2021 ASHRAE Handbook - Foundamentals (SI)

**HONG KONG OBSERVATORY, HONG KONG (WMO: 450050)**

Lat:**22.302N** Long:**114.174E** Elev:**62** StdP: **100.58** Time zone:**8.00 (E08)** Period:**82-92** 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% | 99.6% | | | 99% | | | 0.4% | | 1% | | | | |
| | | | DP | HR | MCDB | DP | HR | MCDB | WS | MCDB | WS | MCDB | MCWS | PCWD | |
| **2** | **9.6** | **10.9** | **-1.0** | **3.5** | **12.8** | **1.8** | **4.3** | **14.0** | **9.2** | **15.9** | **8.4** | **15.8** | **2.2** | **10** | **0.365** |

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 |
| **7** | **3.5** | **32.2** | **26.5** | **31.7** | **26.4** | **31.2** | **26.3** | **27.4** | **30.5** | **27.1** | **30.1** | **26.9** | **29.9** | **3.4** | **270** |

| 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 | |
| **26.6** | **22.3** | **29.3** | **26.2** | **21.8** | **29.1** | **26.1** | **21.6** | **29.0** | **87.5** | **30.6** | **86.4** | **30.3** | **85.3** | **30.1** | **28.4** |

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 |
| **8.6** | **7.4** | **6.5** | DB | **7.6** | **33.5** | **1.7** | **0.3** | **6.3** | **33.7** | **5.3** | **33.9** | **4.4** | **34.1** | **3.1** | **34.4** |
| | | | WB | **4.0** | **28.2** | **1.8** | **0.2** | **2.7** | **28.3** | **1.7** | **28.4** | **0.7** | **28.4** | **-0.6** | **28.6** |

Monthly Climatic Design Conditions

| | | | Annual | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Temperatures, Degree-Days and Degree-Hours** | DBAvg | | **23.1** | **16.2** | **16.1** | **18.5** | **21.9** | **25.8** | **27.9** | **29.0** | **28.8** | **27.8** | **25.5** | **21.7** | **17.6** |
| | DBStd | | **5.29** | **2.37** | **2.57** | **3.33** | **2.70** | **2.01** | **1.70** | **1.29** | **1.27** | **1.50** | **1.85** | **2.49** | **2.85** |
| | HDD10.0 | | **2** | **1** | **0** | **1** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **1** |
| | HDD18.3 | | **237** | **72** | **71** | **39** | **3** | **0** | **0** | **0** | **0** | **0** | **0** | **4** | **46** |
| | CDD10.0 | | **4782** | **192** | **171** | **264** | **357** | **489** | **538** | **588** | **581** | **534** | **481** | **350** | **236** |
| | CDD18.3 | | **1976** | **6** | **8** | **46** | **111** | **231** | **288** | **330** | **323** | **284** | **223** | **104** | **23** |
| | CDH23.3 | | **18618** | **0** | **1** | **79** | **436** | **1826** | **3226** | **4110** | **3924** | **3126** | **1657** | **228** | **5** |
| | CDH26.7 | | **5853** | **0** | **0** | **0** | **31** | **366** | **1081** | **1696** | **1521** | **957** | **200** | **3** | **0** |
| **Wind** | WSAvg | | **3.3** | **3.2** | **3.7** | **3.6** | **3.5** | **3.3** | **3.3** | **3.1** | **2.9** | **3.2** | **3.6** | **3.1** | **2.9** |
| **Precipitation** | PrecAvg | | **2225** | **23** | **47** | **69** | **159** | **317** | **383** | **339** | **385** | **300** | **137** | **39** | **31** |
| | PrecMax | | **3248** | **101** | **241** | **428** | **492** | **772** | **963** | **1147** | **872** | **798** | **718** | **145** | **207** |
| | PrecMin | | **902** | **0** | **0** | **1** | **6** | **6** | **106** | **104** | **85** | **24** | **0** | **0** | **0** |
| | PrecStd | | **512** | **24** | **62** | **85** | **118** | **202** | **189** | **204** | **220** | **187** | **169** | **43** | **51** |
| **Monthly Design Dry Bulb and Mean Coincident Wet Bulb Temperatures** | 0.4% | DB | **22.1** | **23.1** | **26.0** | **28.6** | **31.2** | **32.2** | **33.0** | **32.9** | **32.5** | **30.6** | **26.9** | **24.0** | |
| | | MCWB | **18.5** | **19.8** | **22.7** | **24.3** | **26.2** | **26.5** | **26.8** | **26.6** | **25.6** | **25.2** | **21.9** | **19.3** | |
| | 2% | DB | **20.9** | **21.9** | **25.1** | **27.6** | **30.2** | **31.5** | **32.2** | **32.1** | **31.5** | **29.3** | **26.0** | **22.6** | |
| | | MCWB | **17.5** | **19.3** | **22.6** | **24.2** | **26.0** | **26.6** | **26.7** | **26.6** | **25.8** | **24.6** | **21.7** | **18.1** | |
| | 5% | DB | **20.0** | **20.7** | **24.3** | **26.7** | **29.4** | **30.9** | **31.6** | **31.5** | **30.8** | **28.5** | **25.2** | **21.7** | |
| | | MCWB | **16.9** | **18.4** | **22.2** | **23.8** | **25.7** | **26.5** | **26.6** | **26.5** | **25.7** | **24.2** | **21.4** | **17.6** | |
| | 10% | DB | **19.1** | **19.6** | **23.3** | **26.0** | **28.6** | **30.3** | **31.1** | **31.0** | **30.1** | **27.7** | **24.7** | **21.0** | |
| | | MCWB | **16.2** | **17.4** | **21.4** | **23.6** | **25.4** | **26.4** | **26.4** | **26.4** | **25.5** | **23.8** | **21.1** | **17.2** | |
| **Monthly Design Wet Bulb and Mean Coincident Dry Bulb Temperatures** | 0.4% | WB | **19.5** | **21.1** | **23.6** | **25.3** | **26.9** | **27.7** | **27.7** | **27.7** | **27.3** | **26.2** | **23.9** | **20.1** | |
| | | MCDB | **21.0** | **22.4** | **25.2** | **27.1** | **29.8** | **30.6** | **30.9** | **31.1** | **30.3** | **28.9** | **25.6** | **22.6** | |
| | 2% | WB | **18.5** | **19.9** | **23.1** | **24.6** | **26.5** | **27.2** | **27.3** | **27.2** | **26.9** | **25.6** | **23.0** | **19.4** | |
| | | MCDB | **20.2** | **21.5** | **24.7** | **26.6** | **29.3** | **30.0** | **30.4** | **30.3** | **29.6** | **28.1** | **25.0** | **21.8** | |
| | 5% | WB | **17.6** | **18.9** | **22.5** | **24.2** | **26.1** | **27.0** | **27.1** | **27.0** | **26.6** | **25.1** | **22.4** | **18.6** | |
| | | MCDB | **19.4** | **20.5** | **24.1** | **26.3** | **28.8** | **29.8** | **30.3** | **30.0** | **29.3** | **27.6** | **24.6** | **21.0** | |
| | 10% | WB | **16.8** | **18.0** | **21.5** | **23.8** | **25.7** | **26.7** | **26.9** | **26.7** | **26.2** | **24.6** | **21.8** | **17.8** | |
| | | MCDB | **18.7** | **19.2** | **23.1** | **25.9** | **28.2** | **29.4** | **30.0** | **29.6** | **29.0** | **27.2** | **24.2** | **20.4** | |
| **Mean Daily Temperature Range** | | MDBR | **3.5** | **3.1** | **3.4** | **3.3** | **3.3** | **3.0** | **3.5** | **3.5** | **3.4** | **3.2** | **3.5** | **3.8** | |
| | 5% DB | MCDBR | **4.1** | **4.6** | **4.3** | **4.2** | **4.0** | **3.6** | **4.1** | **4.3** | **4.2** | **3.7** | **3.6** | **4.1** | |
| | | MCWBR | **2.7** | **3.1** | **2.6** | **2.2** | **1.7** | **1.3** | **1.3** | **1.6** | **1.8** | **1.9** | **2.2** | **2.4** | |
| | 5% WB | MCDBR | **3.5** | **4.2** | **4.0** | **4.0** | **3.6** | **3.3** | **3.6** | **3.9** | **3.7** | **3.2** | **3.1** | **3.6** | |
| | | MCWBR | **2.7** | **3.2** | **3.0** | **2.4** | **1.9** | **1.4** | **1.5** | **1.6** | **1.8** | **1.9** | **2.2** | **2.4** | |
| **Clear Sky Solar Irradiance** | taub | | **0.576** | **0.627** | **0.751** | **0.728** | **0.567** | **0.536** | **0.525** | **0.590** | **0.623** | **0.668** | **0.570** | **0.564** | |
| | taud | | **1.814** | **1.742** | **1.537** | **1.622** | **2.019** | **2.121** | **2.149** | **1.946** | **1.845** | **1.697** | **1.895** | **1.865** | |
| | Ebn at noon | | **683** | **681** | **620** | **648** | **757** | **774** | **783** | **736** | **702** | **640** | **685** | **675** | |
| | Edn at noon | | **196** | **223** | **285** | **265** | **177** | **159** | **154** | **189** | **206** | **230** | **179** | **180** | |
| **All-Sky Solar Radiation** | RadAvg | | **3.03** | **3.11** | **3.38** | **3.81** | **4.54** | **4.66** | **5.39** | **5.03** | **4.74** | **4.39** | **3.53** | **3.15** | |
| | RadStd | | **0.50** | **0.50** | **0.45** | **0.56** | **0.59** | **0.69** | **0.57** | **0.46** | **0.37** | **0.44** | **0.40** | **0.46** | |

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** | **N/A** | **N/A** | **N/A** | **N/A** | **N/A** | **N/A** | **N/A** |
| **Regional (0 neighbors)** | **N/A** | **N/A** | **N/A** | **+0.25** | **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 | 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 |
| Edh,noon | | 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 |