2021 ASHRAE Handbook - Foundamentals (SI)

CATAMARCA, ARGENTINA (WMO: 872220)

Lat:**28.5936S**	Long:**65.7553W**	Elev:**454**	StdP: **95.99**	Time zone:**-3.00 (W03)**	Period:**96-19**	WBAN:**99999**

Annual Heating, Humidification, and Ventilation Design Conditions

Coldest Month	Heating DB		Humidification DP/MCDB and HR						Coldest month WS/MCDB				MCWS/PCWD to 99.6% DB		WSF
			99.6%			99%			0.4%		1%				
	99.6%	99%	DP	HR	MCDB	DP	HR	MCDB	WS	MCDB	WS	MCDB	MCWS	PCWD	
6	**1.9**	**3.6**	**-8.0**	**2.0**	**13.9**	**-6.0**	**2.4**	**12.9**	**14.4**	**17.3**	**12.6**	**16.9**	**1.9**	**50**	**0.519**

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
1	**10.8**	**38.5**	**22.1**	**37.0**	**21.8**	**35.8**	**21.6**	**24.4**	**33.9**	**23.8**	**33.1**	**23.2**	**32.2**	**7.3**	**50**

Dehumidification DP/MCDB and HR									Enthalpy/MCDB						Extreme Max WB
0.4%			1%			2%			0.4%		1%		2%		
DP	HR	MCDB	DP	HR	MCDB	DP	HR	MCDB	Enth	MCDB	Enth	MCDB	Enth	MCDB	
21.9	**17.6**	**27.7**	**21.2**	**16.8**	**27.6**	**20.7**	**16.2**	**27.4**	**76.9**	**34.0**	**74.3**	**33.3**	**72.0**	**32.6**	**28.2**

Extreme Annual Design Conditions

Extreme Annual WS				Extreme Annual Temperature				n-Year Return Period Values of Extreme Temperature							
				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
15.5	**14.1**	**12.5**	DB	**-1.8**	**41.4**	**2.1**	**1.2**	**-3.3**	**42.3**	**-4.5**	**43.0**	**-5.7**	**43.6**	**-7.2**	**44.5**
			WB	**-3.0**	**26.2**	**1.9**	**1.2**	**-4.3**	**27.1**	**-5.4**	**27.7**	**-6.5**	**28.4**	**-7.8**	**29.2**

Monthly Climatic Design Conditions

		Annual	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperatures, Degree-Days and Degree-Hours	DBAvg	**21.4**	**28.2**	**27.0**	**24.8**	**21.0**	**16.7**	**12.8**	**12.8**	**16.2**	**20.1**	**23.9**	**26.0**	**27.6**
	DBStd	**6.58**	**3.27**	**3.65**	**3.49**	**3.75**	**3.55**	**2.99**	**3.32**	**3.99**	**4.54**	**4.22**	**3.95**	**3.54**
	HDD10.0	**25**	**0**	**0**	**0**	**0**	**1**	**8**	**12**	**3**	**1**	**0**	**0**	**0**
	HDD18.3	**563**	**0**	**1**	**2**	**17**	**74**	**166**	**174**	**89**	**33**	**7**	**1**	**0**
	CDD10.0	**4184**	**566**	**475**	**460**	**331**	**209**	**93**	**98**	**194**	**303**	**430**	**480**	**544**
	CDD18.3	**1683**	**307**	**242**	**204**	**97**	**24**	**1**	**2**	**23**	**86**	**179**	**232**	**287**
	CDH23.3	**19025**	**3804**	**2752**	**1890**	**756**	**176**	**18**	**51**	**352**	**943**	**1956**	**2750**	**3578**
	CDH26.7	**9262**	**2037**	**1377**	**809**	**246**	**31**	**1**	**11**	**123**	**388**	**936**	**1394**	**1908**
Wind	WSAvg	**5.1**	**6.1**	**5.8**	**5.3**	**4.2**	**3.8**	**2.9**	**3.5**	**4.4**	**5.6**	**6.4**	**6.7**	**6.6**
Precipitation	PrecAvg	**391**	**75**	**72**	**47**	**29**	**12**	**9**	**5**	**3**	**6**	**24**	**44**	**65**
	PrecMax	**635**	**178**	**172**	**95**	**118**	**52**	**41**	**26**	**22**	**40**	**87**	**115**	**131**
	PrecMin	**228**	**18**	**19**	**6**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**2**	**3**
	PrecStd	**124**	**38**	**41**	**27**	**28**	**12**	**10**	**6**	**6**	**8**	**21**	**29**	**26**
Monthly Design Dry Bulb and Mean Coincident Wet Bulb Temperatures	0.4% DB	**39.9**	**39.1**	**36.5**	**33.9**	**29.5**	**25.5**	**27.8**	**34.3**	**36.8**	**38.6**	**39.5**	**40.3**
	0.4% MCWB	**23.2**	**23.1**	**22.8**	**21.4**	**19.0**	**16.1**	**16.3**	**18.0**	**19.3**	**20.5**	**21.2**	**22.1**
	2% DB	**37.9**	**36.9**	**34.6**	**31.3**	**27.1**	**23.0**	**24.2**	**30.0**	**33.2**	**36.0**	**36.9**	**38.0**
	2% MCWB	**22.6**	**22.7**	**22.4**	**20.3**	**17.9**	**14.6**	**14.1**	**16.3**	**17.7**	**20.0**	**21.0**	**22.0**
	5% DB	**36.2**	**35.1**	**32.9**	**29.6**	**25.2**	**21.2**	**22.3**	**27.2**	**30.9**	**33.9**	**35.1**	**36.2**
	5% MCWB	**22.4**	**22.5**	**22.0**	**19.8**	**17.0**	**13.3**	**13.2**	**15.2**	**17.0**	**19.4**	**20.4**	**21.8**
	10% DB	**34.6**	**33.3**	**31.0**	**27.8**	**23.4**	**19.7**	**20.4**	**24.7**	**28.7**	**31.8**	**33.4**	**34.5**
	10% MCWB	**22.2**	**22.3**	**21.3**	**19.2**	**16.2**	**12.7**	**12.1**	**13.9**	**15.8**	**18.4**	**19.7**	**21.4**
Monthly Design Wet Bulb and Mean Coincident Dry Bulb Temperatures	0.4% WB	**25.5**	**25.1**	**24.7**	**23.2**	**20.1**	**17.3**	**17.2**	**18.7**	**20.7**	**23.2**	**23.4**	**24.7**
	0.4% MCDB	**35.4**	**34.4**	**33.3**	**30.2**	**26.4**	**23.0**	**26.1**	**31.3**	**33.0**	**34.2**	**34.6**	**35.2**
	2% WB	**24.3**	**24.3**	**23.7**	**22.1**	**18.8**	**15.7**	**15.6**	**17.3**	**19.1**	**21.7**	**22.3**	**23.7**
	2% MCDB	**34.0**	**33.4**	**31.8**	**27.8**	**25.2**	**21.2**	**22.6**	**28.3**	**30.8**	**32.1**	**33.1**	**33.9**
	5% WB	**23.6**	**23.6**	**22.9**	**21.4**	**18.0**	**14.6**	**14.1**	**15.8**	**18.0**	**20.5**	**21.6**	**23.1**
	5% MCDB	**33.1**	**32.4**	**30.3**	**26.8**	**23.8**	**19.6**	**20.6**	**25.9**	**28.6**	**30.9**	**32.0**	**33.2**
	10% WB	**23.0**	**23.0**	**22.2**	**20.2**	**17.0**	**13.5**	**12.7**	**14.5**	**16.7**	**19.6**	**20.9**	**22.4**
	10% MCDB	**32.1**	**31.4**	**29.0**	**26.1**	**22.2**	**18.3**	**19.1**	**23.5**	**26.7**	**29.2**	**30.9**	**31.9**

Mean Daily Temperature Range														
		MDBR	10.8	10.4	10.1	10.4	11.0	12.4	13.7	14.1	13.2	12.0	11.4	11.2
	5% DB	MCDBR	12.1	11.9	12.0	13.1	13.3	15.2	17.0	18.6	16.2	14.7	13.1	12.9
		MCWBR	3.8	3.5	4.1	4.9	6.0	8.2	8.9	8.5	6.4	5.0	4.5	4.0
	5% WB	MCDBR	11.1	10.8	10.6	10.7	11.7	13.2	15.2	17.7	14.6	13.0	11.8	11.5
		MCWBR	4.0	3.8	4.2	4.5	5.6	7.5	8.3	8.4	6.4	5.0	4.5	4.0
Clear Sky Solar Irradiance	taub		0.401	0.394	0.375	0.361	0.327	0.314	0.311	0.350	0.400	0.409	0.399	0.400
	taud		2.409	2.430	2.482	2.466	2.510	2.516	2.498	2.373	2.235	2.289	2.356	2.397
	Ebn at noon		942	931	917	880	867	857	876	875	875	906	937	945
	Edn at noon		126	120	108	99	86	81	85	107	135	137	132	128
All-Sky Solar Radiation	RadAvg		6.92	6.21	5.27	4.25	3.44	3.23	3.65	4.64	5.71	6.47	7.07	7.13
	RadStd		0.41	0.41	0.38	0.37	0.34	0.27	0.22	0.24	0.38	0.48	0.47	0.35

Historical Trends

	DBAvg	Heating		Cooling			Degree-Days				
		99% DB	99% DP	1% DB	1% WB	1% DP	HDD10.0	HDD18.3	CDD10.0	CDD18.3	
Station Only	N/A	N/A	N/A	+0.99	N/A	N/A	N/A	N/A	N/A	N/A	
Regional (0 neighbors)	N/A	N/A	N/A	+0.67	N/A	N/A	N/A	N/A	N/A	N/A	

CDDn	Cooling degree-days base n°C, °C-day	Lat	Latitude, °	Period	Years used to calculate the design conditions
CDHn	Cooling degree-hours base n°C, °C-hour	Long	Longitude, °	Sd	Standard deviation of daily average temperature, °C
DB	Dry bulb temperature, °C	MCDB	Mean coincident dry bulb temperature, °C	StdP	Standard pressure at station elevation, kPa
DP	Dew point temperature, °C	MCDBR	Mean coincident dry bulb temp. range, °C	taub	Clear sky optical depth for beam irradiance
Ebn,noon Edh,noon	Clear sky beam normal and diffuse horizontal irradiances at solar noon, W/m2	MCDP	Mean coincident dew point temperature, °C	taud	Clear sky optical depth for diffuse irradiance
		MCWB	Mean coincident wet bulb temperature, °C	Tavg	Average temperature, °C
Elev	Elevation, m	MCWBR	Mean coincident wet bulb temp. range, °C	Time Zone	Hours ahead or behind UTC
Enth	Enthalpy, kJ/kg	MCWS	Mean coincident wind speed, m/s	WB	Wet bulb temperature, °C
HDDn	Heating degree-days base n°C, °C-day	MDBR	Mean dry bulb temp. range, °C	Hours 8/4 & 12.8/20.6	Number of hours between 8 a.m. and 4 p.m with DB between 12.8 and 20.6 °C
PCWD	Prevailing coincident wind direction, °,0 = North, 90 = East	WS	Wind speed, m/s	HR	Humidity ratio, g of moisture per kg of dry air