

MANDALGOBI, MG	Station ID = WMO_44341
Latitude = 45.77 N	Elevation = 1393 Meters
Longitude = 106.28 E	Average Pressure = 858.5 mb
Period of Record = 1988 To 2017	

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	34	17	7	6.1	S
0.4% Occurrence	32	16	7	5.7	S
1.0% Occurrence	29	15	7	5.3	W
2.0% Occurrence	28	15	7	5.4	SW
Mean Daily Range	11	-	-	-	NW
97.5% Occurrence	-23	-24	0	3.4	NW
99.0% Occurrence	-26	-26	0	3.5	NW
99.6% Occurrence	-27	-27	0	3.4	NW
Median of Extreme Lows	-30	-30	0	2.6	NW

	Design Value (°C)	Dry Bulb Temperature (°C)	Humidity Ratio (g/kg)	Wind Speed (m/s)	Prevailing Direction (NSEW)
Wet Bulb Temperature (T _{wb})					
Median of Extreme Highs	37	37	-	8.2	SSW
0.4% Occurrence	25	28	18	6	SE
1.0% Occurrence	20	27	13	4.9	SE
2.0% Occurrence	17	25	11	4.8	SE

	Design Value (g/kg)	Dry Bulb Temperature (°C)	Vapor Pressure (kPa)	Wind Speed (m/s)	Prevailing Direction (NSEW)
Humidity Ratio (HR)					
Median of Extreme Highs	15	25	68.69	4.6	S
0.4% Occurrence	14	22	61.09	4.3	NNE
1.0% Occurrence	12	20	55.81	4.4	N
2.0% Occurrence	11	19	51.34	4.3	N

Air Conditioning/ Humid Area Criteria	Threshold	T ≥ 33.9 °C	T ≥ 26.7 °C	Twb ≥ 22.8 °C	Twb ≥ 19.4 °C
	# of Hours	4	88	2	11

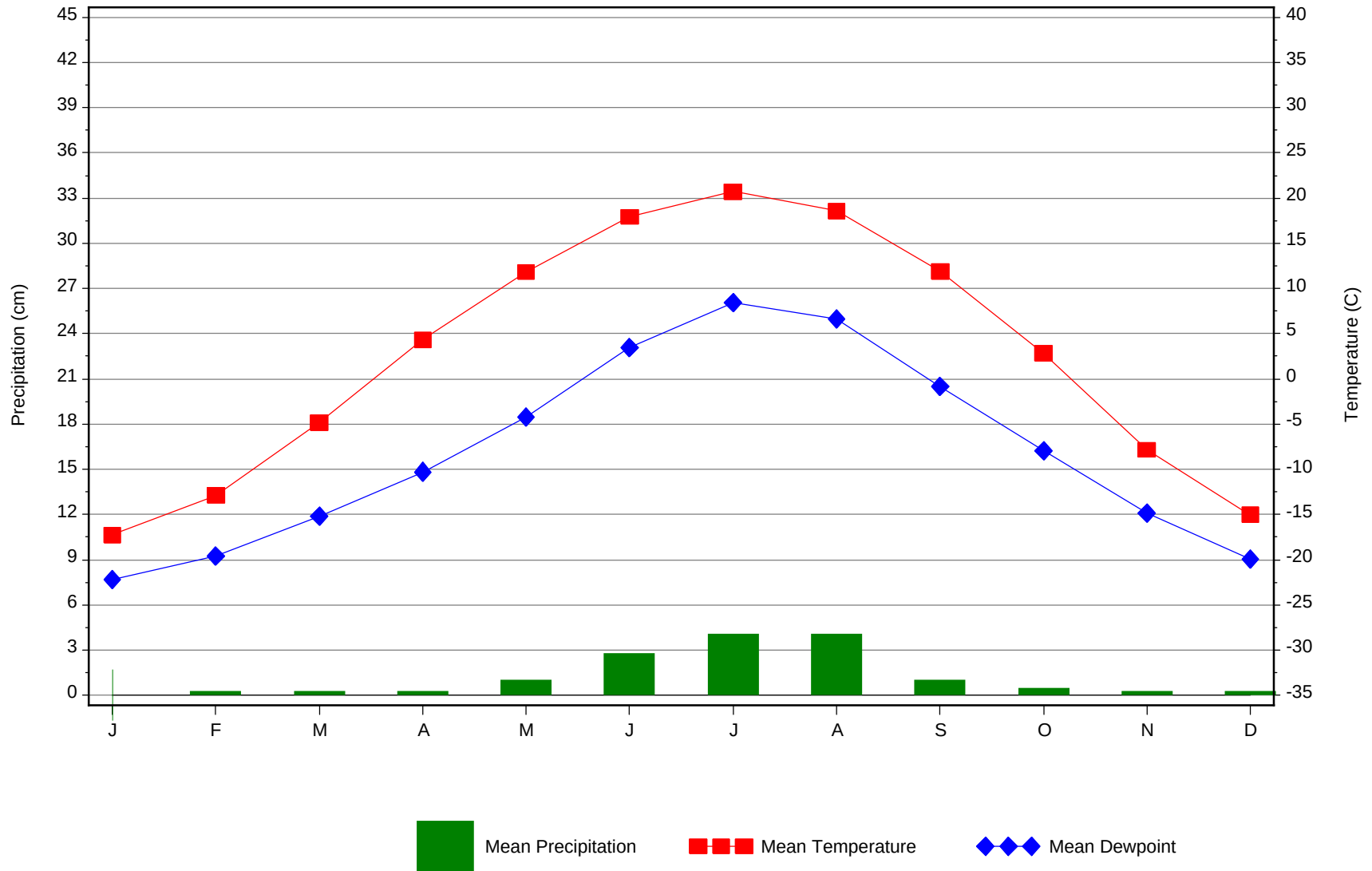
Other Site Data

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
4	N/A	N/A	0.0 + 0.1
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 (#)
3.8	N/A	N/A	68

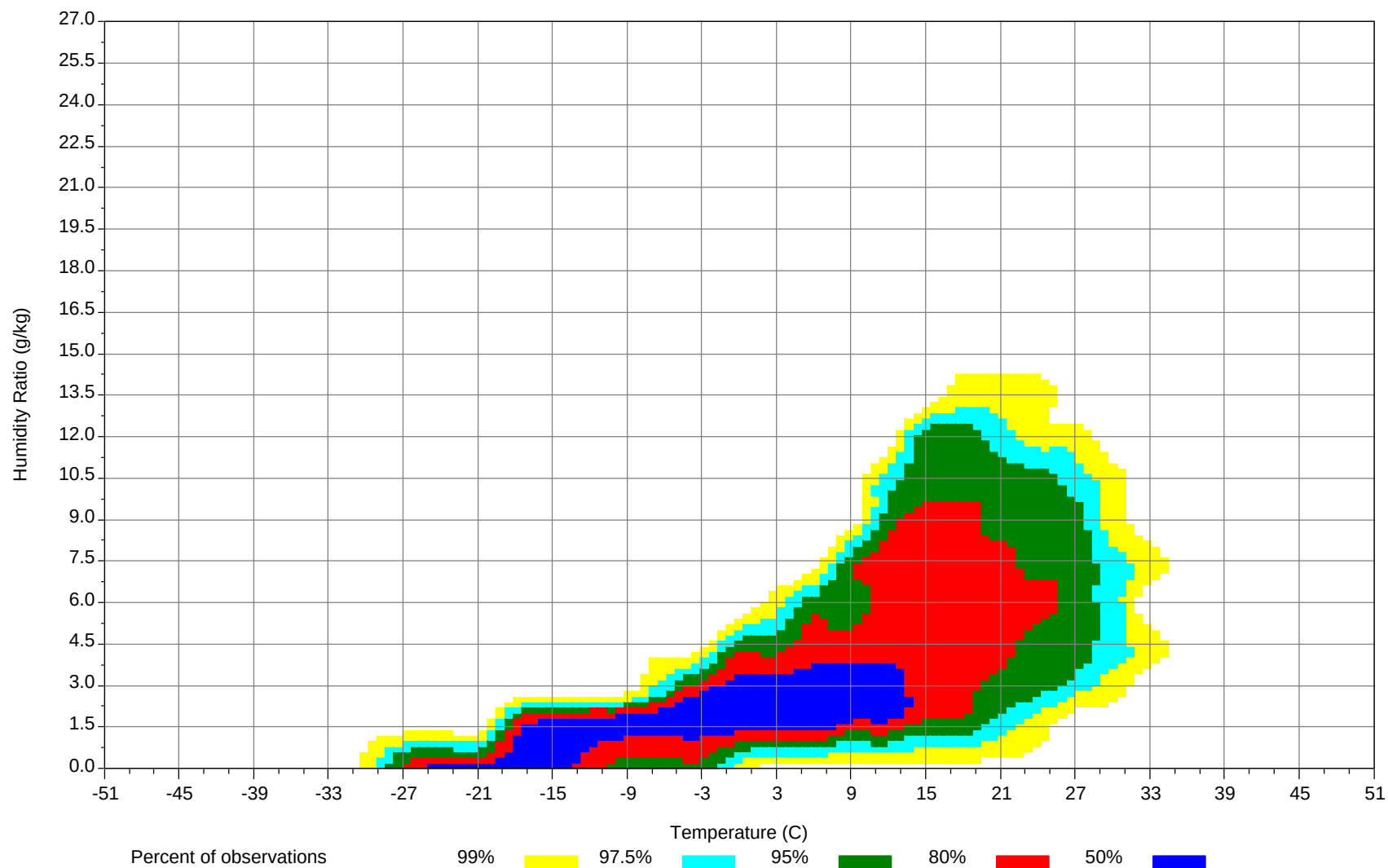
*Note: Temperatures at greater depths can be estimated by adding 0.83° C per 30 meters additional depth.



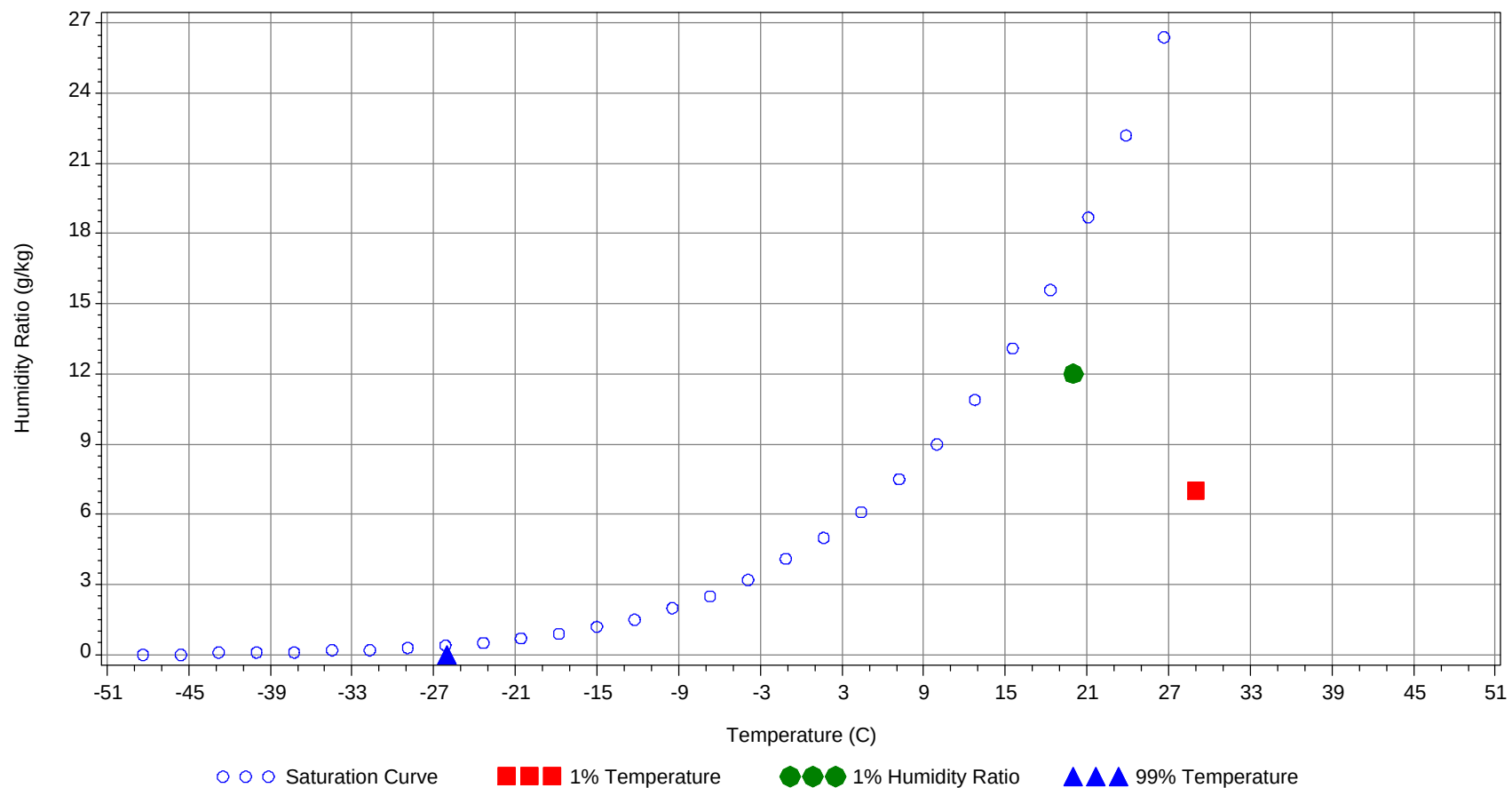
Average Annual Climate



Long Term Psychrometric Summary



Psychrometric Summary of Peak Design Values



	(°C) / (g/kg)	MCDB (°C)	MCWB (°C)	MCDP (°C)	MCHR (g/kg)	Enthalpy (kJ/kg)
1.0% Dry Bulb	29.0		15		7.0	48.6
99.0% Dry Bulb	-26.0				0.0	-25.0
1.0% Humidity Ratio	12.0	20.0	16.3	14.6		51.3

Dry-Bulb Temperature Hours For An Average Year

Temperature Range (°C)	January					February					March				
	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°C)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°C)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°C)
36/ 38															
33/ 35															
30/ 32															
27/ 29															
24/ 26															
21/ 23															
18/ 20												0	0	0	9.5
15/ 17												1	1	2	5.7
12/ 14											0	4	3	7	4
9/ 11											0	9	7	16	2.3
6/ 8							1	1	2	0.4	1	23	15	39	0.7
3/ 5							3	2	5	-1.4	2	30	26	58	-1
0/ 2		1	0	1	-4	1	12	8	21	-3.4	11	44	38	93	-3.1
-3/ -1		4	2	6	-5.4	1	20	13	34	-5.2	24	36	39	99	-5.1
-6/ -4	0	9	6	15	-7.3	3	24	23	50	-7.1	37	35	37	109	-7.1
-9/ -7	2	26	20	48	-9.6	15	41	38	94	-9.5	49	32	37	118	-9.4
-12/-10	7	34	27	68	-12.1	30	41	38	109	-11.9	43	18	22	83	-11.9
-15/-13	21	43	39	103	-14.5	35	29	33	97	-14.4	38	8	12	58	-14.3
-18/-16	52	56	60	168	-17.1	50	30	35	115	-17.1	25	6	8	39	-16.9
-21/-19	57	43	46	146	-19.9	39	15	16	70	-19.9	12	1	3	16	-19.8
-24/-22	58	24	32	114	-22.8	30	7	13	50	-22.8	5	0	1	6	-22.6
-27/-25	33	7	12	52	-25.6	15	2	4	21	-25.7	0			0	-25.1
-30/-28	13	2	3	18	-28.4	4	0	0	4	-28.2					
-33/-31	3		1	4	-30.7	1		0	1	-31.1					
-36/-34	0			0	-33.8	0			0	-34					

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

Temperature Range (°C)	April					May					June				
	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°C)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°C)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°C)
36/ 38												0	0	0	16.3
33/ 35												1	1	2	15.1
30/ 32							0	1	1	17.6		10	8	18	14.7
27/ 29		0	0	0	10.5		7	5	12	12.5	0	22	17	39	14.1
24/ 26		0	0	0	9.2		16	11	27	11.4	1	39	30	70	13.1
21/ 23		5	4	9	8.7	1	30	25	56	9.9	9	56	48	113	11.9
18/ 20	0	11	8	19	7.6	5	33	29	67	8.7	28	46	47	121	11
15/ 17	1	25	19	45	6.1	15	48	44	107	7.1	64	37	45	146	9.9
12/ 14	2	27	22	51	4.5	30	34	38	102	5.7	56	20	24	100	8.7
9/ 11	7	35	32	74	2.9	43	32	33	108	4.2	46	6	14	66	7.2
6/ 8	25	43	44	112	1.2	59	27	33	119	2.7	26	2	4	32	5.1
3/ 5	34	34	33	101	-0.7	43	13	16	72	0.8	7	0	1	8	2.3
0/ 2	56	32	36	124	-2.5	35	7	10	52	-1.3	2			2	-0.2
-3/ -1	43	15	21	79	-4.5	12	1	2	15	-4					
-6/ -4	36	7	10	53	-6.7	5	0	0	5	-6.2					
-9/ -7	23	6	7	36	-9.1	1	0		1	-8.9					
-12/-10	10	1	2	13	-11.6										
-15/-13	4		1	5	-14.2										
-18/-16	1			1	-16.1										
-21/-19	0			0	-19										
-24/-22															
-27/-25															
-30/-28															
-33/-31															
-36/-34															

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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	M C W B (°C)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°C)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°C)
36/ 38		1	1	2	19.5		0	0	0	15					
33/ 35		6	4	10	18	0	2	1	3	16.3					
30/ 32	0	21	17	38	16.8	0	11	9	20	16		0	0	0	12.9
27/ 29	1	33	30	64	15.7	0	24	19	43	15.2		2	2	4	14
24/ 26	5	52	45	102	14.7	1	42	30	73	14.2		13	7	20	12.6
21/ 23	27	65	56	148	13.9	13	59	53	125	13.2	0	30	22	52	11.1
18/ 20	55	40	45	140	13.4	33	48	48	129	12.3	2	39	26	67	10
15/ 17	93	24	38	155	12.5	79	43	53	175	11.5	14	54	45	113	8.5
12/ 14	48	6	10	64	11	64	15	24	103	10.1	31	37	42	110	7.1
9/ 11	15	1	2	18	8.8	43	4	8	55	8.3	49	30	40	119	5.4
6/ 8	3	0	0	3	5.9	13	1	3	17	5.7	64	23	31	118	3.5
3/ 5						2	0	1	3	3.7	39	8	14	61	1.3
0/ 2						0			0	1.5	30	4	8	42	-0.9
-3/ -1											7	1	2	10	-3.5
-6/ -4											3	0	1	4	-6.1
-9/ -7											1			1	-7.8
-12/-10															
-15/-13															
-18/-16															
-21/-19															
-24/-22															
-27/-25															
-30/-28															
-33/-31															
-36/-34															

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Dry-Bulb Temperature Hours For An Average Year

Temperature Range (°C)	October					November					December				
	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°C)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°C)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (°C)
36/ 38															
33/ 35															
30/ 32															
27/ 29															
24/ 26															
21/ 23		1	1	2	9.1										
18/ 20		5	3	8	8										
15/ 17		16	10	26	6.7										
12/ 14	0	27	15	42	5.1		1		1	6.5					
9/ 11	3	35	28	66	3.7		4	2	6	2.4					
6/ 8	17	50	43	110	1.8		9	5	14	1.1					
3/ 5	32	40	41	113	0.2	1	18	10	29	-0.7		0	0	0	-1.3
0/ 2	62	38	48	148	-1.9	4	35	24	63	-2.8	0	3	1	4	-3.5
-3/ -1	52	19	27	98	-4.2	15	31	30	76	-4.7	1	7	3	11	-5.1
-6/ -4	41	10	16	67	-6.1	27	41	36	104	-6.6	2	19	10	31	-7.2
-9/ -7	25	5	10	40	-8.7	50	40	46	136	-9.2	7	37	26	70	-9.5
-12/-10	10	1	3	14	-11.1	42	25	32	99	-11.5	20	46	40	106	-11.8
-15/-13	4		1	5	-13.5	40	17	24	81	-14.2	40	49	51	140	-14.4
-18/-16	1			1	-16.5	34	11	19	64	-16.8	60	47	57	164	-16.9
-21/-19	0			0	-20.5	17	5	8	30	-19.8	56	25	35	116	-19.8
-24/-22						8	2	4	14	-22.8	41	12	18	71	-22.6
-27/-25						2	0	1	3	-25.6	15	3	5	23	-25.6
-30/-28						0			0	-28.3	4	0	1	5	-28.1
-33/-31											1	0	0	1	-30.7
-36/-34											0			0	-35.5

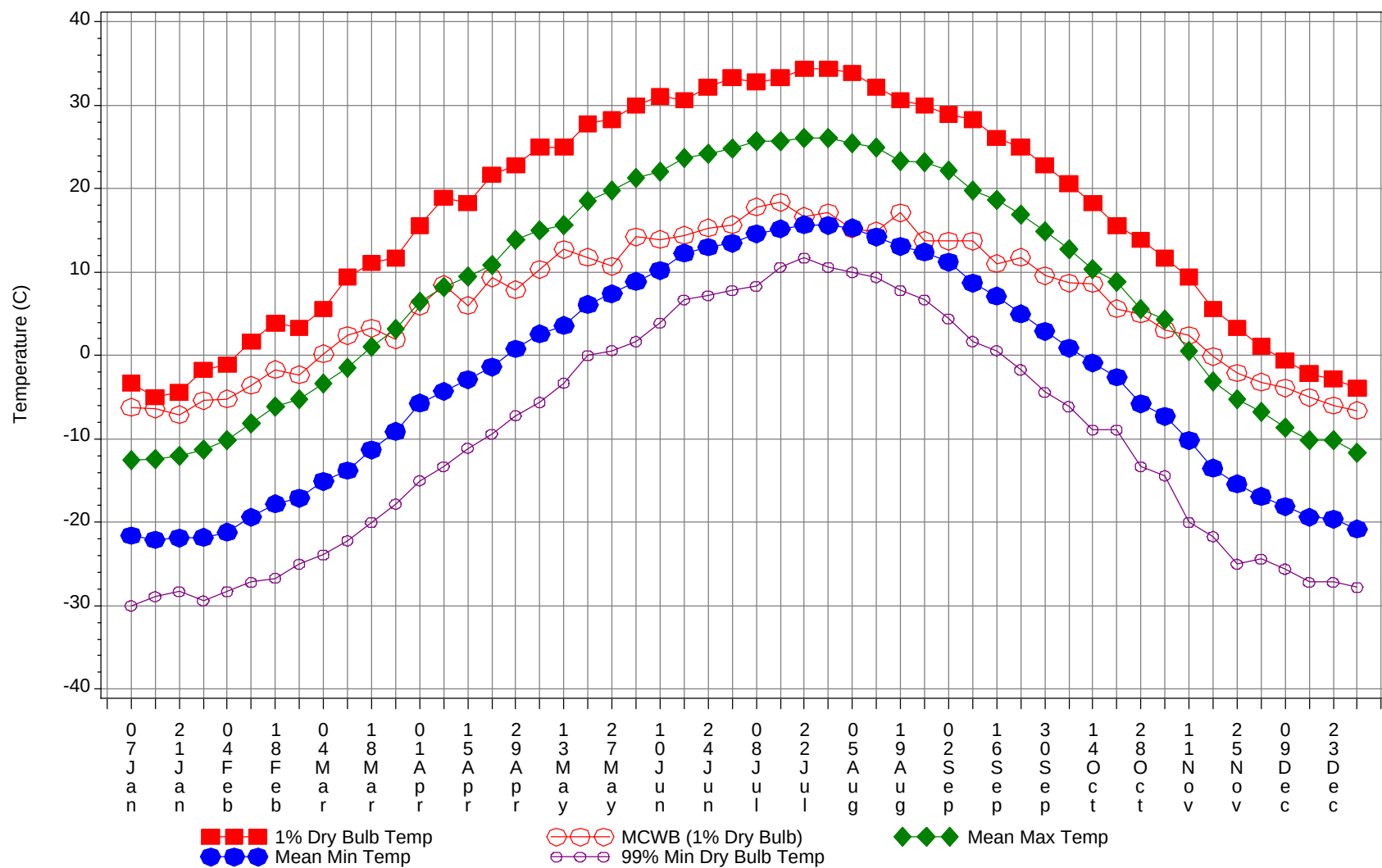
Caution: This summary reflects the typical distribution of temperature in a typical year. It does not reflect the typical moisture distribution. Because wet bulb temperatures are averaged, this summary understates the annual moisture load. For accurate moisture load data, see the long-term humidity summary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

Dry-Bulb Temperature Hours For An Average Year

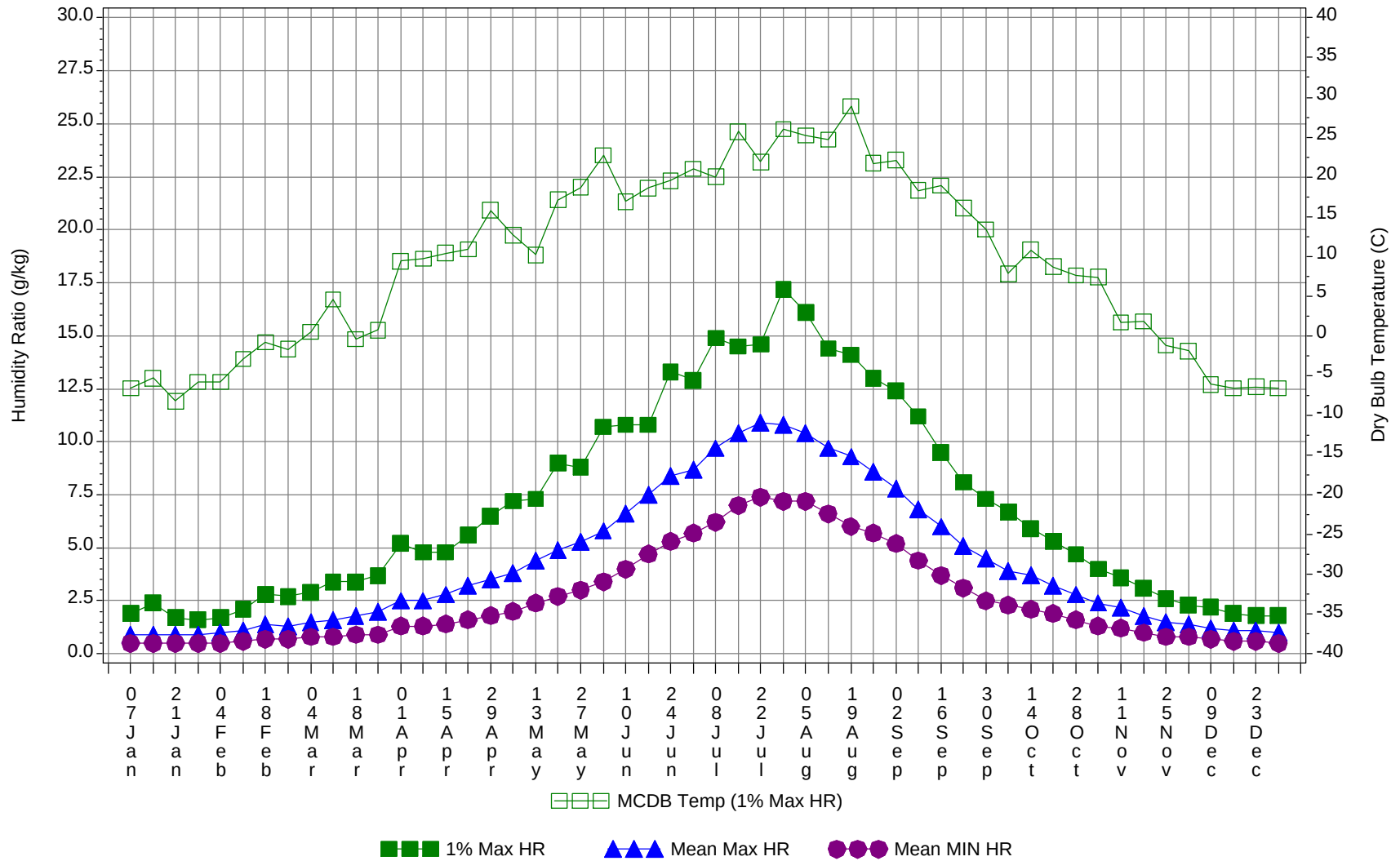
	Annual				
Temperature Range (° C)	01 To 08 LST	09 To 16 LST	17 to 00 LST	Total Obs	M C W B (° C)
36/ 38		2	1	3	18.6
33/ 35	0	8	6	14	17.2
30/ 32	0	41	35	76	16.1
27/ 29	1	86	72	159	14.9
24/ 26	7	159	122	288	13.7
21/ 23	49	243	206	498	12.5
18/ 20	121	219	204	544	11.4
15/ 17	261	245	253	759	10
12/ 14	228	171	176	575	7.8
9/ 11	205	156	165	526	5.2
6/ 8	207	178	179	564	2.5
3/ 5	159	146	145	450	0.1
0/ 2	201	175	173	549	-2.2
-3/ -1	156	136	141	433	-4.6
-6/ -4	154	147	141	442	-6.8
-9/ -7	175	190	186	551	-9.3
-12/-10	165	168	166	499	-11.8
-15/-13	184	149	163	496	-14.3
-18/-16	225	151	181	557	-17
-21/-19	183	89	109	381	-19.9
-24/-22	144	46	68	258	-22.7
-27/-25	67	13	22	102	-25.6
-30/-28	22	2	4	28	-28.3
-33/-31	5	0	1	6	-30.8
-36/-34	0			0	-34.2

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.

Annual Summary of Temperatures



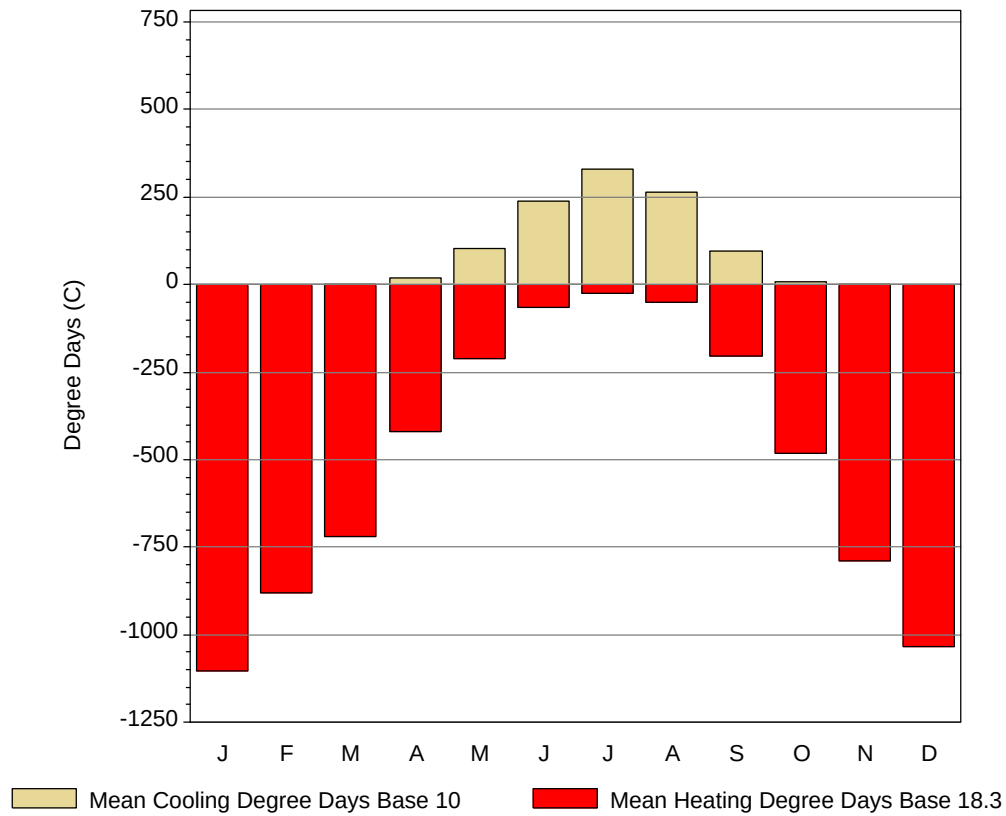
Long Term Humidity and Dry Bulb Temperature Summary



Long Term Humidity and Dry Bulb Temperature Summary

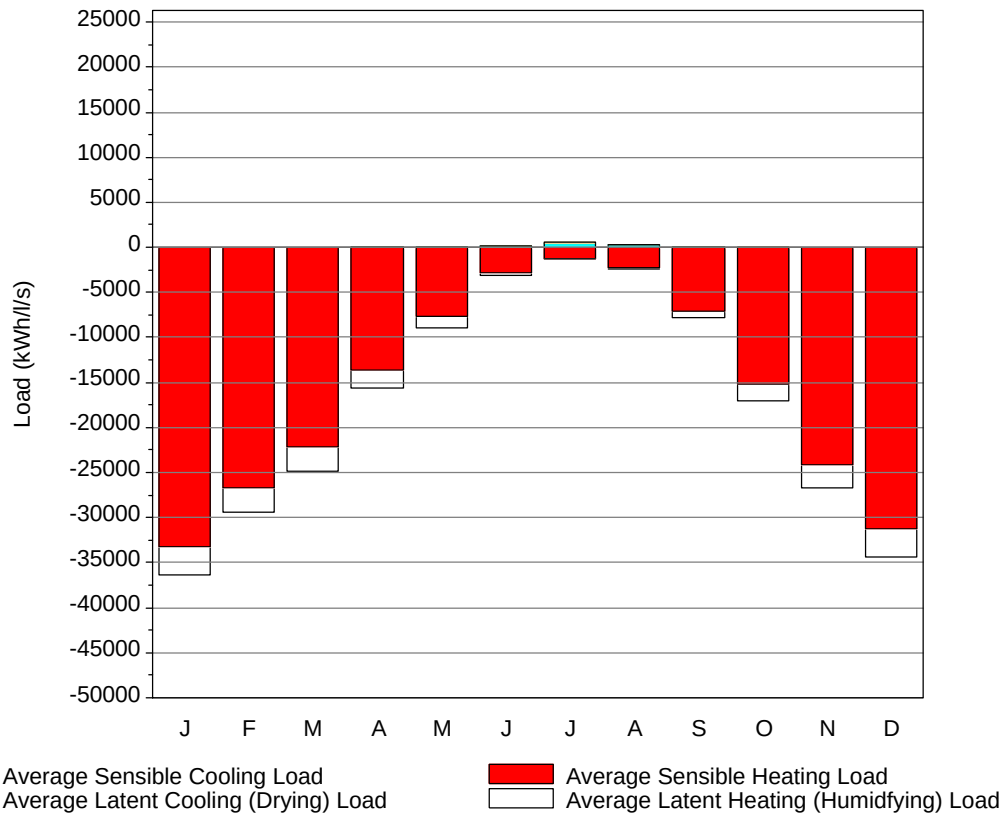
Week Ending	1.0% Temp (°C)	MCWB@ 1% Temp (°C)	Mean Max Temp (°C)	Mean Min Temp (°C)	99% Temp (°C)	1.0% HR (g/kg)	MCDB@ 1% HR (°C)	Mean Max HR (g/kg)	Mean Min HR (g/kg)
7-Jan	-3.3	-6.2	-12.6	-21.6	-30	1.9	-6.6	0.9	0.5
14-Jan	-5	-6.4	-12.4	-22.1	-28.9	2.4	-5.3	0.9	0.5
21-Jan	-4.4	-7.1	-12.1	-21.9	-28.3	1.7	-8.2	0.9	0.5
28-Jan	-1.7	-5.4	-11.3	-21.8	-29.4	1.6	-5.8	0.9	0.5
4-Feb	-1.1	-5.2	-10.1	-21.2	-28.3	1.7	-5.8	1	0.5
11-Feb	1.7	-3.6	-8.1	-19.4	-27.2	2.1	-2.9	1.1	0.6
18-Feb	3.9	-1.7	-6.1	-17.8	-26.7	2.8	-0.8	1.4	0.7
25-Feb	3.3	-2.3	-5.3	-17.1	-25	2.7	-1.7	1.3	0.7
4-Mar	5.6	0.2	-3.3	-15.1	-23.9	2.9	0.5	1.5	0.8
11-Mar	9.4	2.4	-1.5	-13.8	-22.2	3.4	4.6	1.6	0.8
18-Mar	11.1	3.3	1.1	-11.3	-20	3.4	-0.4	1.8	0.9
25-Mar	11.7	1.9	3.2	-9.1	-17.8	3.7	0.7	2	0.9
1-Apr	15.6	5.9	6.4	-5.7	-15	5.2	9.4	2.5	1.3
8-Apr	18.9	8.5	8.2	-4.3	-13.3	4.8	9.7	2.5	1.3
15-Apr	18.3	6	9.5	-2.9	-11.1	4.8	10.4	2.8	1.4
22-Apr	21.7	9.3	10.9	-1.4	-9.4	5.6	10.9	3.2	1.6
29-Apr	22.8	7.9	13.9	0.8	-7.2	6.5	15.8	3.5	1.8
6-May	25	10.3	15	2.6	-5.6	7.2	12.7	3.8	2
13-May	25	12.7	15.7	3.6	-3.3	7.3	10.2	4.4	2.4
20-May	27.8	11.8	18.5	6.1	0	9	17.1	4.9	2.7
27-May	28.3	10.7	19.8	7.4	0.6	8.8	18.7	5.3	3
4-Jun	30	14.2	21.3	8.9	1.7	10.7	22.7	5.8	3.4
10-Jun	31.1	13.9	22	10.2	3.9	10.8	16.9	6.6	4
17-Jun	30.6	14.4	23.7	12.3	6.7	10.8	18.6	7.5	4.7
24-Jun	32.2	15.3	24.2	13	7.2	13.3	19.5	8.4	5.3
1-Jul	33.3	15.7	24.8	13.5	7.8	12.9	21	8.7	5.7
8-Jul	32.8	17.8	25.7	14.6	8.3	14.9	20	9.7	6.2
15-Jul	33.3	18.4	25.7	15.2	10.6	14.5	25.7	10.4	7
22-Jul	34.4	16.7	26.1	15.7	11.7	14.6	21.9	10.9	7.4
29-Jul	34.4	17.1	26.1	15.6	10.6	17.2	26	10.8	7.2
5-Aug	33.9	15.2	25.4	15.3	10	16.1	25.2	10.4	7.2
12-Aug	32.2	14.9	24.9	14.2	9.4	14.4	24.7	9.7	6.6
19-Aug	30.6	17.1	23.3	13.1	7.8	14.1	28.9	9.3	6
26-Aug	30	13.8	23.2	12.4	6.7	13	21.7	8.6	5.7
2-Sep	28.9	13.7	22.2	11.2	4.4	12.4	22.1	7.8	5.2
9-Sep	28.3	13.7	19.8	8.7	1.7	11.2	18.3	6.8	4.4
16-Sep	26.1	11	18.7	7.1	0.6	9.5	18.9	6	3.7
23-Sep	25	11.8	16.9	5	-1.7	8.1	16.1	5.1	3.1
30-Sep	22.8	9.6	14.9	2.9	-4.4	7.3	13.4	4.5	2.5
7-Oct	20.6	8.7	12.8	0.9	-6.1	6.7	7.8	3.9	2.3
14-Oct	18.3	8.6	10.4	-0.9	-8.9	5.9	10.8	3.7	2.1
21-Oct	15.6	5.6	8.9	-2.6	-8.9	5.3	8.7	3.2	1.9
28-Oct	13.9	5	5.6	-5.8	-13.3	4.7	7.6	2.8	1.6
4-Nov	11.7	3.1	4.3	-7.3	-14.4	4	7.4	2.4	1.3
11-Nov	9.4	2.4	0.6	-10.2	-20	3.6	1.7	2.2	1.2
18-Nov	5.6	-0.1	-3.1	-13.5	-21.7	3.1	1.8	1.8	1
25-Nov	3.3	-2.1	-5.2	-15.4	-25	2.6	-1.2	1.5	0.8
2-Dec	1.1	-3.2	-6.7	-16.9	-24.4	2.3	-1.9	1.4	0.8
9-Dec	-0.6	-3.9	-8.6	-18.1	-25.6	2.2	-6.1	1.2	0.7
16-Dec	-2.2	-5	-10.1	-19.4	-27.2	1.9	-6.6	1.1	0.6
23-Dec	-2.8	-6	-10.2	-19.6	-27.2	1.8	-6.4	1.1	0.6
31-Dec	-3.9	-6.6	-11.7	-20.8	-27.8	1.8	-6.6	1	0.5

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	0	0	1104
FEB	0	0	882
MAR	1	0	719
APR	18	1	421
MAY	105	13	212
JUN	239	51	64
JUL	328	94	23
AUG	264	57	52
SEP	95	8	204
OCT	7	0	482
NOV	0	0	787
DEC	0	0	1035
ANN	1057	224	5985

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	0	-33223	0	-3102
FEB	0	-26706	0	-2733
MAR	0	-22160	0	-2645
APR	1	-13646	1	-2020
MAY	32	-7635	18	-1238
JUN	201	-2827	11	-317
JUL	485	-1227	66	-53
AUG	234	-2329	39	-125
SEP	17	-7098	2	-772
OCT	0	-15204	1	-1813
NOV	0	-24083	0	-2553
DEC	0	-31285	0	-3022
ANN	970	-187423	138	-20393

Station Information		Shading Geometry in Dimensionless Units	
City, State, WBAN	N/A	N/A	N/A
Lat, Lon, Elev	N/A	N/A	N/A
Press Stn Type	N/A	N/A	N/A

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													
	Std.Dev.													
	Minimum													
	Maximum													
	Diffuse													
Clear Day	Global													
NORTH	Global													
	Diffuse													
	Clear Day	Global												
EAST	Global													
	Diffuse													
	Clear Day	Global												
SOUTH	Global													
	Diffuse													
	Clear Day	Global												
WEST	Global													
	Diffuse													
	Clear Day	Global												

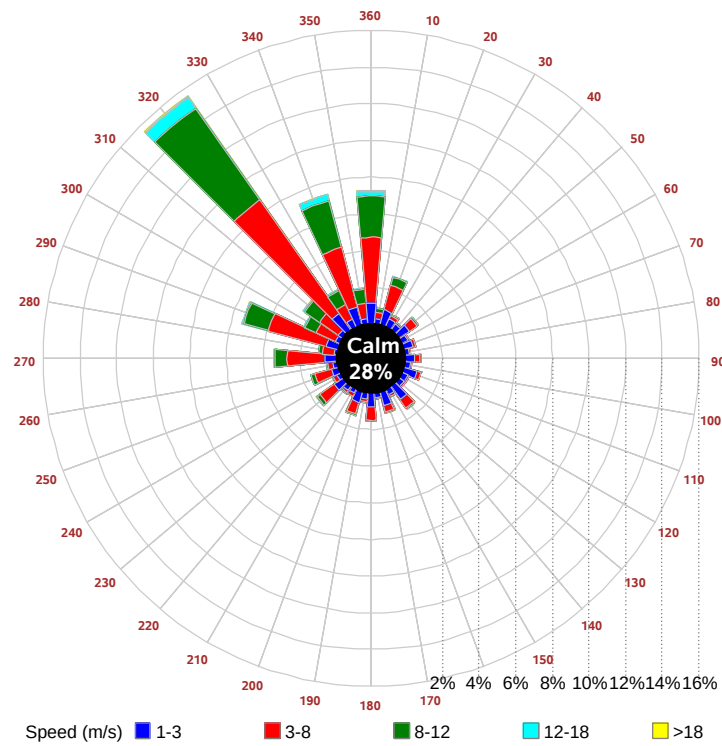
Average Annual Solar Radiation - Nearest Available Site
Source: National Renewable Energy Laboratory, Golden CO, 1995

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													
NORTH	Unshaded													
	Shaded													
EAST	Unshaded													
	Shaded													
SOUTH	Unshaded													
	Shaded													
WEST	Unshaded													
	Shaded													

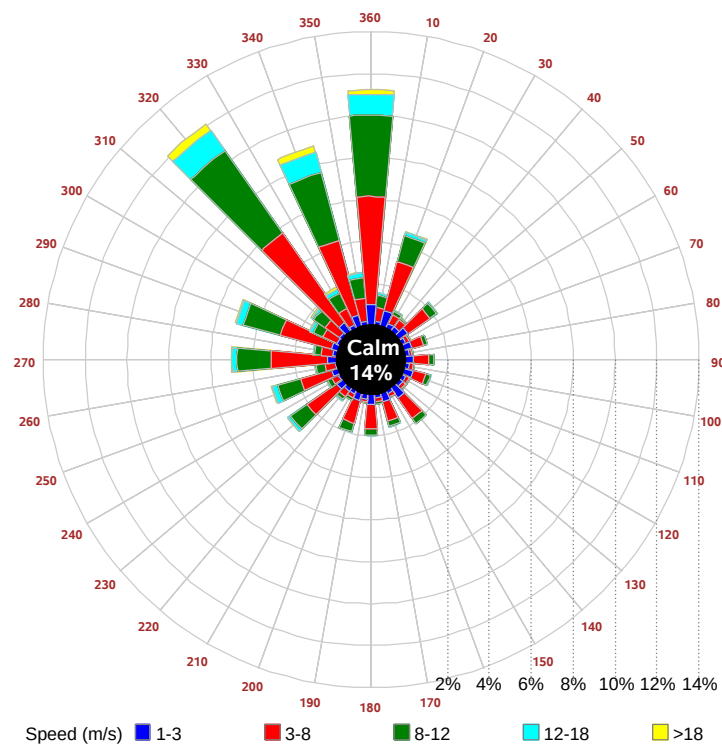
AVERAGE INCIDENT ILLUMINENCE (klux-hr) FOR MOSTLY CLEAR AND MOSTLY CLOUDY CONDITIONS, Percentage Uncertainty = 9											
		March			June						
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm
HORIZ.	M.Clear										
	M.Cloudy										
NORTH	M.Clear										
	M.Cloudy										
EAST	M.Clear										
	M.Cloudy										
SOUTH	M.Clear										
	M.Cloudy										
WEST	M.Clear										
	M.Cloudy										
M.Clear	(% hrs)										

		Sept						Dec			
		9am	11am	1pm	3pm	5pm	9am	11am	1pm	3pm	5pm
HORIZ.	M.Clear										
	M.Cloudy										
NORTH	M.Clear										
	M.Cloudy										
EAST	M.Clear										
	M.Cloudy										
SOUTH	M.Clear										
	M.Cloudy										
WEST	M.Clear										
	M.Cloudy										
M.Clear	(% hrs)										

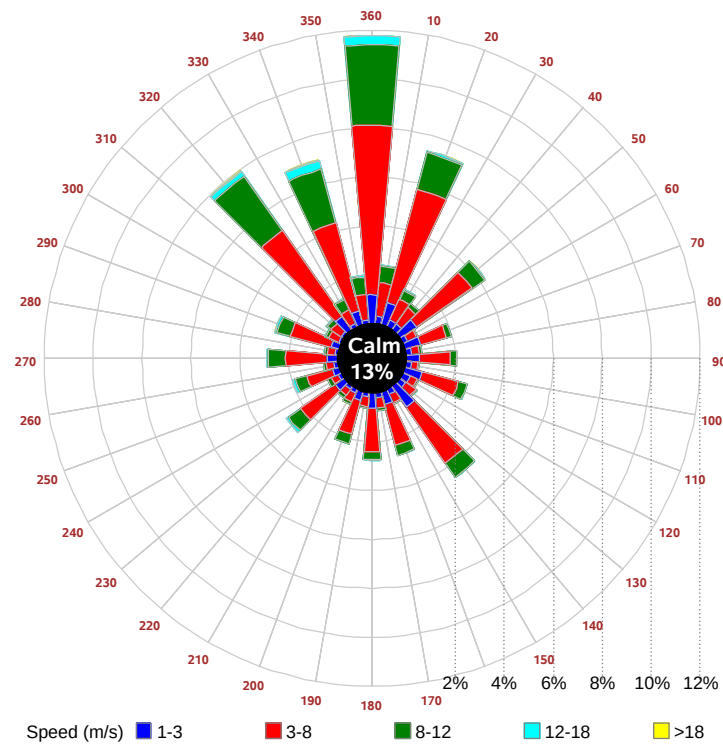
Wind Summary - December, January, and February



Wind Summary - March, April, and May



Wind Summary - June, July, and August



Wind Summary - September, October, and November

