BRADSHAW AAF, HI	
Latitude = 19.76 N	Station ID = ICAO_PHSF
Longitude =155.55 W	Elevation = 1887 Meters
Period of Record = 1988 To 2017	Average Pressure = 815.6 mb

Design Criteria Data

	Mean Coincident (Average) Values				
Dry Bulb Temperature (T)	**Design Value (°C)**	**Wet Bulb Temperature (°C)**	**Humidity Ratio (g/kg)**	**Wind Speed (m/s)**	**Prevailing Direction (NSEW)**
Median of Extreme Highs	27	13	6	7.4	SE
0.4% Occurrence	26	14	7	6.8	SE
1.0% Occurrence	24	14	8	6.1	W
2.0% Occurrence	24	14	9	5.7	W
Mean Daily Range	12	-	-	-	SE
97.5% Occurrence	6	4	5	2	SE
99.0% Occurrence	4	2	4	2.1	SE
99.6% Occurrence	3	0	4	2.2	E
Median of Extreme Lows	-1	-3	3	2.2	E

Wet Bulb Temperature (T_{wb})	**Design Value (°C)**	**Dry Bulb Temperature (°C)**	**Humidity Ratio (g/kg)**	**Wind Speed (m/s)**	**Prevailing Direction (NSEW)**
Median of Extreme Highs	27	26	-	5	-
0.4% Occurrence	23	23	-	5.7	W
1.0% Occurrence	19	22	14	5.1	W
2.0% Occurrence	17	21	13	4.8	W

Humidity Ratio (HR)	**Design Value (g/kg)**	**Dry Bulb Temperature (°C)**	**Vapor Pressure (kPa)**	**Wind Speed (m/s)**	**Prevailing Direction (NSEW)**
Median of Extreme Highs	16	21	69.11	4.4	W
0.4% Occurrence	15	20	62.61	4	W
1.0% Occurrence	14	20	60.88	4.1	W
2.0% Occurrence	13	19	57.43	4.1	W

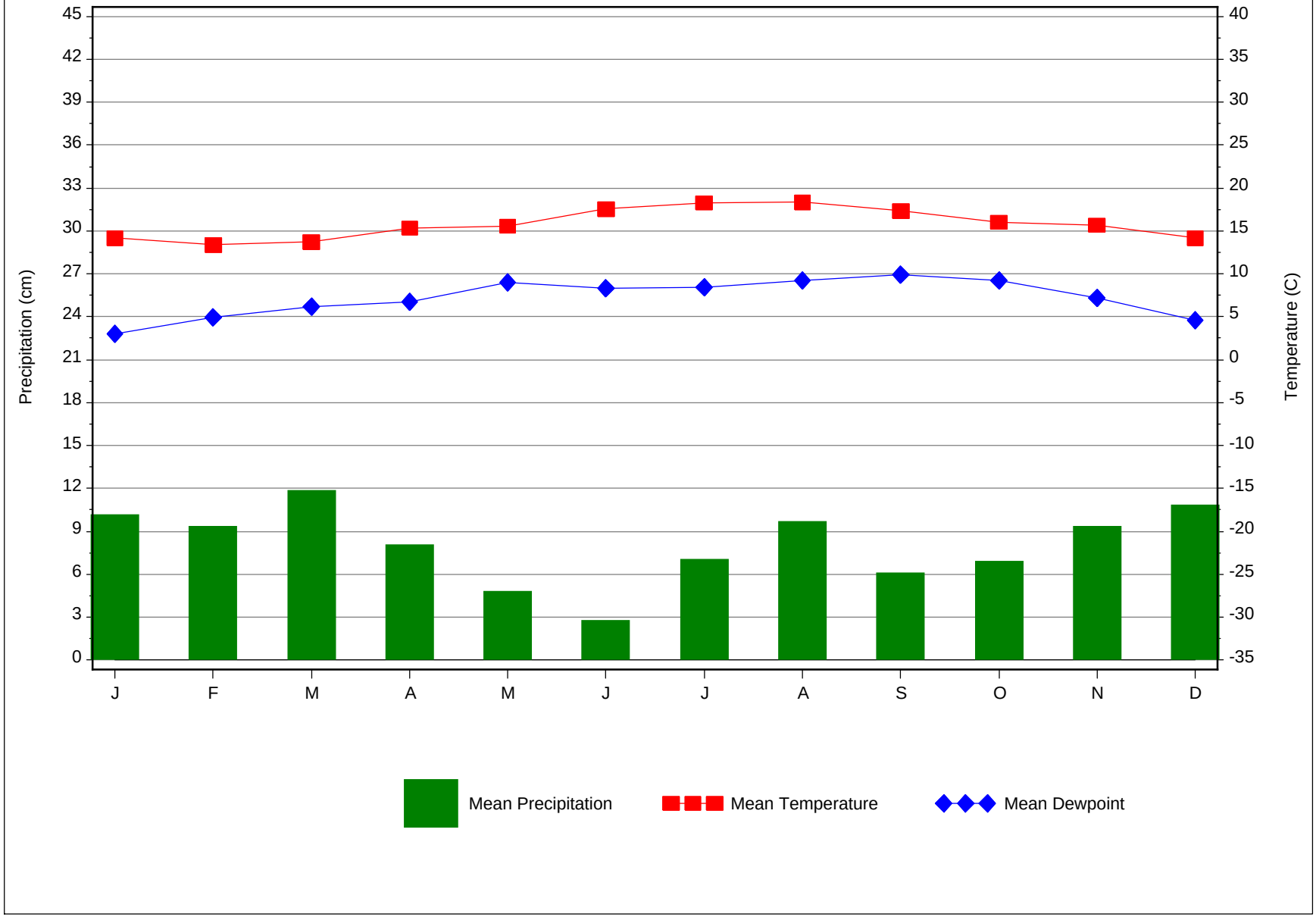
Air Conditioning/ Humid Area Criteria	**Threshold**	**T ≥ 33.9 °C**	**T ≥ 26.7 °C**	**Twb≥22.8 °C**	**Twb≥19.4 °C**
	# of Hours	0	8	2	8

Other Site Data

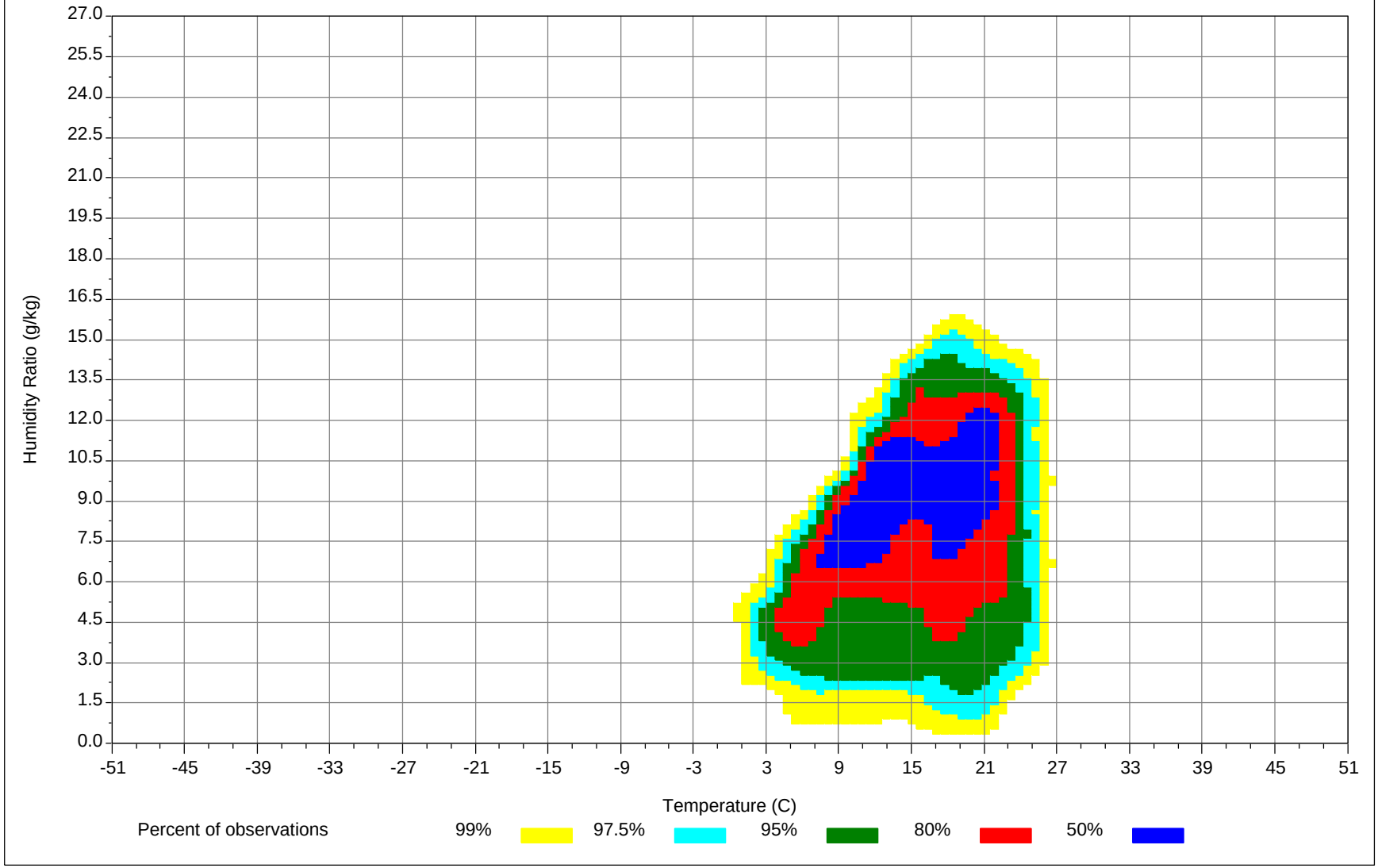
Weather Region	Rain Rate 100 Year Recurrence (cm/hr)	Basic Wind Speed 3 sec gust @ 10 m 50 Year Recurrence (m/s)	Ventilation Cooling Load Index (kWh/l/s/yr) Base 24° C-RH 60% Latent + Sensible
9	15.2	46.9	0.0 + 0.0
Ground Water Temperature (°C) 15 Meter Depth*	Frost Depth 50 Year Recurrence (cm)	Ground Snow Load 50 Year Recurrence (kN/m^2)	Average Annual Freeze-Thaw Cycles (#)
17	0	0	1

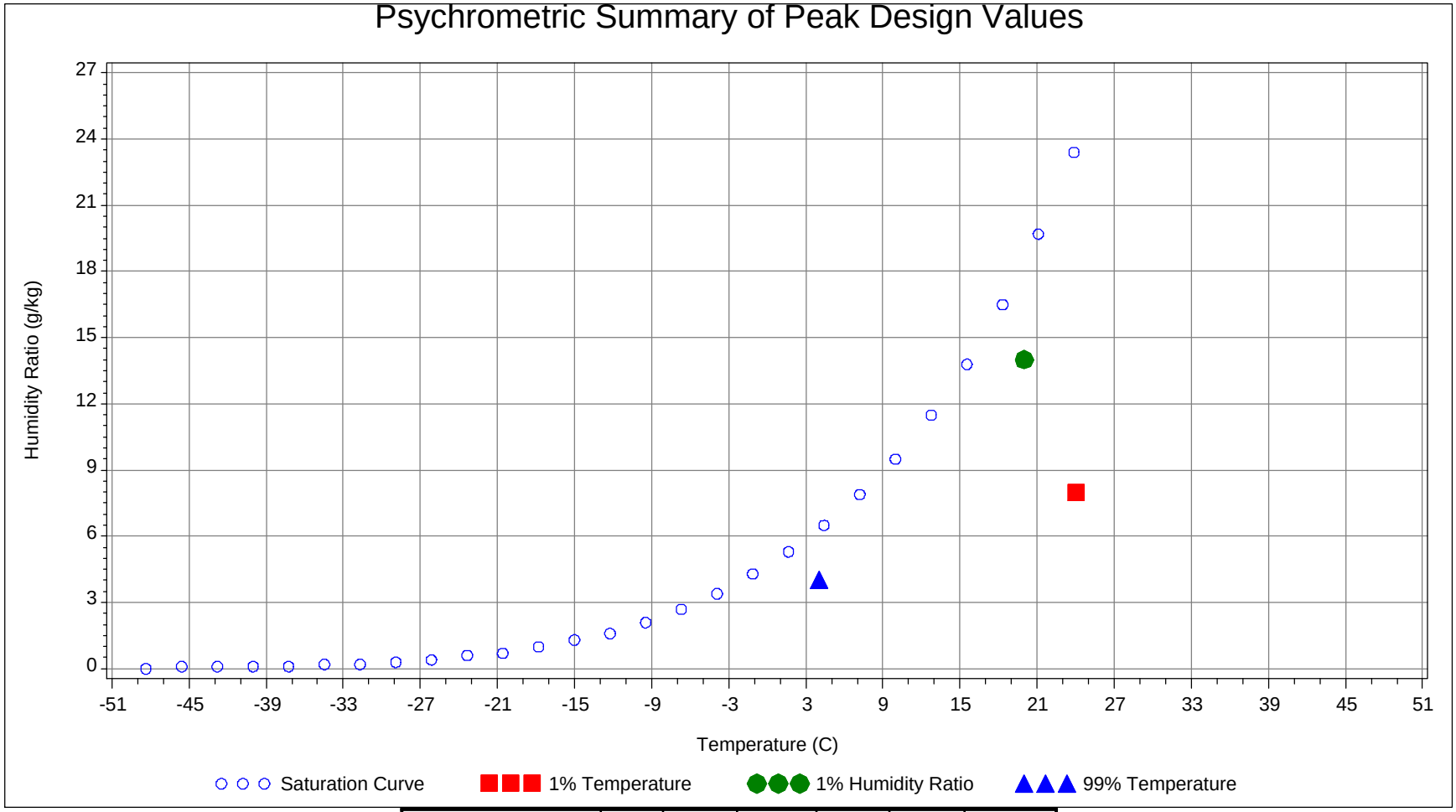
*Note: Temperatures at greater depths can be estimated by adding 0.83°C per 30 meters additional depth.

Average Annual Climate



Long Term Psychrometric Summary





	(°C) / (g/kg)	MCDB (°C)	MCWB (°C)	MCDP (°C)	MCHR (g/kg)	Enthalpy (kJ/kg)
1.0% Dry Bulb	24.0		14		8.0	47.6
99.0% Dry Bulb	4.0				4.0	15.4
1.0% Humidity Ratio	14.0	20.0	16.9	15.9		54.8

Dry-Bulb Temperature Hours For An Average Year

	January					February					March				
Temperature Range (°C)	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°C)**	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°C)**	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°C)**
27/ 29		0		0	14										
24/ 26		2		2	11.7		1		1	14.2		1		1	12.6
21/ 23		30	1	31	11.1	0	19	1	20	11.7		27	0	27	12.5
18/ 20	1	67	9	77	11.4	0	60	4	64	11.7	0	73	5	78	12.4
15/ 17	7	106	33	146	10.5	9	104	33	146	10.7	9	113	36	158	11.2
12/ 14	38	34	62	134	9.1	33	33	72	138	9.9	44	28	73	145	9.9
9/ 11	53	7	75	135	7.3	53	6	74	133	8.2	60	5	89	154	8.5
6/ 8	87	1	59	147	4	74	1	36	111	5.3	94	1	43	138	5.7
3/ 5	44		10	54	1.4	34	0	4	38	1.8	34	0	2	36	2.5
0/ 2	17		1	18	-0.6	18	0	1	19	-0.7	6		0	6	0.1
-3/ -1	1			1	-3.8	2			2	-3.3					

Caution: This summary reflects the typical distribtion of temperature in a typical year. It does not reflect the typical mositure 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

	April					May					June				
Temperature Range (°C)	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°C)**	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°C)**	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°C)**
27/ 29		0		0	10.5							1		1	13.4
24/ 26		1		1	11.7		3		3	14.2		9		9	13.3
21/ 23	0	35	1	36	13.2	1	60	1	62	14	4	102	4	110	14.2
18/ 20	1	92	9	102	12.8	5	103	14	122	13.6	10	92	24	126	13.5
15/ 17	27	99	45	171	11.3	38	76	74	188	12.7	62	35	70	167	12
12/ 14	54	12	77	143	9.9	54	5	94	153	11.4	51	0	80	131	10.3
9/ 11	54	1	77	132	8.3	57	0	51	108	9.1	56		53	109	8.1
6/ 8	85	0	29	114	5.4	78		12	90	6.1	54		8	62	5.7
3/ 5	16		1	17	2.6	15		0	15	3.3	2		0	2	3.5
0/ 2	1			1	1.3										
-3/ -1															

Caution: This summary reflects the typical distribtion of temperature in a typical year. It does not reflect the typical mositure 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

	July					August					September				
Temperature Range (°C)	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°C)**	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°C)**	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°C)**
27/ 29		2		2	12		1		1	13.5		0		0	12
24/ 26		22	1	23	13.9		16	0	16	14.5		7		7	15.3
21/ 23	5	128	8	141	14.3	3	145	8	156	14.8	1	117	1	119	15
18/ 20	19	69	36	124	13.7	16	64	36	116	13.8	9	83	20	112	14.2
15/ 17	72	28	91	191	12.3	72	21	102	195	12.6	57	34	90	181	13
12/ 14	55	0	79	134	10.5	60	0	70	130	10.7	55	0	83	138	11.3
9/ 11	64	0	30	94	8.1	60		28	88	8.2	72	0	44	116	8.8
6/ 8	32		3	35	5.7	37		3	40	5.2	45		3	48	5.9
3/ 5	1			1	4.6	0			0	3.8					
0/ 2															
-3/ -1															

Caution: This summary reflects the typical distribtion of temperature in a typical year. It does not reflect the typical mositure 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

	October					November					December				
Temperature Range (°C)	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°C)**	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°C)**	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°C)**
27/ 29		0		0	10.5		0		0	11.4					
24/ 26		3		3	13.6		3		3	11.8		1		1	11.1
21/ 23	1	96	0	97	14.5	0	54	0	54	13.6		27	0	27	11.1
18/ 20	6	99	12	117	13.9	3	95	5	103	13.3	1	71	2	74	11.8
15/ 17	50	48	72	170	12.9	31	77	46	154	11.9	11	114	32	157	10.9
12/ 14	51	2	99	152	11.2	68	10	85	163	10.1	45	31	74	150	9.6
9/ 11	74	0	57	131	8.9	59	0	68	127	8	70	4	87	161	7.9
6/ 8	64		7	71	5.7	62	0	32	94	5.1	75	0	46	121	4.8
3/ 5	2		0	2	3.3	13		2	15	2.4	37	0	6	43	1.8
0/ 2						2		0	2	0.2	8		0	8	-0.2
-3/ -1						0			0	-3.8					

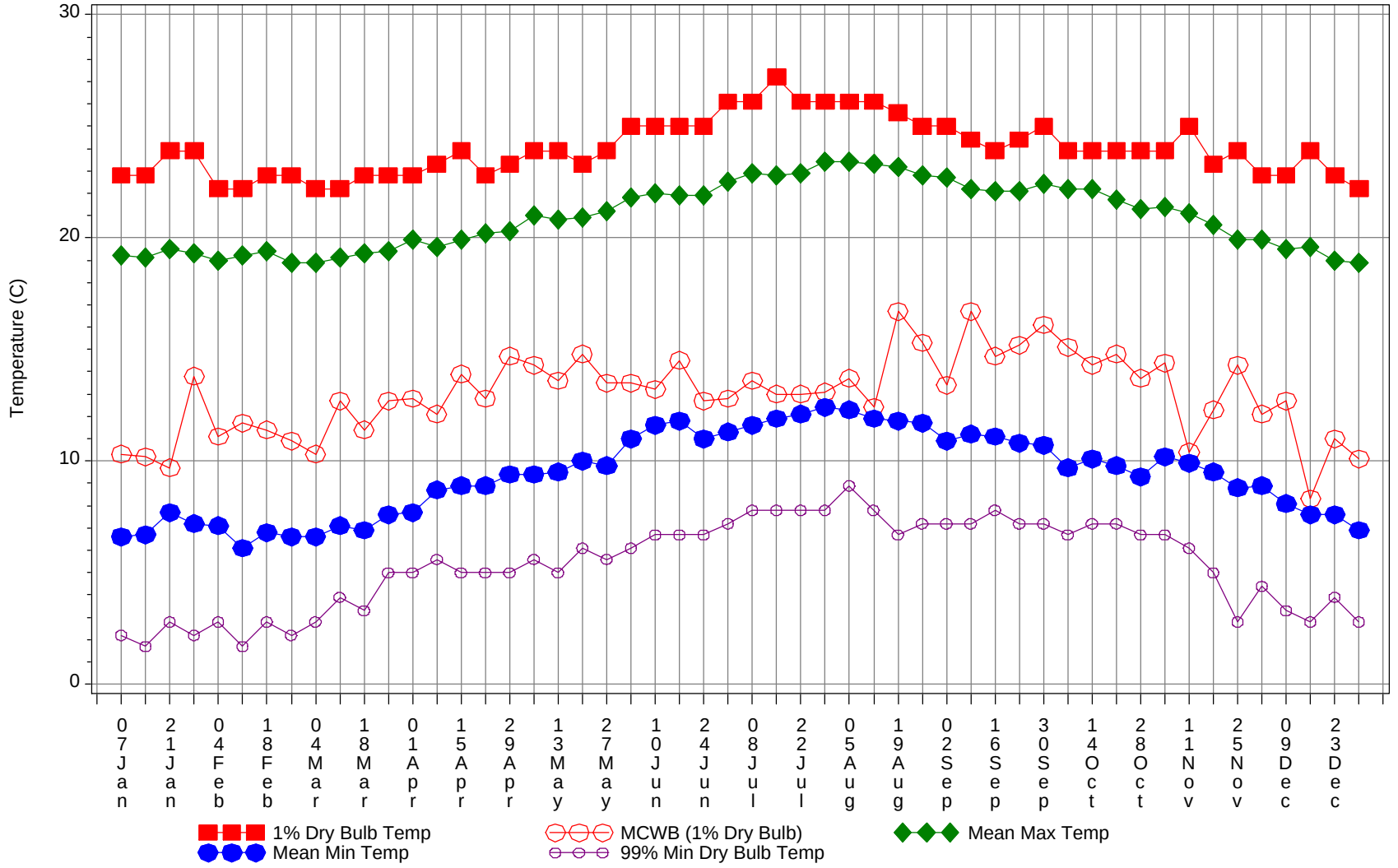
Caution: This summary reflects the typical distribtion of temperature in a typical year. It does not reflect the typical mositure distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary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

Dry-Bulb Temperature Hours For An Average Year

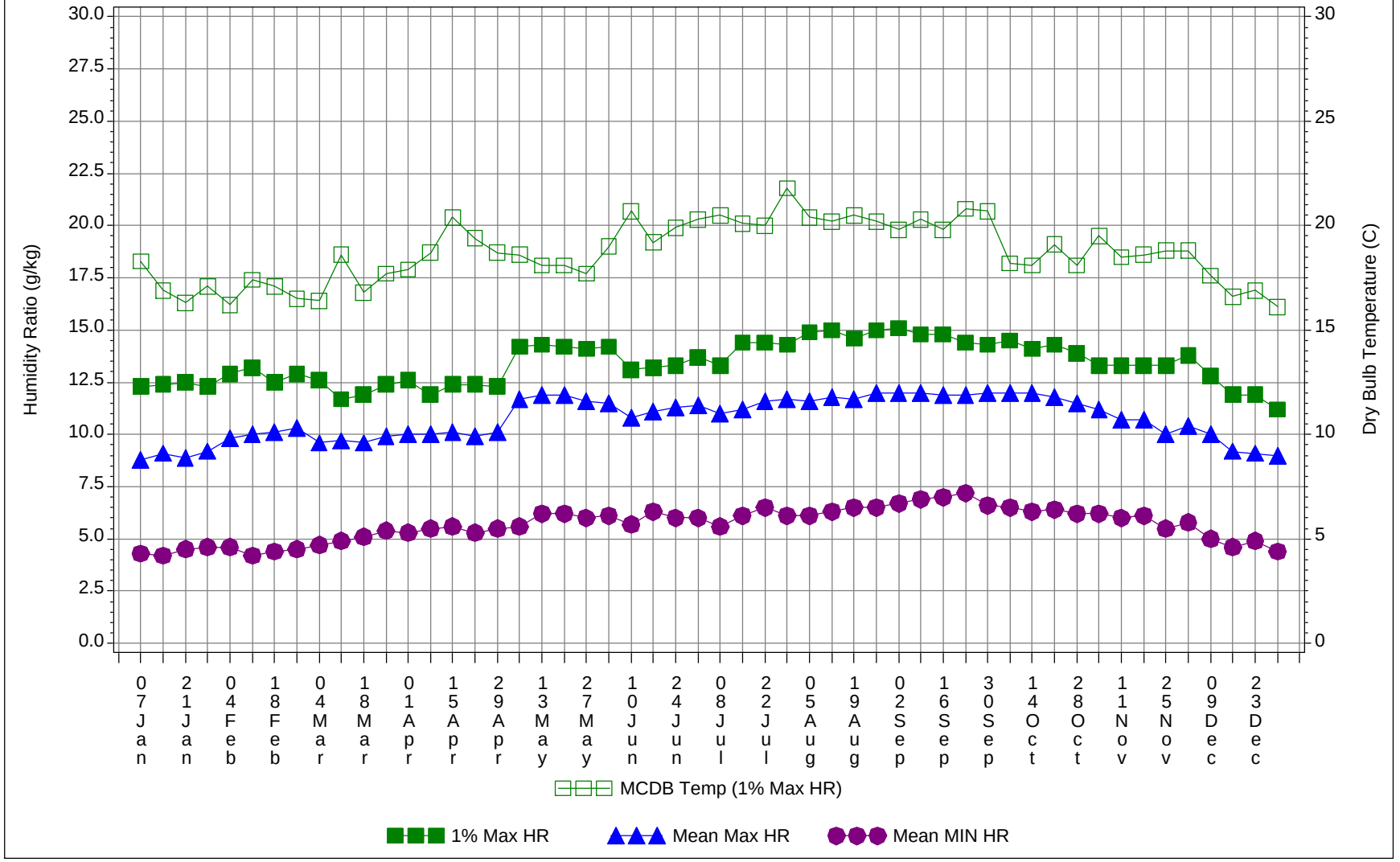
	Annual				
Temperature Range (°C)	**01 To 08 LST**	**09 To 16 LST**	**17 to 00 LST**	**Total Obs**	**MCWB (°C)**
27/ 29		5		5	12.5
24/ 26		67	1	68	13.9
21/ 23	14	833	16	863	14
18/ 20	71	969	143	1183	13.2
15/ 17	438	861	684	1983	11.8
12/ 14	604	159	981	1744	10.4
9/ 11	734	24	776	1534	8.4
6/ 8	797	3	292	1092	5.4
3/ 5	203	0	24	227	2.1
0/ 2	54	0	3	57	-0.4
-3/ -1	3			3	-3.4

Caution: This summary reflects the typical distribtion of temperature in a typical year. It does not reflect the typical mositure 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.

Annual Summary of Temperatures



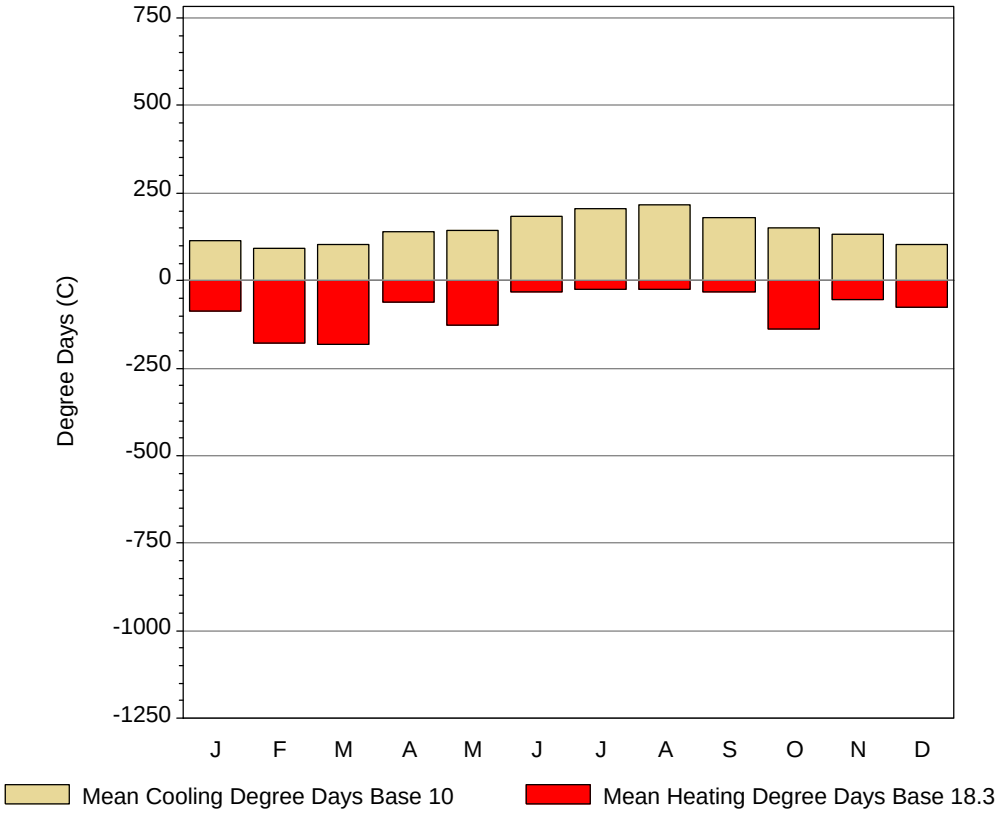
Long Term Humidity and Dry Bulb Temperature Summary



Long Term Humidity and Dry Bulb Temperature Summary

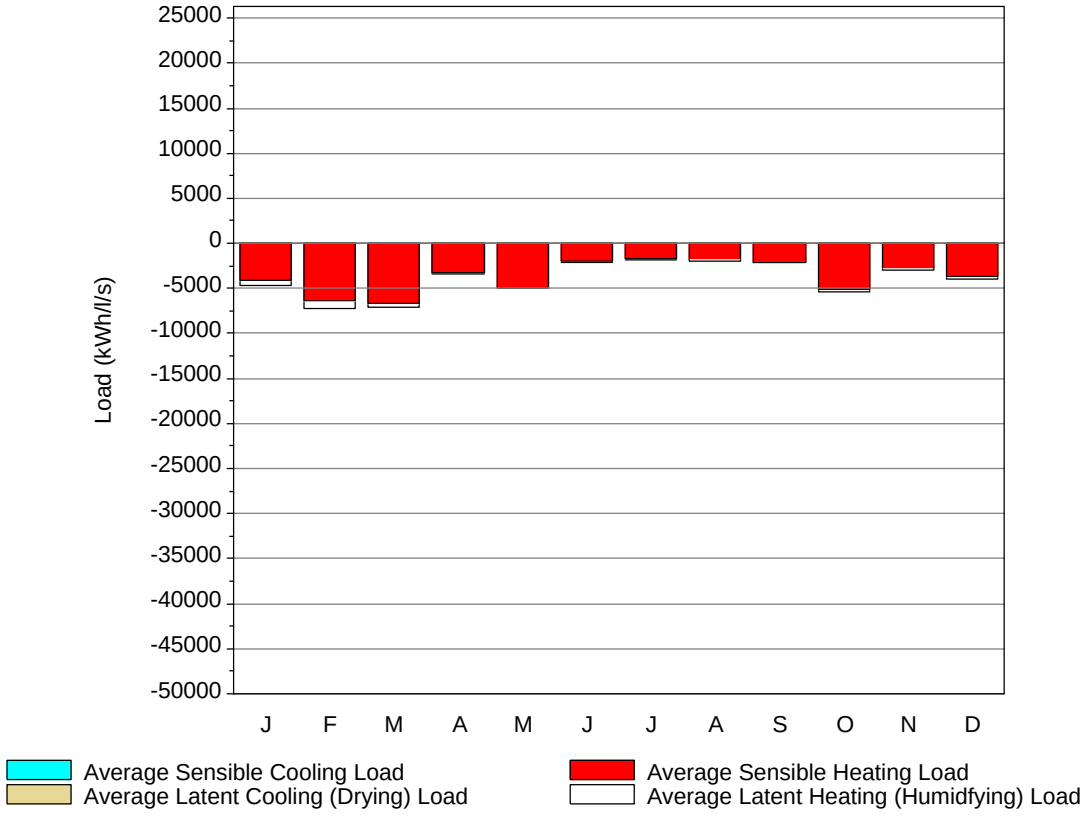
Week Ending	1.0% Temp (°C)	MCWB@ 1% Temp (°C)	Mean Max Temp (°C)	Mean Min Temp (°C)	99% Temp (°C)	1.0% HR (g/kg)	MCDB@ 1% HR (°C)	Mean Max HR (g/kg)	Mean Min HR (g/kg)
7-Jan	22.8	10.3	19.2	6.6	2.2	12.3	18.3	8.8	4.3
14-Jan	22.8	10.2	19.1	6.7	1.7	12.4	16.9	9.1	4.2
21-Jan	23.9	9.7	19.5	7.7	2.8	12.5	16.3	8.9	4.5
28-Jan	23.9	13.8	19.3	7.2	2.2	12.3	17.1	9.2	4.6
4-Feb	22.2	11.1	19	7.1	2.8	12.9	16.2	9.8	4.6
11-Feb	22.2	11.7	19.2	6.1	1.7	13.2	17.4	10	4.2
18-Feb	22.8	11.4	19.4	6.8	2.8	12.5	17.1	10.1	4.4
25-Feb	22.8	10.9	18.9	6.6	2.2	12.9	16.5	10.3	4.5
4-Mar	22.2	10.3	18.9	6.6	2.8	12.6	16.4	9.6	4.7
11-Mar	22.2	12.7	19.1	7.1	3.9	11.7	18.6	9.7	4.9
18-Mar	22.8	11.4	19.3	6.9	3.3	11.9	16.8	9.6	5.1
25-Mar	22.8	12.7	19.4	7.6	5	12.4	17.7	9.9	5.4
1-Apr	22.8	12.8	19.9	7.7	5	12.6	17.9	10	5.3
8-Apr	23.3	12.1	19.6	8.7	5.6	11.9	18.7	10	5.5
15-Apr	23.9	13.9	19.9	8.9	5	12.4	20.4	10.1	5.6
22-Apr	22.8	12.8	20.2	8.9	5	12.4	19.4	9.9	5.3
29-Apr	23.3	14.7	20.3	9.4	5	12.3	18.7	10.1	5.5
6-May	23.9	14.3	21	9.4	5.6	14.2	18.6	11.7	5.6
13-May	23.9	13.6	20.8	9.5	5	14.3	18.1	11.9	6.2
20-May	23.3	14.8	20.9	10	6.1	14.2	18.1	11.9	6.2
27-May	23.9	13.5	21.2	9.8	5.6	14.1	17.7	11.6	6
4-Jun	25	13.5	21.8	11	6.1	14.2	19	11.5	6.1
10-Jun	25	13.2	22	11.6	6.7	13.1	20.7	10.8	5.7
17-Jun	25	14.5	21.9	11.8	6.7	13.2	19.2	11.1	6.3
24-Jun	25	12.7	21.9	11	6.7	13.3	19.9	11.3	6
1-Jul	26.1	12.8	22.5	11.3	7.2	13.7	20.3	11.4	6
8-Jul	26.1	13.6	22.9	11.6	7.8	13.3	20.5	11	5.6
15-Jul	27.2	13	22.8	11.9	7.8	14.4	20.1	11.2	6.1
22-Jul	26.1	13	22.9	12.1	7.8	14.4	20	11.6	6.5
29-Jul	26.1	13.1	23.4	12.4	7.8	14.3	21.8	11.7	6.1
5-Aug	26.1	13.7	23.4	12.3	8.9	14.9	20.4	11.6	6.1
12-Aug	26.1	12.4	23.3	11.9	7.8	15	20.2	11.8	6.3
19-Aug	25.6	16.7	23.2	11.8	6.7	14.6	20.5	11.7	6.5
26-Aug	25	15.3	22.8	11.7	7.2	15	20.2	12	6.5
2-Sep	25	13.4	22.7	10.9	7.2	15.1	19.8	12	6.7
9-Sep	24.4	16.7	22.2	11.2	7.2	14.8	20.3	12	6.9
16-Sep	23.9	14.7	22.1	11.1	7.8	14.8	19.8	11.9	7
23-Sep	24.4	15.2	22.1	10.8	7.2	14.4	20.8	11.9	7.2
30-Sep	25	16.1	22.4	10.7	7.2	14.3	20.7	12	6.6
7-Oct	23.9	15.1	22.2	9.7	6.7	14.5	18.2	12	6.5
14-Oct	23.9	14.3	22.2	10.1	7.2	14.1	18.1	12	6.3
21-Oct	23.9	14.8	21.7	9.8	7.2	14.3	19.1	11.8	6.4
28-Oct	23.9	13.7	21.3	9.3	6.7	13.9	18.1	11.5	6.2
4-Nov	23.9	14.4	21.4	10.2	6.7	13.3	19.5	11.2	6.2
11-Nov	25	10.4	21.1	9.9	6.1	13.3	18.5	10.7	6
18-Nov	23.3	12.3	20.6	9.5	5	13.3	18.6	10.7	6.1
25-Nov	23.9	14.3	19.9	8.8	2.8	13.3	18.8	10	5.5
2-Dec	22.8	12.1	19.9	8.9	4.4	13.8	18.8	10.4	5.8
9-Dec	22.8	12.7	19.5	8.1	3.3	12.8	17.6	10	5
16-Dec	23.9	8.3	19.6	7.6	2.8	11.9	16.6	9.2	4.6
23-Dec	22.8	11	19	7.6	3.9	11.9	16.9	9.1	4.9
31-Dec	22.2	10.1	18.9	6.9	2.8	11.2	16.1	9	4.4

Degree Days, Heating and Cooling
(Base 18.3 C) & Cooling (Base 10 C)



Month	Mean Cooling Degree Days (°C) Base 10	Mean Cooling Degree Days (°C) Base 18.3	Mean Heating Degree Days (°C) Base 18.3
JAN	114	6	88
FEB	91	5	178
MAR	103	6	181
APR	138	9	62
MAY	144	13	127
JUN	184	28	30
JUL	204	39	26
AUG	216	41	26
SEP	179	26	34
OCT	150	21	138
NOV	133	11	52
DEC	103	5	76
ANN	1759	211	1019

Average Ventilation and Infiltration Loads
(Outside Air vs 24C, 60% RH summer; 20C, 30% RH winter)



Month	Average Sensible Cooling Load (kWh/l/s)	Average Sensible Heating Load (kWh/l/s)	Average Latent Cooling Load (kWh/l/s)	Average Latent Heating Load (kWh/l/s)
JAN	3	-4136	41	-536
FEB	1	-6397	14	-865
MAR	1	-6594	0	-540
APR	4	-3285	13	-147
MAY	4	-4890	19	-124
JUN	13	-1980	18	-101
JUL	32	-1745	25	-129
AUG	21	-1828	37	-92
SEP	6	-2134	54	-37
OCT	6	-5133	34	-222
NOV	4	-2779	8	-174
DEC	1	-3614	15	-375
ANN	94	-44517	278	-3344

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

Station Information		Shading Geometry in Dimensionless Units	
City, State, WBAN	HILO, HI 21504	Window:	1.000
Lat, Lon, Elev	19.72N 155.07W 36ft	Overhang:	1.128
Press, Stn_Type	14.7psia Secondary	Vert Gap:	0.200

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	1190	1350	1450	1520	1630	1710	1650	1680	1590	1380	1170	1110	1450
	Std.Dev.	125	151	162	124	134	105	137	119	134	128	126	115	56
	Minimum	890	1090	1120	1330	1320	1470	1400	1390	1340	1160	920	880	1340
	Maximum	1460	1620	1730	1770	1830	1880	2020	1970	1800	1720	1410	1330	1590
	Diffuse	490	570	710	800	800	790	790	730	680	630	560	490	670
Clear Day	Global	1720	1980	2280	2500	2580	2590	2580	2510	2330	2050	1760	1620	2210
NORTH	Global	320	360	410	460	570	680	620	490	410	380	330	310	440
	Diffuse	320	360	410	440	480	510	490	440	410	380	330	310	410
Clear Day	Global	290	310	350	430	710	970	850	510	350	320	290	270	470
EAST	Global	710	780	800	820	850	860	820	860	860	780	670	650	790
	Diffuse	390	430	490	540	550	550	540	530	510	470	400	370	480
Clear Day	Global	1040	1170	1310	1390	1400	1390	1380	1380	1320	1210	1070	1000	1250
SOUTH	Global	1190	1080	810	580	460	450	440	510	730	950	1050	1160	780
	Diffuse	480	500	500	480	450	450	440	450	480	510	490	470	470
Clear Day	Global	1980	1740	1270	680	390	380	380	520	1010	1580	1910	2020	1150
WEST	Global	650	720	760	770	820	870	850	880	840	730	640	610	760
	Diffuse	390	430	500	540	550	560	550	540	510	460	410	380	480
Clear Day	Global	1040	1170	1310	1390	1400	1390	1380	1380	1320	1210	1070	1000	1250

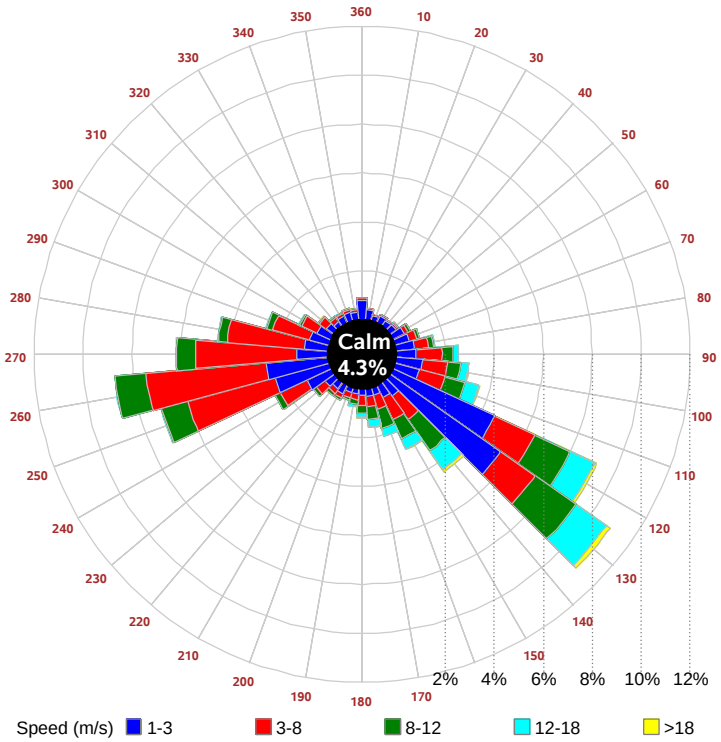
Average Annual Solar Radiation - Nearest Available Site
Source: National Renewable Energy Laboratory, Golden CO, 1995

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	840	970	1050	1100	1190	1240	1200	1230	1160	990	830	780	1050
NORTH	Unshaded	220	250	280	310	350	410	380	320	280	260	230	210	290
	Shaded	160	180	200	220	240	260	250	230	210	190	170	150	200
EAST	Unshaded	490	550	570	580	600	600	580	610	610	550	470	460	560
	Shaded	300	330	330	330	340	340	330	350	350	320	280	280	320
SOUTH	Unshaded	850	730	510	360	310	310	310	320	430	620	740	840	530
	Shaded	270	230	230	230	230	230	220	230	240	230	240	290	240
WEST	Unshaded	450	500	530	540	580	610	600	630	590	510	440	430	540
	Shaded	270	300	310	310	330	340	340	350	340	300	260	250	310

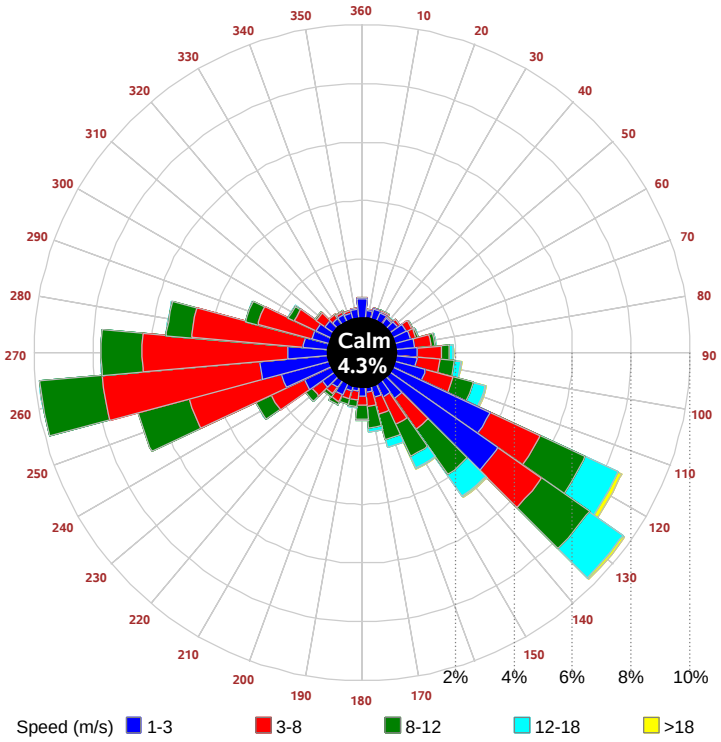
AVERAGE INCIDENT ILLUMINANCE (klux-hr) FOR MOSTLY CLEAR AND MOSTLY CLOUDY CONDITIONS Percentage Uncertainty = 9											
				March					June		
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm
HORIZ.	M.Clear	43	84	100	83	41	57	91	104	87	49
	M.Cloudy	26	51	65	53	24	37	61	75	62	32
NORTH	M.Clear	11	15	16	16	11	30	25	21	26	30
	M.Cloudy	11	16	19	18	10	20	22	21	24	19
EAST	M.Clear	80	65	17	16	11	78	58	15	16	12
	M.Cloudy	31	36	19	18	10	39	40	17	18	12
SOUTH	M.Clear	27	48	56	48	26	13	16	15	16	12
	M.Cloudy	15	29	38	31	14	13	17	17	18	12
WEST	M.Clear	11	15	17	65	75	13	16	19	64	76
	M.Cloudy	11	16	19	38	28	13	17	20	45	36
M.Clear	(% hrs)	23	26	25	21	18	17	21	22	20	16

				Sept					Dec		
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm
HORIZ.	M.Clear	51	90	101	82	39	32	68	78	60	20
	M.Cloudy	32	58	71	56	25	19	40	52	39	13
NORTH	M.Clear	12	16	16	16	11	9	14	15	13	7
	M.Cloudy	12	17	18	17	10	8	14	17	14	6
EAST	M.Clear	81	61	16	16	11	64	53	15	13	7
	M.Cloudy	37	39	18	17	10	23	28	17	14	6
SOUTH	M.Clear	23	41	46	37	17	48	76	82	69	34
	M.Cloudy	16	29	36	29	12	19	37	47	36	12
WEST	M.Clear	12	16	23	69	75	9	14	21	58	51
	M.Cloudy	12	17	22	45	32	8	14	19	32	17
M.Clear	(% hrs)	27	29	28	26	21	33	35	35	30	24

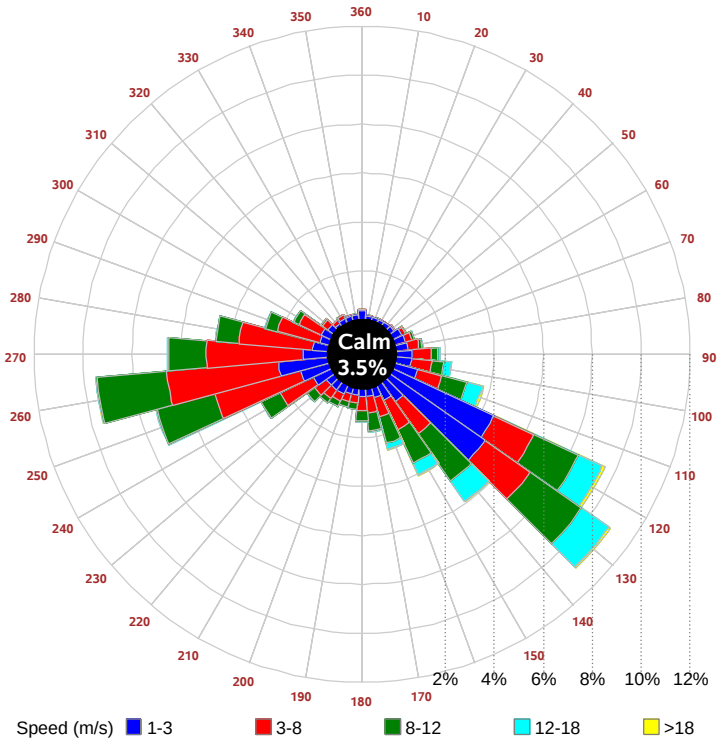
Wind Summary - December, January, and February



Wind Summary - March, April, and May



Wind Summary - June, July, and August



Wind Summary - September, October, and November