

was a difficult problem. We are extremely gratified that, before our persistence and enthusiasm, the difficulties have been transformed into inspiring cooperation. We are proud that in the Catalog Data Pages of THE GUIDE, the Engineer, Architect, Contractor or Builder can find authoritative, *serviceable* data which he can use effectively in the selection of material or equipment, and in the general design of installations. We feel that this pride is justified because it has been *earned*,—through devotion to principles and unremitting efforts to prove them. We are, too, very grateful to those far-seeing, broadminded manufacturers who have joined with us in this enterprise, the sole object of which is service to and advancement of the Art of Heating, Ventilating and Air Conditioning,—an Art now immutably associated with the comfort, health and happiness of practically every man, woman and child in the civilized world.

These manufacturers, whose Catalog Data appear in THE GUIDE, pay for the service rendered to them as effective advertising, and the support and cooperation of these prescient manufacturers constitute an important part of the means whereby the American Society of Heating and Ventilating Engineers is enabled to achieve the publication and wide distribution of THE GUIDE,—whereby the Society has been enabled to extend its wholly philanthropic services to the general advancement of the Profession and its allied Industries, the one entirely dependent upon the other and both, jointly, essential to the general interests of the public. To them, our whole-hearted acknowledgements.

Thus, through the splendid cooperation of its Members, backed by that of allied Manufacturers, The Society is enabled to extend its service and influence in a manner otherwise impossible,—to contribute signally to the advancement of those ideals which inspired its founders and have been perpetuated in its membership.

In this edition every Text Chapter has been carefully revised in accordance with current knowledge and all useful data which have become available since the last edition have been added. Arrangement and indexing have had intensive study and "The Index of the Technical Data Sections" (pp. iv to xiii), has been made as comprehensive as possible. Likewise the Index to the *Catalog Data Section* (pp. 495 to 818) and the Index to *Modern Heating and Ventilating Equipment* (pp. 819 to 840) have been revised and amplified. The use of these Indices will greatly augment the utility of the work, with regard to any particular purpose. While we feel a perusal of all the Text and Catalog Data Pages will amply reward the time so employed, we suggest that the Indexes provide a quick and convenient means of access to reliable information upon such specific subjects as may be of immediate importance to the user.

It is recommended that use be made of the *Catalog Data* to supplement the *Text Data* on any subject, as it will be found to contain much of the engineering data on sizes, shapes, capacities, dimensions, space requirements, applications and installations, so useful in the planning, specifying and installation of mechanical equipment.

It is also suggested that the cross references in the Text always be used, as they have been very carefully planned to give ready access to the data contained in other Chapters which may be useful in connection with the particular Chapter in question.

Also that the notes and explanations (especially those applicable to Tables) be studied, as in the interest of brevity and simplicity certain data have been made to serve many purposes by the use of these notes, but at the same time may be susceptible to improper use if not fully understood.

We are more than gratified that THE GUIDE has been adopted in many Schools, Colleges and Universities, as a standard Text Book, more than four hundred copies of the last Edition being so employed. In appreciation, we pledge ourselves to unflinching efforts that we may continue to merit this unusual recognition.

We invite and will welcome constructive criticism from every source.

More than nine thousand (9000) copies of this Issue will be published and distributed with the sincere hope that the generous efforts of the Contributors and the ready cooperation of the represented Manufacturers will be more than required in services rendered to the general advantage of the Profession, the Associated Industries and the Public-at-large.

GUIDE PUBLICATION COMMITTEE

PERRY WEST, *General Chairman and Editor-in-Chief*

C. V. HAYNES

W. H. CARRIER

Vice-Chairmen

CHAPTER I

HEAT LOSSES FROM BUILDINGS

Data on Inside and Outside Temperatures, Heat Transmission Coefficients, Theory of Heat Transfer, Infiltration and Wind Effects, Heat Conductivity Tables for Various Building Construction.

INTRODUCTION

THE latest authoritative data on conductivities of building and insulating materials, have been used in the revision and enlargement of this chapter of THE GUIDE 1929. To the standard tables of heat transmission coefficients computed last year data for several new types of constructions have been added so that the figures for modern walls, roofs, ceilings, floors and partitions, both insulated and uninsulated are the most complete extant.

Much fundamental research work is now under way, especially on surface factors and data from these investigations should prove useful in future editions, but are not as yet complete or definite enough for use in THE GUIDE.

CALCULATING HEAT LOSSES

The procedure to be followed in determining the heat loss from any building can be divided into seven consecutive steps, as follows:

1. Determine on the inside air temperature, at the breathing line, which is to be maintained in the building during the coldest weather. See Table 1, p. 4.
2. Determine on an outside air temperature for design purposes, based on the minimum temperatures recorded in the locality in question, which will provide for all but the most severe conditions. Such conditions as may exist for only a few consecutive hours are readily taken care of by the heat capacity of the building itself. See Table 3, p. 8.
3. Select or compute the heat transmission coefficients for outside walls and glass, also for inside walls, floors, or top-floor ceilings, if these are next to unheated space. Include roof if next to heated space. See pages 22 to 45 and Tables 7 to 12.
4. Measure up net outside wall, glass and roof next to heated spaces, as well as any cold walls, floors or ceilings next to unheated space. Such measurements are made from building plans, or from the actual building.
5. Compute the heat transmission losses for each kind of wall, glass, floor, ceiling and roof in the building by multiplying the heat transmission coefficient in each case

Data for this Chapter of THE GUIDE originally prepared by Arthur C. Willard, Professor of Heating and Ventilation and Head of Department of Mechanical Engineering, University of Illinois.

The work of compiling and computing Tables 7-12, in accordance with the methods set forth in the text was done by P. D. Close.

The material for this edition has been revised by the following committee: Prof. F. B. Rowley, *chairman*; H. S. Ashenurst, P. D. Close, Prof. A. P. Kratz, Prof. G. L. Larson, L. B. Lent, E. C. Lloyd, H. P. Reid, E. N. Sanborn, C. G. Segeler and M. S. Wunderlich.