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ANTANANARIVO/IVATO, Madagascar

WMO#: **670830**

Lat: **18.80S** Long: **47.48E** Elev: **1276** StdP: **86.91** Time Zone: **3.00 (AFE)** Period: **86-10** WBAN: **99999**

Annual Heating and Humidification Design Conditions

	Coldest Month	Heating DB		Humidification DP/MCDB and HR						Coldest month WS/MCDB				MCWS/PCWD to 99.6% DB		
				99.6%			99%			0.4%		1%				
		99.6%	99%	DP	HR	MCDB	DP	HR	MCDB	WS	MCDB	WS	MCDB	MCWS	PCWD	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	
(1)	7	7.8	8.9	4.2	6.0	18.7	5.8	6.7	17.1	8.5	17.6	7.7	17.2	0.9	160	(1)

Annual Cooling, Dehumidification, and Enthalpy Design Conditions

	Hottest Month	Hottest Month DB Range	Cooling DB/MCWB						Evaporation WB/MCDB						MCWS/PCWD to 0.4% DB		
			0.4%		1%		2%		0.4%		1%		2%				
			DB	MCWB	DB	MCWB	DB	MCWB	WB	MCDB	WB	MCDB	WB	MCDB	MCWS	PCWD	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	
(2)	1	9.2	29.5	19.3	28.7	19.4	27.9	19.3	22.5	26.6	21.7	25.9	21.0	25.2	3.1	100	(2)

	Dehumidification DP/MCDB and HR									Enthalpy/MCDB						Hours 8 to 4 & 12.8/20.6	
	0.4%			1%			2%			0.4%		1%		2%			
	DP	HR	MCDB	DP	HR	MCDB	DP	HR	MCDB	Enth	MCDB	Enth	MCDB	Enth	MCDB		
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	
(3)	21.2	18.5	24.3	20.2	17.5	23.1	20.0	17.2	22.7	73.3	26.6	70.1	25.8	67.7	25.1	1183	(3)

Extreme Annual Design Conditions

	Extreme Annual WS			Extreme Max WB	Extreme Annual DB				n-Year Return Period Values of Extreme DB								
					Mean		Standard deviation		n=5 years		n=10 years		n=20 years		n=50 years		
	1%	2.5%	5%		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	
(4)	7.8	7.0	6.3	27.6	4.0	31.8	2.4	1.0	2.3	32.5	1.0	33.0	-0.3	33.6	-2.1	34.3	(4)

Monthly Climatic Design Conditions

				Annual (d)	Jan (e)	Feb (f)	Mar (g)	Apr (h)	May (i)	Jun (j)	Jul (k)	Aug (l)	Sep (m)	Oct (n)	Nov (o)	Dec (p)	
(5)	Temperatures, Degree-Days and Degree-Hours	Tavg		19.3	22.0	21.9	21.7	20.4	18.4	15.9	15.1	15.7	17.8	19.8	21.2	22.0	(5)
(6)		Sd			1.22	1.15	1.28	1.37	1.83	1.74	1.58	1.61	1.92	1.96	1.55	1.29	(6)
(7)		HDD10.0		0	0	0	0	0	0	0	0	0	0	0	0	0	(7)
(8)		HDD18.3		319	0	0	0	2	22	73	100	81	33	8	1	0	(8)
(9)		CDD10.0		3401	373	333	362	313	260	178	159	178	233	303	336	373	(9)
(10)		CDD18.3		680	115	99	103	64	23	2	1	1	16	53	86	116	(10)
(11)		CDH23.3		3327	478	383	410	269	108	13	3	22	151	396	517	576	(11)
(12)		CDH26.7		492	72	47	47	22	5	0	0	1	16	74	105	103	(12)
(13)	Precipitation	PrecAvg		1456	274	279	204	65	23	8	11	10	11	76	188	310	(13)
(14)		PrecMax		1741	423	632	391	535	89	39	57	64	89	153	362	576	(14)
(15)		PrecMin		1090	78	31	49	1	2	1	1	1	1	1	59	116	(15)
(16)		PrecSD		185.7	91.2	134.3	94.8	113.9	22.9	11.5	14.8	18.2	19.0	43.1	87.7	134.6	(16)
(17)	Monthly Design Dry Bulb and Mean Coincident Wet Bulb Temperatures	0.4%	DB		29.9	29.2	29.1	28.6	27.2	25.0	23.5	25.8	28.3	30.2	30.8	30.2	(17)
(18)			MCWB		20.8	21.2	20.8	19.2	18.5	16.5	14.9	15.3	16.2	18.1	18.5	20.1	(18)
(19)		2%	DB		28.2	28.0	27.9	27.1	25.9	23.1	22.1	23.5	26.8	28.6	29.1	29.0	(19)
(20)			MCWB		20.6	20.7	20.9	19.0	17.9	15.7	14.6	14.6	15.9	17.4	18.2	19.7	(20)
(21)		5%	DB		27.2	26.9	26.9	26.1	24.4	21.9	21.0	22.0	25.1	27.0	28.0	27.9	(21)
(22)			MCWB		20.3	20.3	20.2	18.8	17.4	15.5	14.1	14.4	15.8	17.1	18.1	19.8	(22)
(23)		10%	DB		26.1	25.9	25.8	25.0	23.0	20.5	19.8	20.7	23.5	25.6	26.6	26.7	(23)
(24)			MCWB		20.0	19.9	19.9	18.5	17.1	14.8	13.9	14.1	15.3	16.8	17.9	19.5	(24)
(25)	Monthly Design Wet Bulb and Mean Coincident Dry Bulb Temperatures	0.4%	WB		23.2	23.2	23.4	21.7	20.7	18.6	17.6	17.1	18.8	20.8	21.7	22.8	(25)
(26)			MCDB		26.9	26.8	27.0	25.7	24.9	22.6	20.3	22.2	24.8	26.1	27.0	27.5	(26)
(27)		2%	WB		22.1	22.0	22.1	20.5	19.4	17.2	15.9	16.1	17.6	19.4	20.6	21.6	(27)
(28)			MCDB		26.1	26.3	26.2	24.8	23.2	20.9	20.0	21.2	23.4	24.7	25.8	26.2	(28)
(29)		5%	WB		21.3	21.1	21.1	19.7	18.3	16.2	15.0	15.4	16.7	18.4	19.7	20.8	(29)
(30)			MCDB		25.3	25.1	25.0	24.1	22.3	20.0	19.3	20.1	22.4	23.8	24.5	25.3	(30)
(31)		10%	WB		20.7	20.4	20.3	19.1	17.6	15.5	14.3	14.7	16.0	17.7	19.0	20.1	(31)
(32)			MCDB		24.3	24.2	24.0	23.4	21.6	19.1	18.3	19.0	21.5	23.0	23.7	24.5	(32)
(33)	Mean Daily Temperature Range		MDBR		9.2	9.1	9.3	10.0	10.4	10.1	10.1	10.8	12.2	12.8	11.8	10.4	(33)
(34)		5% DB	MCDBR		10.8	10.6	10.6	11.5	12.4	11.8	12.0	12.9	14.7	14.9	13.7	11.9	(34)
(35)			MCWBR		4.7	4.9	4.8	4.9	5.8	5.4	5.5	5.4	5.4	5.3	4.8	4.8	(35)
(36)		5% WB	MCDBR		9.6	9.7	9.8	10.5	11.3	10.7	10.4	11.3	12.9	13.0	11.9	10.7	(36)
(37)			MCWBR		4.9	5.2	5.2	5.2	6.0	5.7	5.5	5.7	5.6	5.6	5.2	5.1	(37)
(38)	Clear Sky Solar Irradiance	taub			0.374	0.377	0.343	0.321	0.285	0.273	0.270	0.278	0.309	0.363	0.383	0.380	(38)
(39)		taud			2.681	2.669	2.719	2.688	2.707	2.685	2.672	2.649	2.597	2.507	2.559	2.657	(39)
(40)		Ebn,noon			970	957	967	953	955	951	963	983	986	958	955	964	(40)
(41)		Edh,noon			97	96	89	85	77	76	79	87	98	112	108	99	(41)

Nomenclature: See separate page