by the area of the surface in square feet and the temperature difference between the inside and outside air. (See paragraphs 1 and 2.)

6. Select unit values and compute the heat equivalent of the infiltration of cold air taking place around outside doors and windows. These unit values depend on kind or width of crack and wind velocity, and when multiplied by the length of crack and the temperature difference between the inside and outside air, the result expresses the heat required to warm up the cold air leaking into the building per hour. See pages 47 to 60 and Tables 14 to 19.

7. The sum of the heat losses by transmission (paragraph 5) through the outside wall and glass, as well as through any cold floors, ceilings or roof, and the heat equivalent (paragraph 6) of the cold air entering by infiltration represents the total heat loss equivalent for any building.

The above are the heat losses after the building is heated and under stable operating conditions, in coldest weather. Additional heat is required for raising the temperature of the air, the building materials and the material contents of the building to standard inside temperature.

The rate at which this additional heat is required depends upon the heat capacity of the structure and its material contents and upon the time in which these are to be heated.

This additional heat may be figured and allowed for as conditions require, but inasmuch as the heating system proportioned for taking care of the above heat losses will usually have a capacity about 100 per cent greater than that required for average winter weather, and inasmuch as most buildings may either be continuously heated or more time be allowed for heating up, during the few minimum temperature days, no allowance is made except in the size of boilers or furnaces.

## INSIDE TEMPERATURES FOR WINTER[1]

The inside air temperature which must be maintained within a building and which should always be stated in the heating specifications, is understood to be the temperature at the breathing line 5 ft. above the floor and not less than 3 ft. from the outside walls. Inside air temperatures usually specified vary in accordance with the use to which the building is to be put, and Table 1 presents values which are in conformity with good practice.

In connection with inside temperatures for winter where humidifying means are provided, approximately 1 deg. variation for each 10 per cent variation in relative humidity should be provided. For example, if the relative humidity is raised from a condition of 15 per cent to one of 45 per cent by artificial humidification it is desirable to lower the indoor temperature about 3 deg. as indicated by the Effective Temperature Line on the Comfort Chart. (See Chapter XXIII, p. 357.) The temperatures given in the table are for normal dry air with dew-points approximately equivalent to outdoor air. A reduction in the temperatures will be required corresponding to the raise of the moisture content by artificial humidification.

In making the actual heat loss computations, however, for the various rooms in a building it is often necessary to modify the temperatures given in Table 1 so that the air temperature at the proper level will be

[1]Material for inside and outside temperatures prepared especially for THE GUIDE by the following committee: W. H. Carrier, *chairman;* Prof. A. R. Acheson, R. S. Franklin, Dr. E. V. Hill and S. R. Lewis.





TABLE 1. INSIDE TEMPERATURES USUALLY SPECIFIED

| TYPE OF BUILDING | DEG. FAHR. |
|---|---|
| SCHOOLS— | |
| Class Rooms | 68 |
| Assembly Rooms | 66 – 68 |
| Gymnasiums | 55 – 65 |
| Toilets and Baths | 70 |
| Wardrobe and Locker Rooms | 65 – 68 |
| Kitchens | 66 |
| Dining and Lunch Rooms | 65 – 68 |
| Playrooms | 60 – 65 |
| Natatoriums | 75 |
| THEATRES— | |
| Seating Space | 68 – 72 |
| Lounge Rooms | 68 |
| Toilets | 68 |
| HOSPITALS— | |
| Private Rooms | 70 |
| Private Rooms (surgical) | 70 – 80 |
| Operating Rooms | 70 – 95 |
| Wards | 68 |
| Kitchens and Laundries | 66 |
| Toilets | 68 |
| Bathrooms | 70 – 80 |
| HOTELS— | |
| Bedrooms and Baths | 70 |
| Dining Rooms | 70 |
| Kitchens and Laundries | 66 |
| Ball Rooms | 65 – 68 |
| Toilets and Service Rooms | 68 |
| HOMES— | |
| Where 68 deg. is generally the desirable standard of temperature a guarantee of 70 deg. is customarily exacted. | |
| STORES | 65 – 68 |
| PUBLIC BUILDINGS | 68 – 70 |
| WARM AIR BATHS | 120 |
| STEAM BATHS | 110 |
| FACTORIES AND MACHINE SHOPS | 60 – 65 |
| FOUNDRIES AND BOILER SHOPS | 50 – 60 |
| PAINT SHOPS | 80 |

used. By "air temperature at the proper level" is meant, in the case of walls, the air temperature at the mean height between floor and ceiling; in the case of glass, the air temperature at the mean height of the glass; in the case of roof or ceiling, the air temperature at the mean height of the roof or ceiling above the floor of the heated room, and in the case of floors, the air temperature at the floor level. In the case of heated spaces adjacent to unheated (no heat of any kind) spaces, it will usually be sufficient to assume the temperature in such spaces as the mean between the temperature of the inside heated spaces and the outside air temperature.

The air temperature at the mean height between floor and ceiling is the "breathing-line" temperature, Table 1, for rooms not over 10 ft. in