Principles of Heating, Ventilating, and Air Conditioning

Tenth Edition

Based on the 2025 *ASHRAE Handbook—Fundamentals*

Kevin L. Amende, PE
Julia A. Keen, PhD, PE
Andrew M. Sneed, PE
Megan Tosh, PE

ASHRAE®

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Peachtree Corners

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Part III Online Supplemental Materials

The following materials are available for free online to purchasers of this book.



Air-Processing Equipment ***(includes problems at end of material)***
Climatic Design Conditions for Selected U.S. Cities
Cogeneration and Heat Recovery Systems ***(includes problems at end of material)***
Economic Analyses and Life-Cycle Costs ***(includes problems at end of material)***
Fitting Loss Coefficients
Heat Exchange Equipment ***(includes problems at end of material)***
Heating Equipment ***(includes problems at end of material)***
Panel Heating and Cooling Systems ***(includes problems at end of material)***
Psychrometric Charts Nos. 1, 2, and 4 (I-P) and 1, 2, and 6 (SI)
Refrigeration Equipment ***(includes problems at end of material)***
Radiant Time Series (RTS) Method
RTS Method Load Calculation Spreadsheets in Microsoft® Excel®
Systems Design Problems

PREFACE

Principles of Heating, Ventilating, and Air Conditioning, Tenth Edition, a textbook based on the 2025 *ASHRAE Handbook—Fundamentals*, builds upon the ninth edition that had received an influx of new authors and a new single-column layout to improve readability for digital users. Past contributions from authors Dr. Harry Sauer, Jr.; William J. Coad; and Ronald H. Howell had laid the foundation for the new authors to revise and modernize this textbook for the next generation of HVAC engineers. Holding true to the textbook's original intent, this tenth edition is designed to be used in HVAC-related courses at engineering colleges and technical institutes. The text has been developed to give broad and current coverage of the heating, ventilating, and air-conditioning field when combined with the 2025 *ASHRAE Handbook—Fundamentals*. The authors made a conscious effort to improve the user experience when updating the textbook layout and content.

This textbook provides materials that are typically covered in a one-semester course and includes online supplemental materials online that give readers access to additional content, such as multiple versions of the psychrometric chart. The Systems Design Problems from previous editions are also included online.

This book should prove most suitable as a textbook and subsequent reference book for (a) undergraduate engineering courses in the general field of HVAC, (b) similar courses at technical institutes, (c) continuing education and refresher short courses for engineers, and (d) adult education courses for non-engineers. This text also readily aids in self-instruction of the 2025 *ASHRAE Handbook—Fundamentals* by engineers wishing to develop their competence in the HVAC&R field.

Although numerous references are made to the other ASHRAE Handbook volumes, sufficient material has been included from these to make this text complete enough for various courses in the HVAC&R field. The material covered for various audiences in regular university courses, technical institute courses, and short courses can and will vary greatly. This textbook focuses on the principles of HVAC and provides enough resources to allow users to tailor the content to their educational needs. Toward this end, the following major sections are included:

Part I	General Concepts, Chapters 1–8
Part II	HVAC Systems, Chapters 9–12
Part III	Online Supplemental Materials

Although the 2025 *ASHRAE Handbook—Fundamentals* is published in an SI edition, which uses international units, and an inch-pound (I-P) edition, this single version of *Principles of Heating, Ventilating, and Air Conditioning* is designed to serve the I-P edition with some SI interspersed throughout. Tables and figures for SI units can easily be found at the end of each chapter with tab indicators. The appendix, Units and Conversions, contains useful information for HVAC&R units.

A particular point of confusion must be addressed: as with previous editions, because this textbook was developed to be used with *ASHRAE Handbook—Fundamentals*, several tables and figures have been reproduced in their original form, complete with references to material elsewhere in the Fundamentals volume (not in this book). Thus, if the source attribution in a table or figure indicates that it is a Fundamentals table or figure, then all references to other locations, equations, tables, etc., refer to those in Fundamentals, not in Principles, unless otherwise noted.