

TABLE 2. BASE TEMPERATURE FOR THE DEGREE-DAYS

| TYPE OF BUILDING                   | No. OF BUILDINGS ANALYZED | TEMPERATURE F CORRESPONDS TO ZERO STEAM CONSUMPTION |
|------------------------------------|---------------------------|-----------------------------------------------------|
| Office.....                        | 60                        | 66.2                                                |
| Office and Bank.....               | 4                         | 65.8                                                |
| Bank.....                          | 3                         | 66.2                                                |
| Office and Telephone Exchange..... | 2                         | 65.5                                                |
| Office and Stores.....             | 6                         | 67.4                                                |
| Stores.....                        | 11                        | 64.0                                                |
| Department Stores.....             | 12                        | 64.3                                                |
| Hotels.....                        | 7                         | 66.5                                                |
| Apartments.....                    | 14                        | 68.8                                                |
| Residences.....                    | 8                         | 66.9                                                |
| Clubs.....                         | 4                         | 65.5                                                |
| Lodges.....                        | 5                         | 64.9                                                |
| Theatres.....                      | 3                         | 67.6                                                |
| Churches.....                      | 2                         | 65.8                                                |
| Garage.....                        | 2                         | 64.8                                                |
| Auto Sales and Service.....        | 4                         | 61.2                                                |
| Newspaper and Printing.....        | 3                         | 67.7                                                |
| Warehouse and Loft.....            | 3                         | 67.7                                                |
| Office and Loft.....               | 2                         | 65.2                                                |
| Manufacturing.....                 | 8                         | 65.4                                                |
| Average for 163 Buildings.....     |                           | 66.0 F                                              |

\*Report of Commercial Relations Committee, 1932 Proceedings, National District Heating Association.

TABLE 3. STEAM CONSUMPTION FOR VARIOUS CLASSES OF BUILDINGS<sup>a</sup>  
(Heating Season Only)

| BUILDING CLASSIFICATION              | No. OF BUILDINGS LISTED | STEAM CONSUMPTION<br>POUNDS PER DEGREE-DAY—65 F BASE <sup>b</sup> |                                 |                                            |
|--------------------------------------|-------------------------|-------------------------------------------------------------------|---------------------------------|--------------------------------------------|
|                                      |                         | Per M Cu Ft of Heated Space                                       | Per M Sq Ft of Radiator Surface | Per M Btu per Hr of Heat Loss <sup>c</sup> |
| Apartments.....                      | 16                      | 1.78                                                              | 97.5                            | 0.359                                      |
| Hotels.....                          | 10                      | 1.46                                                              | 80.6                            | 0.371                                      |
| Residences.....                      | 12                      | 1.32                                                              | 64.2                            | .....                                      |
| Printing.....                        | 7                       | 1.25                                                              | 105.5                           | .....                                      |
| Clubs and Lodges.....                | 10                      | 0.96                                                              | 77.0                            | .....                                      |
| Retail Stores.....                   | 18                      | 0.90                                                              | 80.6                            | 0.268                                      |
| Theatres.....                        | 6                       | 0.90                                                              | 75.0                            | 0.498                                      |
| Loft and Mfg.....                    | 16                      | 0.89                                                              | 72.3                            | 0.283                                      |
| Banks.....                           | 7                       | 0.88                                                              | 45.2                            | .....                                      |
| Auto Sales and Service.....          | 8                       | 0.83                                                              | 62.2                            | .....                                      |
| Churches.....                        | 6                       | 0.58                                                              | 49.4                            | .....                                      |
| Department Stores.....               | 14                      | 0.57                                                              | 60.7                            | 0.238                                      |
| Garages (Storage) <sup>e</sup> ..... | 6                       | 0.42                                                              | 72.3                            | .....                                      |
| Offices (Total).....                 | 35                      | 1.09                                                              | 70.0                            | 0.283                                      |
| Offices (Heating only).....          | 35                      | 0.975                                                             | 65.4                            | 0.256                                      |

<sup>a</sup>Includes steam for heating domestic water for heating season only.

<sup>b</sup>Heat loss calculated for maximum design condition (in most cases 70 F inside, zero outside).

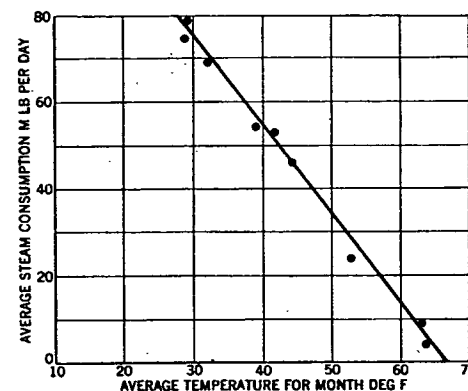
<sup>c</sup>Equivalent steam radiator surface.

<sup>d</sup>The figures are a numerical—not a weighted—average for the several buildings in each class.

<sup>e</sup>Based on zero consumption at 55 F.

expected. For an average figure, the A.G.A. base of 65 F may therefore be safely used, and if greater refinement is desired, the figure for the type of building under consideration can be taken from Table 2.

Table 3<sup>4</sup> gives the steam consumption per degree-day, expressed in three different ways, for 196 buildings in 14 different classifications. These buildings are divided among 21 different cities in the United States. The steam used for heating the domestic water is included in these figures, but in the case of office buildings, the steam for heating only is also shown. The data are placed on a comparable basis by expressing the steam consumption in terms of pounds per degree-day per thousand square feet of equivalent installed radiator surface, per thousand cubic feet of heated space, and per thousand Btu of calculated heat loss.

FIG. 1. METHOD OF DETERMINING BASE TEMPERATURE FOR DEGREE-DAY CALCULATIONS<sup>5</sup>

The choice of these units of comparison require some explanation. The use of *heated space* in preference to the gross cubage used by architects is obviously more accurate for this purpose. The architect's cubage includes the outer walls and certain percentages of attic and basement space which are usually unheated. The net heated space is usually about 80 per cent of the gross cubage and can be calculated from the latter if it cannot be measured. The cubical content is somewhat inaccurate as a basis of comparison due to differences in types of construction, exposure, and ratio of exposed area to cubical contents.

The use of radiator surface as the basis of comparison has two objections. One is that the amount of radiator surface in a building is often either excessive or deficient, and figures for steam consumption based on it are therefore likely to be in error. Another reason is that it is difficult to convert fan coil surface into equivalent direct radiator surface with accuracy. On the whole, the use of radiator surface as the basis of comparison is the least satisfactory of the three methods.

<sup>4</sup>The Heat Requirements of Buildings, by J. H. Walker and G. H. Tuttle (A.S.H.V.E. JOURNAL SECTION, Heating, Piping and Air Conditioning, December, 1934).

<sup>5</sup>Report of Commercial Relations Committee, 1932 Proceedings, National District Heating Association.