

**MINNEAPOLIS-ST PAUL MN**

Latitude = 44.88 N

WMO No. 726580

Longitude = 93.22 W

Elevation = 837 feet

Period of Record = 1973 to 1996

Average Pressure = 29.07 inches Hg

**Design Criteria Data**

		Mean Coincident (Average) Values			
	<b>Design Value</b>	Wet Bulb Temperature	Humidity Ratio	Wind Speed	Prevailing Direction
	(°F)	(°F)	(gr/lb)	(mph)	(NSEW)
<b>Dry Bulb Temperature (T)</b>					
Median of Extreme Highs	97	75	98	15.8	SSW
0.4% Occurrence	91	73	98	13.8	S
1.0% Occurrence	88	72	95	13.0	S
2.0% Occurrence	85	70	90	12.5	S
Mean Daily Range	17	-	-	-	-
97.5% Occurrence	-3	-4	3	9.3	NW
99.0% Occurrence	-10	-11	2	8.9	WNW
99.6% Occurrence	-15	-15	2	8.9	W
Median of Extreme Lows	-21	-21	1	9.2	NW
		Mean Coincident (Average) Values			
	<b>Design Value</b>	Dry Bulb Temperature	Humidity Ratio	Wind Speed	Prevailing Direction
	(°F)	(°F)	(gr/lb)	(mph)	(NSEW)
<b>Wet Bulb Temperature (T<sub>wb</sub>)</b>					
Median of Extreme Highs	80	90	140	12.2	S
0.4% Occurrence	76	86	121	12.4	S
1.0% Occurrence	74	84	113	11.9	S
2.0% Occurrence	73	82	110	11.5	S
		Mean Coincident (Average) Values			
	<b>Design Value</b>	Dry Bulb Temperature	Vapor Pressure	Wind Speed	Prevailing Direction
	(gr/lb)	(°F)	(in. Hg)	(mph)	(NSEW)
<b>Humidity Ratio (HR)</b>					
Median of Extreme Highs	140	87	0.90	10.8	SSE
0.4% Occurrence	127	83	0.82	10.1	SE
1.0% Occurrence	119	81	0.77	11.0	S
2.0% Occurrence	111	79	0.72	10.8	S
<b>Air Conditioning/ Humid Area Criteria</b>	<b># of Hours</b>	T ≥ 93°F	T ≥ 80°F	T <sub>wb</sub> ≥ 73°F	T <sub>wb</sub> ≥ 67°F
		23	501	182	774

**Other Site Data**

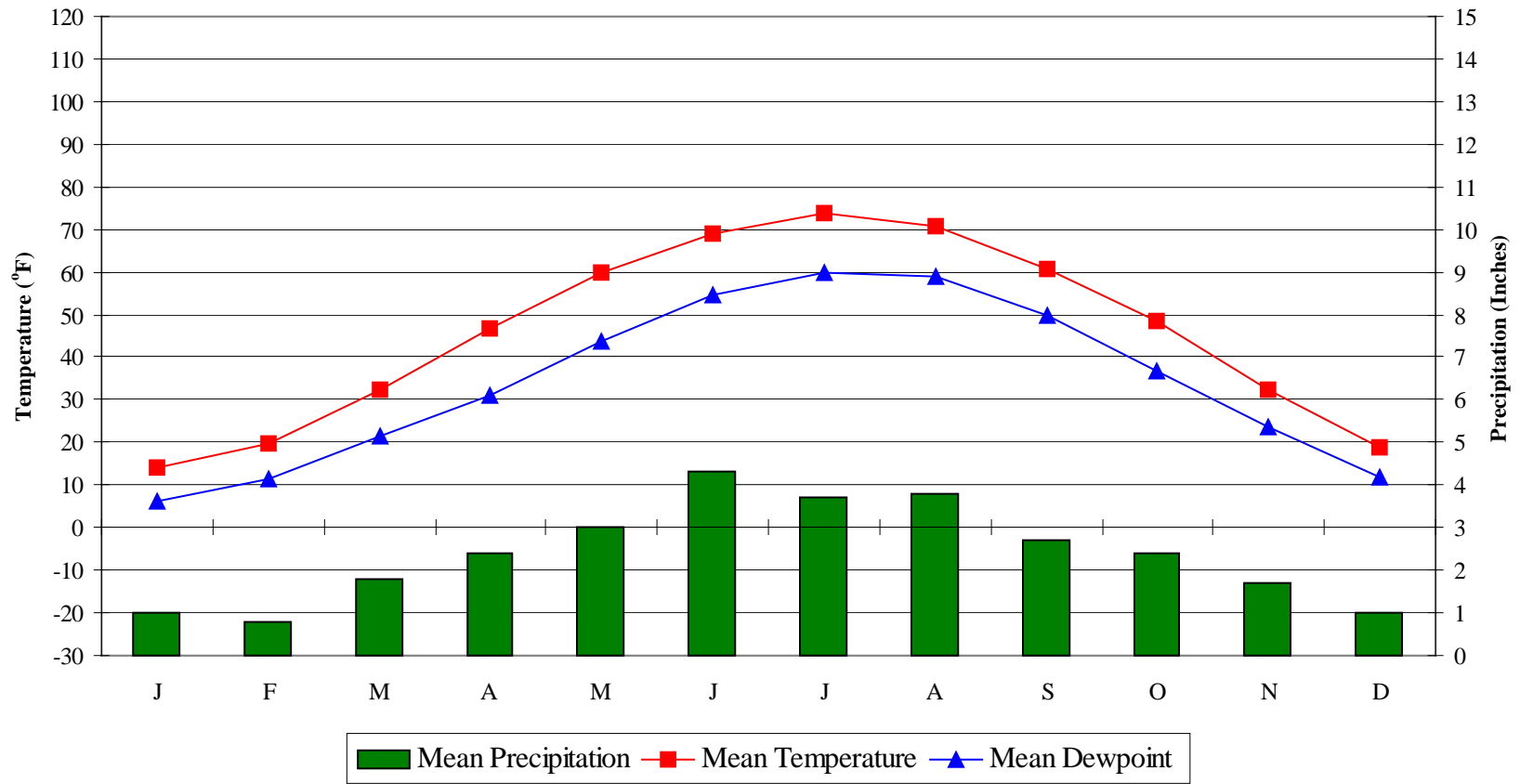
Weather Region	Rain Rate 100 Year Recurrence (in./hr)	Basic Wind Speed 3 sec gust @ 33 ft 50 Year Recurrence (mph)	Ventilation Cooling Load Index (Ton-hr/cfm/yr) Base 75°F-RH 60% Latent + Sensible
5	3.3	90	1.0 + 0.5
Ground Water Temperature (°F) 50 Foot Depth *	Frost Depth 50 Year Recurrence (in.)	Ground Snow Load 50 Year Recurrence (lb/ft <sup>2</sup> )	Average Annual Freeze-Thaw Cycles (#)
48.1	125	51	58

\*Note: Temperatures at greater depths can be estimated by adding 1.5°F per 100 feet additional depth.

MINNEAPOLIS-ST PAUL MN

WMO No. 726580

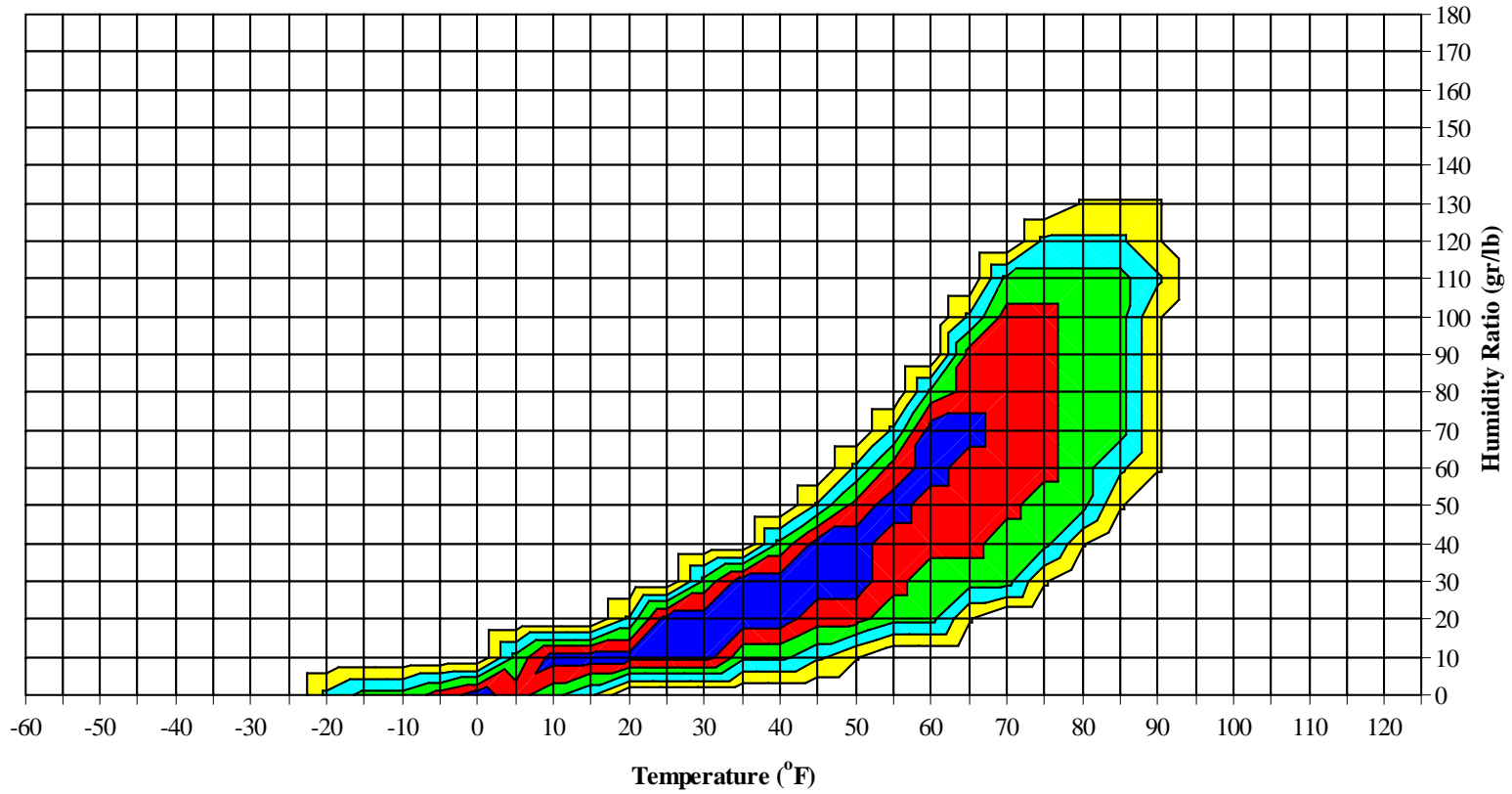
### Average Annual Climate



MINNEAPOLIS-ST PAUL MN

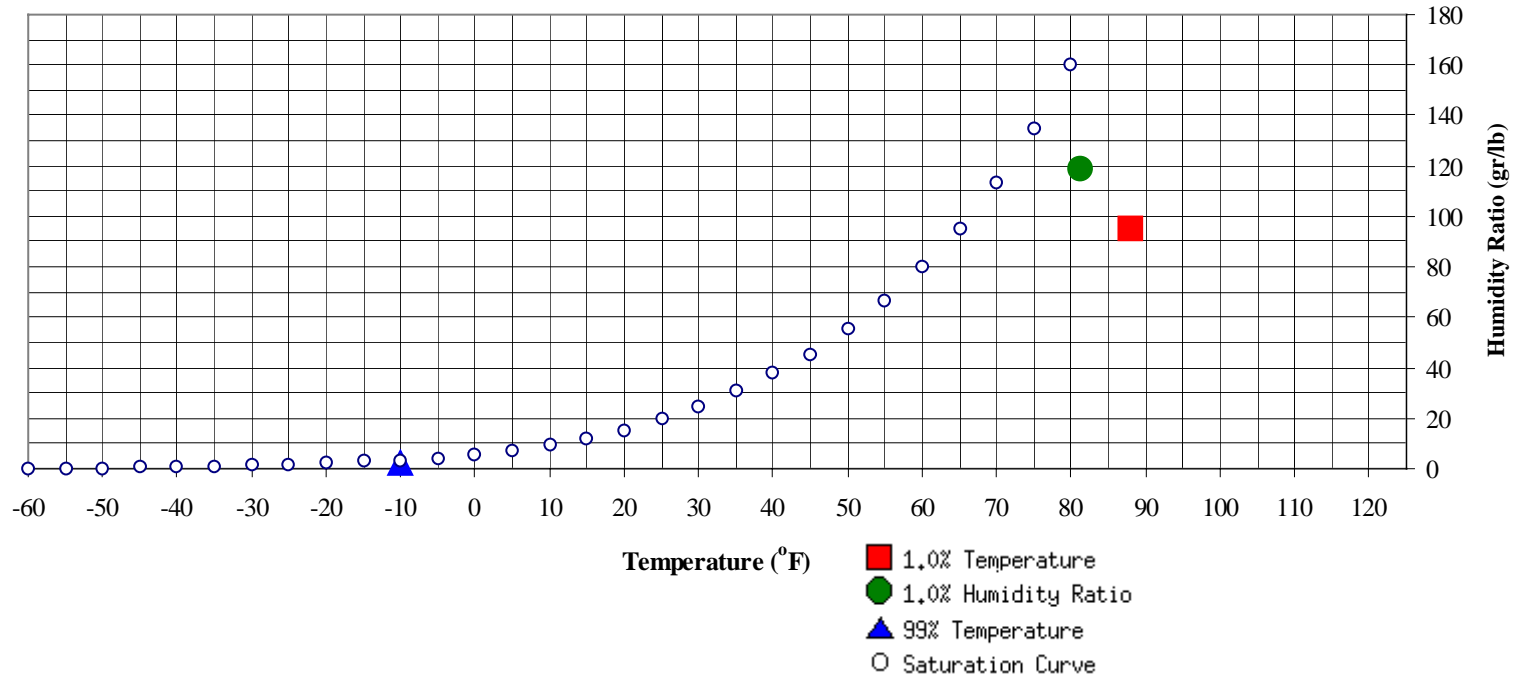
WMO No. 726580

### Long Term Psychrometric Summary



- 50% of all observations
- 80% of all observations
- 95% of all observations
- 97.5% of all observations
- 99% of all observations

Psychrometric Summary of Peak Design Values



	(°F)	MCHR (gr/lb)	Enthalpy (btu/lb)	1.0% Humidity Ratio	(gr/lb)	MCDB (°F)	MCWB (°F)	MC Dewpt (°F)	Enthalpy (btu/lb)
<b>99% Dry Bulb</b>	-10	2	-2.1		119	81.2	73.9	71.1	38.1

	(°F)	MCHR (gr/lb)	MCWB (°F)	Enthalpy (btu/lb)
<b>1.0% Dry Bulb</b>	88	95	71.7	36.0

Dry-Bulb Temperature Hours For An Average Year (Sheet 1 of 5)

Period of Record = 1973 to 1996

Temperature Range (°F)	January					February					March					
	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)	
	01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00			
100 / 104																
95 / 99																
90 / 94																
85 / 89																
80 / 84												0		0	62.4	
75 / 79												0		0	62.4	
70 / 74												1	0	1	59.5	
65 / 69												1	1	2	56.1	
60 / 64												0	4	2	6	51.9
55 / 59		0		0	44.5		1	0	1	46.6		1	8	5	14	47.9
50 / 54		0	0	0	41.8	0	2	1	3	44.2		3	15	10	28	44.2
45 / 49		1	0	1	39.1	0	4	2	6	40.1		7	23	18	48	41.0
40 / 44	1	5	2	7	36.5	1	12	7	20	36.6		18	36	31	85	36.8
35 / 39	5	16	12	33	33.2	13	29	28	71	33.6		42	54	53	148	33.2
30 / 34	22	27	29	79	29.9	30	33	36	99	29.5		56	40	50	145	29.2
25 / 29	25	29	29	84	25.1	32	29	29	90	24.8		39	24	30	92	24.1
20 / 24	30	31	30	91	20.3	28	26	27	81	19.9		29	17	18	64	19.6
15 / 19	30	31	29	89	15.5	25	25	25	75	15.2		22	13	13	48	15.0
10 / 14	29	26	28	83	10.7	19	19	19	58	10.4		11	6	8	25	10.3
5 / 9	23	25	23	70	5.9	18	18	21	56	5.7		7	3	5	16	5.5
0 / 4	22	22	25	69	0.8	21	12	15	47	1.0		8	2	3	13	1.0
-5 / -1	17	12	15	44	-3.3	13	6	7	27	-3.2		5	1	1	6	-3.0
-10 / -6	19	11	13	43	-7.7	11	4	4	19	-7.4		1			1	-7.2
-15 / -11	14	6	7	27	-12.4	6	2	2	10	-12.2		0			0	-11.0
-20 / -16	8	3	3	14	-17.1	3	1	1	5	-17.0						
-25 / -21	4	1	2	7	-21.6	1	0	0	2	-21.8						
-30 / -26	2	0	0	2	-25.9	0	0	0	1	-26.2						
-35 / -31	0	0		0	-30.3	0			0							

Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary and the ventilation and infiltration load pages in this manual.

Dry-Bulb Temperature Hours For An Average Year (Sheet 2 of 5)

Period of Record = 1973 to 1996

Temperature Range (°F)	April					May					June				
	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00		
100 / 104															75.7
95 / 99															71.6
90 / 94		0	0	0	62.5		1	0	2	68.0		7	3	10	72.0
85 / 89		1	0	1	62.7		7	2	9	65.9	0	20	9	30	70.0
80 / 84		3	1	4	61.8	0	15	7	21	63.9	2	38	23	64	67.6
75 / 79		6	3	9	59.6	1	25	15	41	61.8	12	50	36	97	65.0
70 / 74	1	11	6	18	57.0	5	39	28	72	59.0	32	51	53	136	62.6
65 / 69	2	17	10	29	53.8	21	43	40	104	56.8	52	40	50	142	60.0
60 / 64	6	24	19	49	51.0	38	41	46	126	53.8	62	22	39	122	56.6
55 / 59	13	34	28	75	47.2	46	38	44	127	50.0	47	8	20	75	52.7
50 / 54	23	35	35	93	43.8	51	23	36	109	46.3	23	2	5	30	48.6
45 / 49	33	37	41	110	40.6	43	11	19	74	42.5	7	0	2	9	44.0
40 / 44	48	35	41	124	37.2	28	5	9	43	38.4	2	0	0	3	40.8
35 / 39	48	23	31	101	33.1	12	0	2	14	33.8					
30 / 34	40	11	16	67	29.1	3	0	0	3	30.2					
25 / 29	17	3	6	27	24.3	0		0	0	24.4					
20 / 24	6	1	2	9	19.8										
15 / 19	2	1	1	3	15.1										
10 / 14	1	0	0	2	10.7										
5 / 9	0			0	5.3										
0 / 4															
-5 / -1															
-10 / -6															
-15 / -11															
-20 / -16															
-25 / -21															
-30 / -26															
-35 / -31															

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Dry-Bulb Temperature Hours For An Average Year (Sheet 3 of 5)

Period of Record = 1973 to 1996

Temperature Range (°F)	July					August					September				
	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00		
100 / 104		1	0	1	75.6		0		0	73.0					
95 / 99		4	2	6	75.1		2	0	2	76.1		0	0	0	73.7
90 / 94		15	7	22	73.8		7	2	9	74.8		2	0	2	74.1
85 / 89	0	38	19	58	71.3	0	27	11	38	72.8		7	2	9	71.0
80 / 84	8	61	39	109	69.0	3	46	26	75	69.7	0	17	7	24	68.8
75 / 79	24	60	55	140	66.6	13	60	45	119	66.9	3	23	14	40	66.1
70 / 74	61	45	62	167	64.6	45	56	63	164	64.8	14	37	27	78	63.0
65 / 69	72	16	44	132	61.8	67	33	53	153	61.6	21	44	34	99	59.4
60 / 64	57	6	17	79	58.3	64	14	33	112	58.0	35	48	48	131	56.0
55 / 59	22	1	4	27	54.4	39	3	13	54	53.8	51	34	48	133	52.3
50 / 54	3		0	3	50.7	13		2	15	50.1	51	18	35	104	48.2
45 / 49	0			0	45.8	2		0	3	46.0	36	8	16	60	43.9
40 / 44						0			0	42.5	19	3	7	29	39.6
35 / 39											8	0	2	10	35.5
30 / 34											2	0	0	2	31.8
25 / 29											0			0	28.2
20 / 24															
15 / 19															
10 / 14															
5 / 9															
0 / 4															
-5 / -1															
-10 / -6															
-15 / -11															
-20 / -16															
-25 / -21															
-30 / -26															
-35 / -31															

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Dry-Bulb Temperature Hours For An Average Year (Sheet 4 of 5)

Period of Record = 1973 to 1996

Temperature Range (°F)	October					November					December				
	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00			01 To 08	09 To 16	17 To 00		
100 / 104															
95 / 99															
90 / 94															
85 / 89		0		0	66.3										
80 / 84		2	0	3	63.5										
75 / 79	0	4	1	6	61.5										
70 / 74	1	11	5	17	59.3		1		1	56.1					
65 / 69	2	16	9	27	56.8	0	1	0	2	54.7					
60 / 64	8	31	20	59	53.3	1	5	2	7	52.8		0		0	55.5
55 / 59	19	42	33	94	50.0	3	9	5	17	50.3	0	0	0	1	53.4
50 / 54	30	47	44	121	46.0	5	13	9	27	45.7	0	0	0	1	47.3
45 / 49	48	40	51	139	42.4	11	22	18	51	41.6	0	1	0	2	42.6
40 / 44	50	33	42	125	38.1	17	29	24	70	37.7	1	10	2	13	36.8
35 / 39	46	15	29	90	33.9	36	41	40	117	33.5	7	20	16	44	33.6
30 / 34	29	4	11	44	29.7	53	49	54	156	29.4	33	43	40	116	30.0
25 / 29	12	1	3	16	25.3	42	30	36	108	24.7	42	42	48	132	25.2
20 / 24	2	0	0	3	20.7	30	16	23	68	20.2	37	33	33	103	20.4
15 / 19	0			0	18.0	20	13	14	46	15.5	34	28	29	91	15.6
10 / 14						12	6	7	24	10.9	22	21	25	67	10.6
5 / 9						5	3	4	13	6.1	18	18	16	53	5.8
0 / 4						4	1	3	8	1.4	19	13	15	46	1.1
-5 / -1						2	0	0	2	-2.9	11	8	9	28	-3.3
-10 / -6						0	0	0	1	-6.9	9	6	8	23	-7.6
-15 / -11						0		0	1	-11.6	6	3	4	13	-12.2
-20 / -16											4	1	2	7	-16.8
-25 / -21											2	0	1	3	-21.4
-30 / -26											0	0	0	0	-26.1
-35 / -31															

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**MINNEAPOLIS-ST PAUL MN**

WMO No. 726580

**Dry-Bulb Temperature Hours For An Average Year (Sheet 5 of 5)**

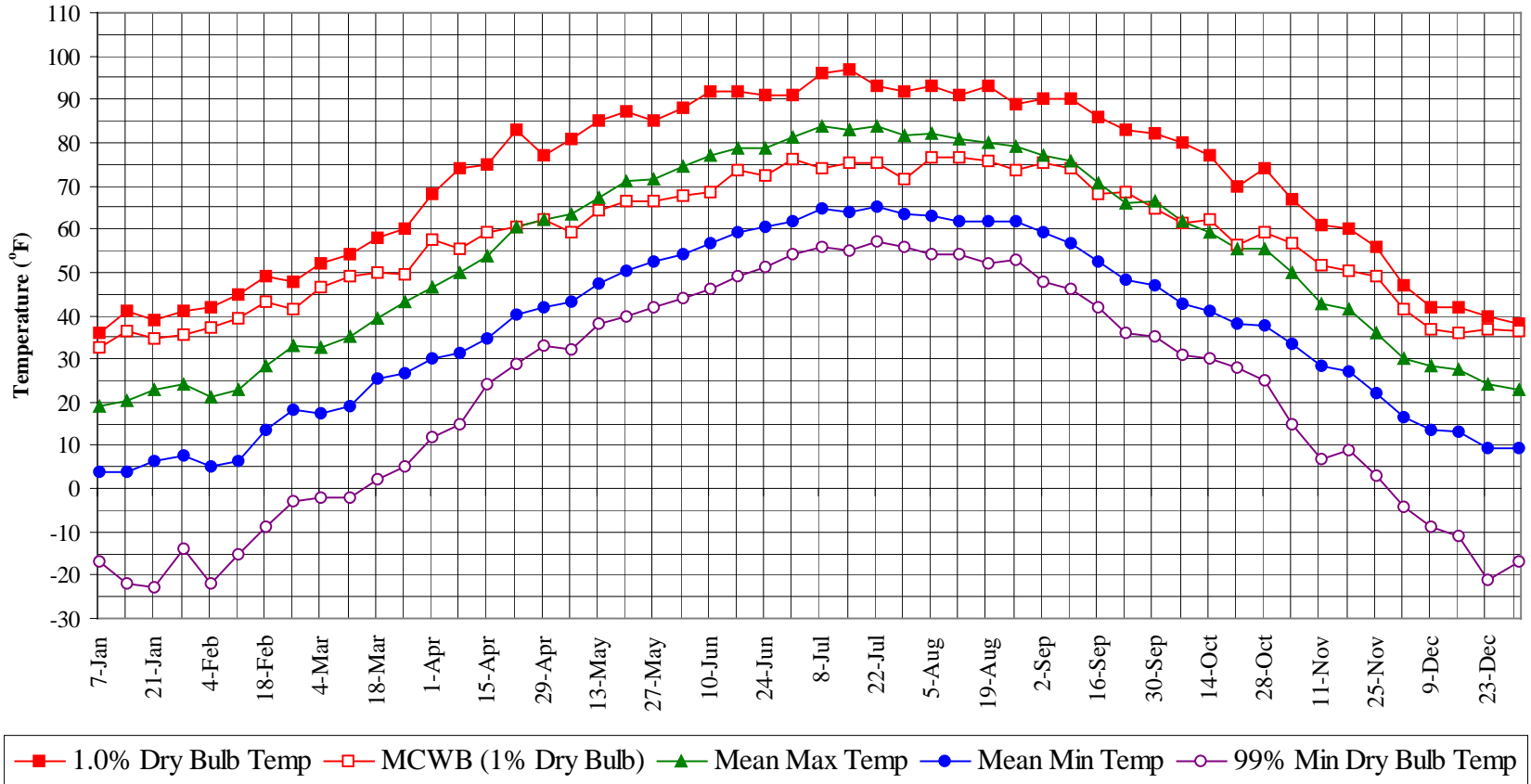
**Period of Record = 1973 to 1996**

**Annual Totals**

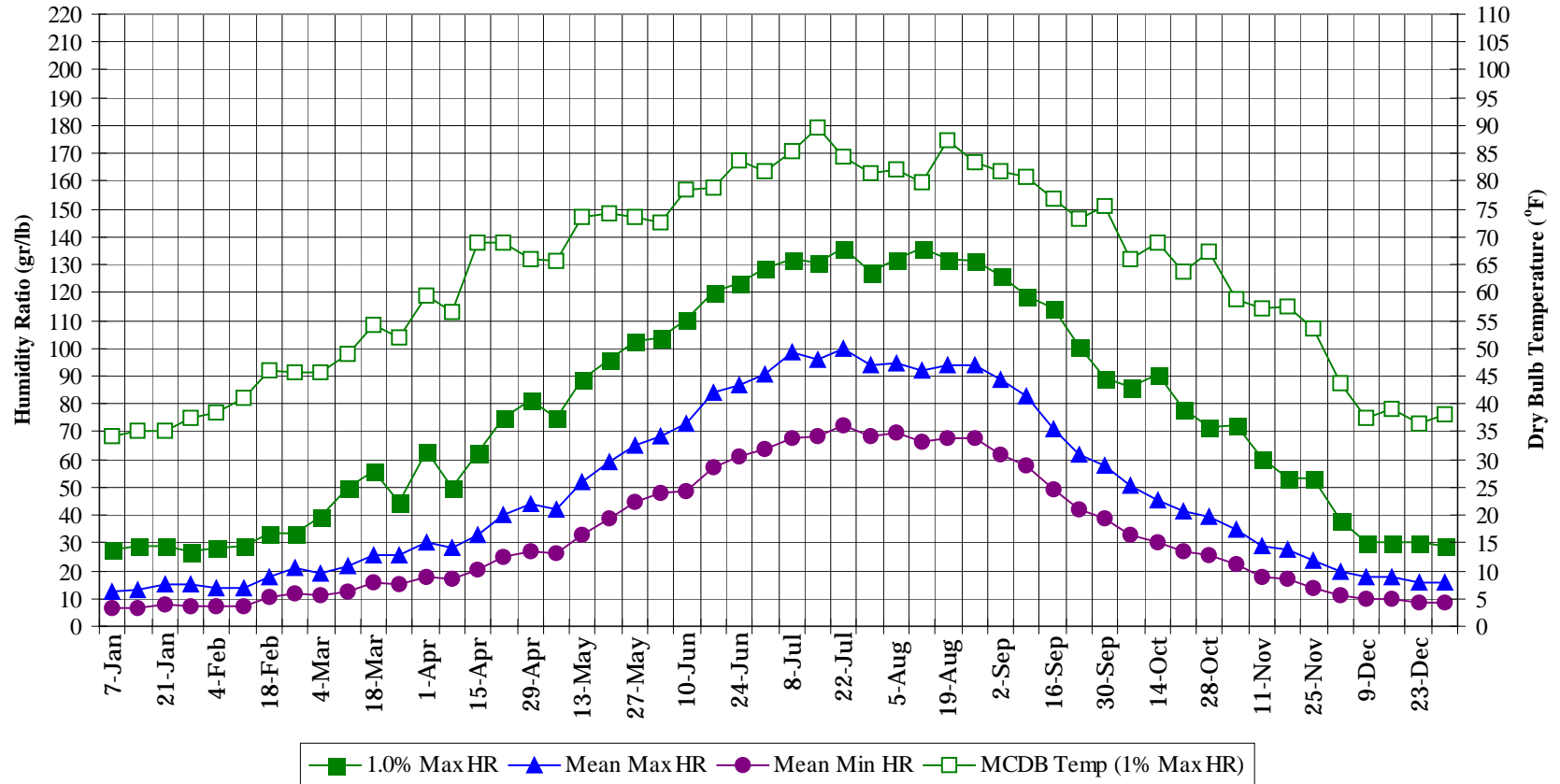
Temperature Range (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00		
100 / 104		1	0	1	75.3
95 / 99		8	3	10	74.7
90 / 94		33	13	46	73.4
85 / 89	1	100	43	145	71.0
80 / 84	14	181	104	299	68.4
75 / 79	53	228	169	450	65.7
70 / 74	158	249	244	651	63.1
65 / 69	239	210	239	688	59.7
60 / 64	270	193	224	687	55.6
55 / 59	241	176	197	613	51.0
50 / 54	200	153	177	530	46.3
45 / 49	187	147	165	499	42.0
40 / 44	184	167	165	516	37.6
35 / 39	216	200	214	630	33.5
30 / 34	270	208	237	716	29.5
25 / 29	211	160	183	554	24.8
20 / 24	164	126	134	424	20.1
15 / 19	134	111	112	356	15.4
10 / 14	93	79	88	260	10.6
5 / 9	72	68	69	210	5.8
0 / 4	74	51	61	185	1.0
-5 / -1	49	28	33	109	-3.3
-10 / -6	41	22	26	89	-7.6
-15 / -11	28	11	13	52	-12.3
-20 / -16	15	5	6	26	-17.0
-25 / -21	8	2	3	12	-21.6
-30 / -26	2	0	0	3	-26.0
-35 / -31	0	0		0	-30.3

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### Annual Summary of Temperatures



## Long Term Humidity and Dry Bulb Temperature Summary



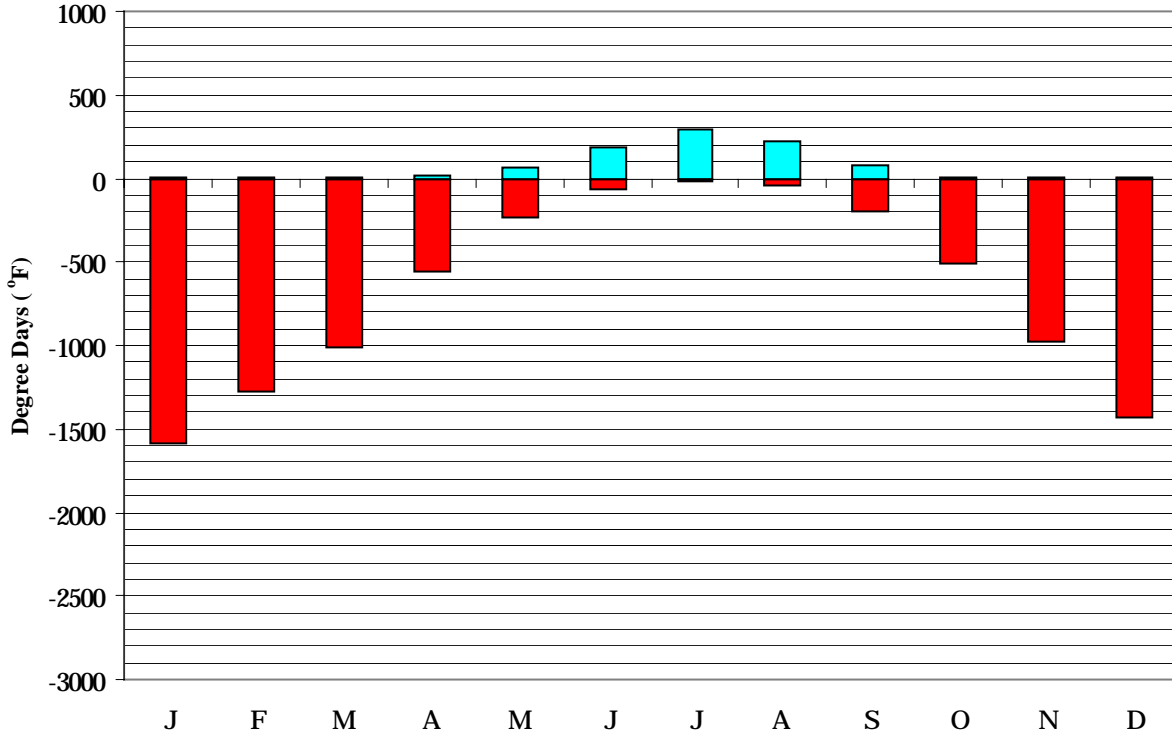
**MINNEAPOLIS-ST PAUL MN**

WMO No. 726580

**Long Term Dry Bulb Temperature and Humidity Summary**

Week Ending	1.0% Temp (°F)	MCWB @ 1% Temp (°F)	Mean Max Temp (°F)	Mean Min Temp (°F)	99% Temp (°F)	1.0% HR (gr/lb)	MCDB @ 1% HR (°F)	Mean Max HR (gr/lb)	Mean Min HR (gr/lb)
7-Jan	36.0	32.5	19.2	4.0	-17.0	27.3	34.3	12.8	6.6
14-Jan	41.0	36.3	20.5	3.9	-22.0	28.7	35.2	13.3	6.7
21-Jan	39.0	34.7	22.8	6.6	-23.0	28.7	35.2	15.0	7.7
28-Jan	41.0	35.7	24.0	7.8	-14.0	26.6	37.4	14.9	7.3
4-Feb	42.0	37.3	21.2	5.1	-22.0	28.0	38.3	13.8	7.2
11-Feb	45.0	39.5	22.8	6.2	-15.0	28.7	40.9	13.8	7.2
18-Feb	49.0	43.0	28.4	13.7	-9.0	33.6	45.8	17.6	10.3
25-Feb	48.0	41.3	33.1	18.1	-3.0	33.6	45.6	20.7	11.8
4-Mar	52.0	46.5	32.6	17.3	-2.0	39.2	45.5	19.1	11.0
11-Mar	54.0	49.3	35.2	19.2	-2.0	49.7	49.0	21.6	12.8
18-Mar	58.0	50.1	39.4	25.3	2.0	56.0	54.2	25.4	15.6
25-Mar	60.0	49.7	43.3	26.6	5.0	44.8	52.0	25.4	15.1
1-Apr	68.0	57.5	46.7	30.2	12.0	63.0	59.3	30.3	17.9
8-Apr	74.0	55.4	50.2	31.4	15.0	49.7	56.6	28.5	17.2
15-Apr	75.0	59.4	53.6	34.8	24.0	62.3	68.9	33.1	20.5
22-Apr	83.0	60.7	60.3	40.0	29.0	74.9	68.8	40.2	24.7
29-Apr	77.0	62.1	62.1	42.1	33.0	81.2	65.9	44.0	27.2
6-May	81.0	59.2	63.3	43.0	32.0	74.9	65.8	42.3	26.0
13-May	85.0	64.5	67.3	47.4	38.0	88.9	73.5	52.1	32.9
20-May	87.0	66.4	71.0	50.3	40.0	95.9	74.2	59.4	38.6
27-May	85.0	66.3	71.7	52.7	42.0	102.2	73.4	65.2	44.4
3-Jun	88.0	67.8	74.5	54.4	44.0	103.6	72.7	68.5	47.9
10-Jun	92.0	68.5	77.0	56.5	46.0	110.6	78.5	73.2	48.9
17-Jun	92.0	73.8	78.6	59.1	49.0	120.4	78.7	84.2	57.2
24-Jun	91.0	72.4	78.9	60.5	51.0	123.2	83.9	86.9	61.1
1-Jul	91.0	76.4	81.1	62.0	54.0	128.8	81.8	90.6	63.7
8-Jul	96.0	74.1	83.8	64.5	56.0	132.3	85.4	98.3	67.9
15-Jul	97.0	75.4	82.8	63.8	55.0	130.9	89.5	95.9	68.0
22-Jul	93.0	75.2	84.0	65.0	57.0	135.8	84.2	100.1	72.0
29-Jul	92.0	71.7	81.8	63.6	56.0	127.4	81.6	94.1	68.3
5-Aug	93.0	76.4	82.0	63.3	54.0	132.3	82.1	94.7	69.6
12-Aug	91.0	76.4	80.9	61.9	54.0	135.8	79.7	92.2	66.0
19-Aug	93.0	75.6	79.8	61.6	52.0	132.3	87.4	93.9	67.7
26-Aug	89.0	73.5	79.0	61.6	53.0	131.6	83.5	94.1	67.7
2-Sep	90.0	75.4	77.0	59.4	48.0	126.0	81.8	88.8	61.6
9-Sep	90.0	74.1	75.9	56.8	46.0	119.0	80.9	82.7	58.0
16-Sep	86.0	68.3	70.5	52.5	42.0	114.5	76.9	71.0	49.3
23-Sep	83.0	68.6	66.0	48.1	36.0	100.8	73.3	61.6	42.0
30-Sep	82.0	64.8	66.3	46.9	35.0	89.3	75.6	57.6	38.9
7-Oct	80.0	61.4	61.8	42.7	31.0	86.1	65.9	50.8	32.7
14-Oct	77.0	62.3	59.4	41.0	30.0	90.3	69.0	45.6	29.9
21-Oct	70.0	56.3	55.5	38.3	28.0	78.4	63.7	41.1	27.1
28-Oct	74.0	59.1	55.3	37.6	25.0	71.4	67.2	39.7	25.9
4-Nov	67.0	56.9	49.9	33.5	15.0	72.1	58.9	34.9	22.0
11-Nov	61.0	51.5	42.9	28.3	7.0	60.2	57.3	28.7	17.4
18-Nov	60.0	50.5	41.4	26.9	9.0	53.2	57.4	27.3	17.0
25-Nov	56.0	49.3	35.8	21.8	3.0	53.2	53.6	23.8	13.5
2-Dec	47.0	41.3	29.9	16.4	-4.0	37.8	43.8	19.8	11.4
9-Dec	42.0	37.0	28.2	13.6	-9.0	30.1	37.4	17.9	9.8
16-Dec	42.0	36.1	27.5	13.1	-11.0	30.1	39.1	17.9	9.9
23-Dec	40.0	36.7	24.2	9.5	-21.0	30.1	36.5	16.1	8.8
31-Dec	38.0	36.4	22.9	9.4	-17.0	28.7	38.2	15.4	8.7

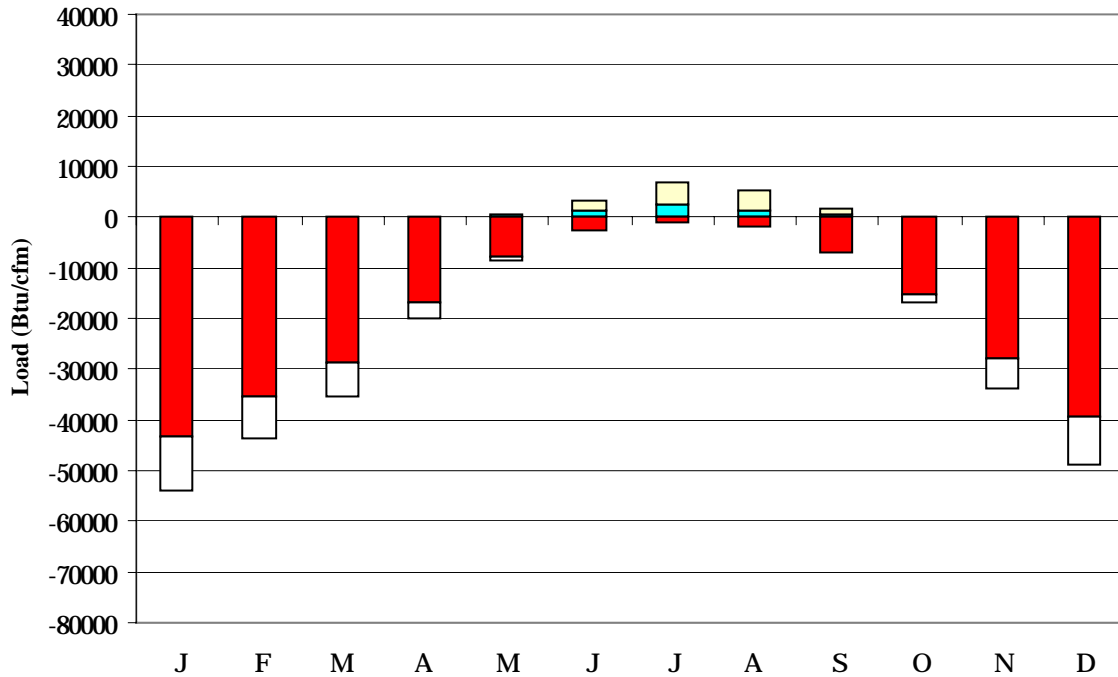
**Degree Days, Heating and Cooling**  
(Base 65°F)



■ Mean Cooling Degree Days ■ Mean Heating Degree Days

	Mean Cooling Degree Days (°F)	Mean Heating Degree Days (°F)
JAN	0	1583
FEB	0	1276
MAR	1	1015
APR	15	562
MAY	71	234
JUN	183	63
JUL	291	19
AUG	218	40
SEP	76	202
OCT	11	504
NOV	0	982
DEC	0	1428
ANN	866	7908

**Average Ventilation and Infiltration Loads**  
 (Outside Air vs. 75°F, 60% RH summer; 68°F, 30% RH winter)



	Average Sensible Cooling Load (Btu/cfm)	Average Sensible Heating Load (Btu/cfm)	Average Latent Cooling Load (Btu/cfm)	Average Latent Heating Load (Btu/cfm)
JAN	0	-43443	0	-10679
FEB	0	-35269	0	-8551
MAR	2	-28723	0	-6569
APR	59	-16747	7	-3421
MAY	361	-7820	282	-759
JUN	1241	-2598	2018	-15
JUL	2359	-990	4311	0
AUG	1458	-1814	3961	0
SEP	405	-6894	1109	-151
OCT	31	-15260	36	-1750
NOV	0	-27768	0	-5890
DEC	0	-39425	0	-9379
ANN	5916	-226751	11724	-47164

## Average Annual Solar Radiation – Nearest Available Site

(Source: National Renewable Energy Laboratory, Golden CO, 1995)

City: MINNEAPOLIS  
 State: MN  
 WBAN No: 14922  
 Lat(N): 44.88  
 Long(W): 93.22  
 Elev(ft): 837

Stn Type: Secondary

SHADING GEOMETRY IN DIMENSIONLESS UNITS

Window: 1

Overhang: 0.675

Vert Gap: 0.331

AVERAGE INCIDENT SOLAR RADIATION (Btu/sq.ft./day), Percentage Uncertainty = 9		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
HORIZ	Global	560	860	1190	1490	1810	1980	2010	1710	1290	880	540	430	1230
	Std Dev	36	53	90	116	136	133	117	115	104	73	47	35	38
	Minimum	490	750	990	1280	1540	1750	1770	1520	1030	770	420	360	1160
	Maximum	640	970	1370	1740	2050	2340	2200	2010	1510	1020	630	530	1340
	Diffuse	290	420	580	670	770	820	760	670	540	390	300	250	540
Clear Day	Global	720	1090	1600	2130	2500	2650	2550	2220	1720	1180	770	610	1650
NORTH	Global	180	260	350	430	540	630	600	470	350	260	180	150	370
	Diffuse	180	260	350	420	490	530	510	440	350	260	180	150	340
Clear Day	Global	160	220	300	410	580	690	640	460	320	230	160	130	360
EAST	Global	400	580	750	910	1060	1130	1150	1020	820	590	370	310	760
	Diffuse	220	330	430	510	590	630	620	540	430	310	220	180	420
Clear Day	Global	600	830	1110	1360	1500	1540	1510	1380	1160	870	630	520	1090
SOUTH	Global	1060	1230	1180	1040	940	890	960	1050	1120	1110	860	820	1020
	Diffuse	350	450	520	530	570	590	590	550	490	400	310	290	470
Clear Day	Global	1850	2010	1930	1570	1250	1100	1160	1410	1730	1890	1810	1730	1620
WEST	Global	410	590	760	900	1050	1140	1180	1050	820	590	380	310	770
	Diffuse	230	330	430	510	590	640	630	550	440	320	220	180	420
Clear Day	Global	600	830	1110	1360	1500	1540	1510	1380	1160	870	630	520	1090

## Average Annual Solar Heat and Illumination – Nearest Available Site

(Source: National Renewable Energy Laboratory, Golden CO, 1995)

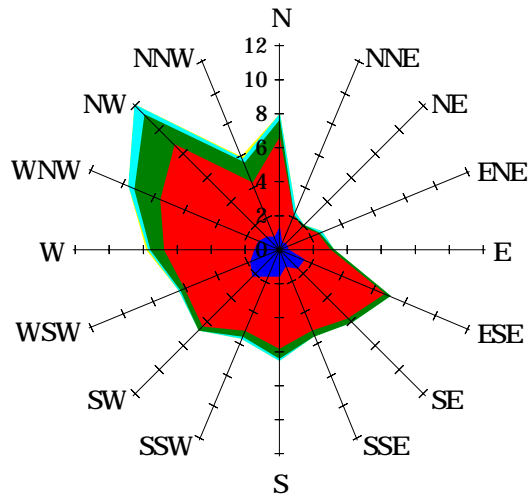
AVERAGE TRANSMITTED SOLAR RADIATION (Btu/sq.ft./day) FOR DOUBLE GLAZING, Percentage Uncertainty = 9														
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
HORIZ	Unshaded	350	570	820	1070	1310	1430	1460	1230	910	600	350	270	860
NORTH	Unshaded	120	180	240	290	360	410	390	310	240	180	120	100	250
	Shaded	100	150	200	250	310	350	340	270	210	150	100	84	210
EAST	Unshaded	270	410	530	650	760	810	820	730	580	420	250	210	540
	Shaded	240	350	440	530	610	640	660	590	480	350	220	180	440
SOUTH	Unshaded	810	910	830	700	600	550	600	680	770	810	640	630	710
	Shaded	780	830	630	400	340	350	350	360	510	690	610	600	540
WEST	Unshaded	280	410	540	640	750	810	840	750	580	420	260	210	540
	Shaded	250	350	450	530	600	650	680	610	480	350	220	180	450

AVERAGE INCIDENT ILLUMINANCE (klux-hr) FOR MOSTLY CLEAR AND MOSTLY CLOUDY CONDITIONS, Percentage Uncertainty = 9											
		March					June				
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm
HORIZ.	M.Clear	33	65	76	62	27	46	80	97	94	70
	M.Cloudy	20	42	50	40	18	29	53	67	66	48
NORTH	M.Clear	9	13	14	13	8	16	15	16	17	15
	M.Cloudy	8	15	17	14	8	13	17	18	18	16
EAST	M.Clear	72	59	14	13	8	79	74	35	17	15
	M.Cloudy	25	31	17	14	8	35	43	28	18	16
SOUTH	M.Clear	38	77	90	73	32	11	36	54	51	28
	M.Cloudy	16	37	45	35	14	11	26	39	37	22
WEST	M.Clear	9	13	18	64	67	11	15	16	48	78
	M.Cloudy	8	15	19	32	24	11	17	18	36	46
M.Clear	(% hrs)	31	32	32	30	32	39	38	33	31	34
		Sept					Dec				
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm
HORIZ.	M.Clear	23	59	78	73	46	7	30	38	23	0
	M.Cloudy	14	35	48	47	29	5	19	24	15	0
NORTH	M.Clear	7	13	15	14	11	3	8	9	7	0
	M.Cloudy	6	13	16	16	11	2	8	10	6	0
EAST	M.Clear	61	70	31	14	11	25	37	9	7	0
	M.Cloudy	19	31	22	16	11	7	16	10	6	0
SOUTH	M.Clear	19	58	80	74	44	22	73	87	60	0
	M.Cloudy	9	27	41	40	22	6	25	30	18	0
WEST	M.Clear	7	13	15	48	73	3	8	16	42	0
	M.Cloudy	6	13	16	29	32	2	8	12	14	0
M.Clear	(% hrs)	42	42	38	37	39	26	27	27	29	33



## Wind Summary - December, January, and February

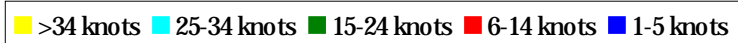
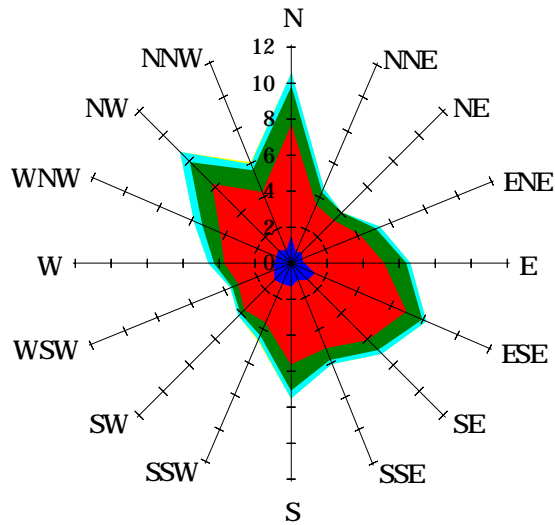
Labels of Percent Frequency on North Axis



Percent Calm = 4.15

## Wind Summary - March, April, and May

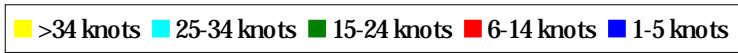
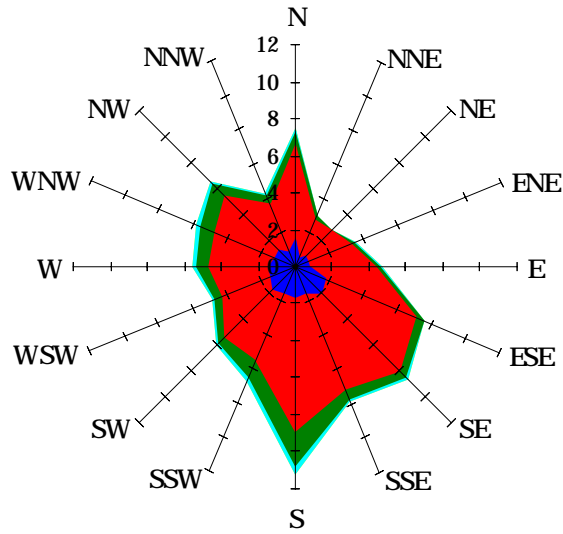
Labels of Percent Frequency on North Axis



Percent Calm = 4.20

### Wind Summary - June, July, and August

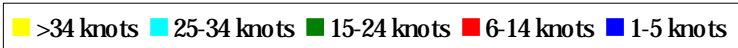
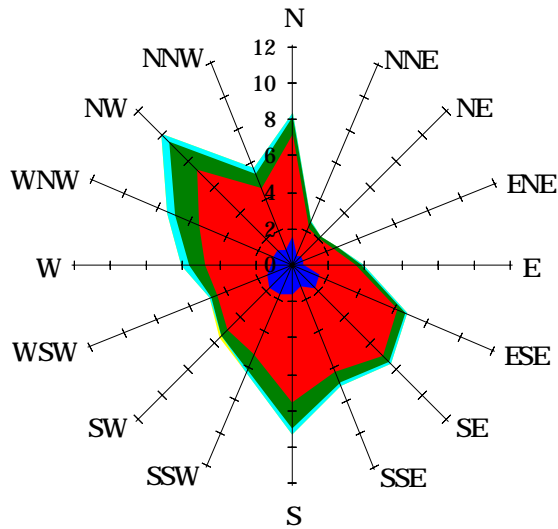
Labels of Percent Frequency on North Axis



Percent Calm = 4.69

### Wind Summary - September, October, and November

Labels of Percent Frequency on North Axis



Percent Calm = 4.29