

ASHRAE Research: Improving the Quality of Life

The American Society of Heating, Refrigerating and Air-Conditioning Engineers is the world's foremost technical society in the fields of heating, ventilation, air conditioning, and refrigeration. Its members worldwide ideas, identify needs, support research, and write the industry's standards for testing and practice. The result is that engineers are better able to keep indoor environments safe and productive while protecting and preserving the outdoors for generations to come.

One of the ways that ASHRAE supports its members' and industry's need for information is through ASHRAE Research. Thousands of individuals and companies support ASHRAE Research

annually, enabling ASHRAE to report new data about material properties and building physics and to promote the application of innovative technologies.

The chapters in ASHRAE Handbooks are updated through the experience of members of ASHRAE technical committees and through results of ASHRAE Research reported at ASHRAE meetings and published in ASHRAE special publications and in *ASHRAE Transactions*.

For information about ASHRAE Research or to become a member contact, ASHRAE, 1791 Tullie Circle, Atlanta, GA 30329; telephone: 404-636-8400; www.ashrae.org.

The 2001 *ASHRAE Handbook*

The Fundamentals volume covers basic principles and provides data for the practice of HVAC&R technology. Although design data change little over time, research sponsored by ASHRAE and others continues to generate new information that meets the evolving needs of the people and industries that rely on HVAC&R technology to improve the quality of life. The ASHRAE technical committees that prepare chapters strive to provide new information, clarify existing information, delete obsolete materials and reorganize chapters to make the Handbook more understandable and easier to use. In this volume, some of the changes and additions are as follows:

- Chapter 1, Thermodynamics and Refrigeration Cycles, includes new sections on ideal thermal and absorption cycles, multiple stage cycles, and thermodynamic representation of absorption cycles. The section on ammonia water cycles has been expanded.
- Chapter 12, Air Contaminants, has undergone major revisions. Material has been added from the 1999 *ASHRAE Handbook*, Chapter 44, Control of Gaseous Indoor Air Contaminants. Health-related material with standards and guidelines for exposure has been moved to Chapter 9, Indoor Environmental Health.
- Chapter 15, Fundamentals of Control now includes new or revised figures on discharge air temperature control, step input process, and pilot positioners. New are sections on networking and fuzzy logic, revised descriptions on dampers and modulating control, and text on chilled mirror humidity sensors and dispersive infrared technology.
- Chapter 17, Energy Resources, contains new sections on sustainability and designing for effective energy resource use.
- Chapter 19, Refrigerants, provides information on phaseout of CFC and HCFC refrigerants and includes new data on R-143a and R-404A, R-407C, R-410A, R-507, R-508A, and R-508B blends.
- Chapter 20, Thermophysical Properties of Refrigerants, has new data on R-143a and R-245fa. Though most CFC Refrigerants have been removed from the chapter, R-12 has been retained to assist in making comparisons. Revised formulations have been used for many of the HFC refrigerants, conforming to international standards where applicable.
- Chapter 23, Thermal and Moisture Control in Insulated Assemblies—Fundamentals, now has a reorganized section on economic insulation thickness, a revised surface condensation section, and a new section on moisture analysis models.
- Chapter 26, Ventilation and Infiltration, includes rewritten stack pressure and wind pressure sections. New residential sections discuss averaging time variant ventilation, superposition methods, the enhanced (AIM-2) model, air leakage through automatic doors, and central air handler blowers in ventilation systems. The nonresidential ventilation section has also been rewritten, and now includes a commercial building envelope leakage measurements summary.

- Chapter 27, Climatic Design Information, now contains new monthly, warm-season design values for some United States locations. These values aid in consideration of seasonal variations in solar geometry and intensity, building occupancy, and use patterns.
- Chapter 29, Nonresidential Cooling and Heating Load Calculations, now contains enhanced data on internal loads, an expanded description of the heat balance method, and the new, simplified radiant time series (RTS) method.
- Chapter 30, Fenestration, now has revised solar heat gain and visible transmittance sections, including information on the solar heat gain coefficients (SHGC) method. The chapter now also has a rewritten section on solar-optical properties of glazings, an expanded daylighting section, and a new section on occupant comfort and acceptance.
- Chapter 31, Energy Estimating and Modeling Methods, now contains improved model forms for both design and existing building performance analysis. A new section describes a simplified method for calculating heat flow through building foundations and basements. Sections on secondary equipment and bin-energy method calculations have added information, while the section on data-driven models has been rewritten and now illustrates the variable-base degree-day method.
- Chapter 32, Space Air Diffusion, has been reorganized to be more user-friendly. The section on principles of jet behavior now includes simpler equations with clearer tables and figures. Temperature profiles now accompany characteristics of different outlets, with stagnant regions identified. The section on underfloor air distribution and task/ambient conditioning includes updates from recent ASHRAE-sponsored research projects.
- Chapter 33, HVAC Computational Fluid Dynamics, is a new chapter that provides an introduction to computational methods in flow modeling, including a description of computational fluid dynamics (CFD) with discussion of theory and capabilities.
- Chapter 34, Duct Design, includes revisions to duct sealing requirements from ASHRAE *Standard* 90.1, and has been expanded to include additional common fittings, previously included in electronic form in ASHRAE's Duct Fitting Database.

This Handbook is published both as a bound print volume and in electronic format on a CD-ROM. It is available in two editions—one contains inch-pound (I-P) units of measurement, and the other contains the International System of Units (SI).

Look for corrections to the 1998, 1999, and 2000 Handbooks on the Internet at <http://www.ashrae.org>. Any changes in this volume will be reported in the 2002 *ASHRAE Handbook* and on the ASHRAE web site.

If you have suggestions for improving a chapter or you would like more information on how you can help revise a chapter, e-mail ashrae@ashrae.org; write to Handbook Editor, ASHRAE, 1791 Tullie Circle, Atlanta, GA 30329; or fax 404-321-5478.