

**Design conditions for RICHMOND, VA, USA**

**Station Information**

Station name	WMO#	Lat	Long	Elev	StdP	Hours +/- UTC	Time zone code	Period
1a	1b	1c	1d	1e	1f	1g	1h	1i
<b>RICHMOND</b>	<b>724010</b>	<b>37.50N</b>	<b>77.32W</b>	<b>164</b>	<b>14.609</b>	<b>-5.00</b>	<b>NAE</b>	<b>7201</b>

**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%	99.6%			99%			0.4%		1%		MCWS	PCWD
			DP	HR	MCDB	DP	HR	MCDB	WS	MCDB	WS	MCDB		
2	3a	3b	4a	4b	4c	4d	4e	4f	5a	5b	5c	5d	6a	6b
<b>1</b>	<b>14.7</b>	<b>19.3</b>	<b>-0.4</b>	<b>5.4</b>	<b>21.3</b>	<b>4.5</b>	<b>7.0</b>	<b>25.0</b>	<b>24.6</b>	<b>42.6</b>	<b>21.8</b>	<b>43.4</b>	<b>6.9</b>	<b>0</b>

**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%		MCWS	PCWD
		DB	MCWB	DB	MCWB	DB	MCWB	WB	MCDB	WB	MCDB	WB	MCDB		
7	8	9a	9b	9c	9d	9e	9f	10a	10b	10c	10d	10e	10f	11a	11b
<b>7</b>	<b>19.0</b>	<b>94.7</b>	<b>76.4</b>	<b>92.1</b>	<b>75.5</b>	<b>89.6</b>	<b>74.5</b>	<b>78.9</b>	<b>89.7</b>	<b>77.7</b>	<b>87.9</b>	<b>76.6</b>	<b>86.0</b>	<b>10.1</b>	<b>230</b>

  

Dehumidification DP/MCDB and HR									Enthalpy/MCDB					
DP	HR	MCDB	1%			2%			0.4%		1%		2%	
			DP	HR	MCDB	DP	HR	MCDB	Enth	MCDB	Enth	MCDB	Enth	MCDB
12a	12b	12c	12d	12e	12f	12g	12h	12i	13a	13b	13c	13d	13e	13f
<b>76.1</b>	<b>137.1</b>	<b>83.7</b>	<b>74.9</b>	<b>131.8</b>	<b>82.3</b>	<b>73.8</b>	<b>126.9</b>	<b>80.9</b>	<b>42.4</b>	<b>89.7</b>	<b>41.1</b>	<b>87.9</b>	<b>40.0</b>	<b>86.2</b>

**Extreme Annual Design Conditions**

Extreme Annual WS			Extreme Max WB	Extreme Annual DB						n-Year Return Period Values of Extreme DB					
1%	2.5%	5%		Mean		Standard deviation		n=5 years		n=10 years		n=20 years		n=50 years	
Max	Min	Max		Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
14a	14b	14c	15	16a	16b	16c	16d	17a	17b	17c	17d	17e	17f	17g	17h
<b>20.3</b>	<b>18.2</b>	<b>16.5</b>	<b>84.4</b>	<b>98.2</b>	<b>6.9</b>	<b>2.6</b>	<b>6.6</b>	<b>100.1</b>	<b>2.2</b>	<b>101.6</b>	<b>-1.7</b>	<b>103.1</b>	<b>-5.4</b>	<b>104.9</b>	<b>-10.2</b>

**Monthly Design Dry Bulb and Mean Coincident Wet Bulb Temperatures**

%	Jan		Feb		Mar		Apr		May		Jun	
	DB	MCWB	DB	MCWB	DB	MCWB	DB	MCWB	DB	MCWB	DB	MCWB
	18a	18b	18c	18d	18e	18f	18g	18h	18i	18j	18k	18l
0.4%	<b>69.2</b>	<b>60.4</b>	<b>73.6</b>	<b>57.8</b>	<b>82.3</b>	<b>65.1</b>	<b>89.5</b>	<b>66.5</b>	<b>91.3</b>	<b>72.2</b>	<b>96.0</b>	<b>76.5</b>
1%	<b>66.2</b>	<b>59.3</b>	<b>70.3</b>	<b>57.7</b>	<b>78.9</b>	<b>62.5</b>	<b>86.3</b>	<b>65.5</b>	<b>89.1</b>	<b>70.5</b>	<b>94.0</b>	<b>75.8</b>
2%	<b>63.6</b>	<b>58.0</b>	<b>67.2</b>	<b>56.8</b>	<b>75.3</b>	<b>60.2</b>	<b>83.7</b>	<b>65.0</b>	<b>87.2</b>	<b>70.4</b>	<b>92.2</b>	<b>74.9</b>

  

%	Jul		Aug		Sep		Oct		Nov		Dec	
	DB	MCWB	DB	MCWB	DB	MCWB	DB	MCWB	DB	MCWB	DB	MCWB
	18m	18n	18o	18p	18q	18r	18s	18t	18u	18v	18w	18x
0.4%	<b>98.1</b>	<b>77.7</b>	<b>96.9</b>	<b>77.4</b>	<b>94.2</b>	<b>75.3</b>	<b>85.4</b>	<b>69.6</b>	<b>78.4</b>	<b>64.3</b>	<b>72.5</b>	<b>62.9</b>
1%	<b>96.4</b>	<b>77.3</b>	<b>95.0</b>	<b>76.8</b>	<b>91.9</b>	<b>74.8</b>	<b>83.2</b>	<b>68.8</b>	<b>75.8</b>	<b>63.6</b>	<b>69.9</b>	<b>62.0</b>
2%	<b>95.1</b>	<b>76.9</b>	<b>93.2</b>	<b>76.4</b>	<b>89.3</b>	<b>73.5</b>	<b>81.0</b>	<b>68.5</b>	<b>73.5</b>	<b>62.3</b>	<b>66.5</b>	<b>59.6</b>

**Monthly Design Wet Bulb and Mean Coincident Dry Bulb Temperatures**

%	Jan		Feb		Mar		Apr		May		Jun	
	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB
	19a	19b	19c	19d	19e	19f	19g	19h	19i	19j	19k	19l
0.4%	<b>63.5</b>	<b>66.2</b>	<b>63.0</b>	<b>69.4</b>	<b>67.0</b>	<b>75.7</b>	<b>69.3</b>	<b>81.2</b>	<b>76.0</b>	<b>86.1</b>	<b>78.7</b>	<b>90.7</b>
1%	<b>61.6</b>	<b>65.3</b>	<b>61.4</b>	<b>67.4</b>	<b>65.4</b>	<b>74.8</b>	<b>68.3</b>	<b>80.1</b>	<b>74.8</b>	<b>84.2</b>	<b>77.8</b>	<b>89.5</b>
2%	<b>59.0</b>	<b>62.8</b>	<b>59.2</b>	<b>64.3</b>	<b>63.7</b>	<b>72.0</b>	<b>67.2</b>	<b>78.7</b>	<b>73.4</b>	<b>82.2</b>	<b>77.0</b>	<b>88.3</b>

  

%	Jul		Aug		Sep		Oct		Nov		Dec	
	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB	WB	MCDB
	19m	19n	19o	19p	19q	19r	19s	19t	19u	19v	19w	19x
0.4%	<b>80.8</b>	<b>92.6</b>	<b>80.2</b>	<b>91.1</b>	<b>77.6</b>	<b>88.2</b>	<b>72.4</b>	<b>80.2</b>	<b>68.9</b>	<b>72.6</b>	<b>65.7</b>	<b>69.7</b>
1%	<b>80.2</b>	<b>91.5</b>	<b>79.4</b>	<b>90.3</b>	<b>76.7</b>	<b>86.5</b>	<b>71.4</b>	<b>78.8</b>	<b>67.3</b>	<b>70.9</b>	<b>63.5</b>	<b>66.9</b>
2%	<b>79.4</b>	<b>90.3</b>	<b>78.5</b>	<b>88.8</b>	<b>75.9</b>	<b>84.9</b>	<b>70.2</b>	<b>77.6</b>	<b>66.1</b>	<b>70.5</b>	<b>61.3</b>	<b>65.5</b>

**Monthly Mean Daily Temperature Range**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
20a	20b	20c	20d	20e	20f	20g	20h	20i	20j	20k	20l
<b>17.6</b>	<b>19.4</b>	<b>21.0</b>	<b>22.8</b>	<b>21.2</b>	<b>20.1</b>	<b>19.0</b>	<b>18.6</b>	<b>19.3</b>	<b>21.8</b>	<b>20.8</b>	<b>18.1</b>

WMO# World Meteorological Organization number      Lat Latitude, °      Long Longitude, °  
 Elev Elevation, ft      StdP Standard pressure at station elevation, psi  
 DB Dry bulb temperature, °F      DP Dew point temperature, °F      WB Wet bulb temperature, °F  
 WS Wind speed, mph      Enth Enthalpy, Btu/lb      HR Humidity ratio, grains of moisture per lb of dry air  
 MCDB Mean coincident dry bulb temperature, °F      MCWB Mean coincident wet bulb temperature, °F      MCWS Mean coincident wind speed, mph  
 PCWD Prevailing coincident wind direction, °, 0 = North, 90 = East