

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 this 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 outdoor 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 outdoor air in operating rooms, although 100 percent outdoor 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 outdoor 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 ^d °F	COL. 6 DESIGN DRY-BULB TEMP. ON T.A.C. 2½% BASIS ^e °F	COL. 7 DESIGN DRY-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	...	95	78	...
	Birmingham.....CO	711	1893-1945	107	...	95	78	5.4
	Birmingham.....AP	615	1939-1947	103	94	...	...	...
	Mobile.....CO	143	1872-1947	103	...	95	80	8.0
	Mobile.....AP	219	1940-1947	104	92	...	...	...
Ariz.....	Montgomery.....CO	293	1872-1947	107	...	95	78	...
	Montgomery.....AP	226	1938-1944 ^d	103	...	...	...	...
	Flagstaff.....CO	6957	1899-1947	93	...	90	65	...
	Kingman.....AP	3473	1935-1939	107	99	...	...	...
	Phoenix.....CO	1122	1895-1947	118	...	105	76	6.0
Ark.....	Phoenix.....AP	1112	1933-1947	117	107	...	...	...
	Tucson.....CO	2561	1935-1939	112	102	105	72	...
	Winslow.....CO	4853	Up to 1946	107	...	100	70	...
	Winslow.....AP	4899	1937-1947	103	95	...	...	...
	Yuma.....CO	146	1876-1946	120	...	110	78	...
Calif.....	Yuma.....AP	146	1882-1945	113	...	95	76	6.1
	Fort Smith.....CO	463	1945-1947	107	...	...	...	...
	Fort Smith.....AP	451	1879-1942 ^d	110	...	95	78	6.2
	Little Rock.....CO	282	1942-1947	107	97	...	...	...
	Little Rock.....AP	499	1937-1946	113	104	105	70	...
Calif.....	Bakersfield.....AP	740	1931-1947 ^d	111	94	...	...	...
	Burbank.....AP	1925	1935-1939	113	104	...	...	...
	Daggett.....CO	132	1886-1947	85	...	90	65	...
	Eureka.....CO	337	1837-1939	115	...	105	74	7.9
	Fresno.....CO	281	1939-1947	111	103	...	...	...
Calif.....	Fresno.....AP	534	1877-1947	109	...	90	70	5.8
	Los Angeles.....CO	21	1929-1947	102	80	85	65	...
	Oakland.....CO	305 ^c	1877-1934	115	...	100	70	...
	Red Bluff.....AP	346	1944-1947	112	...	...	...	...
	Red Bluff.....CO	579	1935-1939	112	101	...	...	...
Calif.....	Redding.....CO	116	1877-1947	114	...	100	72	7.9
	Sacramento.....AP	22	1938-1947	108	...	...	...	...
	Sacramento.....CO	90	1871-1940	110	...	85	68	...
	San Diego.....CO	34	1939-1947	106	79	...	...	...
	San Diego.....AP	164	1875-1947	101	...	85	65	10.7
Calif.....	San Francisco.....CO	100	Up to 1946	106	...	91	70	...
	San Jose.....CO	124	1935-1939	116	103	...	...	...
	Williams.....AP	5398	1871-1947	105	...	95	64	6.9
	Denver.....CO	5379	1934-1947	104	93	...	...	...
	Denver.....AP	6558	Up to 1946	99	...	95	65	...
Calif.....	Durango.....CO	4587 ^c	Up to 1946	105	...	95	65	6.3
	Grand Junction.....CO	4770	1899-1938	104	...	95	65	...
	Pueblo.....CO	4810	1871-1947	104	95	...	...	...
	Pueblo.....AP	229	1895-1940 ^d	101	...	93	75	...
	Hartford.....CO	20	1940-1947	98	...	95	75	7.4
Conn.....	Hartford.....AP	180	1872-1947	101	...	95	75	...
	New Haven.....CO	17	1943-1947	94	84	...	...	...
	New Haven.....AP	128	1871-1947	106	...	95	78	5.9
	Washington.....CO	20	1935-1939	106	92	...	...	...
	Apalachicola.....CO	23	1922-1947	102	...	95	80	8.4
Fla.....	Jacksonville.....CO	104	1871-1947	104	...	95	78	...
	Jacksonville.....AP	29	1938-1947	105	94	...	...	...
	Key West.....CO	23	1871-1947	100	...	98	78	...
	Key West.....AP	48	1939-1947	95	...	...	...	...
	Miami.....CO	253	1896-1947	96	...	91	79	8.7
Ga.....	Miami.....AP	13	1940-1947	100	89	...	...	...
	Pensacola.....CO	67	1879-1947	103	...	95	78	...
	Pensacola.....AP	113	1943-1947	105	...	...	...	...
	Tampa.....CO	111	1890-1940	98	...	95	78	7.4
	Tampa.....AP	12	1941-1946 ^d	98	...	...	...	...
Ga.....	Titusville.....AP	52	1935-1939	98	90	...	...	...
	Atlanta.....CO	1020	1935-1939	102	93	95	76	7.9
	Augusta.....CO	195	1871-1946	106	...	98	76	...
	Augusta.....AP	424	1939-1947	105	...	...	...	...
	Macon.....CO	408	1899-1947	105	...	95	78	...
Idaho.....	Macon.....AP	432	1939-1947	102	...	...	...	...
	Savannah.....CO	115	1871-1945 ^d	105	...	95	78	8.0
	Savannah.....AP	56	1939-1947	105	93	...	...	...
	Boise.....CO	2818	1864-1939	112	...	95	65	5.8
	Burley.....AP	2849	1939-1947	109	95	...	...	...
Idaho.....	Idaho Falls.....AP	4150	1935-1939	104	88	...	...	...
	Lewiston.....CO	4744	1935-1939	100	...	...	...	...
	Pocatello.....CO	783	1900-1944 ^d	117	...	95	65	...
	Pocatello.....AP	4522	1899-1947	105	...	95	65	...
	Cairo.....CO	4467	1938-1947	103	92	...	...	...
Ill.....	Chicago.....CO	319	1872-1947	106	...	98	78	...
	Chicago.....CO	601	Up to 1946	105	...	95	75	9.5
	Chicago.....AP	615	1935-1939	107	92	...	...	...
	Moline.....AP	594	1932-1947	106	94	96	76	...