

COPYRIGHT 1965

BY THE
AMERICAN SOCIETY OF HEATING, REFRIGERATING
AND
AIR-CONDITIONING ENGINEERS, INC.

AND BY IT
DEDICATED

TO THE ADVANCEMENT OF

THE PROFESSION

AND

ITS ALLIED INDUSTRIES

TEXT AND ILLUSTRATIONS ARE FULLY PRO-
TECTED BY COPYRIGHT AND NOTHING THAT
APPEARS MAY BE REPRINTED EITHER WHOLLY
OR IN PART WITHOUT SPECIAL PERMISSION.

Printed and Bound by
GEORGE BANTA CO. INC.
MENASHA - WISCONSIN
U.S.A.



PREFACE TO 1965 VOLUME FUNDAMENTALS AND EQUIPMENT

The ASHRAE GUIDE AND DATA BOOK 1965 is the second revision of the *Fundamentals and Equipment* Volume. The *Fundamentals and Equipment* Volume and its companion *Applications* Volume (ASHRAE GUIDE AND DATA BOOK 1964) provide comprehensive coverage of current practice in heating, refrigerating, ventilating, and air conditioning.

New information has been added in many chapters, and much of the existing text has been revised.

Two new chapters have been added, and two existing chapters have been split to form separate chapters, for a total of 71.

The arrangement of chapters has been revised to provide ten sections, as follows: I, Theory; II, General Engineering Data; III, Materials; IV, Calculations; V, Air Handling; VI, Refrigeration; VII, Heating; VIII, General Components; IX, Unitary Equipment; and X, General.

Some of the outstanding improvements to be found in this volume are: (1) a revised section on duct construction, including tables listing recommended construction for the low, medium and high pressure rectangular ducts and for round ducts, in agreement with the recommendations of the Sheet Metal and Air Conditioning Contractors National Association; (2) a new table of winter outdoor design conditions for 434 stations, including 62 in Canada; (3) a revised section on heat gain through fenestration, with revised data on glass block, new shading coefficients for glass block and draperies, and a new classification of drapery fabrics; (4) a new high altitude (5000 ft) psychrometric chart (see inside back cover), and revised text discussion to cover the four ASHRAE psychrometric charts included with this volume; (5) a rewritten chapter on secondary coolants (brines), including new information on glycols and halocarbons; (6) a new chapter on physiological considerations in environmental control for animals and plants; (7) a new chapter on physiological factors in drying and storing farm crops; (8) revised data on Refrigerants 11 and 22, new data for Refrigerant 502, and new data on cryogenic refrigerants; (9) a rewritten chapter on corrosion and water treatment; (10) a rewritten chapter on thermodynamics and refrigeration cycles; (11) a revised chapter on sound control, featuring a new work sheet for calculating duct attenuation; (12) a revised section on refrigerant control devices; and (13) revised sections on heat transfer by radiation and in boiling.

Chapters which have been extensively revised include: Chapter 1—the chapter was entirely rewritten to improve the presentation and provide more complete coverage for thermodynamics, compression refrigeration cycles, and absorption refrigeration cycles.

Chapter 2—sections on performance of thermocouples, design of devices, and advantages and applications have been revised.

Chapter 3—a section on the new ASHRAE high altitude psychrometric chart has been added. A copy of the new chart (No. 4) is included inside the back cover of this volume, together with a copy of the normal, low, and high temperature charts (Nos. 1, 2, and 3). A new section on transport properties of moist air has been added to the chapter.

Chapter 4—the sections on thermal radiation and boiling heat transfer have been rewritten and expanded.

Chapter 5—the section on two-phase flow has been expanded.

Chapter 6—a new chapter discussing physiological considerations in environmental control for animals and plants.

Chapter 9—a new chapter discussing physiological factors in drying and storing farm crops.

Chapter 12—rewritten and made a separate chapter. Sections on odor detection and on odor removal revised and updated.

Chapter 13—added section on transducers. Sections on location of space controllers and control of air flow were revised.

Chapter 14—revised to incorporate new reference value for sound power. A work sheet for calculating duct attenuation was added.

Chapter 16—completely rewritten to update and expand the information.

Chapter 19—new data added for properties of Refrigerant 502 and several cryogenic refrigerants. Values for Refrigerants 11 and 22 were revised to update the information.

Chapter 20—new charts and tables of properties added for Refrigerant 502 and several cryogenic fluids. Tables and charts for Refrigerants 11 and 22 were revised.

Chapter 21—completely rewritten to update and provide additional information on properties of glycols and halocarbons.

Chapter 22—revised sections on underground pipe insulation, insulation thickness to prevent surface condensation, and interior finish treatments.

Chapter 24—revised section on glass and door coefficients, and added data on conductivities and resistances of building and insulating materials.

Chapter 26—the table of winter climatic conditions was completely revised to include data for 434 stations (372 in the U. S. and 62 in Canada).

Chapter 27—the section on heat gain through fenestration was revised, with changes in data for glass block (to conform with data for other glass types), new shading coefficients for glass block and for draperies. A classification of drapery fabrics has been added. The table on summer climatic conditions has been revised to update values for several stations.

Chapter 29—revised and rearranged to improve the presentation. New information added on perforated ceilings and ceiling slots. Sections on outlet performance and balancing of systems were revised extensively.

Chapter 30—new sections added on outlet location and selection, air-light fixtures, and constant volume control.

Chapter 31—section on duct construction revised to provide new data in agreement with that published by the Sheet Metal and Air Conditioning Contractors National Association. New tables added for recommended construction of rectangular (low, medium and high pressure) ducts and for round ducts.

Chapter 32—illustrations of humidifiers revised to update.

Chapter 33—section on centrifugal compressors revised to update and improve presentation.

Chapter 40—added information on two-effect generator in lithium bromide-water cycle. Section on control of absorber and generator was revised.

Chapter 48—Part II revised to improve sections on application and rating of remote unit condensers and on control of air-cooled units. Section on liquid receivers revised and relocated.