2.78	2.92	3.06	3.19	3.33
11"								.81	.92	1.00	1.07	1.15	1.22	1.30	1.38	1.45	1.53	1.60	1.68	1.76	1.83	1.98	2.14	2.29	2.44	2.60	2.75	2.91	3.06	3.20	3.36	3.51	3.67
12"									1.00	1.08	1.17	1.25	1.33	1.42	1.50	1.58	1.68	1.75	1.83	1.92	2.00	2.10	2.26	2.50	2.75	2.84	3.00	3.17	3.34	3.50	3.66	3.82	4.00
13"										1.17	1.26	1.35	1.45	1.57	1.63	1.71	1.80	1.90	1.99	2.06	2.17	2.34	2.53	2.72	2.90	3.07	3.25	3.44	3.60	3.79	3.97	4.15	4.33
14"											1.36	1.46	1.56	1.65	1.75	1.85	1.95	2.04	2.14	2.24	2.34	2.53	2.72	2.92	3.12	3.31	3.50	3.70	3.89	4.10	4.28	4.47	4.67
15"												1.56	1.67	1.77	1.88	1.98	2.08	2.19	2.29	2.40	2.50	2.71	2.92	3.13	3.34	3.54	3.75	3.96	4.17	4.38	4.58	4.80	5.00
16"													1.78	1.89	2.00	2.11	2.22	2.34	2.44	2.56	2.66	2.90	3.12	3.33	3.55	3.76	4.00	4.22	4.45	4.67	4.89	5.10	5.33
17"														2.01	2.06	2.17	2.29	2.41	2.51	2.65	2.76	3.00	3.24	3.48	3.70	3.82	4.25	4.50	4.72	4.95	5.20	5.43	5.67
18"															2.25	2.38	2.50	2.62	2.75	2.88	3.00	3.26	3.50	3.76	4.00	4.25	4.50	4.76	5.00	5.25	5.50	5.75	6.00
19"																2.50	2.64	2.78	2.91	3.03	3.16	3.43	3.70	3.96	4.22	4.50	4.75	5.00	5.28	5.54	5.80	6.07	6.33
20"																	2.78	2.92	3.06	3.20	3.33	3.60	3.90	4.17	4.45	4.72	5.00	5.28	5.56	5.83	6.11	6.40	6.67
21"																		3.06	3.20	3.35	3.50	3.80	4.08	4.37	4.66	4.96	5.25	5.55	5.83	6.12	6.42	6.71	7.00
22"																			3.36	3.51	3.66	3.97	4.28	4.60	4.90	5.20	5.50	5.80	6.10	6.41	6.72	7.03	7.33
23"																				3.68	3.83	4.15	4.46	4.80	5.10	5.43	5.75	6.10	6.38	6.70	7.00	7.35	7.67
24"																					4.00	4.34	4.66	5.00	5.34	5.66	6.00	6.35	6.67	7.00	7.33	7.67	8.00
26"																						4.63	5.05	5.42	5.78	6.14	6.50	6.86	7.22	7.60	7.95	8.30	8.67
28"																							5.45	5.84	6.22	6.50	6.75	7.40	7.78	8.16	8.55	8.95	9.33
30"																								6.25	6.66	7.10	7.50	7.93	8.33	8.75	9.17	9.58	10.00
32"																									7.10	7.56	8.00	8.45	8.90	9.34	9.78	10.20	10.70
34"																										8.00	8.50	9.00	9.45	9.90	10.40	10.90	11.30
36"																											9.00	9.50	10.00	10.50	11.00	11.50	12.00
38"																												9.78	10.60	11.10	11.60	12.10	12.70
40"																													11.10	11.70	12.20	12.80	13.30
42"																														12.20	12.80	13.40	14.00
44"																															13.40	14.00	14.70
46"																																14.70	15.30
48"																																	16.00

For Ducts and Dampers exceeding 48" in one dimension, find area in table for one-half of desired size and multiply by 2. Where both dimensions exceed 48", take one-half of each dimension, find area in table, and multiply by 4.

VELOCITY PRESSURES FOR VELOCITY OF DRY AIR AT VARIOUS TEMPERATURES

(ft/min) (29.92 In. Hg)

TABLE 6X

PRES IN. W G	50 F	60 F	70 F	80 F	100 F	150 F	200 F
.010	392.8	396.6	400.5	404.1	411.5	429.5	446.9
.015	479.2	484.0	488.6	493.0	502.1	524.0	545.3
.020	553.8	559.3	564.7	569.7	580.2	605.6	630.2
.025	620.6	626.8	632.8	638.5	650.3	678.7	706.2
.030	681.4	688.2	694.8	701.0	714.0	745.1	775.3
.035	734.3	741.8	748.9	755.6	769.5	803.2	835.8
.040	785.6	793.3	801.0	808.2	823.1	859.0	893.9
.045	832.8	841.0	849.1	856.7	872.5	910.6	947.6
.050	879.8	888.5	897.1	905.1	921.8	962.1	1001
.055	919.2	928.3	937.2	945.6	963.1	1005	1046
.060	960.4	969.9	979.2	988.0	1006	1050	1093
.065	1001	1011	1021	1030	1049	1095	1139
.070	1038	1048	1058	1068	1087	1135	1181
.075	1076	1086	1097	1107	1127	1176	1224
.080	1111	1122	1133	1143	1164	1215	1264
.085	1146	1158	1169	1180	1201	1254	1305
.090	1178	1194	1201	1212	1234	1288	1340
.095	1209	1221	1233	1244	1267	1322	1376
.100	1242	1255	1266	1278	1300	1358	1413
.11	1303	1316	1329	1340	1366	1425	1483
.12	1358	1372	1385	1397	1423	1485	1545
.13	1413	1427	1441	1454	1481	1545	1608
.14	1468	1482	1497	1510	1538	1606	1671
.15	1523	1538	1553	1567	1596	1666	1733
.16	1571	1587	1602	1616	1646	1718	1788
.17	1622	1638	1654	1669	1700	1774	1846
.18	1665	1682	1698	1713	1745	1821	1895
.19	1712	1729	1746	1762	1794	1873	1948
.20	1757	1776	1791	1808	1841	1921	2000
.21	1799	1817	1834	1850	1885	1967	2047
.22	1846	1864	1882	1899	1934	2018	2100
.23	1885	1904	1922	1939	1975	2061	2145
.24	1924	1943	1962	1980	2016	2104	2190
.25	1964	1983	2002	2020	2057	2147	2234
.26	2003	2022	2042	2060	2098	2190	2279
.27	2043	2063	2083	2102	2140	2234	2324
.28	2082	2103	2123	2142	2181	2276	2369
.29	2114	2134	2155	2174	2214	2311	2404
.30	2151	2175	2193	2214	2254	2352	2447
.32	2223	2245	2267	2287	2330	2431	2530
.34	2290	2313	2335	2356	2399	2504	2606
.36	2357	2380	2403	2425	2469	2577	2682
.38	2427	2451	2475	2497	2543	2654	2762
.40	2482	2507	2531	2554	2601	2714	2825
.42	2545	2570	2595	2618	2666	2783	2896
.44	2607	2634	2655	2683	2732	2850	2967
.46	2663	2689	2715	2739	2791	2912	3030
.48	2718	2745	2771	2796	2847	2972	3092
.50	2778	2805	2832	2857	2910	3037	3160
.52	2832	2861	2888	2914	2967	3097	3223
.54	2887	2916	2944	2970	3025	3157	3285
.56	2938	2967	2996	3023	3079	3213	3343
.58	2993	3023	3052	3079	3136	3273	3406
.60	3040	3071	3100	3128	3186	3325	3460

TABLE 6X (continued)

PRES IN. W G	50 F	60 F	70 F	80 F	100 F	150 F	200 F
.62	3094	3125	3156	3184	3243	3385	3522
.64	3142	3174	3204	3233	3292	3436	3576
.66	3192	3223	3254	3283	3344	3490	3631
.68	3241	3273	3304	3334	3395	3544	3687
.70	3287	3319	3351	3381	3443	3594	3740
.72	3333	3366	3398	3429	3492	3644	3792
.74	3378	3411	3444	3475	3539	3694	3844
.76	3425	3459	3492	3523	3588	3745	3897
.78	3468	3502	3536	3568	3634	3792	3946
.80	3513	3548	3582	3614	3681	3842	3998
.82	3558	3594	3628	3651	3728	3891	4049
.84	3601	3636	3671	3704	3772	3937	4097
.86	3644	3680	3715	3748	3818	3984	4146
.88	3684	3720	3756	3790	3860	4028	4192
.90	3727	3764	3800	3834	3905	4076	4241
.92	3768	3796	3842	3876	3948	4121	4288
.94	3808	3846	3883	3918	3990	4163	4333
.96	3849	3887	3924	3959	4032	4208	4379
.98	3888	3926	3964	4000	4073	4251	4424
1.00	3929	3971	4005	4043	4117	4296	4470
1.05	4025	4065	4104	4141	4217	4401	4580
1.10	4119	4160	4200	4238	4316	4504	4687
1.15	4216	4254	4295	4334	4414	4606	4793
1.20	4303	4345	4387	4426	4508	4705	4889
1.25	4393	4440	4478	4520	4602	4804	4997
1.30	4477	4522	4565	4606	4691	4896	5095
1.35	4564	4609	4653	4695	4781	4990	5193
1.40	4647	4693	4738	4781	4869	5082	5288
1.45	4729	4776	4822	4865	4955	5172	5381
1.50	4812	4864	4905	4952	5042	5262	5474
1.55	4890	4939	4986	5031	5124	5347	5564
1.60	4969	5018	5066	5112	5206	5433	5654
1.70	5122	5172	5222	5269	5356	5601	5828
1.80	5271	5323	5374	5422	5522	5763	5997
1.90	5413	5466	5519	5569	5671	5919	6159
2.00	5556	5616	5664	5718	5822	6076	6320
2.10	5696	5752	5807	5859	5968	6228	6481
2.20	5829	5886	5943	5996	6107	6374	6632
2.30	5955	6014	6072	6127	6240	6512	6776
2.40	6089	6149	6208	6264	6381	6658	6928
2.50	6211	6278	6332	6392	6508	6792	7066
2.60	6332	6395	6456	6514	6634	6924	7105
2.70	6462	6525	6588	6647	6770	7066	7352
2.80	6575	6640	6704	6764	6889	7190	7481
2.90	6693	6759	6824	6885	7012	7319	7616
3.00	6807	6879	6937	7003	7130	7440	7742

DENSITIES OF ANTI-FREEZE AND SECONDARY REFRIGERANT SOLUTIONS

TABLE 7X

GLYCEROL (GLYCERINE) AND WATER SOLUTION

% Glycerol by Weight	Sp. Gr. 68 F	Freezing Point Deg. F
10	1.024	29.1
20	1.049	23.4
30	1.075	14.9
40	1.101	4.3
50	1.128	– 9.4
60	1.156	–30.5
70	1.184	–38.0
80	1.211	– 5.5
90	1.238	29.1
100	1.264	62.6

METHYL ALCOHOL AND WATER SOLUTION

% Alcohol by Weight	Sp. Gr. 68 F	Crystallization Point Deg. F
2.5	0.994	30
6.8	0.987	26.6
13.8	0.977	21.0
17.5	0.972	16.3
20.3	0.968	12.9
24.2	0.963	6.8
29.9	0.954	– 2.0
39	0.937	–19.7
47.3	0.922	–29.0
56.1	0.900	–41.8
71.9	0.863	–60.3

SODIUM CHLORIDE AND WATER SOLUTION

% NaCl by Weight	Sp. Gr. 60 F	Freezing Point Deg. F
5.5	1.04	26.0
8.2	1.06	22.7
10.9	1.08	19.0
13.5	1.10	14.9
16.1	1.12	10.4
18.6	1.14	5.4
21.1	1.16	– 0.3
22.3	1.17	– 3.4
23.3	1.18	– 6.0

ETHYLENE GLYCOL (PRESTONE) AND WATER SOLUTION

% Glycol by Volume	Sp. Gr. 60 F	Freezing Point Deg. F
12.5	1.019	25
17.0	1.026	20
25.0	1.038	10
32.5	1.048	0
38.5	1.056	–10
44.0	1.063	–20
49.0	1.069	–30
52.5	1.073	–40

CALCIUM CHLORIDE AND WATER SOLUTION

% $CaCl_2$ by Weight	Sp. Gr. 60 F	Freezing Point Deg. F
9.2	1.08	23.2
13.5	1.12	16.5
17.6	1.16	7.0
21.5	1.20	– 5.8
25.1	1.25	–21.5
28.7	1.28	–44.3

GLOSSARY OF CONTROL TERMS AND DEFINITIONS

CONTROL ACTION is that manner in which a controller sends its varying output to an operator in response to the controlled variable changes imposed upon its measuring element.

CONTROL AGENT is a source of energy such as steam, water, etc., which is regulated by the controlled device.

CONTROL POINT is the actual value of the controlled variable which the controller is causing to be maintained at a given time.

CONTROL PRESSURE is the output air pressure of a controller.

CONTROLLED DEVICE is the final control element which is actuated by the controller and regulates the flow or effect of the control agent. A valve, damper, relay, etc.

CONTROLLED MEDIUM is the material (such as air in a space) in which a controlled variable such as temperature is controlled.

CONTROLLED VARIABLE is the variable such as temperature, humidity or pressure which is being measured and controlled.

CONTROLLER is an instrument that measures variations in the controlled variable and transmits energy to produce an appropriate corrective control action.

CONTROLLING ELEMENT is the part of a controller which transmits the effect produced by the measuring element for the operation of the controlled device.

CUMULATOR is an auxiliary control device actuated by the pressure from one or more controllers and used to produce a variety of special effects.

DIRECT ACTING applies to a pneumatic controller when an *increase* in the controlled variable results in an increased control pressure.

DIFFERENTIAL is the difference in values of the controlled variable which will activate a two-position controller to change an output of either maximum or zero to the opposite extreme, with no intermediate steps.

FEEDBACK is the transmission of information about the results of an action back to its origin.

FLOATING ACTION moves the controlled device either toward its open or its closed position until the controller is satisfied, or until the controlled device reaches the end of its travel or until a corrective movement in the opposite direction is required. Generally there is a neutral zone in which no motion of the controlled device is required by the controller. When the controlled variable gets outside the differential of the controller, the controlled device is moved in the proper direction.

MASTER CONTROLLER is an instrument whose variable output is used to change the set point of a submaster controller. It may be a thermostat; humidostat, pressure controller, manual switch, etc.

MASTER PRESSURE is the variable output air pressure from the master controller, which changes the submaster controller's set point.

MEASURING ELEMENTS are those elements which ascertain and communicate the value of the controlled variable.

NORMALLY CLOSED applies to a controlled device which closes when all operating force, (control pressure, electric energy) is removed.

NORMALLY OPEN applies to a controlled device which opens when all operating force is removed.

OFFSET is the sustained difference between the set point and the actual control point of the controlled variable. This is also sometimes called drift, deviation, or droop.

OPERATOR is the device which responds to the output of the controller and positions the controlled device.

PROPORTIONAL BAND is the change in controlled variable required to move the controlled device from one extreme limit of travel to the other. It is normally used with respect to recording and indicating controllers and is expressed in per cent of the chart or scale range. (See Throttling Range)

GLOSSARY OF CONTROL TERMS AND DEFINITIONS
(continued)

PROPORTIONAL ACTION is when the output of the controller changes in proportion to the amount of change in the controlled variable.

PROPORTIONAL PLUS AUTOMATIC RESET ACTION is proportional action with the addition of a response which continually resets the control point back toward the set point to reduce the offset. (See Reset Rate)

PROPORTIONAL PLUS RATE ACTION is the combination of proportional action plus a response which precedes the normal proportional response. This response is proportional to the rate of change, or speed, with which the controlled variable deviates from the set point.

RANGE is the limitation between maximum and minimum values within which a device is designed to function.

RANGE OF REMOTE READJUSTMENT the change in set point of a submaster controller for full change in pressure from the master controller.

RATE TIME is the time in minutes that rate action response precedes normal proportional action response.

RELAY is a device where the control of energy flowing in one circuit governs the application of energy flowing in another circuit.

RESET RATE is the number of times per minute that the correction made by the proportional action is duplicated by the reset action. It is usually expressed in "repeats per minute".

REVERSE ACTING applies to a pneumatic controller when an increase in the controlled variable results in a *decreased* control pressure.

SENSITIVITY in pneumatic output control systems, is the number of psi that the control pressure changes per unit change in the controlled variable (psi per degree *temperature;* psi per per cent *relative humidity;* psi control pressure change per psi *pressure change* of control agent).

SET POINT is the point at which a controller is set to maintain a certain controlled variable value. It is the target value which a controller attempts to maintain. It may differ from the control point. (See Offset).

SPRING RANGE is the range through which the control pressure must change to produce total movement of the controlled device from one extreme position to the other.

Nominal Spring Range describes the control pressure range, which applies when there is no load opposing the operator.

Actual Spring Range describes the control pressure range, which will operate the controlled device under actual conditions where it must overcome forces due to fluid flow, friction, etc. in addition to the nominal spring pressures.

SUBMASTER CONTROLLER is a controller whose set point is automatically readjusted from a remote location. The set point is changed over a predetermined range by variations in output from a master controller.

A. *Direct Readjustment:* An increase in master pressure increases the set point.

B. *Reverse Readjustment:* An increase in master pressure decreases the set point.

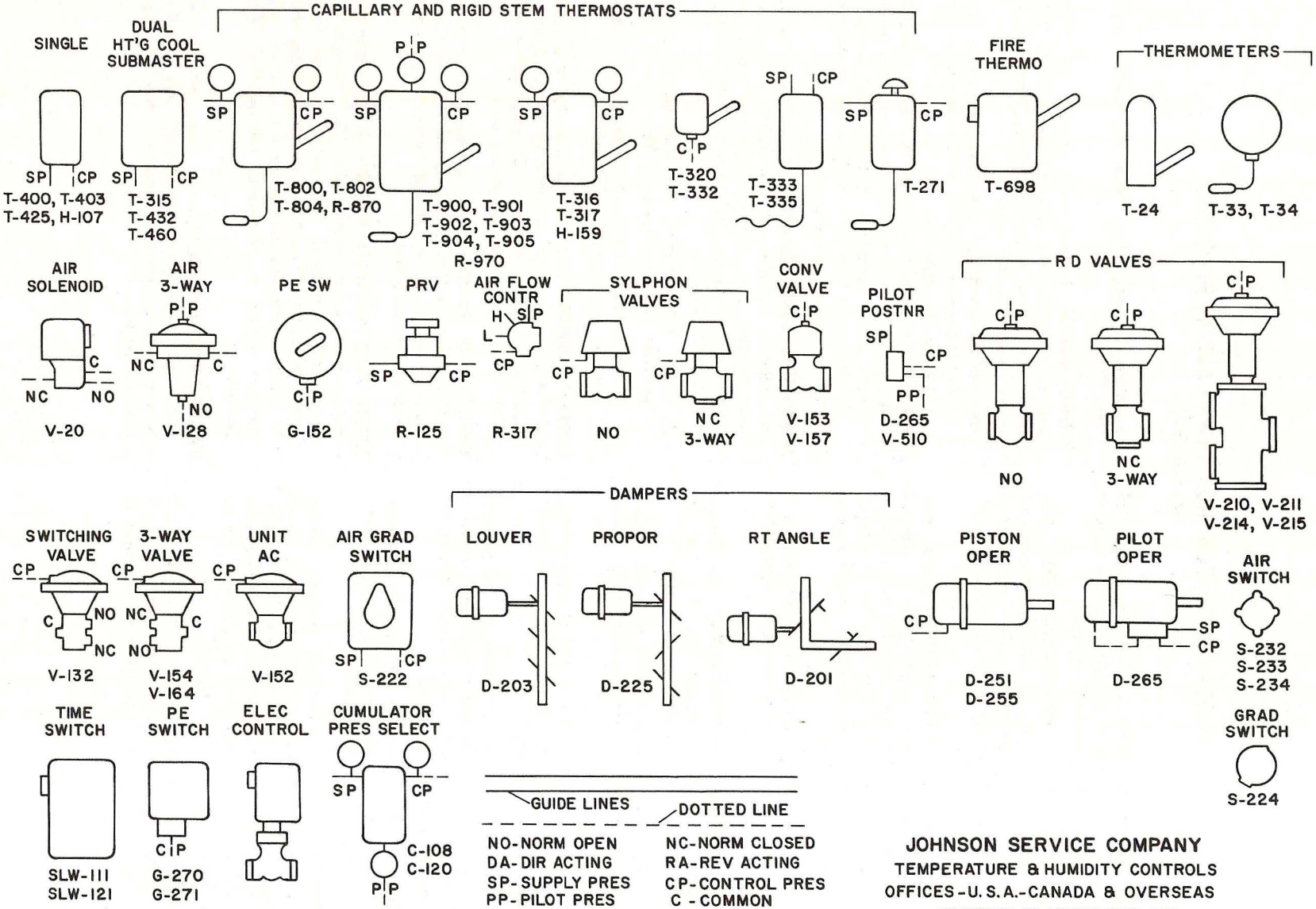
SUPPLY PRESSURE is the force per unit area (psi) of the compressed air supplied to a controller. It is usually constant at 15 or 20 psig, but it may have some other value in special cases.

THROTTLING RANGE is the change in controlled variable required to move the controlled device from its one extreme limit of travel to the other. (See Proportional Band).

TIMED TWO-POSITION ACTION is a variation of two-position action wherein the "On" periods are prematurely shortened. This may be done by a cam mechanism although it is usually accomplished in electric room thermostats by means of a heat element which is energized during the "On" periods.

TWO-POSITION ACTION is the type wherein the controlled device can be positioned only to either a maximum or minimum position, with no intermediate steps.

CONTROL DIAGRAM SYMBOLS



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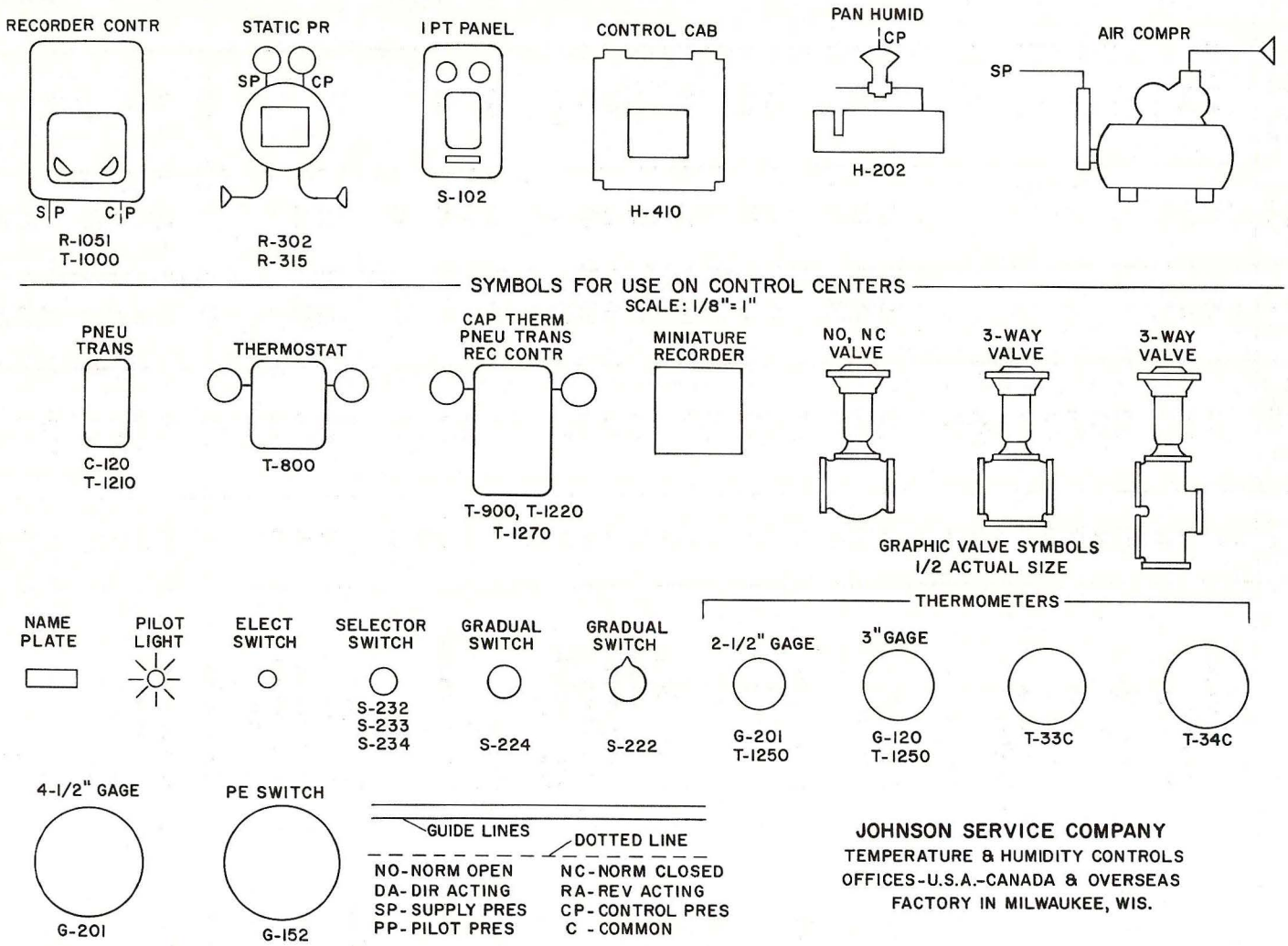
CONTROL DIAGRAM SYMBOLS (continued) AND CONTROL CENTER SYMBOLS



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DESIGN CLIMATIC CONDITIONS FOR CITIES IN U.S. AND CANADA

Abstracted by permission from
HEATING VENTILATING AIR CONDITIONING GUIDE, 1960
Chapters 12, 13 and 37.

State	City	Design Conditions in Common Use					Avg. Yearly Degree-Day 65F Base
		Winter		Summer			
		D.B. Temp.	Avg. Wind Vel. MPH	D.B. Temp.	W.B. Temp.	Avg. Wind Vel. MPH	
Ala.	Anniston	12	...	95	78	...	2820
	Birmingham	12	8.0	95	78	5.4	2780
	Mobile	22	9.9	95	80	8.0	1529
	Montgomery	18	7.5	95	78	...	1954
Alaska	Anchorage	–24	5.3	...	..	...	.....
	Barrow	–48	11.1	...	..	...	.....
	Fairbanks	–57	3.6	...	..	...	.....
	Juneau	–5	8.4	...	..	...	.....
	Ketchikan	4	14.2	...	..	...	.....
	Kodiak	4	9.4	...	..	...	.....
	Nome	–36	11.3	...	..	...	.....
	Seward	–4	8.0	...	..	...	.....
	Sitka	2	7.2	...	..	...	.....
Ariz.	Flagstaff	–4	7.7	90	65	...	7525
	Phoenix	36	5.4	105	76	6.0	1492
	Yuma	38	6.7	110	78	...	951
Ark.	Bentonville	–1	6.7	...	..	...	4036
	Fort Smith	6	8.3	95	76	6.1	3188
	Little Rock	8	8.3	95	78	6.2	2982
Calif.	Eureka	32	7.3	90	65	...	4632
	Fresno	32	5.4	105	74	7.9	2532
	Independence	12	...	...	..	...	3834
	Los Angeles	41	6.4	90	70	5.8	1451
	Sacramento	30	7.2	100	72	7.9	2600
	San Diego	43	6.3	85	68	...	1574
	San Francisco	37	7.5	85	65	10.7	3069
	San Jose	38	...	91	70	...	2410
Col.	Denver	–12	7.5	95	64	6.9	5673
	Durango	–6	5.0	95	65	...	7143
	Grand Junction	–3	4.4	95	65	6.3	5796
	Leadville	–9	11.1	...	..	...	10678
	Pueblo	–14	7.9	95	65	...	5709
Conn.	Bridgeport	–1	10.5	...	..	...	.....
	Hartford	–2	8.7	93	75	...	.....
	New Haven	0	9.4	95	75	...	.....
	New London	3	9.3	...	..	...	.....
	Norwalk	–1	10.5	...	..	...	.....
D. C.	Washington	10	7.8	95	78	5.9	4258
Fla.	Jacksonville	28	9.0	95	78	8.4	1113
	Key West	53	10.6	98	78	...	77
	Pensacola	24	10.9	95	78	...	1435
	Tampa	36	8.6	95	78	7.4	674
Ga.	Atlanta	11	11.7	95	76	7.9	2811
	Augusta	20	6.5	98	76	...	2138
	Macon	20	6.7	95	78	...	2049
	Savannah	24	9.5	95	78	8.0	1710

JOHNSON SERVICE COMPANY, MILWAUKEE, WIS.

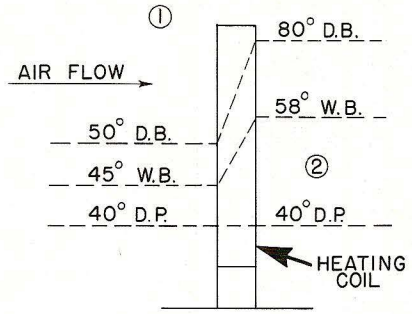
State	City	Design Conditions in Common Use					Avg. Yearly Degree-Day 65F Base
		Winter		Summer			
		D.B. Temp.	Avg. Wind Vel. MPH	D.B. Temp.	W.B. Temp.	Avg. Wind Vel. MPH	
Idaho	Boise	–10	9.1	95	65	5.8	5890
	Lewiston	–12	4.1	95	65	...	5483
	Pocatello	–17	8.9	95	65	...	6976
Ill.	Cairo	0	9.8	98	78	...	3756
	Chicago	–11	11.7	95	75	9.5	6310
	Peoria	–13	8.3	96	76	8.2	6087
Ind.	Evansville	–4	9.6	95	78	7.0	4360
	Fort Wayne	–7	10.4	95	75	...	6287
	Indianapolis	–8	11.3	95	76	8.9	5134
	Lafayette	–9	11.3	...	..	...	.....
	Terre Haute	–6	10.2	95	78	...	5366
Iowa	Charles City	–21	7.9	...	..	...	7504
	Davenport	–12	10.5	95	78	...	6091
	Des Moines	–13	10.1	95	78	8.6	6274
	Dubuque	–15	7.1	95	78	...	7271
	Keokuk	–13	8.3	95	78	...	5663
	Sioux City	–16	11.5	95	78	...	7012
Kansas	Concordia	–11	7.7	95	78	...	5323
	Dodge City	–9	10.6	95	78	...	5058
	Iola	–7	8.3	...	..	...	4616
	Topeka	–8	9.2	100	78	...	4919
	Wichita	–6	12.4	100	75	11.8	4571
Ky.	Bowling Green	2	9.5	...	..	...	.....
	Hopkinsville	2	9.5	...	..	...	.....
	Irvington	0	9.7	...	..	...	.....
	Lexington	–2	13.3	...	..	...	4979
	Louisville	–2	9.8	95	78	7.2	4279
	Shelbyville	–2	13.3	...	..	...	.....
La.	New Orleans	26	8.6	95	80	6.9	1175
	Shreveport	14	8.8	100	78	7.0	2117
Me.	Eastport	–9	12.6	90	70	...	8246
	Portland	–9	10.4	90	73	8.7	7681
Md.	Baltimore	8	8.2	95	78	7.4	4203
Mass.	Boston	0	12.4	92	75	12.5	5791
Mich.	Alpena	–10	11.0	95	75	...	8073
	Detroit	–4	12.0	95	75	9.5	6404
	Escanaba	–18	9.5	...	..	...	8657
	Grand Haven	–3	12.4	...	..	...	.....
	Grand Rapids	–4	12.1	...	..	...	6474
	Houghton	–18	8.7	...	..	...	9030
	Lansing	–8	9.8	95	75	...	6982
	Ludington	–7	11.9	...	..	...	7458
	Marquette	–16	10.6	93	73	...	8529
	Sault Ste. Marie	–19	8.9	...	..	...	9475
Minn.	Duluth	–27	13.4	93	73	...	9574
	Minneapolis	–23	11.3	95	75	10.2	7853
	Morehead	–29	9.7	...	..	...	9327
	St. Paul	–23	9.5	95	75	...	7804
Miss.	Corinth	6	11.6	...	..	...	3087
	Meridian	14	6.3	95	79	4.6	2333
	Vicksburg	15	8.3	95	78	6.4	2000

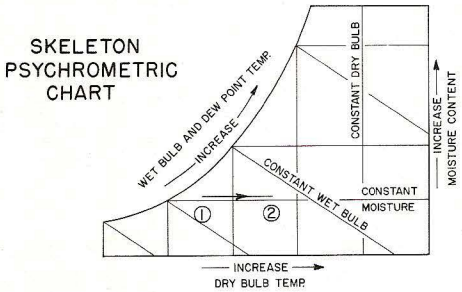
State	City	Design Conditions in Common Use					Avg. Yearly Degree-Day 65F Base
		Winter		Summer			
		D.B. Temp.	Avg. Wind Vel. MPH	D.B. Temp.	W.B. Temp.	Avg. Wind Vel. MPH	
Mo.	Columbia	–9	8.9	100	78	...	5113
	Hannibal	–12	9.0	...	..	...	5393
	Kansas City	–8	10.3	100	76	9.1	4888
	St. Louis	–5	11.8	95	78	9.5	4469
	Springfield	–5	11.0	...	..	8.7	4693
Mont.	Billings	–31	12.4	90	66	...	7106
	Havre	–39	9.4	95	70	...	8213
	Helena	–39	7.4	95	67	8.1	8126
	Kalispell	–31	5.2	95	65	...	8055
	Miles City	–35	5.6	...	..	...	7850
Nebr.	Lincoln	–15	10.6	95	78	9.7	5865
	North Platte	–15	7.9	95	78	8.1	6546
	Omaha	–17	9.7	95	78	...	6160
	Valentine	–21	9.2	95	78	...	7075
Nev.	Reno	3	6.0	95	65	7.2	6036
	Winnemucca	–9	8.1	95	65	...	6369
N. H.	Concord	–11	6.2	90	73	4.9	7612
N. J.	Atlantic City	8	15.8	95	78	...	4741
	Charlotteburg	–1	...	...	..	...	.....
	Elizabeth	2	11.2	...	..	...	.....
	Flemington	3	10.5	...	..	...	.....
	New Brunswick	4	10.5	...	..	...	.....
	Plainfield	4	11.2	...	..	...	.....
	Somerville	2	10.5	...	..	...	.....
	Trenton	2	10.9	...	..	...	5068
N. M.	Albuquerque	8	7.3	95	70	7.8	4389
	Roswell	4	7.1	95	70	...	3424
	Santa Fe	3	7.0	...	..	...	6123
N. Y.	Albany	–9	10.5	93	75	7.5	6319
	Binghampton	–7	6.8	95	75	...	6556
	Buffalo	–5	17.1	93	73	12.1	6838
	Canton	–22	10.5	90	73	8.2	8305
	Ithaca	–4	11.3	...	..	...	6914
	New York	5	16.8	95	75	12.5	5050
	Oswego	–7	12.1	93	73	...	6975
	Rochester	–4	9.6	95	75	...	6863
	Syracuse	–10	11.2	93	75	...	6520
N. C.	Asheville	5	9.5	93	75	5.6	4072
	Charlotte	14	7.3	95	78	...	3205
	Greensboro	...	...	95	78	...	.....
	Hatteras	21	14.3	...	..	...	2392
	Raleigh	14	7.9	95	78	6.3	3075
	Wilmington	20	9.4	95	78	8.4	2323
N. D.	Bismarck	–31	9.1	95	73	9.5	9033
	Devils Lake	–32	10.1	95	70	...	9940
	Grand Forks	–30	13.2	...	..	...	9871
	Williston	–35	8.6	95	73	...	9068
Ohio	Cincinnati	–3	8.5	95	78	5.6	4532
	Cleveland	–5	14.7	95	75	11.1	6144
	Columbus	–3	11.6	95	76	...	5717
	Dayton	–4	11.1	95	78	...	5597
	Sandusky	–4	11.0	95	75	...	5859
	Toledo	–5	12.1	95	75	...	6394
Okla.	Oklahoma City	–1	11.5	101	77	9.8	3519

State	City	Design Conditions in Common Use					Avg. Yearly Degree-Day 65F Base
		Winter		Summer			
		D.B. Temp.	Avg. Wind Vel. MPH	D.B. Temp.	W.B. Temp.	Avg. Wind Vel. MPH	
Ore.	Baker	–14	5.6	90	66	...	7087
	Portland	10	7.3	90	68	6.5	4143
	Roseburg	19	3.9	90	66	...	4122
Pa.	Erie	–3	13.6	93	75	...	6116
	Harrisburg	4	7.6	95	..	...	5258
	Philadelphia	6	11.0	95	78	9.7	4523
	Pittsburgh	–3	11.6	95	75	8.9	5048
	Reading	3	9.0	95	75	...	5060
	Scranton	–2	7.6	95	75	...	6047
R. I.	Block Island	7	20.6	95	75	...	5843
	Kingston	0	11.7	...	..	...	.....
	Providence	1	12.1	93	75	9.5	5607
S. C.	Charleston	22	10.5	95	78	9.8	1769
	Columbia	19	8.0	95	75	...	2284
S. D.	Huron	–21	10.7	95	75	10.3	7902
	Pierre	–22	11.7	...	..	...	7283
	Rapid City	–22	8.0	95	70	7.9	7535
Tenn.	Chattanooga	8	7.7	95	76	5.6	3384
	Knoxville	5	7.2	95	75	5.7	3590
	Memphis	6	9.3	95	78	7.3	3006
	Nashville	3	9.8	95	78	...	3513
Texas	Abilene	7	10.1	100	74	...	2657
	Amarillo	–2	12.1	100	72	11.8	4345
	Corpus Christi	23	11.0	95	80	...	1011
	Dallas	8	10.6	100	78	9.3	2272
	El Paso	20	9.0	100	69	8.4	2641
	Fort Worth	8	10.5	100	78	9.5	2361
	Galveston	23	11.2	95	80	9.7	1211
	Houston	19	10.5	95	80	8.8	1276
	Palestine	11	8.0	100	78	...	1980
	San Antonio	19	8.3	100	78	7.8	1579
	Taylor	12	9.8	...	..	...	1909
Utah	Salt Lake City	–1	7.8	95	65	9.8	5463
Vt.	Burlington	–17	11.6	90	73	8.5	7865
	Northfield	–19	8.8	...	..	...	8804
Va.	Cape Henry	17	14.0	95	78	...	3307
	Lynchburg	11	8.1	95	75	...	4153
	Norfolk	15	12.1	95	78	10.1	3119
	Richmond	11	8.1	95	78	6.4	3720
	Wytheville	3	7.3	...	..	...	5103
Wash.	Seattle	15	9.8	85	65	7.7	4438
	Spokane	–16	6.2	93	65	6.5	6852
	Tacoma	15	8.0	85	64	...	4866
	Tatoosh Island	18	18.9	...	..	...	5724
	Walla Walla	–12	5.3	...	..	...	4848
W. Va.	Elkins	–4	6.2	...	..	...	5773
	Parkersburg	–1	7.2	95	75	5.2	4750
Wis.	Green Bay	–20	10.5	95	75	9.2	8259
	LaCrosse	–20	9.3	95	75	6.4	7650
	Madison	–19	10.1	95	75	7.9	7300
	Milwaukee	–17	12.1	95	75	9.8	6944
Wyo.	Cheyenne	–19	13.3	95	65	9.2	7562
	Lander	–30	3.9	95	65	...	8303
	Yellowstone Park	–34	8.8	...	..	...	9605

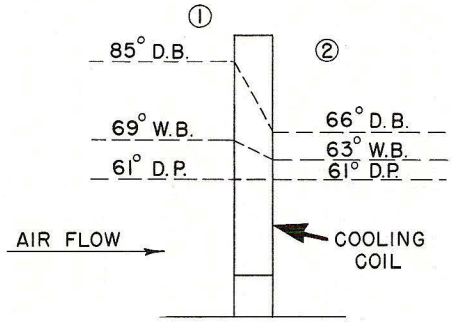
Province	City	Design Conditions in Common Use					Avg. Yearly Degree-Day 65F Base
		Winter		Summer			
		D.B. Temp.	Avg. Wind Vel. MPH	D.B. Temp.	W.B. Temp.	Avg. Wind Vel. MPH	
Alta.	Calgary	–31	10.1	90	66	9.7	9520
	Edmonton	–39	7.6	90	68	8.9	10320
	Grande Prairie	–47	7.9	...	..	...	.....
	Lethbridge	–32	15.0	...	..	...	8650
	Medicine Hat	–34	9.0	90	65	9.1	8650
B. C.	Estevan Point	22	9.9	...	..	...	.....
	Fort Nelson	–47	3.7	...	..	...	.....
	Prince George	–42	7.2	...	..	...	9500
	Prince Rupert	12	8.0	...	..	...	6910
	Vancouver	13	7.7	80	67	7.8	5230
Man.	Churchill	–43	14.7	...	..	...	16810
	The Pas	–42	6.4	...	..	...	.....
	Winnipeg	–35	12.0	90	71	11.5	10630
N. B.	Campbellton	–22	...	...	..	...	.....
	Fredericton	–24	9.2	90	75	...	8830
	Moncton	–23	14.9	...	..	...	8700
	Saint John	–12	13.8	...	..	7.9	8380
Nfld.	Corner Brook	–12	...	...	..	...	9210
	Gander	–10	17.2	...	..	...	9440
	Goose Bay	–30	10.3	...	..	...	12140
	St. John's	–2	19.3	...	..	...	8780
N. W. T.	Fort Norman	–54	...	...	..	...	16020
	Resolute	–53	9.2	...	..	...	.....
	Yellowknife	–51	...	...	..	...	.....
N. S.	Halifax	–6	9.6	90	75	6.6	7570
	Sydney	–9	13.1	...	..	9.9	8220
	Yarmouth	1	13.5	...	..	...	7520
Ont.	Fort William	–29	9.6	...	..	8.4	10350
	Hamilton	–6	...	...	..	...	6890
	Kapuskasing	–42	10.0	...	..	...	11790
	Kingston	–17	10.8	...	..	...	7810
	London	–11	11.9	...	..	...	7380
	North Bay	–33	11.3	...	..	9.6	.....
	Ottawa	–26	11.1	90	75	8.9	8830
	Sioux Lookout	–39	8.5	...	..	...	.....
	Toronto	–13	12.1	93	75	8.1	7020
	Windsor	–2	12.3	...	..	...	.....
P. E. I.	Charlottetown	–11	11.3	...	..	8.7	8380
Que.	Arvida	–31	8.2	...	..	...	10440
	Mont Joli	–18	13.3	...	..	...	.....
	Montreal	–20	13.1	90	75	9.9	8130
	Quebec City	–19	12.4	90	75	9.0	9070
	Sherbrooke	–24	8.2	...	..	...	8610
Sask.	Prince Albert	–46	4.9	...	..	...	11430
	Regina	–39	12.1	90	71	12.4	10770
	Saskatoon	–41	9.7	90	70	10.7	10960
	Swift Current	–34	14.6	...	..	...	9660
Y. T.	Dawson	–54	...	...	..	...	15040
	Whitehorse	–51	8.7	...	..	...	.....

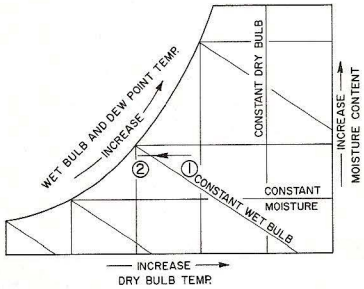
AIR CONDITIONING PROCESSES AND THE PSYCHROMETRIC CHART



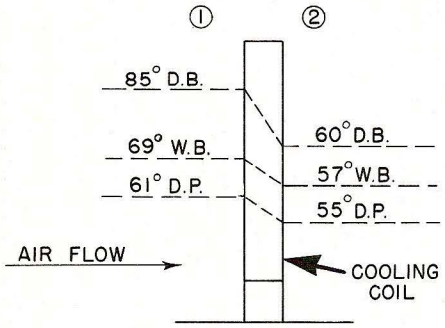


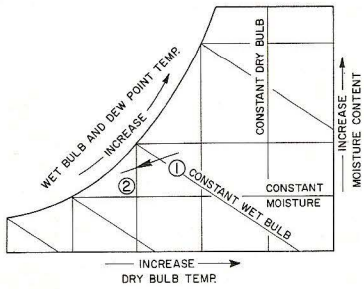
HEATING



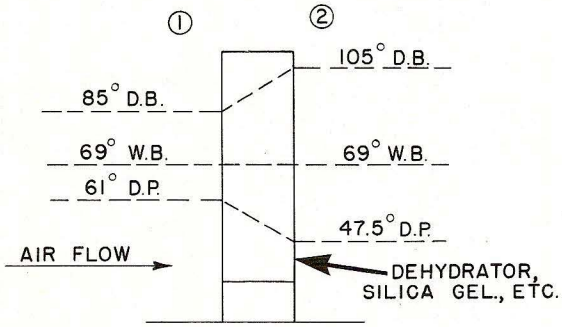


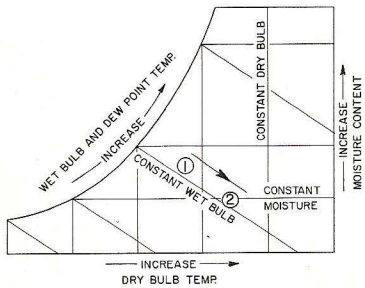
SENSIBLE COOLING





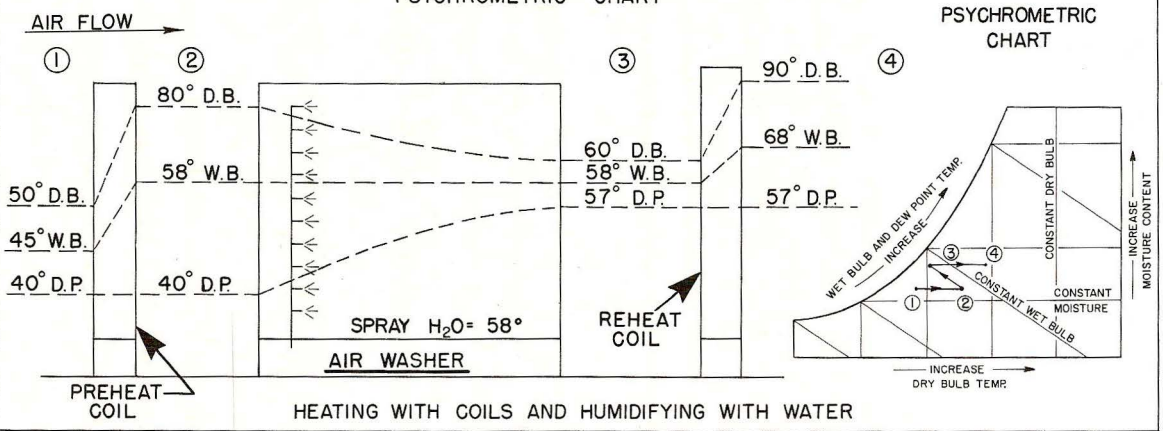
COOLING & DEHUMIDIFICATION



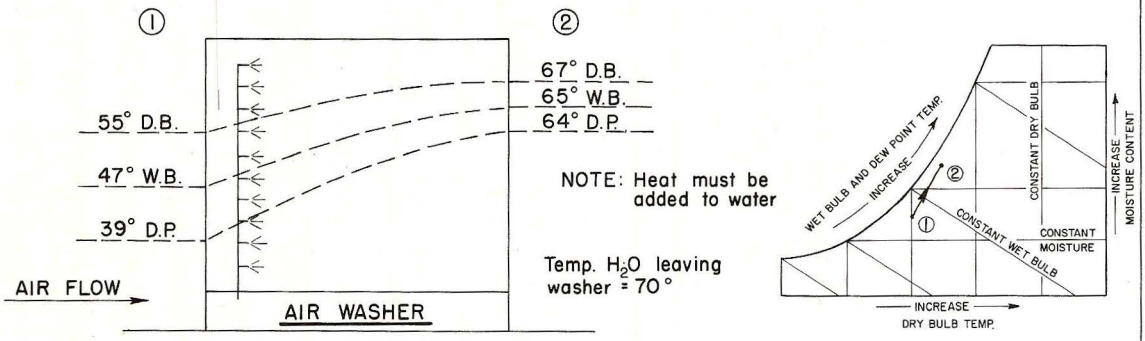


CHEMICAL DEHUMIDIFICATION

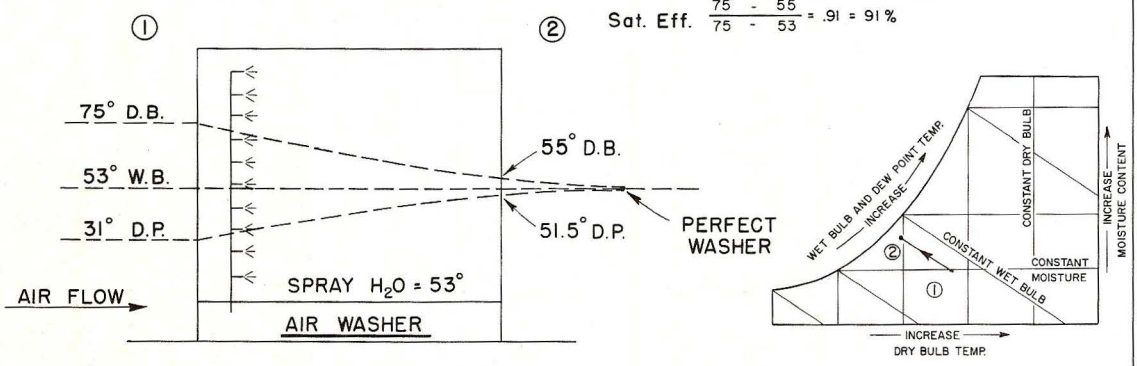
AIR CONDITIONING PROCESSES AND THE PSYCHROMETRIC CHART



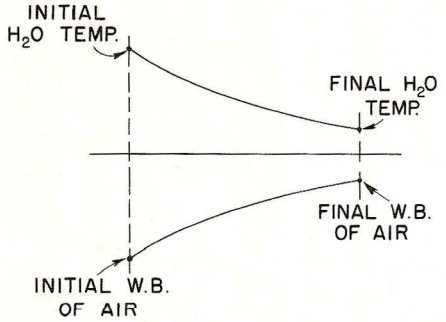
HEATING WITH COILS AND HUMIDIFYING WITH WATER



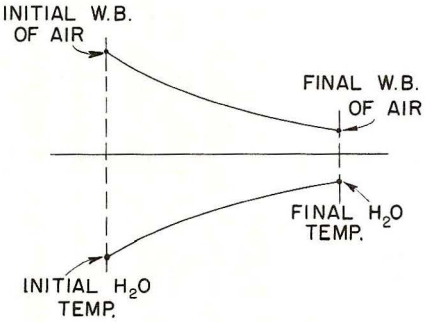
HEATING & HUMIDIFICATION



ADIABATIC SATURATION



HEATING AIR WITH SPRAY WATER



COOLING AIR WITH SPRAY WATER