



# PSYCHROMETRIC CHART

## LOW TEMPERATURES

Barometric Pressure 29.92 In. Hg

ADDITIVE CORRECTIONS FOR W, h, AND v WHEN BAROMETRIC PRESSURE DIFFERS FROM STANDARD BAROMETER

### APPROXIMATE ALTITUDE IN FEET

Wet Bulb Temp. t'	Sat. Vapor Press. in. Hg	APPROXIMATE ALTITUDE IN FEET													
		-900		900		1800		2700		3700		4800		5900	
		$\Delta p = +1$	$\Delta p = -1$	$\Delta p = -2$	$\Delta p = -3$	$\Delta p = -4$	$\Delta p = -5$	$\Delta p = -6$	$\Delta W_s^1$	$\Delta h$	$\Delta W_s^1$	$\Delta h$	$\Delta W_s^1$	$\Delta h$	$\Delta W_s^1$
-20	0.013	-0.06	-0.01	0.06	0.01	0.13	0.02	0.20	0.03	0.28	0.04	0.36	0.05	0.47	0.07
-18	0.014	-0.07	-0.01	0.07	0.01	0.14	0.02	0.23	0.03	0.32	0.05	0.41	0.06	0.52	0.08
-16	0.016	-0.07	-0.01	0.08	0.01	0.16	0.02	0.26	0.04	0.36	0.06	0.46	0.07	0.58	0.09
-14	0.018	-0.08	-0.01	0.09	0.01	0.18	0.03	0.29	0.04	0.40	0.06	0.52	0.08	0.65	0.10
-12	0.020	-0.09	-0.01	0.10	0.01	0.21	0.03	0.32	0.05	0.44	0.07	0.58	0.09	0.72	0.11
-10	0.022	-0.10	-0.02	0.11	0.02	0.23	0.03	0.36	0.05	0.50	0.07	0.64	0.10	0.81	0.12
-8	0.025	-0.12	-0.02	0.12	0.02	0.26	0.04	0.40	0.06	0.55	0.08	0.72	0.11	0.90	0.13
-6	0.027	-0.13	-0.02	0.14	0.02	0.29	0.04	0.44	0.07	0.62	0.09	0.80	0.12	1.00	0.15
-4	0.030	-0.14	-0.02	0.15	0.02	0.32	0.05	0.50	0.07	0.69	0.10	0.89	0.13	1.12	0.17
-2	0.034	-0.16	-0.02	0.17	0.02	0.35	0.05	0.55	0.08	0.78	0.11	0.99	0.15	1.24	0.19
0	0.038	-0.18	-0.03	0.19	0.03	0.39	0.06	0.61	0.09	0.85	0.13	1.10	0.17	1.38	0.21
2	0.042	-0.20	-0.03	0.21	0.03	0.44	0.07	0.68	0.10	0.94	0.14	1.22	0.19	1.63	0.23
4	0.046	-0.22	-0.03	0.23	0.03	0.48	0.07	0.75	0.11	1.05	0.16	1.36	0.21	1.70	0.26
6	0.051	-0.24	-0.04	0.25	0.04	0.54	0.08	0.83	0.13	1.16	0.18	1.51	0.23	1.89	0.29
8	0.057	-0.27	-0.04	0.27	0.04	0.59	0.09	0.93	0.14	1.28	0.19	1.67	0.25	2.09	0.32
10	0.063	-0.30	-0.04	0.32	0.05	0.66	0.10	1.03	0.16	1.42	0.22	1.85	0.28	2.31	0.35
12	0.069	-0.33	-0.05	0.35	0.05	0.73	0.11	1.13	0.17	1.57	0.24	2.04	0.31	2.56	0.39
14	0.077	-0.36	-0.05	0.39	0.06	0.81	0.12	1.25	0.19	1.74	0.26	2.26	0.34	2.82	0.43
16	0.085	-0.40	-0.06	0.43	0.06	0.89	0.14	1.38	0.21	1.92	0.29	2.49	0.38	3.12	0.48
18	0.093	-0.44	-0.07	0.47	0.07	0.98	0.15	1.53	0.23	2.12	0.32	2.75	0.42	3.44	0.53
20	0.103	-0.49	-0.08	0.52	0.08	1.08	0.17	1.68	0.26	2.28	0.36	3.03	0.46	3.79	0.58
22	0.113	-0.5	-0.08	0.6	0.09	1.2	0.18	1.9	0.29	2.6	0.40	3.4	0.52	4.2	0.64
24	0.124	-0.6	-0.09	0.6	0.10	1.3	0.20	2.1	0.32	2.8	0.43	3.7	0.57	4.6	0.71
26	0.137	-0.7	-0.10	0.7	0.11	1.4	0.22	2.3	0.35	3.1	0.48	4.1	0.63	5.1	0.78
28	0.150	-0.7	-0.11	0.8	0.12	1.6	0.24	2.5	0.38	3.4	0.52	4.5	0.69	5.6	0.86
30	0.165	-0.8	-0.12	0.8	0.13	1.7	0.27	2.7	0.42	3.8	0.58	4.9	0.75	6.1	0.92
32	0.180	-0.9	-0.13	0.9	0.14	1.9	0.29	3.0	0.45	4.1	0.63	5.3	0.82	6.6	1.01
34	0.197	-0.9	-0.14	1.0	0.15	2.1	0.32	3.2	0.49	4.4	0.68	5.7	0.88	7.2	1.11
36	0.212	-1.0	-0.15	1.1	0.17	2.2	0.35	3.5	0.53	4.8	0.74	6.2	0.96	7.8	1.20
38	0.229	-1.1	-0.17	1.2	0.18	2.4	0.37	3.8	0.58	5.2	0.80	6.8	1.05	8.4	1.30
40	0.248	-1.2	-0.18	1.3	0.20	2.6	0.41	4.1	0.63	5.7	0.88	7.4	1.14	9.2	1.42
42	0.268	-1.3	-0.20	1.4	0.21	2.8	0.44	4.4	0.69	6.1	0.94	8.0	1.23	10.0	1.54
44	0.289	-1.4	-0.22	1.5	0.23	3.1	0.47	4.8	0.74	6.7	1.04	8.7	1.34	10.8	1.67
46	0.312	-1.5	-0.23	1.6	0.25	3.3	0.51	5.2	0.80	7.2	1.11	9.4	1.45	11.7	1.81
48	0.336	-1.6	-0.25	1.8	0.27	3.6	0.56	5.6	0.87	7.8	1.21	10.2	1.58	12.6	1.95

### PROPERTIES OF SATURATED AIR

-20 to -100 F

Temp. F	Vapor Press. In. Hg	Moisture Content Grains*	Volume cu ft*	Enthalpy Btu*
-20	.0126	1.83	11.08	-4.52
-22	.0112	1.83	11.08	-5.03
-24	.0100	1.45	10.99	-5.54
-26	.0089	1.29	10.93	-6.04
-28	.0079	1.15	10.88	-6.55
-30	.0070	1.02	10.83	-7.05
-32	.0062	0.90	10.78	-7.54
-34	.0055	0.80	10.73	-8.04
-36	.0049	0.71	10.68	-8.53
-38	.0043	0.62	10.63	-9.03
-40	.0038	0.55	10.58	-9.52
-42	.0033	0.49	10.53	-10.01
-44	.0029	0.43	10.48	-10.50
-46	.0026	0.38	10.43	-10.98
-48	.0023	0.33	10.38	-11.47
-50	.0020	0.29	10.33	-11.96
-52	.0017	0.25	10.28	-12.44
-54	.0015	0.22	10.23	-12.93
-56	.0013	0.19	10.18	-13.41
-58	.0012	0.17	10.13	-13.89
-60	.0010	0.15	10.08	-14.38
-62	.0009	0.13	10.03	-14.86
-64	.0008	0.11	9.98	-15.34
-66	.0007	0.10	9.93	-15.83
-68	.0006	0.08	9.87	-16.31
-70	.0005	0.07	9.82	-16.79
-72	.0004	0.06	9.77	-17.27
-74	.0004	0.05	9.72	-17.75
-76	.0003	0.05	9.67	-18.23
-78	.0003	0.04	9.62	-18.71
-80	.0002	0.03	9.57	-19.19
-82	.0002	0.03	9.52	-19.68
-84	.0002	0.03	9.47	-20.16
-86	.0001	0.02	9.42	-20.64
-88	.0001	0.02	9.37	-21.12
-90	.0001	0.02	9.32	-21.60
-92	.0001	0.01	9.27	-22.08
-94	.0001	0.01	9.22	-22.56
-96	.0001	0.01	9.17	-23.04
-98	.0001	0.01	9.12	-23.52
-100	.0000	0.01	9.07	-24.00

\*Per lb of dry air

**Example:** At a barometric pressure of 25.92 with 30 F DB and 28 F WB, determine W, h, and v.  $\Delta p = -4$  and from table  $\Delta W_s^1 = 3.4$ . From note above,

$$\Delta W = \Delta W_s^1 - \left( \frac{2}{24} \times .01 \times 3.4 \right) = 3.4 - .003 = 3.4$$

Therefore  $W = 19.2$  (from chart) + 3.4 = 22.6 gr per lb of dry air. From table  $\Delta h = 0.52$ . Therefore  $h =$  saturation enthalpy from chart + deviation + 0.52 = 10.1 + .06 + 0.52 = 10.68 Btu per lb of dry air. From equation above

$$v = \frac{.764(30 + 459.7)}{25.92} \left[ 1 + \frac{22.6}{4360} \right] = 14.32 \text{ cu ft per lb of dry air.}$$

- t = Dry bulb temperature (F).
  - t' = Wet bulb temperature (F).
  - p = Barometric pressure (in. of Hg).
  - $\Delta p$  = Pressure difference from standard barometer (in. of Hg).
  - W = Moisture content of air (gr per lb of dry air).
  - $W_s^1$  = Moisture content of air saturated at wet bulb temperature t' (gr per lb of dry air).
  - $\Delta W$  = Moisture content correction of air when barometric pressure differs from standard barometer (gr per lb of dry air).
  - $\Delta W_s^1$  = Moisture content correction of air saturated at wet bulb temperature when barometric pressure differs from standard barometer (gr per lb of dry air).
  - NOTE: To obtain  $\Delta W$  reduce value of  $\Delta W_s^1$  by 1% where  $t - t' = 24$  F and correct proportionally when  $t - t'$  is not 24 F.
  - h = Enthalpy of moist air (Btu per lb of dry air).
  - $\Delta h$  = Enthalpy correction when barometer pressure differs from standard barometer, for saturated or unsaturated air (Btu per lb of dry air).
  - v = Volume of moist air (cu ft per lb of dry air).
- $$v = \frac{.764(t + 459.7)}{p} \left[ 1 + \frac{W}{4360} \right]$$

### ENTHALPY OF ADDED OR REJECTED MOISTURE (ICE)



