

KIEL, GERMANY

Latitude = 54.50 N

Longitude = 10.28 E

Period of Record = 1973 to 1996

WMO No. 100440

Elevation = 75 feet

Average Pressure = 29.84 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	76	67	88	14.7	E
0.4% Occurrence	75	67	88	14.2	E
1.0% Occurrence	72	65	83	12.6	E
2.0% Occurrence	70	64	81	11.8	E
Mean Daily Range	5	-	-	-	-
97.5% Occurrence	28	27	19	16.6	E
99.0% Occurrence	25	24	16	18.3	E
99.6% Occurrence	22	21	14	20.8	E
Median of Extreme Lows	23	22	14	21.0	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	70	73	104	13.7	E
0.4% Occurrence	69	72	100	13.7	E
1.0% Occurrence	67	70	93	12.8	E
2.0% Occurrence	65	68	87	12.6	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	105	72	0.70	14.1	ESE
0.4% Occurrence	103	71	0.69	12.9	E
1.0% Occurrence	95	69	0.64	12.1	E
2.0% Occurrence	90	68	0.60	12.8	E
Air Conditioning/ Humid Area Criteria	# of Hours	T ≥ 93°F	T ≥ 80°F	T _{wb} ≥ 73°F	T _{wb} ≥ 67°F
		3	15	14	108

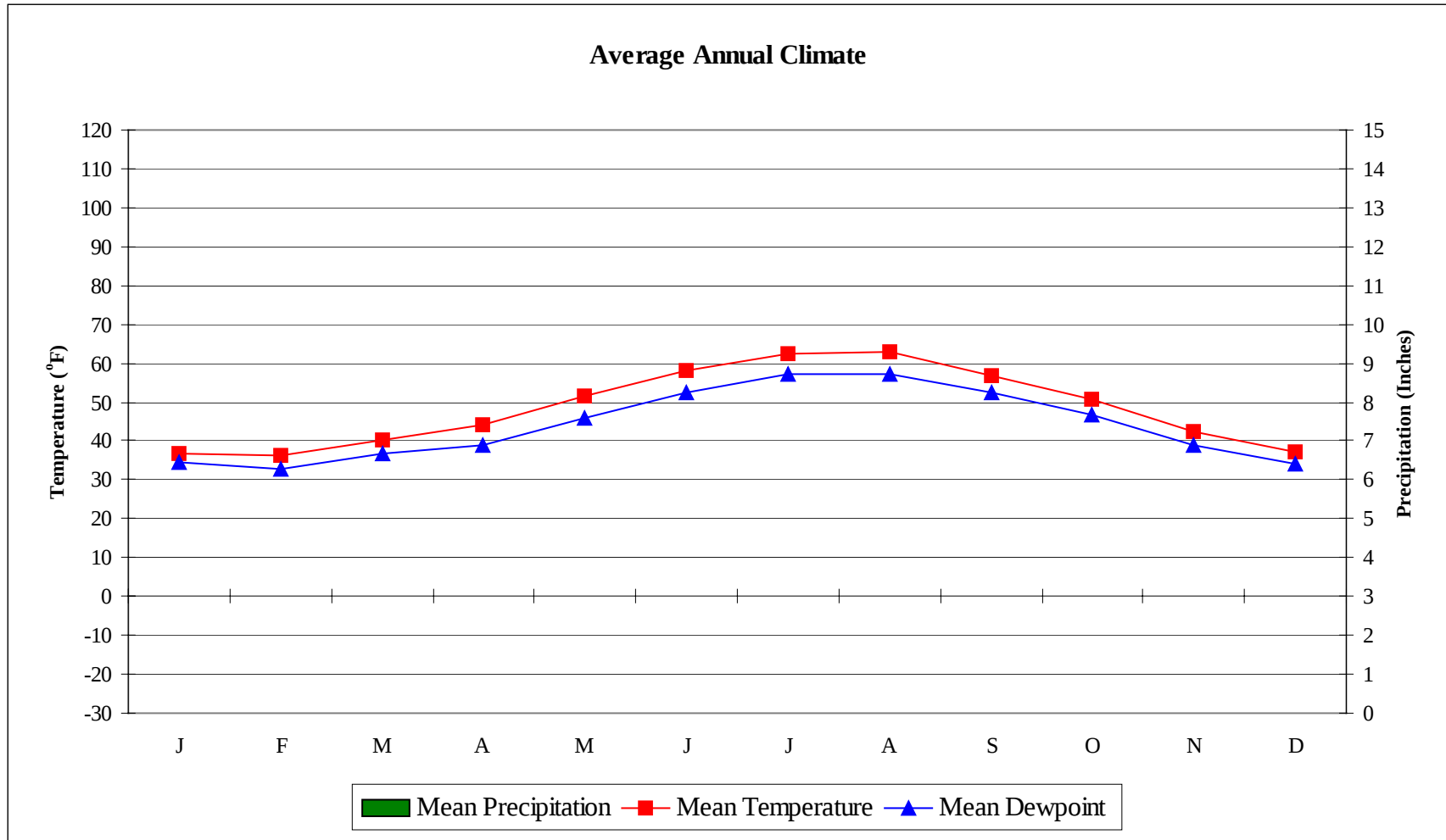
Other Site Data

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	0.2 + 0.0
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 (#)
51.1	N/A	N/A	11

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

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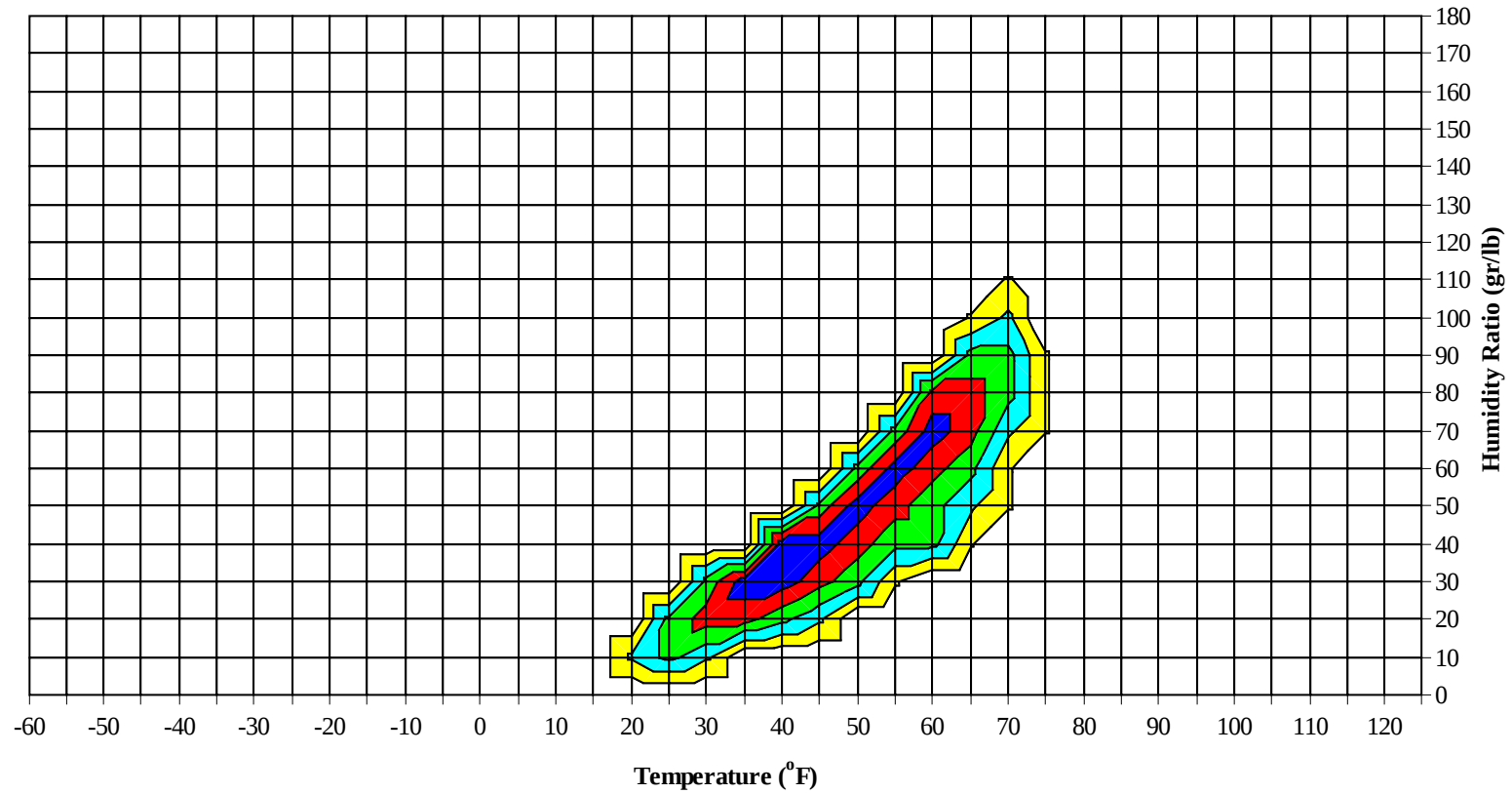


No Precipitation Data Available

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Long Term Psychrometric Summary

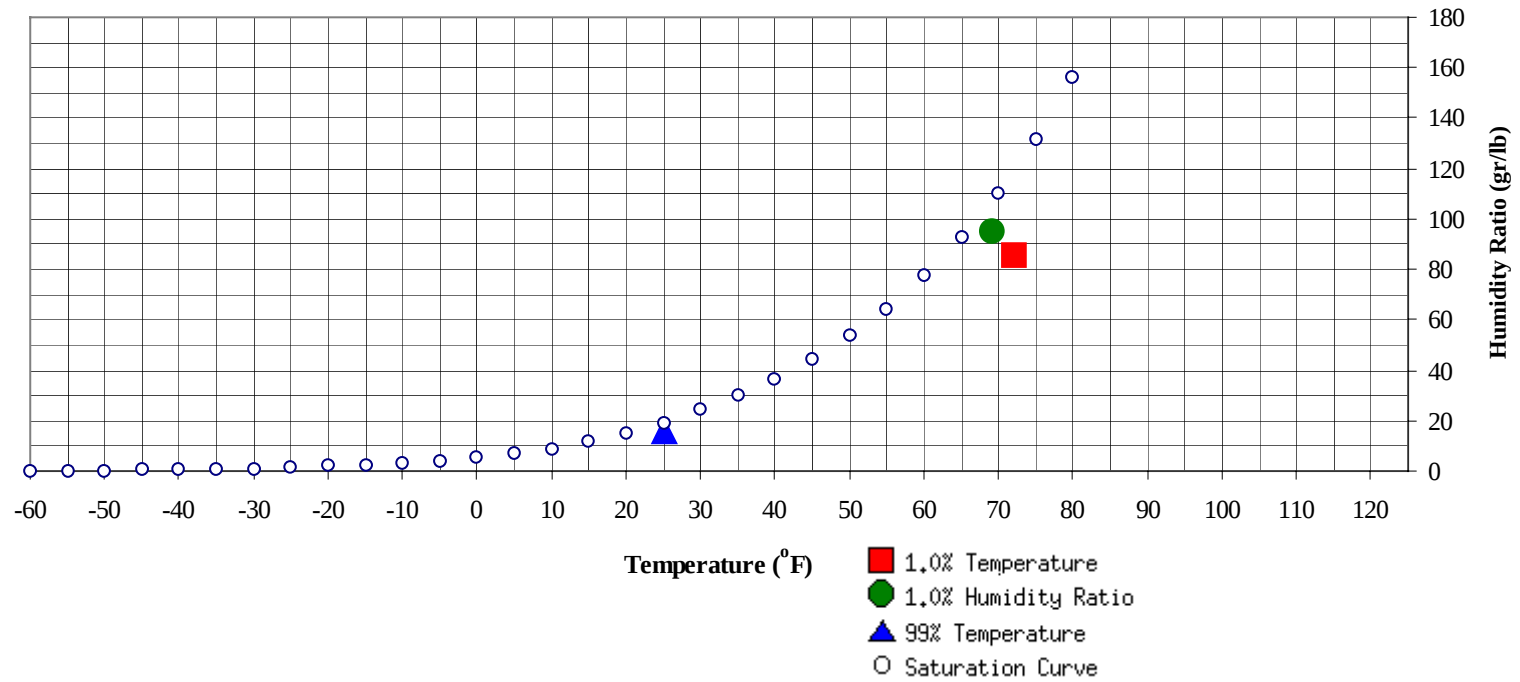


- 50% of all observations
- 80% of all observations
- 95% of all observations
- 97.5% of all observations
- 99% of all observations

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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	25	15.9	8.4		95.2	69.1	66.9	65.8	31.4

1.0% Dry Bulb	(°F)	MCHR (gr/lb)	MCWB (°F)	Enthalpy (btu/lb)
	72	85.8	65.9	30.7

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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		
100 / 104															
95 / 99															
90 / 94															
85 / 89															
80 / 84															
75 / 79															
70 / 74															
65 / 69												0	0	0	55.3
60 / 64												1	1	2	52.6
55 / 59						1	1	1	3	52.8	1	3	4	8	51.1
50 / 54	2	1	1	4	49.3	3	4	4	12	48.6	4	11	12	27	48.7
45 / 49	17	17	19	53	44.9	12	17	18	47	44.6	32	41	41	114	44.7
40 / 44	61	72	75	208	40.8	49	53	56	158	40.3	70	78	87	234	40.5
35 / 39	84	74	80	238	36.5	74	64	73	210	36.3	92	78	76	246	36.1
30 / 34	50	48	44	142	31.5	45	50	43	139	31.1	44	34	26	103	31.8
25 / 29	24	27	23	74	26.1	23	23	20	66	25.6	4	3	2	9	26.0
20 / 24	8	9	5	23	21.5	14	9	8	31	21.0					
15 / 19	1	0	1	2	18.3	3	2	1	6	16.4					
10 / 14						0	0		0	12.5					

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.

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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	09	17			01	09	17			01	09	17		
	To 08	To 16	To 00			To 08	To 16	To 00			To 08	To 16	To 00		
100 / 104											0 0 95.5				
95 / 99											0 0 91.0				
90 / 94											1 0 1 88.1				
85 / 89											0 0 0 68.5				
80 / 84											0 0 0 70.1				
75 / 79	0 0 58.0										0 3 3 6 64.9				
70 / 74	0	1	0	1	55.2	1 1 2 59.5					1	6	10	17	63.5
65 / 69	0	2	1	3	53.6	0	3	4	7	57.6	9	19	21	49	62.2
60 / 64	1	3	4	8	51.7	3	16	20	39	56.2	40	67	66	173	58.5
55 / 59	3	12	9	24	50.9	29	55	59	144	53.3	83	97	84	264	54.2
50 / 54	14	29	37	80	48.1	91	102	91	284	49.3	91	43	53	187	50.5
45 / 49	59	62	65	186	44.5	79	55	59	194	44.9	15	4	3	22	46.2
40 / 44	93	88	94	275	40.3	44	15	14	72	41.7	0			0	43.7
35 / 39	62	39	28	128	35.8	2	1	0	3	38.5					
30 / 34	8	4	2	14	31.6										
25 / 29		1		1	28.8										
20 / 24															
15 / 19															
10 / 14															

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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															
95 / 99	0	0	1	1	90.4										
90 / 94	1	1	0	2	87.4		0		0	68.0					
85 / 89	1	1	1	3	80.7		0	0	0	76.0					
80 / 84	2	0	1	3	78.1		2	1	3	65.2					
75 / 79	1	4	6	11	68.9		4	5	9	66.6	0	0	0	0	72.2
70 / 74	5	24	26	54	65.9	6	23	28	57	65.2	0	2	1	3	65.1
65 / 69	31	57	61	148	62.9	34	62	62	158	63.0	2	10	8	20	62.3
60 / 64	90	109	96	295	59.1	94	114	102	310	59.2	25	68	68	160	58.3
55 / 59	94	50	51	195	55.1	103	42	48	193	55.5	128	117	115	360	54.7
50 / 54	24	3	5	32	51.6	10	1	2	13	52.3	70	36	40	146	50.6
45 / 49											10	4	2	16	46.2
40 / 44											5	4	6	15	41.0
35 / 39											0	0	0	0	38.7
30 / 34															
25 / 29															
20 / 24															
15 / 19															
10 / 14															

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KIEL, GERMANY

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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															
80 / 84															
75 / 79															
70 / 74		0	0	0	59.0								0	0	53.0
65 / 69		2	2	4	62.3								0	0	
60 / 64	5	9	9	24	58.6		0		0	51.0			0	0	
55 / 59	33	59	58	150	54.6	2	3	3	8	54.8		0	0	0	49.0
50 / 54	98	91	91	280	50.2	15	24	15	55	49.6	5	4	4	13	50.0
45 / 49	68	58	67	193	45.0	59	70	75	205	45.3	20	26	24	70	44.9
40 / 44	38	25	21	84	40.2	91	78	82	251	40.8	64	66	65	194	40.7
35 / 39	5	3	1	9	35.7	55	49	45	150	35.7	79	76	82	238	35.9
30 / 34						12	12	14	39	30.6	51	49	47	147	30.8
25 / 29						4	4	4	12	26.5	23	21	22	66	26.4
20 / 24											5	5	4	14	21.7
15 / 19											1	0	0	1	17.7
10 / 14															

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WMO No. 100440

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

Period of Record = 1973 to 1996

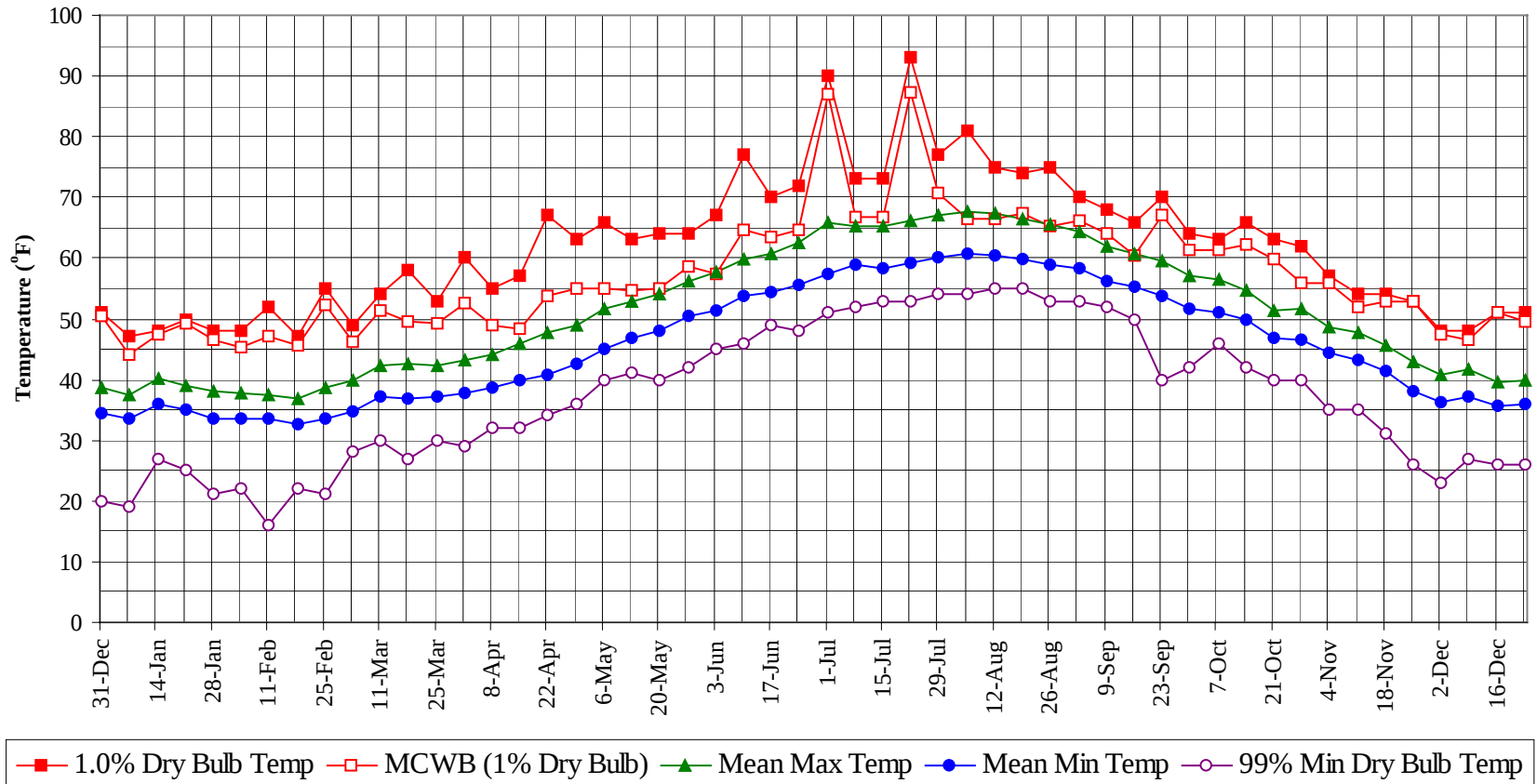
Annual Totals					
Temperature Range (°F)	Hour Group (LST)			Total Obs	M C W B (°F)
	01 To 08	09 To 16	17 To 00		
100 / 104		0		0	95.5
95 / 99	0	0	1	1	90.5
90 / 94	1	2	0	3	86.9
85 / 89	1	2	1	4	79.4
80 / 84	2	3	2	7	71.4
75 / 79	1	10	15	26	67.3
70 / 74	14	59	68	141	65.1
65 / 69	81	158	164	403	62.6
60 / 64	270	396	374	1040	58.7
55 / 59	493	442	439	1373	54.5
50 / 54	433	350	352	1134	49.9
45 / 49	370	351	372	1094	45.0
40 / 44	507	473	493	1472	40.6
35 / 39	438	379	378	1196	36.1
30 / 34	202	194	173	570	31.2
25 / 29	75	77	68	221	26.1
20 / 24	26	22	18	66	21.3
15 / 19	6	2	2	10	17.1
10 / 14	0	0		0	12.5

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.

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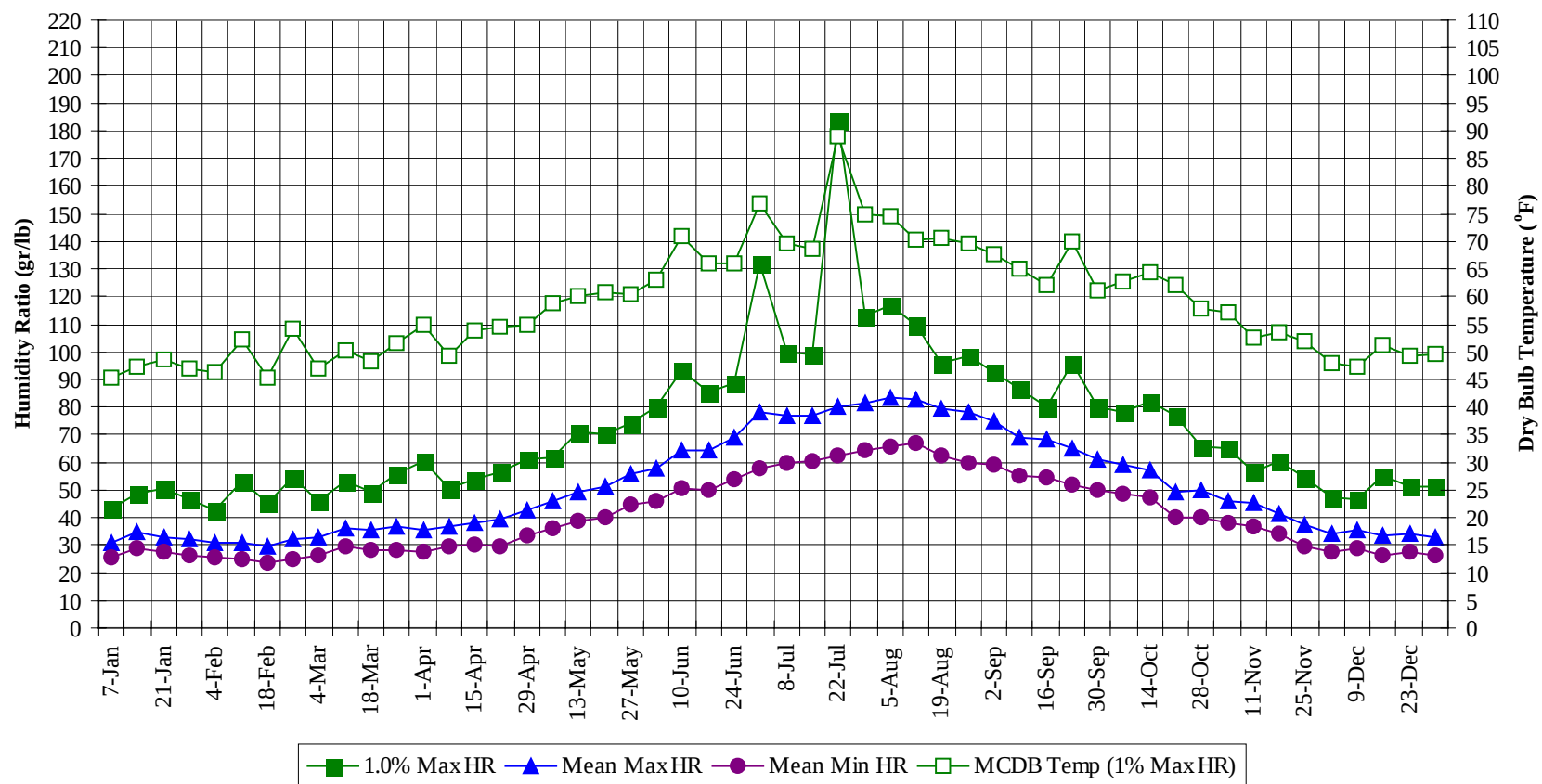
Annual Summary of Temperatures



KIEL, GERMANY

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Long Term Humidity and Dry Bulb Temperature Summary

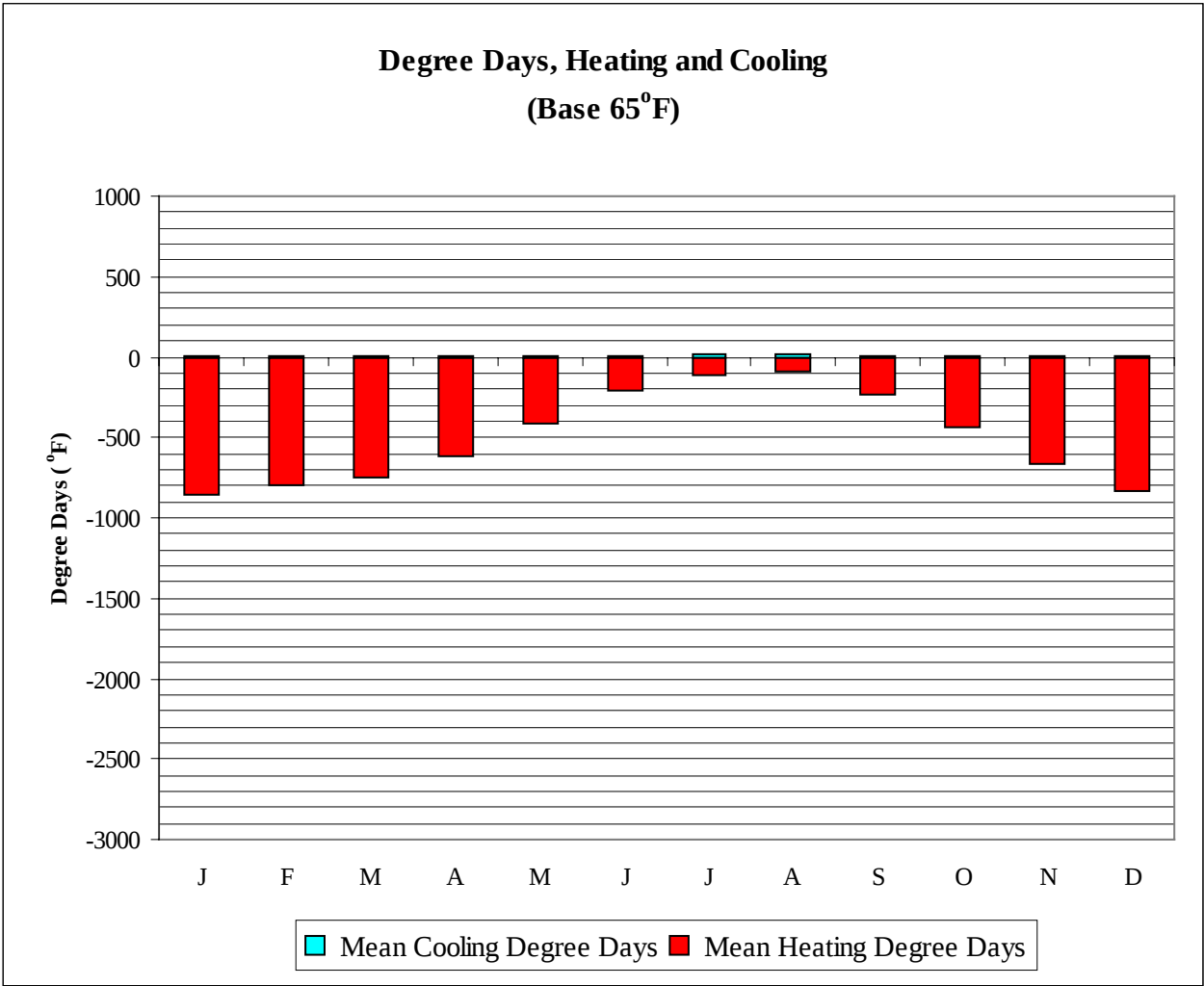


KIEL, GERMANY

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Long Term Dry Bulb Temperature and Humidity Summary

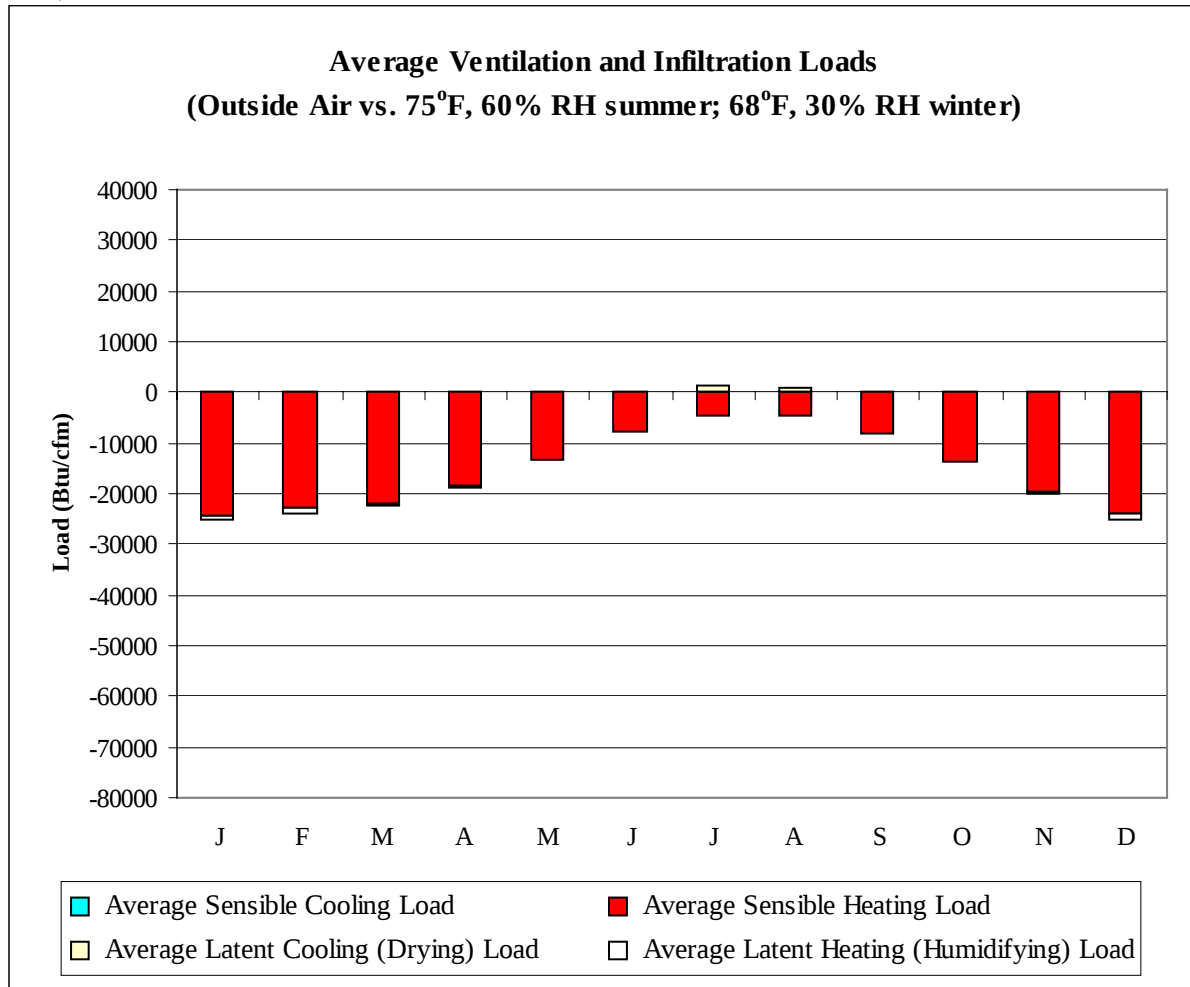
Week Ending	1.0% Temp (°F)	MCWB @ 1% Temp (°F)	Mean Max Temp (°F)	Mean Min Temp (°F)	99% Temp (°F)	1.0% HR (gr/lb)	MCDB @ 1% HR (°F)	Mean Max HR (gr/lb)	Mean Min HR (gr/lb)
7-Jan	47.0	44.1	37.5	33.5	19.0	43.4	45.5	31.2	25.7
14-Jan	48.0	47.3	40.3	36.0	27.0	48.3	47.3	35.1	29.0
21-Jan	50.0	49.2	38.9	35.0	25.0	50.4	48.6	32.7	27.3
28-Jan	48.0	46.4	38.0	33.5	21.0	46.9	47.0	32.0	26.1
4-Feb	48.0	45.3	37.8	33.7	22.0	42.7	46.4	31.1	25.6
11-Feb	52.0	47.1	37.5	33.4	16.0	53.2	52.2	31.0	25.2
18-Feb	47.0	45.5	36.8	32.6	22.0	45.5	45.3	29.6	23.9
25-Feb	55.0	52.3	38.8	33.6	21.0	54.6	54.2	31.9	24.8
4-Mar	49.0	46.3	39.9	34.9	28.0	46.2	47.0	33.1	26.6
11-Mar	54.0	51.4	42.2	37.2	30.0	53.2	50.1	35.9	29.4
18-Mar	58.0	49.7	42.6	37.0	27.0	49.0	48.2	35.7	28.3
25-Mar	53.0	49.3	42.3	37.2	30.0	56.0	51.4	36.5	28.4
1-Apr	60.0	52.7	43.1	37.7	29.0	60.2	54.8	35.4	27.7
8-Apr	55.0	49.0	44.2	38.8	32.0	50.4	49.2	36.8	29.4
15-Apr	57.0	48.4	46.1	39.8	32.0	53.9	54.0	37.9	30.0
22-Apr	67.0	53.7	47.6	40.9	34.0	56.7	54.6	39.3	29.9
29-Apr	63.0	55.0	49.0	42.7	36.0	60.9	54.8	42.8	33.4
6-May	66.0	55.0	51.7	45.0	40.0	61.6	58.6	46.2	36.4
13-May	63.0	54.8	52.8	46.8	41.0	70.7	60.2	49.6	38.9
20-May	64.0	55.0	54.2	48.2	40.0	70.0	60.8	51.4	40.1
27-May	64.0	58.5	56.3	50.5	42.0	74.2	60.6	56.1	44.6
3-Jun	67.0	57.3	57.8	51.5	45.0	79.8	63.0	58.0	46.2
10-Jun	77.0	64.7	60.0	53.6	46.0	93.1	70.9	64.1	50.4
17-Jun	70.0	63.4	60.8	54.5	49.0	85.4	65.9	64.5	50.2
24-Jun	72.0	64.6	62.4	55.5	48.0	88.9	66.0	68.7	53.8
1-Jul	90.0	87.0	65.9	57.5	51.0	132.3	77.0	78.1	57.7
8-Jul	73.0	66.8	65.3	59.0	52.0	100.1	69.7	76.6	59.6
15-Jul	73.0	66.9	65.2	58.3	53.0	99.4	68.6	76.7	60.5
22-Jul	93.0	87.2	66.1	59.2	53.0	184.1	89.0	80.3	62.6
29-Jul	77.0	70.7	67.2	60.0	54.0	112.7	74.7	81.2	64.1
5-Aug	81.0	66.5	67.6	60.7	54.0	116.9	74.5	83.1	65.5
12-Aug	75.0	66.5	67.4	60.5	55.0	109.9	70.3	82.5	66.7
19-Aug	74.0	67.4	66.4	59.9	55.0	95.9	70.4	79.5	62.6
26-Aug	75.0	65.3	65.7	58.9	53.0	98.7	69.6	78.2	60.0
2-Sep	70.0	66.1	64.3	58.2	53.0	92.4	67.8	75.1	59.3
9-Sep	68.0	64.2	61.9	56.2	52.0	86.8	65.0	69.0	54.9
16-Sep	66.0	60.3	60.8	55.2	50.0	79.8	62.2	68.4	54.2
23-Sep	70.0	67.1	59.4	53.8	40.0	95.9	70.0	65.1	51.8
30-Sep	64.0	61.3	57.0	51.8	42.0	79.8	61.0	60.8	49.6
7-Oct	63.0	61.3	56.4	51.2	46.0	78.4	62.7	59.0	48.3
14-Oct	66.0	62.3	54.8	49.8	42.0	81.9	64.3	57.2	47.5
21-Oct	63.0	59.9	51.4	46.8	40.0	77.0	62.2	49.4	39.9
28-Oct	62.0	56.0	51.6	46.4	40.0	65.8	58.0	49.7	40.2
4-Nov	57.0	55.8	48.7	44.3	35.0	65.1	57.1	45.8	37.9
11-Nov	54.0	52.0	47.7	43.2	35.0	56.7	52.7	45.0	36.6
18-Nov	54.0	52.8	45.6	41.3	31.0	60.2	53.4	41.5	34.0
25-Nov	53.0	53.0	43.0	38.2	26.0	54.6	52.0	37.5	29.7
2-Dec	48.0	47.5	40.7	36.1	23.0	47.6	47.9	34.2	27.5
9-Dec	48.0	46.6	41.7	37.0	27.0	46.9	47.1	35.3	28.6
16-Dec	51.0	51.0	39.6	35.6	26.0	55.3	51.1	33.3	26.5
23-Dec	51.0	49.4	40.0	35.9	26.0	51.1	49.4	34.4	27.3
31-Dec	51.0	50.4	38.8	34.3	20.0	51.1	49.7	32.9	26.6



	Mean Cooling Degree Days (°F)	Mean Heating Degree Days (°F)
JAN	0	852
FEB	0	801
MAR	0	754
APR	0	619
MAY	0	419
JUN	7	215
JUL	19	108
AUG	17	95
SEP	2	233
OCT	0	432
NOV	0	660
DEC	0	833
ANN	46	6021

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	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	-24421	0	-899
FEB	0	-22898	0	-1066
MAR	0	-21886	0	-540
APR	0	-18327	0	-393
MAY	0	-13248	2	-42
JUN	29	-7795	211	-1
JUL	93	-4782	1089	0
AUG	23	-4416	721	0
SEP	2	-8330	97	-2
OCT	0	-13551	7	-115
NOV	0	-19451	0	-491
DEC	0	-23944	0	-1119
ANN	147	-183049	2127	-4668

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

No Solar Radiation
Data Available

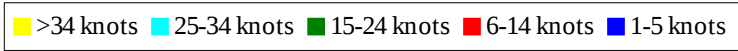
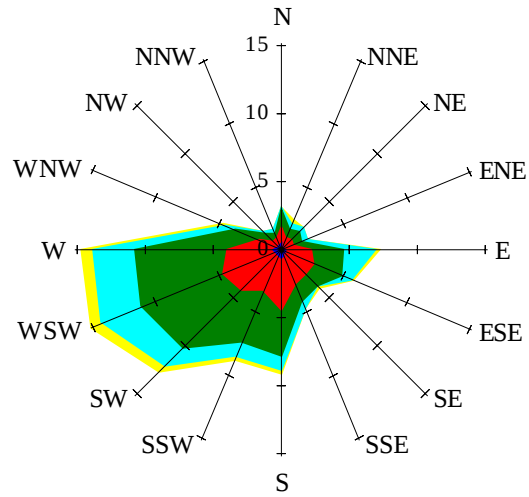


Average Annual Solar Heat and Illumination – Nearest Available Site

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

Wind Summary - December, January, and February

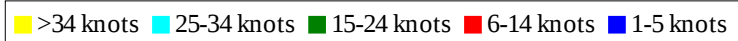
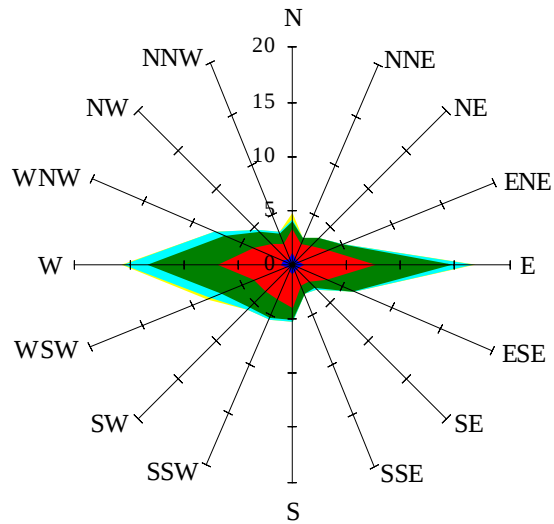
Labels of Percent Frequency on North Axis



Percent Calm = 0.89

Wind Summary - March, April, and May

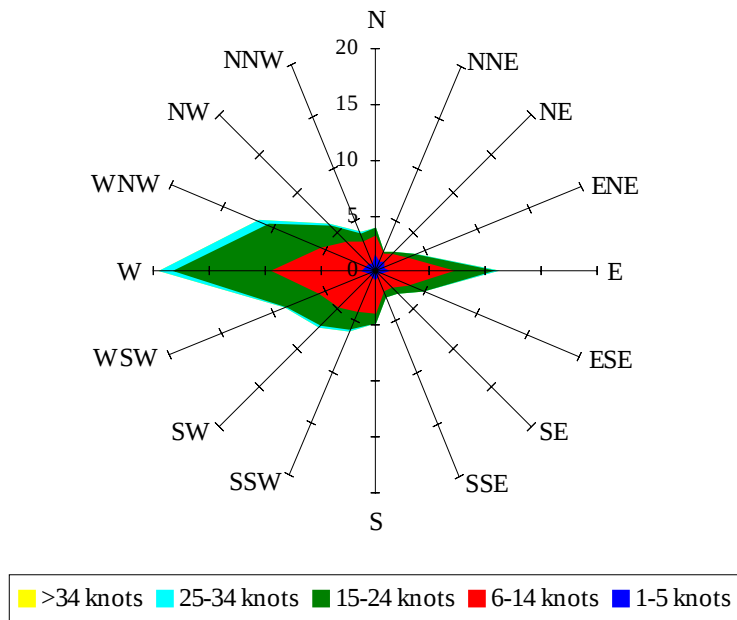
Labels of Percent Frequency on North Axis



Percent Calm = 0.87

Wind Summary - June, July, and August

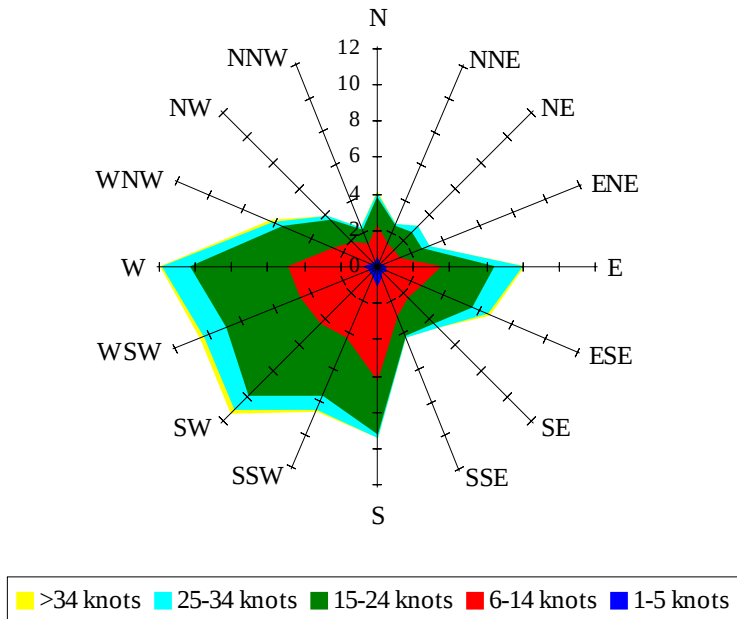
Labels of Percent Frequency on North Axis



Percent Calm = 0.64

Wind Summary - September, October, and November

Labels of Percent Frequency on North Axis



Percent Calm = 0.28