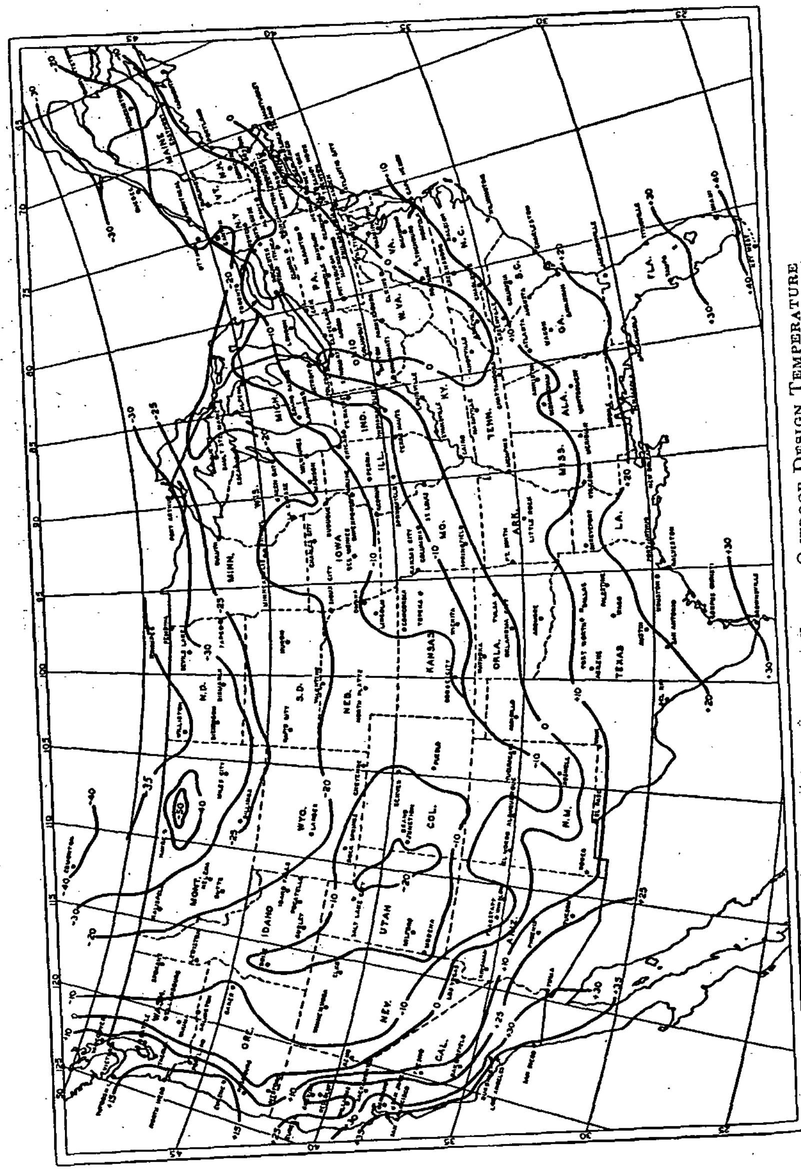

FIG. 1. ISOTHERMS OF WINTER OUTDOOR DESIGN TEMPERATURE

tween the 0 F and 10 F isotherms would normally have a design temperature of 5 F although sharp changes in elevation must be taken into consideration in mountainous areas. This map will be of considerable value in selecting design temperatures for cities and towns not listed in Table 1.

The design temperatures in Column 10 of Table 1 are often used with a design wind velocity of 15 mph. However, Column 11 shows that the

average wind velocity from December through February is 15 mph or higher in only 7 of the cities listed and Column 9 shows that a wind velocity of 15 mph did not occur in any city listed for temperatures equal to or lower than those shown in Column 8 for the years 1935–1939. Consequently, it will often be desirable to modify the U values in Tables 6 to 9 and 15 to 19 of Chapter 9 to correspond to lower wind velocities. Correction factors for different wind velocities can be found in Table 21 of Chapter 9.

Column 6 in Table 1 lists the average annual minimum temperature which is the average of readings of the one lowest temperature occurring for each year the weather station has been in existence. A comparison of the temperatures listed in Columns 6, 8, and 10 of Table 1 offers some guidance in selecting a suitable outdoor design temperature for particular cities. For the 63 cities in the United States having temperatures listed in all three columns the average annual minimums in Column 6 average 2.3 deg warmer than the design temperature in common use listed in Column 10 whereas the design temperatures in Column 8 average 11.0 deg warmer than those in Column 10. There are variations of 6 deg or more in either direction from these average differences, however, for a few cities in this group.

Designers are cautioned against attempting to compensate for internal vagrant heat sources in a structure, the heat generated by electrical equipment, the approximations that may exist in heat transmission factors and infiltration rates, and the safety factors used in selecting heating plant capacity by adjusting the design temperature difference between indoors and outdoors. These factors should be accounted for by more careful analysis of their existence and magnitude in computing the heating load that must be carried by the heating plant itself.

INSIDE TEMPERATURES

The inside air temperature which must be maintained within a building is understood to be the dry-bulb temperature at the breathing line, 5 ft above the floor, or at the seating level, 30 in. above the floor, and not less than 3 ft from the outside walls. Inside air temperatures usually specified, vary in accordance with the intended use of the building. Table 2 presents values which conform to good practice.

The proper dry-bulb temperature to be maintained depends upon the relative humidity and air motion, as explained in Chapter 6. In other words, a person may feel warm or cool at the same dry-bulb temperature, depending on the relative humidity and air motion. The optimum winter *effective temperature* for sedentary persons, as determined at the A.S.H.V.E. Research Laboratory, is 67–68 ET.

As explained in Chapter 6 for so-called still air conditions, a relative humidity of approximately 50 percent is required to produce an effective temperature of 68 ET when the dry-bulb temperature is 72.5 F. However, even where provision is made for artificial humidification, the relative humidity is seldom maintained higher than 40 percent during the extremely cold weather, and where no provision is made for humidification, the relative humidity may be 20 percent or less. Consequently, in using the figures listed in Table 2, consideration should be given to the actual relative humidity to be maintained, if provision is to be made for humidification. If no humidification is to be provided, the higher temperatures