

OLDENBURG, GERMANY

Latitude = 53.18 N

Longitude = 8.17 E

Period of Record = 1973 to 1996

WMO No. 102150

Elevation = 66 feet

Average Pressure = 29.89 inches Hg

Design Criteria Data

	Design Value	Mean Coincident (Average) Values			
		Wet Bulb Temperature (°F)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Dry Bulb Temperature (T)	(°F)				
Median of Extreme Highs	90	68	66	8.7	ESE
0.4% Occurrence	84	67	70	8.7	E
1.0% Occurrence	80	64	66	8.7	E
2.0% Occurrence	76	63	64	8.3	E
Mean Daily Range	13	-	-	-	-
97.5% Occurrence	23	22	14	7.5	E
99.0% Occurrence	18	18	12	7.0	E
99.6% Occurrence	12	12	9	6.8	E
Median of Extreme Lows	10	9	8	5.4	E
	Design Value	Mean Coincident (Average) Values			
		Dry Bulb Temperature (°F)	Humidity Ratio (gr/lb)	Wind Speed (mph)	Prevailing Direction (NSEW)
Wet Bulb Temperature (T_{wb})	(°F)				
Median of Extreme Highs	71	84	91	7.4	E
0.4% Occurrence	68	80	81	7.7	E
1.0% Occurrence	66	76	77	7.6	E
2.0% Occurrence	64	73	73	7.6	E
	Design Value	Mean Coincident (Average) Values			
		Dry Bulb Temperature (°F)	Vapor Pressure (in. Hg)	Wind Speed (mph)	Prevailing Direction (NSEW)
Humidity Ratio (HR)	(gr/lb)				
Median of Extreme Highs	97	76	0.65	6.6	N
0.4% Occurrence	88	72	0.59	6.2	W
1.0% Occurrence	81	68	0.54	7.6	W
2.0% Occurrence	78	68	0.52	6.4	WSW
Air Conditioning/ Humid Area Criteria	# of Hours	T ≥ 93°F	T ≥ 80°F	T _{wb} ≥ 73°F	T _{wb} ≥ 67°F
		2	89	2	71

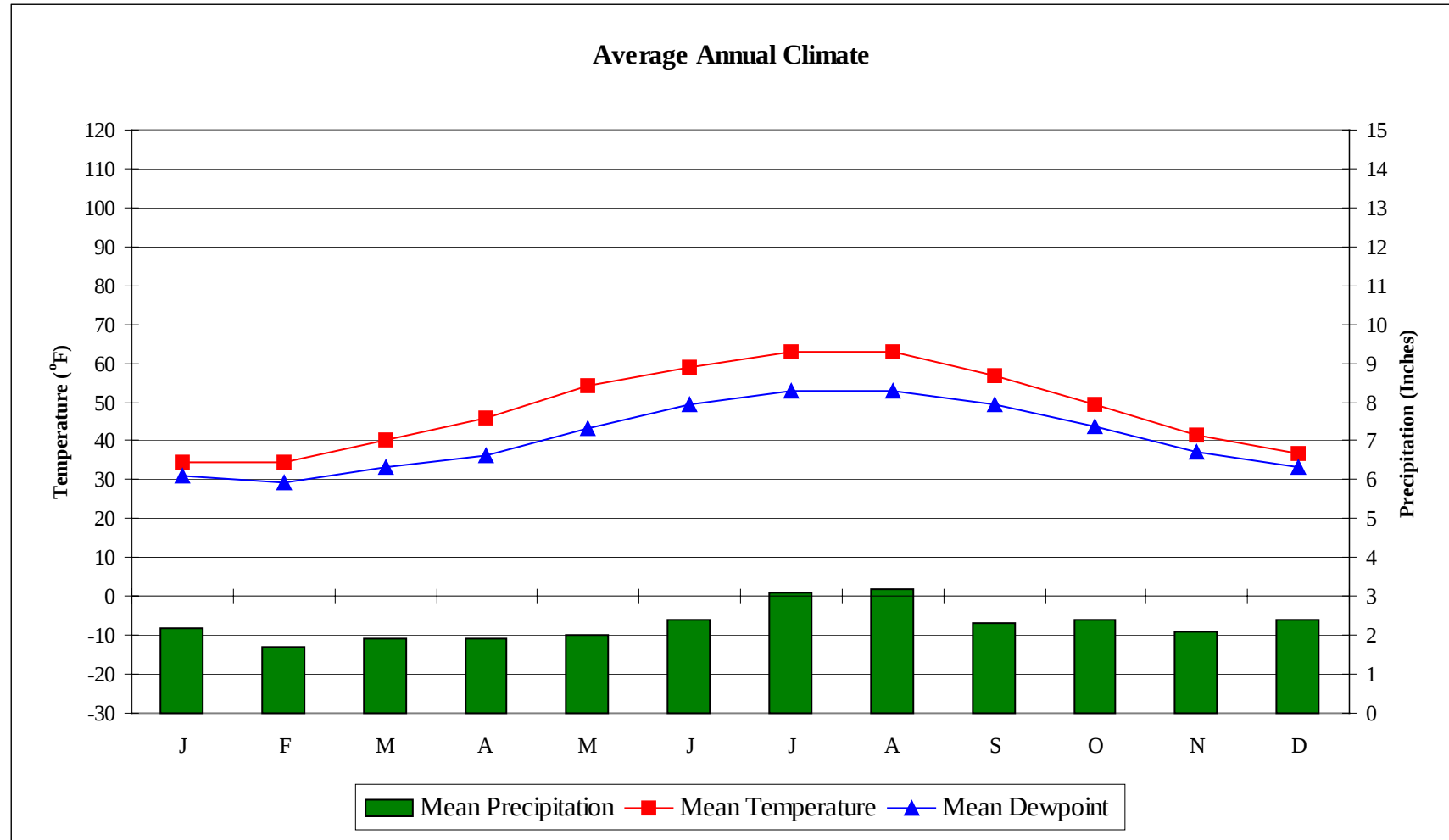
Other Site Data

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
6	N/A	N/A	0.0 + 0.1
Ground Water Temperature (°F) 50 Foot Depth *	Frost Depth 50 Year Recurrence (in.)	Ground Snow Load 50 Year Recurrence (lb/ft ²)	Average Annual Freeze-Thaw Cycles (#)
50.8	N/A	N/A	35

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

OLDENBURG, GERMANY

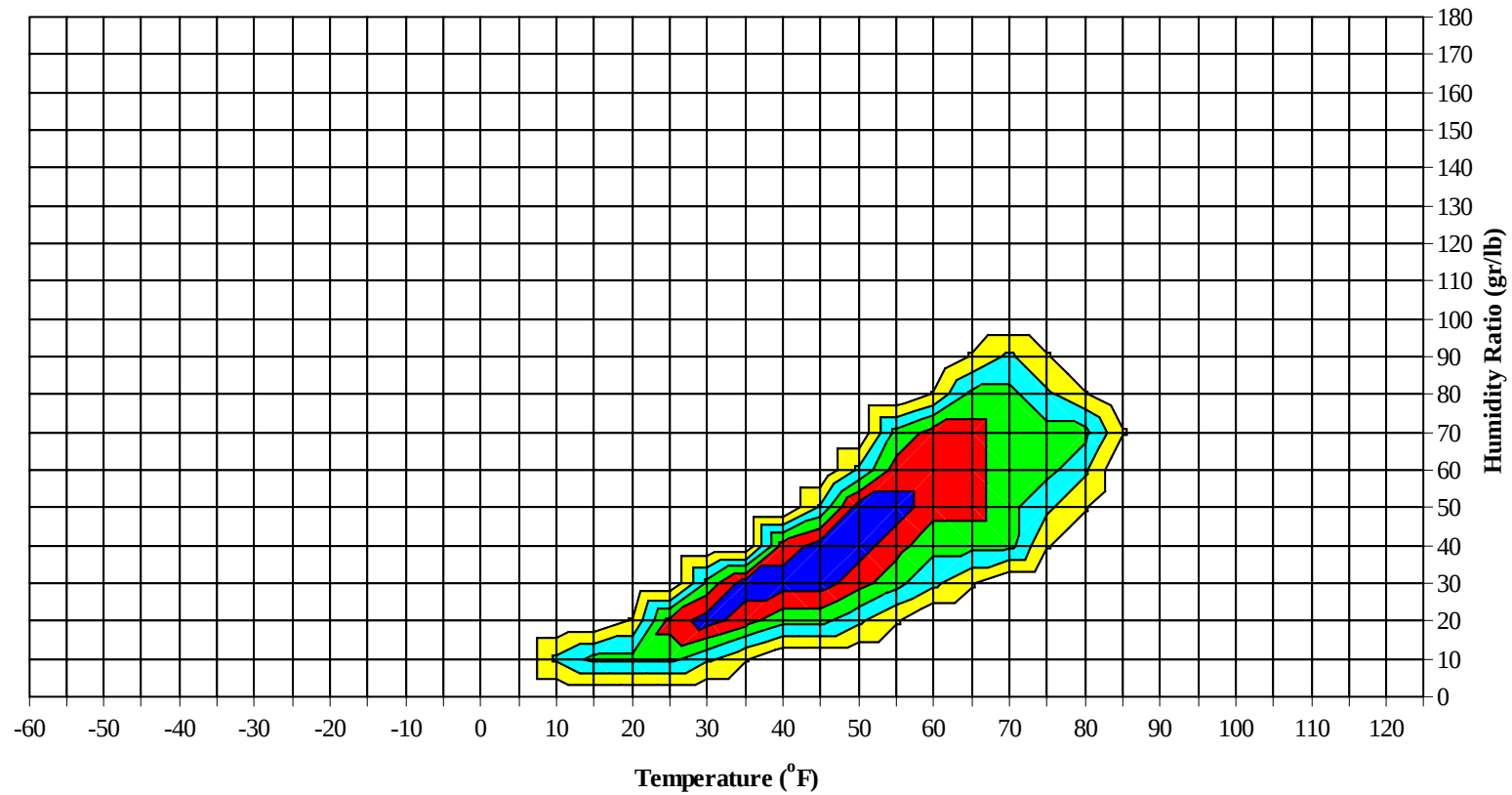
WMO No. 102150



OLDENBURG, GERMANY

WMO No. 102150

Long Term Psychrometric Summary

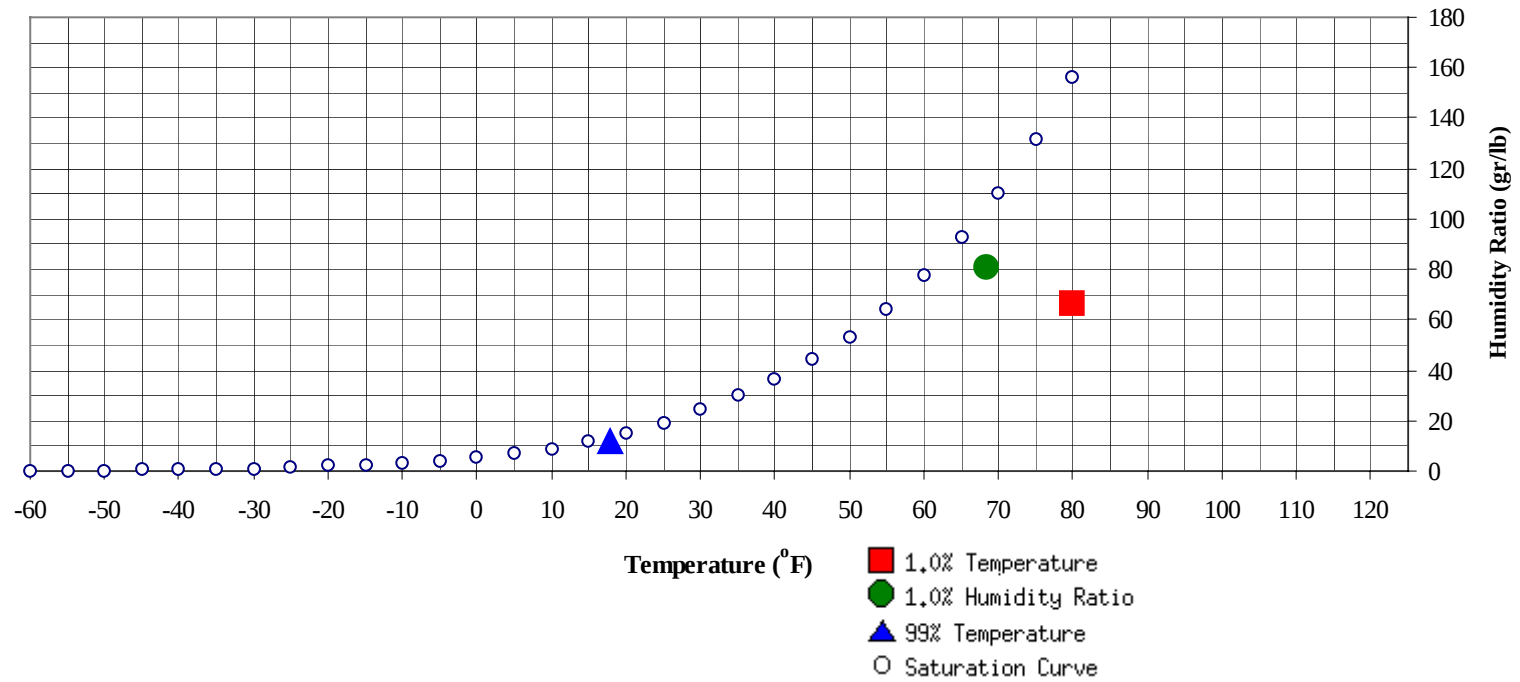


- 50% of all observations
- 80% of all observations
- 95% of all observations
- 97.5% of all observations
- 99% of all observations

OLDENBURG, GERMANY

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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)
99% Dry Bulb	18	11.6	6.1		81.2	68.3	63.6	61	29.1

1.0% Dry Bulb	(°F)	MCHR (gr/lb)	MCWB (°F)	Enthalpy (btu/lb)
	80	66.3	64.5	29.6

OLDENBURG, GERMANY

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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		
95 / 99															
90 / 94															
85 / 89															
80 / 84															
75 / 79															
70 / 74												0	0	0	56.0
65 / 69												1	0	1	51.8
60 / 64							0		0	54.0		4	1	5	50.7
55 / 59	0	0	0	0	50.0	1	2	1	4	49.9	1	13	7	21	49.1
50 / 54	6	8	7	21	47.3	2	9	6	17	46.6	7	32	22	61	46.3
45 / 49	24	35	30	88	43.4	15	33	23	71	42.7	34	65	56	154	42.6
40 / 44	35	46	40	120	39.6	26	33	35	94	39.6	43	50	52	145	38.9
35 / 39	64	63	65	193	36.0	48	51	50	150	35.4	71	52	61	184	35.1
30 / 34	53	45	50	147	31.3	55	51	55	162	30.7	62	24	40	126	30.7
25 / 29	25	22	23	70	25.8	35	26	33	94	25.4	21	5	8	34	25.6
20 / 24	13	12	12	37	21.2	18	9	12	39	20.8	5	1	1	7	20.9
15 / 19	17	10	13	40	16.9	16	6	7	29	16.9	3	0	1	4	17.0
10 / 14	8	5	7	20	12.2	6	2	2	10	12.0	1	0	0	1	12.0
5 / 9	2	1	2	5	7.0	3	0	0	3	7.2	0		0	0	6.9
0 / 4	2	0	0	2	1.9	0			0	3.0	0		0	0	2.5
-5 / -1	0	0	0	0	-2.8										
-10 / -6	0		0	0	-6.7										

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.

OLDENBURG, GERMANY

WMO No. 102150

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		
95 / 99															
90 / 94							0		0	65.0		1	1	2	67.4
85 / 89							1	0	1	63.0		3	1	4	67.1
80 / 84		0	0	0	57.4		4	2	6	61.9	0	8	4	12	65.7
75 / 79		2	1	3	58.4		12	5	17	60.4	0	20	9	29	63.0
70 / 74		4	2	6	55.7	0	19	10	29	58.1	2	29	17	48	60.5
65 / 69	0	7	3	10	53.7	1	23	14	38	55.9	7	30	20	57	58.4
60 / 64	2	19	10	31	51.6	9	50	33	93	53.7	28	60	48	136	56.0
55 / 59	6	32	21	59	48.8	32	55	53	141	51.1	69	62	73	204	52.9
50 / 54	16	55	42	113	45.9	71	54	63	189	47.9	85	24	54	163	49.3
45 / 49	49	69	63	181	42.3	74	24	47	145	43.8	41	2	12	55	45.2
40 / 44	60	33	51	144	39.2	35	3	15	53	39.9	7	0	1	8	41.0
35 / 39	63	16	37	116	35.6	22	1	5	28	36.3	2		0	2	37.3
30 / 34	34	2	10	46	31.0	4	0	0	4	31.8					
25 / 29	9		1	10	26.0	0			0	27.5					
20 / 24	1		0	1	21.6										
15 / 19	0			0	19.0										
10 / 14															
5 / 9															
0 / 4															
-5 / -1															
-10 / -6															

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OLDENBURG, GERMANY

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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		
95 / 99		0	0	0	71.9		0	0	0	70.3					
90 / 94		2	0	2	68.8		1	1	2	67.1					
85 / 89		6	3	9	68.2		5	2	7	66.8					
80 / 84		16	8	24	66.8	0	13	6	19	65.7		1	0	1	65.9
75 / 79	0	27	14	41	64.0	1	28	12	41	63.8		5	1	6	64.6
70 / 74	5	42	28	75	62.0	3	47	26	76	61.5	0	16	5	21	61.2
65 / 69	19	47	36	102	59.9	12	52	37	101	59.5	1	29	13	43	59.1
60 / 64	56	69	69	193	57.3	56	70	76	201	57.6	17	79	47	142	56.5
55 / 59	96	35	70	201	54.1	95	29	65	189	54.2	67	79	86	231	53.5
50 / 54	62	3	20	85	50.2	65	2	22	89	50.3	86	27	63	176	49.7
45 / 49	10		1	11	45.9	16	0	2	18	46.0	52	4	21	77	45.2
40 / 44	0		0	0	41.7	1	0		1	41.8	13		4	17	41.1
35 / 39											5		1	6	37.2
30 / 34															
25 / 29															
20 / 24															
15 / 19															
10 / 14															
5 / 9															
0 / 4															
-5 / -1															
-10 / -6															

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OLDENBURG, GERMANY

WMO No. 102150

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		
95 / 99															
90 / 94															
85 / 89															
80 / 84															
75 / 79		1	0	1	64.3										
70 / 74		4	1	5	61.8										
65 / 69	0	9	3	12	59.0										
60 / 64	3	22	12	37	56.5		1	0	1	53.8					
55 / 59	25	59	42	127	52.8	4	12	6	22	52.2	1	1	1	3	51.6
50 / 54	59	77	69	205	48.9	23	40	29	92	48.4	11	13	13	37	48.4
45 / 49	72	51	66	190	44.3	46	68	60	173	43.9	33	44	37	114	44.1
40 / 44	37	16	32	86	40.3	52	46	49	147	40.0	38	41	42	121	40.0
35 / 39	35	7	19	61	36.5	60	43	56	159	36.1	59	59	62	180	35.9
30 / 34	14	1	4	19	31.8	36	23	28	87	31.1	53	49	49	151	31.1
25 / 29	2		0	2	27.2	14	5	11	30	26.1	29	26	28	83	25.9
20 / 24						5	1	2	8	21.7	12	6	10	28	21.5
15 / 19						1	0	1	2	18.1	8	4	4	16	17.3
10 / 14						0		0	0	12.0	2	2	2	6	12.0
5 / 9											1	1	1	3	6.9
0 / 4											0	0	0	0	2.7
-5 / -1															
-10 / -6															

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

Period of Record = 1973 to 1996

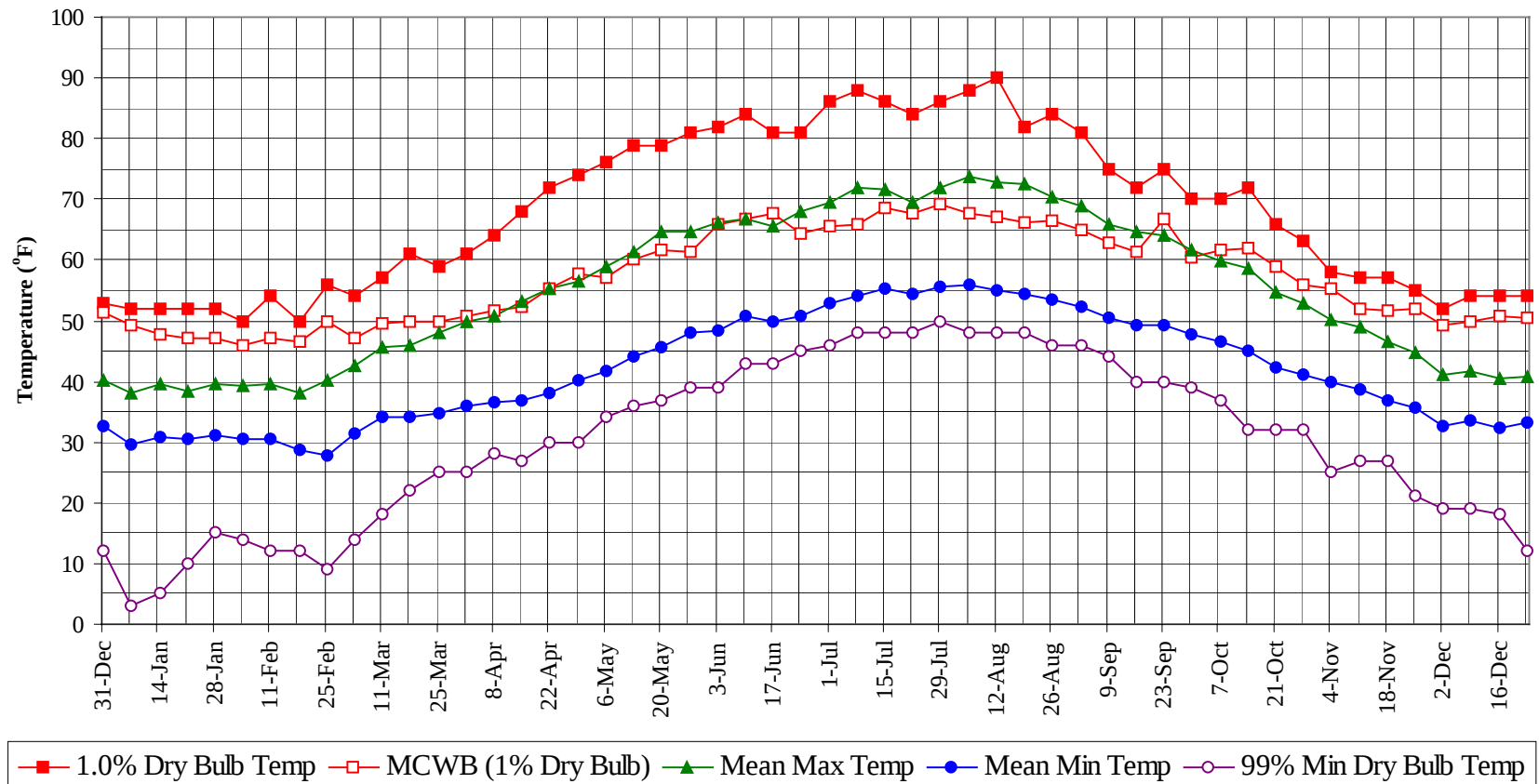
Annual Totals					
Temperature Range (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00		
95 / 99		1	0	1	71.0
90 / 94		5	2	7	67.8
85 / 89		14	6	20	67.4
80 / 84	0	42	20	62	65.7
75 / 79	1	95	43	139	63.2
70 / 74	11	161	88	260	60.9
65 / 69	41	199	125	365	58.8
60 / 64	172	375	296	843	56.3
55 / 59	397	382	425	1204	52.9
50 / 54	493	348	409	1249	48.6
45 / 49	465	394	419	1278	43.7
40 / 44	346	271	319	937	39.6
35 / 39	429	293	353	1075	35.8
30 / 34	310	194	233	736	31.0
25 / 29	133	85	102	320	25.7
20 / 24	54	30	38	122	21.2
15 / 19	45	20	26	91	17.0
10 / 14	17	8	12	37	12.1
5 / 9	6	2	3	11	7.0
0 / 4	2	1	1	4	2.1
-5 / -1	0	0	0	0	-2.8
-10 / -6	0		0	0	-6.7

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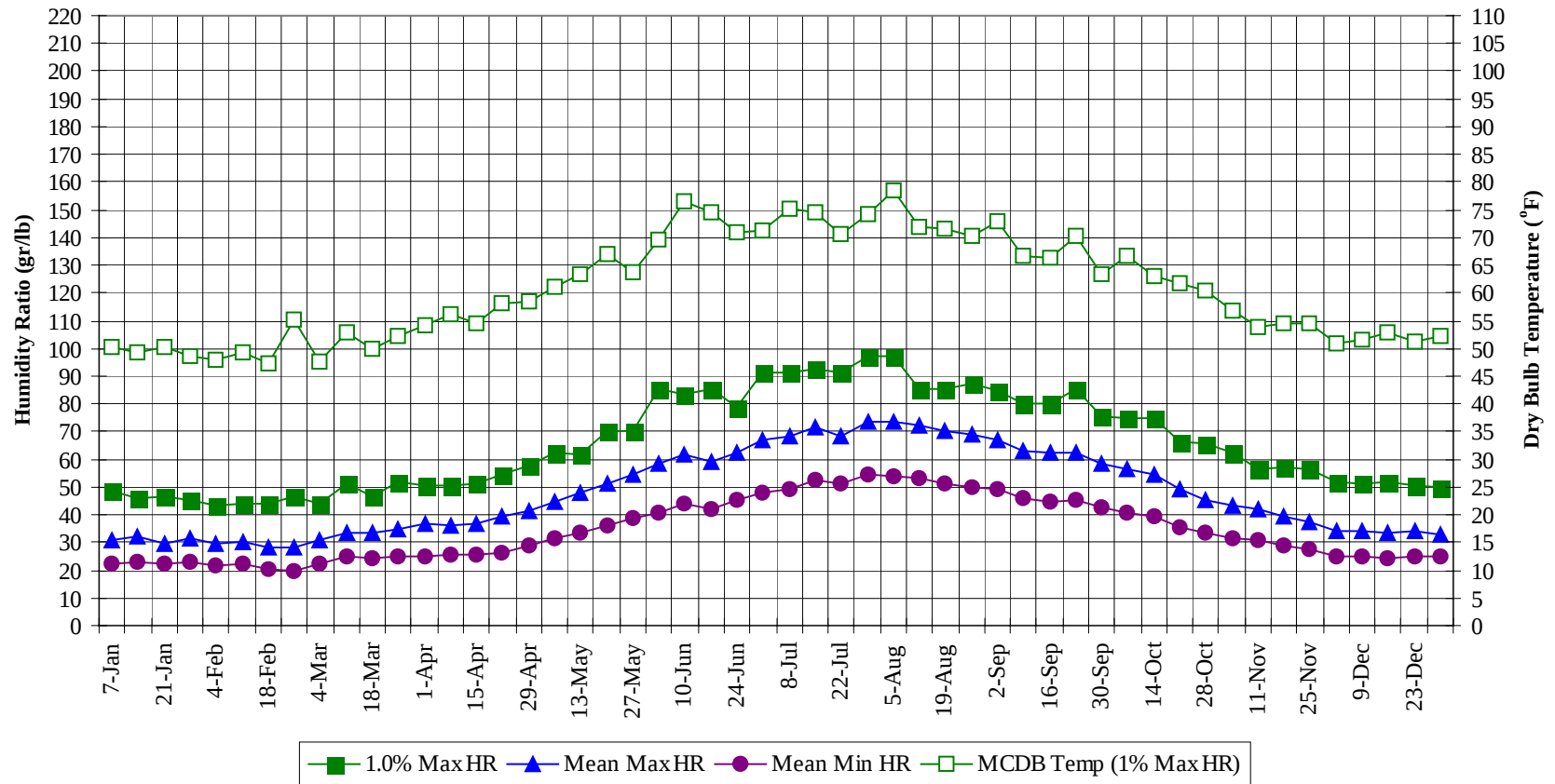
Annual Summary of Temperatures



OLDENBURG, GERMANY

WMO No. 102150

Long Term Humidity and Dry Bulb Temperature Summary



OLDENBURG, GERMANY

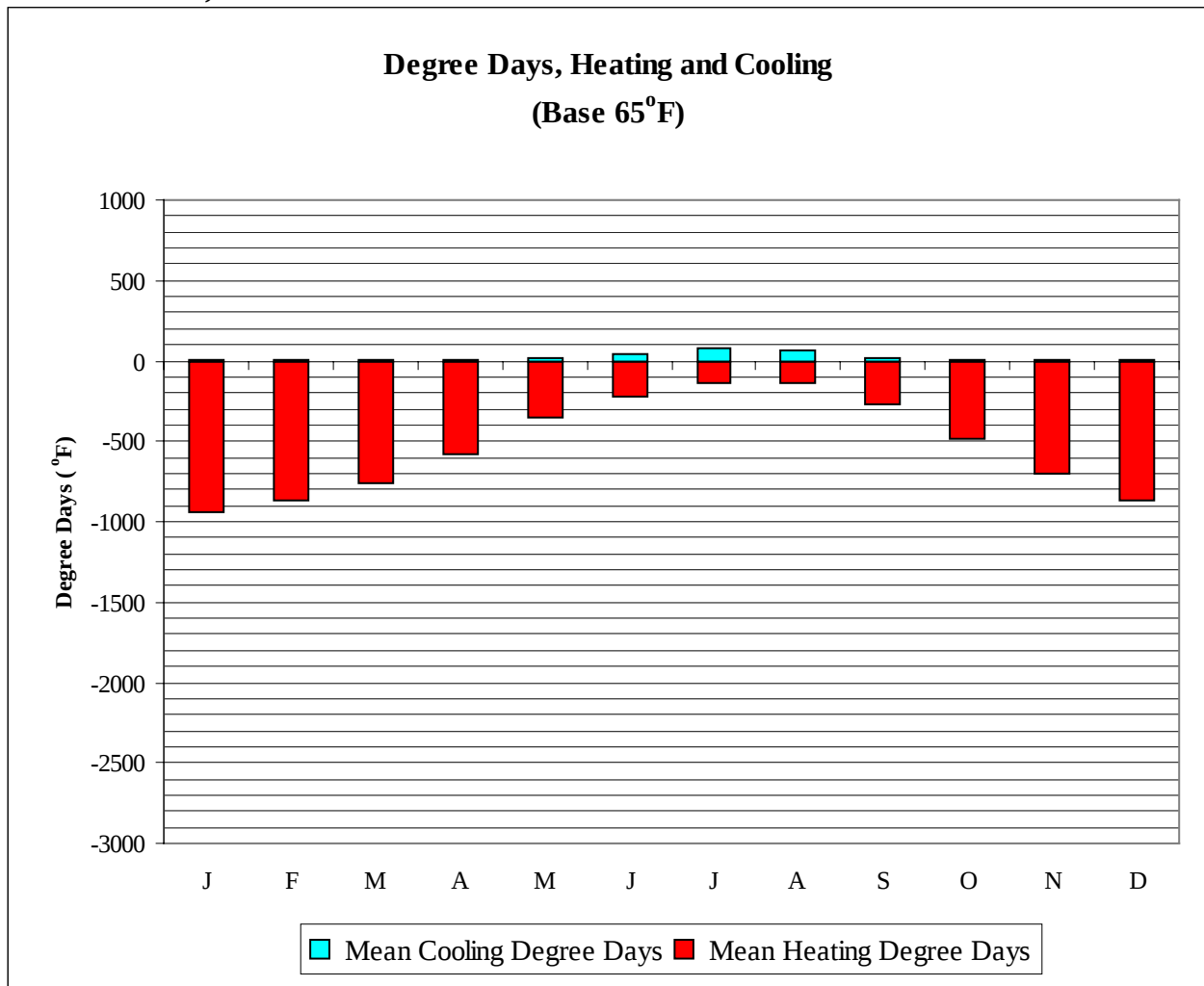
WMO No. 102150

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	52.0	49.3	38.1	29.5	3.0	48.3	50.1	30.7	22.1
14-Jan	52.0	47.6	39.4	30.8	5.0	46.2	49.2	32.0	23.1
21-Jan	52.0	47.0	38.4	30.5	10.0	46.9	50.3	29.8	22.1
28-Jan	52.0	47.3	39.7	31.1	15.0	45.5	48.5	31.5	22.7
4-Feb	50.0	46.1	39.4	30.5	14.0	43.4	47.8	29.6	21.7
11-Feb	54.0	47.0	39.7	30.5	12.0	44.1	49.1	30.3	22.4
18-Feb	50.0	46.6	38.0	28.6	12.0	44.1	47.1	28.0	20.5
25-Feb	56.0	50.0	40.3	27.8	9.0	46.9	55.2	28.3	19.6
4-Mar	54.0	47.1	42.7	31.3	14.0	44.1	47.8	31.0	22.3
11-Mar	57.0	49.5	45.7	34.2	18.0	51.1	53.0	33.8	24.7
18-Mar	61.0	49.9	46.0	34.3	22.0	46.9	49.9	33.5	24.4
25-Mar	59.0	49.8	48.1	34.9	25.0	51.8	52.1	34.8	24.8
1-Apr	61.0	50.8	49.9	35.9	25.0	50.4	54.2	36.5	25.2
8-Apr	64.0	51.5	50.6	36.4	28.0	50.4	56.1	36.2	25.9
15-Apr	68.0	52.2	53.1	36.8	27.0	51.1	54.5	36.6	25.6
22-Apr	72.0	55.3	55.4	38.0	30.0	54.6	58.1	39.3	26.6
29-Apr	74.0	57.8	56.5	40.1	30.0	58.1	58.5	41.4	29.2
6-May	76.0	57.0	58.8	41.7	34.0	62.3	61.2	44.7	31.2
13-May	79.0	60.1	61.4	44.2	36.0	61.6	63.5	47.9	33.8
20-May	79.0	61.7	64.5	45.6	37.0	70.0	66.9	51.1	36.1
27-May	81.0	61.2	64.7	47.9	39.0	70.0	63.8	54.3	39.0
3-Jun	82.0	65.9	66.2	48.3	39.0	85.4	69.7	58.1	40.8
10-Jun	84.0	66.7	66.8	50.7	43.0	83.3	76.5	61.7	44.3
17-Jun	81.0	67.6	65.7	49.8	43.0	85.4	74.6	58.9	41.8
24-Jun	81.0	64.4	67.9	50.8	45.0	79.1	70.9	62.4	45.0
1-Jul	86.0	65.6	69.5	52.9	46.0	91.0	71.4	66.8	47.9
8-Jul	88.0	65.7	71.9	54.0	48.0	91.0	75.1	68.3	49.2
15-Jul	86.0	68.5	71.6	55.2	48.0	92.4	74.4	71.7	52.3
22-Jul	84.0	67.6	69.6	54.3	48.0	91.0	70.6	68.6	51.2
29-Jul	86.0	69.3	72.1	55.5	50.0	97.3	74.2	73.7	54.2
5-Aug	88.0	67.7	73.7	56.0	48.0	97.3	78.5	73.5	53.8
12-Aug	90.0	67.1	73.0	55.1	48.0	85.4	72.0	72.2	53.2
19-Aug	82.0	66.3	72.4	54.4	48.0	85.4	71.7	70.5	51.5
26-Aug	84.0	66.5	70.5	53.6	46.0	87.5	70.4	69.0	50.1
2-Sep	81.0	65.0	68.9	52.4	46.0	84.7	73.0	66.7	49.0
9-Sep	75.0	62.9	65.9	50.5	44.0	79.8	66.6	63.3	45.9
16-Sep	72.0	61.5	64.7	49.3	40.0	79.8	66.4	62.1	44.6
23-Sep	75.0	66.6	64.1	49.2	40.0	85.4	70.3	62.5	45.2
30-Sep	70.0	60.4	61.8	47.9	39.0	75.6	63.4	58.4	43.0
7-Oct	70.0	61.6	59.9	46.5	37.0	74.9	66.6	56.2	40.6
14-Oct	72.0	61.9	58.5	44.9	32.0	74.9	63.0	54.3	39.5
21-Oct	66.0	58.9	54.8	42.4	32.0	66.5	61.6	49.1	35.3
28-Oct	63.0	55.9	52.9	41.1	32.0	65.8	60.5	45.4	33.5
4-Nov	58.0	55.1	50.3	39.7	25.0	62.3	57.0	43.3	31.6
11-Nov	57.0	52.1	48.8	38.8	27.0	56.7	53.8	41.7	31.0
18-Nov	57.0	51.8	46.5	36.8	27.0	57.4	54.5	39.1	28.6
25-Nov	55.0	51.9	44.8	35.6	21.0	56.7	54.5	37.5	27.3
2-Dec	52.0	49.3	41.2	32.6	19.0	51.8	50.8	34.0	24.8
9-Dec	54.0	49.8	41.8	33.5	19.0	51.1	51.4	34.5	25.0
16-Dec	54.0	50.8	40.5	32.2	18.0	51.8	52.8	33.4	24.1
23-Dec	54.0	50.5	40.9	33.2	12.0	50.4	51.1	33.9	24.9
31-Dec	53.0	51.5	40.1	32.7	12.0	49.7	52.2	33.0	24.7

OLDENBURG, GERMANY

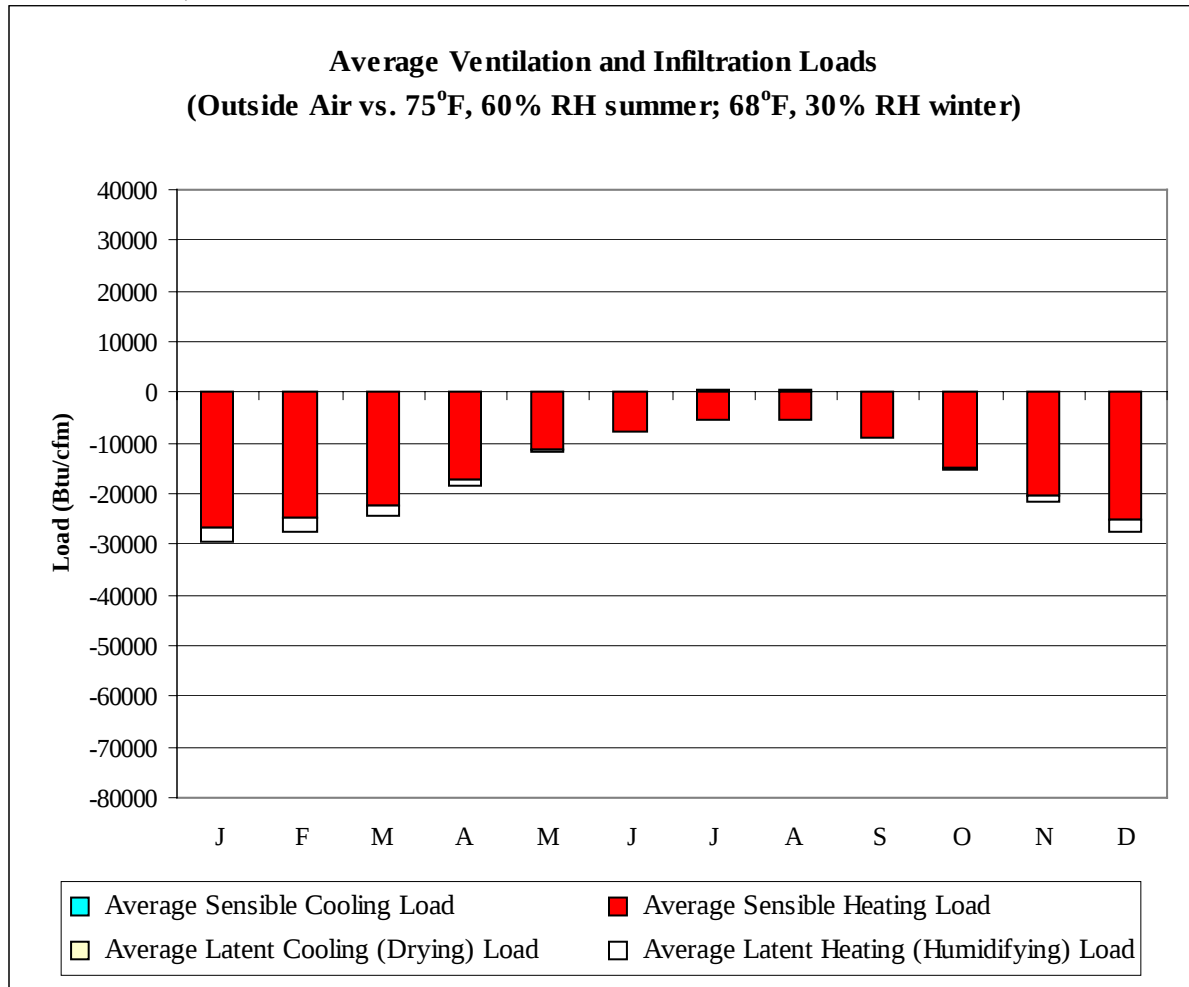
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	Mean Cooling Degree Days (°F)	Mean Heating Degree Days (°F)
JAN	0	936
FEB	0	863
MAR	0	763
APR	4	577
MAY	23	357
JUN	45	220
JUL	75	136
AUG	69	141
SEP	13	264
OCT	2	486
NOV	0	702
DEC	0	874
ANN	231	6319

OLDENBURG, GERMANY

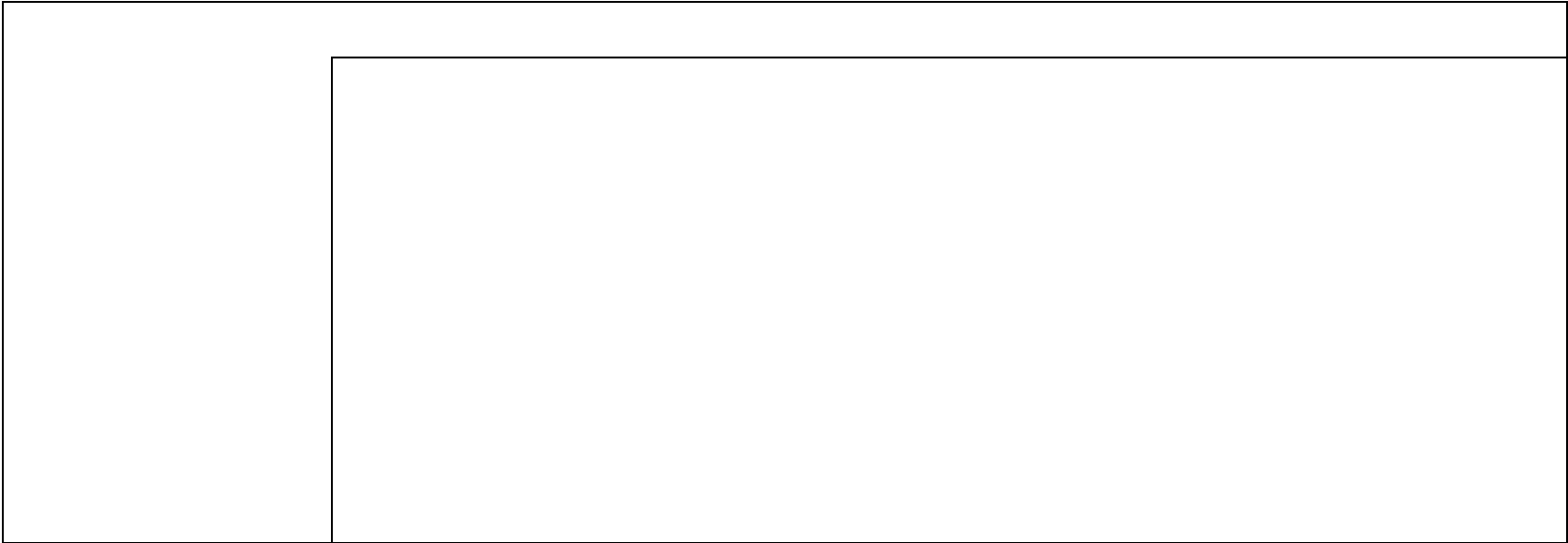
WMO No. 102150



	Average Sensible Cooling Load	Average Sensible Heating Load	Average Latent Cooling Load	Average Latent Heating Load
	(Btu/cfm)	(Btu/cfm)	(Btu/cfm)	(Btu/cfm)
JAN	0	-26673	0	-2832
FEB	0	-24568	0	-3102
MAR	0	-22188	0	-2054
APR	8	-17241	0	-1142
MAY	79	-11415	7	-224
JUN	214	-7604	93	-5
JUL	401	-5250	300	0
AUG	335	-5381	131	0
SEP	22	-8998	41	-4
OCT	1	-14972	1	-240
NOV	0	-20522	0	-1039
DEC	0	-25062	0	-2274
ANN	1060	-189874	573	-12916

Average Annual Solar Radiation – Nearest Available Site
(Source: National Renewable Energy Laboratory, Golden CO, 1995)

No Solar Radiation
Data Available

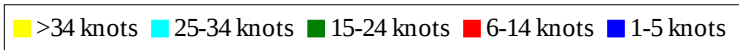
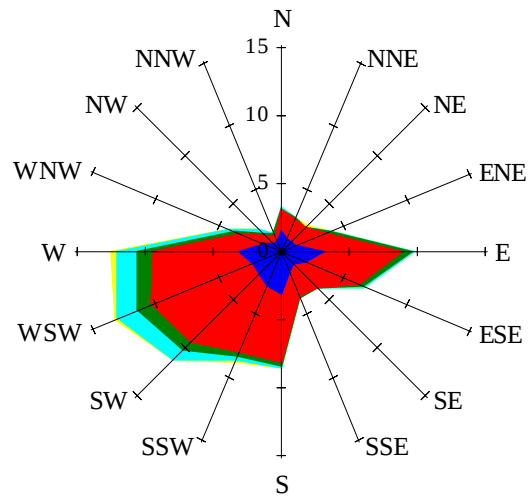


Average Annual Solar Heat and Illumination – Nearest Available Site

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

Wind Summary - December, January, and February

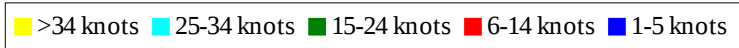
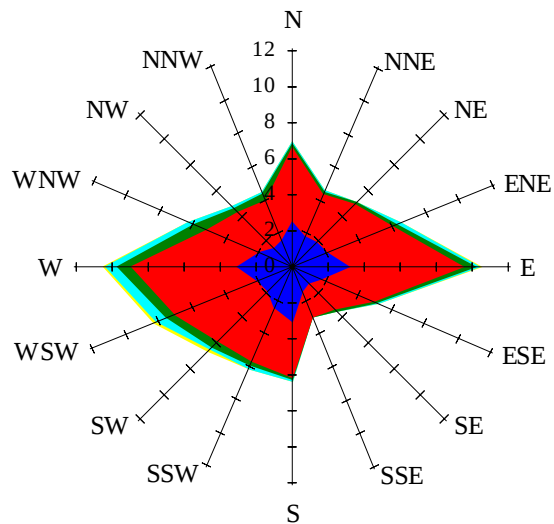
Labels of Percent Frequency on North Axis



Percent Calm = 2.04

Wind Summary - March, April, and May

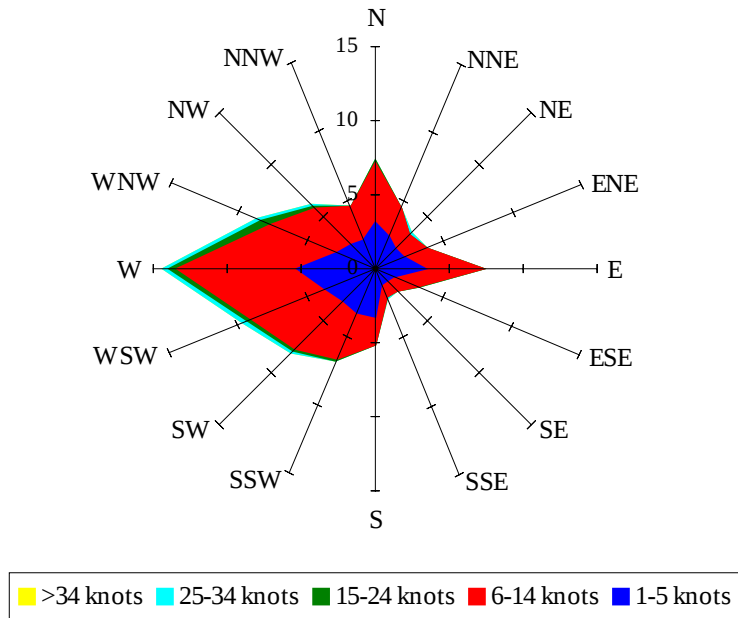
Labels of Percent Frequency on North Axis



Percent Calm = 2.54

Wind Summary - June, July, and August

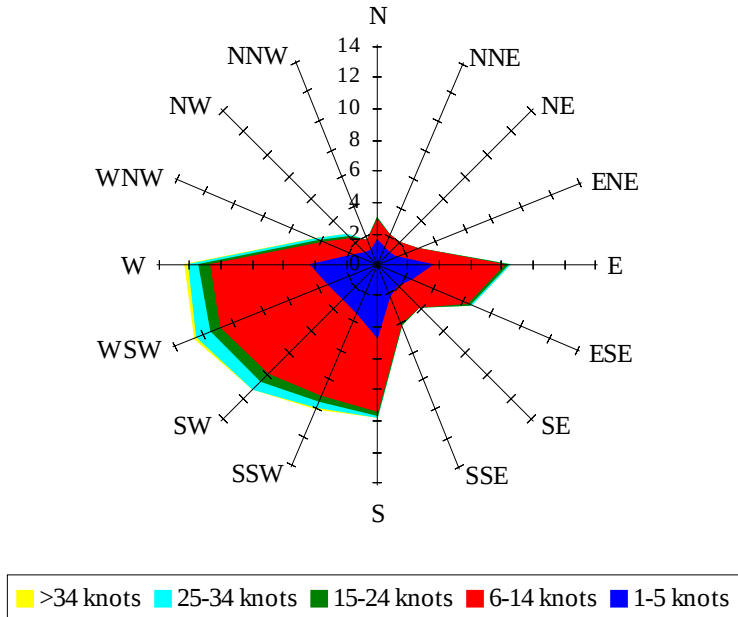
Labels of Percent Frequency on North Axis



Percent Calm = 3.35

Wind Summary - September, October, and November

Labels of Percent Frequency on North Axis



Percent Calm = 3.28