

The Technical Advisory Committee on Weather Design Conditions has suggested that wet-bulb design temperature be taken as that wet-bulb temperature which has been equalled or exceeded in 5 percent of the hours during months of the period of record. While not available for the 1956 edition of THE GUIDE, due to the tremendous task of compiling these data, it is hoped that they will be available for some stations for future editions.

The wind velocity to be used in design should be that wind velocity which accompanies the design temperatures in each instance, but since these data are not available, the average summer wind velocities for the period of record were taken from U. S. Weather Bureau records revised to 1948. It is pointed out that this is not necessarily the velocity which coincides with the design temperatures, but it may serve as a guide to the designer.

Other weather data, such as *daily range of temperature*, are useful particularly when making cooling load calculations for an early morning peak on an east exposure. Daily range of temperature is the difference between the average of the daily maximum dry-bulb temperatures and the average of the daily minimum temperatures. This range is highest in semi-arid or desert regions and at high elevations, and lowest near the oceans or very large lakes. The daily range of temperature (Fahrenheit degrees) in July for the principal areas of the United States can be approximated from the following tabulation:

East Sea Shore.....	12 to 18	East of Mississippi River.....	19 to 24
Gulf Sea Shore.....	12 to 18	Mississippi River to Rocky Mountains.....	24 to 33
Great Lakes Shore.....	18 to 21	Rocky Mountain Area.....	33 to 42
West Sea Shore.....	15 to 20	West Coastal States.....	20 to 36

Ventilation Rate

The introduction of outside air is necessary for the ventilation of conditioned spaces. Chapter 6 suggests *minimum* outdoor-air requirements for representative applications; but it is to be emphasized that minimum requirements are not necessarily *adequate* requirements for all psychological attitudes and physiological responses. Where maximum economy in space and load are essential, as in submarines or other restricted spaces, as little as 1 cfm of outside air per person has been found to be sufficient provided that satisfactory ventilation is simultaneously obtained by an adequate decontamination of recirculated air.²

Local codes and ordinances frequently specify ventilation requirements for public places and for industrial installations. For operating rooms, minimum requirements for safe practice are given in a *National Board of Fire Underwriters' pamphlet*.³ This pamphlet does not require 100 percent outside air in operating rooms, although 100 percent outside air is normally used and recommended.

Recommended and minimum ventilation rates for the most common applications are summarized in Table 3. For further general applications, a basis of estimating the cfm per person may be taken as:

1. People not smoking.....	7½ Recommended	5 Minimum
2. People smoking.....	40 Recommended	25 Minimum

The cooling load due to the introduction of outside air for ventilation is determined once the indoor and outdoor design conditions are fixed. Calculations will be discussed subsequently.

Cooling Load

TABLE 2. SUMMER CLIMATIC CONDITIONS*
Suggested Design Wet-Bulb and Dry-Bulb Temperatures

COL. 1 STATE	COL. 2 STATION ^b	COL. 3 ELEVATION ^c Ft	COL. 4 PERIOD OF RECORD ^d	COL. 5 HIGHEST TEMP. EVER RECORDED ^e °F	COL. 6 DESIGN DRY-BULB TEMP. ON T.A.C. 2½% BASIS ^c °F	COL. 7 DESIGN WET-BULB TEMP. IN COMMON USE ^f °F	COL. 8 DESIGN WET-BULB TEMP. IN COMMON USE ^f °F	COL. 9 AVERAGE SUMMER WIND VELOCITY ^g MPH
Ala.	Anniston.....CO	733	1893-1947	105				
	Birmingham.....CO	711	1893-1945	107				
	Mobile.....CO	615	1939-1947	103		95	78	5.4
	Mobile.....AP	143	1872-1947	103	94	95	78	
	Montgomery.....CO	219	1940-1947	104		95	80	8.0
	Montgomery.....AP	226	1872-1947	107	92			
Ariz.	Flagstaff.....CO	6957	1938-1944 ^d	103		95	78	
	Kingman.....CO	3473	1935-1939	93		90	65	
	Phoenix.....CO	1122	1885-1947	107	99			
	Phoenix.....AP	1112	1933-1947	118		105	76	6.0
	Tucson.....AP	2561	1935-1939	112	107	102	72	
	Winslow.....CO	4853	Up to 1946	107		105	70	
	Yuma.....CO	4899	1937-1947	103	95			
Ark.	Fort Smith.....CO	545	1876-1946	120		110	78	
	Fort Smith.....AP	463	1892-1945	113		95	76	6.1
	Little Rock.....CO	451	1945-1947	107				
	Little Rock.....AP	282	1879-1942 ^d	110		95	78	6.2
Calif.	Bakersfield.....AP	499	1937-1946	113	97			
	Burbank.....AP	740	1931-1947 ^d	111	104	105	70	
	Daguerre.....CO	1925	1935-1939	113	104			
	Eureka.....CO	132	1886-1947	85				
	Fresno.....CO	387	1887-1939	115		90	65	
	Fresno.....AP	281	1939-1947	111	103	105	74	7.9
	Los Angeles.....CO	534	1877-1947	109		90	70	5.8
	Oakland.....AP	21	1929-1947	115	80		65	
	Red Bluff.....CO	305 ^c	1877-1934	112		100	70	
	Red Bluff.....AP	346	1944-1947	112		101		
	Redding.....CO	579	1935-1939	112		100	72	7.9
	Sacramento.....CO	116	1877-1947	114		100		
	Sacramento.....AP	22	1938-1947	108				
	San Diego.....CO	90	1871-1940	110		85	68	
	San Diego.....AP	34	1879-1947	106	79			
	San Francisco.....CO	164	1875-1947	101		85	65	10.7
	San Jose.....CO	100	Up to 1946	108		91	70	
	Williams.....AP	124	1935-1939	118	103			
Colo.	Denver.....CO	5398	1871-1947	104		95	64	6.9
	Denver.....AP	5379	1934-1947	99	93			
	Grand Junction.....CO	6558	Up to 1946	105		95	65	
	Pueblo.....CO	4770	1889-1938	104		95	65	6.3
	Pueblo.....AP	4810	1939-1947	104	95			
Conn.	Hartford.....CO	229	1900-1940 ^d	101		93	76	
	Hartford.....AP	20	1940-1947	98	88			
	New Haven.....CO	180	1872-1947	101		95	75	7.4
	New Haven.....AP	17	1943-1947	94				
D. C.	Washington.....AP	128	1871-1947	106		95	78	5.9
	Washington.....CO	20	1935-1939	102	92			
Fla.	Apalachicola.....CO	23	1922-1947	104		95	80	
	Jacksonville.....CO	104	1871-1947	105		95	78	8.4
	Jacksonville.....AP	29	1935-1947	100	94			
	Key West.....CO	23	1871-1947	95		98	78	
	Key West.....AP	48	1930-1947	96		91	79	8.7
	Miami.....CO	253	1896-1947	100		95	78	
	Miami.....AP	13	1940-1947	100				
	Pensacola.....CO	67	1879-1947	103	89			
	Pensacola.....AP	113	1943-1947	98		95	78	
	Tampa.....CO	111	1890-1940	98		95	78	7.4
	Titusville.....AP	12	1941-1946 ^d	98				
Ga.	Atlanta.....AP	1020	1935-1939	102	90			
	Augusta.....CO	195	1871-1946	106	93			
	Augusta.....AP	424	1939-1947	105		95	76	7.9
	Macon.....CO	403	1890-1947	105		95	78	
	Macon.....AP	432	1939-1947	102				
	Savannah.....CO	115	1871-1945 ^d	105		95	78	8.0
	Savannah.....AP	56	1939-1947	105	93			
Idaho	Boise.....CO	2818	1884-1939	112		95	65	5.8
	Boise.....AP	2849	1939-1947	109	95			
	Burley.....AP	4150	1935-1939	104	94			
	Lewiston.....CO	763	1900-1944 ^d	117		95	65	
	Pocatello.....CO	4522	1899-1947	105		95	65	
	Pocatello.....AP	4467	1938-1947	103	92			
Ill.	Chicago.....CO	319	1872-1947	108		98	78	
	Chicago.....AP	601	Up to 1946	105		95	75	9.5
	Chicago.....CO	615	1935-1939	107	92			
	Moline.....AP	594	1932-1947	106	94	96	76	