



# Principles of Refrigeration

By Roy J. Dossat

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This text is a detailed, applications-oriented treatment of the mechanical refrigeration cycle and associated equipment. Completely self-contained, the first five chapters cover the fundamental principles of physics and thermodynamics, including psychometrics. The text emphasizes the cyclic nature of refrigeration systems and offers a thorough examination of each part in relation to other parts and to the whole system. The book contains examples and practice problems that draw theory and practice together.

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## **Editorial Review**

From the Publisher

A comprehensive applications-oriented treatment of the mechanical refrigeration cycle and associated equipment.

From the Back Cover

A comprehensive applications-oriented treatment of the mechanical refrigeration cycle and associated equipment. Contains an overview of the fundamental principles of physics and thermodynamics, including an introduction to psychrometrics, that are essential to an understanding of mechanical refrigeration. For anyone interested in HVAC.

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*Principles of Refrigeration* has been one of the foundation textbooks in the refrigeration field since Roy Dossat wrote the first edition in 1961. Through four additional editions, Mr. Dossat presented the fundamentals of refrigeration theory, components and systems to students who were preparing to enter an occupation rich with opportunities. I am honored that Mr. Dossat selected me to carry on his tradition of excellence by awarding me the opportunity to write the fifth edition of his textbook.

Having taught HVAC/R students at Ferris State University I have discovered the strengths and weaknesses that students have in developing the study habits and analytical skills they need to prepare themselves as successful technicians, technologists and engineers. I know from personal experience that if students graduate without the ability to build upon their educational experience, they will be limited in their advancement and opportunities. If an instructor can teach students how processes can be broken down into the fundamental principles, they will be able to correctly analyze and troubleshoot systems and processes that were not presented in a book or classroom activities. I have used this information, along with feedback from many faculty and graduates who used the previous editions of this book, as the basis for writing the fifth edition. The following paragraphs outline some of the significant changes in the text.

- This book is intended for students of two- and four-year refrigeration programs who have previously completed a fundamental course in refrigeration systems. Although such a course is not a prerequisite, this edition was written to advance the student's knowledge of refrigeration systems by presenting more detailed information about the refrigeration cycle, component design and system operation than is normally found in an introductory text. The book presents the science behind the operation of systems as a method of building solid analytical skills that will raise the student above his or her peers when it comes to determining the cause of system malfunctions and inefficiencies and to selecting the best component to modify a system or replace a failed part.
- The first eleven chapters of the book have been significantly enhanced. The thermodynamics, heat transfer, mechanics and physics topics have been expanded. Rather than a review, these topics are now thoroughly explained in a manner that allows a student to comprehend the sciences related to refrigeration processes. The information develops the foundation needed to understand the underlying theory of refrigeration component and system operation. This part of the book may be a comprehensive review for students in programs where these subjects are taught as separate courses, but it is also an excellent presentation for those who use this book as the primary resource for this information.
- All of the information presented in Parts 1 through 3 is used throughout the remainder of the text to explain how refrigeration components function. There is no esoteric or "nice-to-know" information presented in

this section, so classroom time can be used more efficiently. The refrigeration cycles show how changes in system variables are transferred through the system. This information develops the reader's analytical skills.

- The book presents the formulas, units and proofs that support the information presented in the chapters in Parts 2, 3 and 4. The mathematical material is intended to be a resource in developing the relationships that exist in the processes rather than as a mathematical exercise. These relationships will be applied throughout the remainder of the text; the formulas will not. The chapters can be just as effective in training a technician without the associated formulas, but they are there to show from whence the information presented in the chapter was derived. In support of this presentation method, all of the mathematics related to the chapter material is presented in the last section of the chapter labeled "Optional Analysis." This section can be skipped or assigned as extra credit material.
- The formulas are presented in Inch-Pound and System International units. All variables are written with the appropriate units to show students how to properly approach problems by applying the fundamental relationships. This reduces the memorization of formulas and increases the understanding of the interrelationships between the sciences. The use of SI units also exposes students to the associated methods of measuring variables, so they become familiar with the information found on product literature and equipment nameplates. The formulas and examples are used to show relationships without making the book appear to be an engineering text.
- Most of the topics in the 4th edition remain in this edition, although they have been reorganized to improve the flow of information. The entire book was rewritten using a style that is more closely related with books, manuals and other material read by today's students.
- Some of the chapters that appeared too long have been split into two smaller chapters, so they are easier for the instructor to build lectures around and less intimidating to students. Each chapter also includes true-and-false questions along with multiple-choice questions to highlight the important information presented in the chapter.

Through these and other changes, I have taken a very important, comprehensive and effective resource and made it easier for both student and instructor to use and comprehend the information. Through the use of smaller sentences, fewer assumptions, more explanation and a logical presentation format, I believe I have succeeded in developing a new edition of the book that honors Mr. Dossat's intent to help those who have chosen the refrigeration field for their career. This edition will be more appealing to faculty who currently use the book and more inviting to those who are looking for a comprehensive textbook for their students.

*Thomas Horan*

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