ASHRAE COMMUNITY CYCLE OF INNOVATION ASHRAE MEDIA

THE ASHRAE COMMUNITY IS A NETWORK OF MORE THAN 50,000 PERSONS COMMITTED TO SUCCESSFUL HVAC&R ENGINEERING AND ENCOURAGEMENT OF INNOVATIVE PRACTICE. THOUSANDS OF OTHERS RELY ON ASHRAE.

ASHRAE volunteers conduct research, share experience in ASHRAE publications and web media, write standards guiding product design and application, and educate an entire industry on applying innovation in everyday practice to meet the needs of building owners. Their involvement fuels the Cycle of Innovation that drives HVAC&R technology.

ASHRAE Journal and ASHRAE.org link those 50,000 thought leaders and innovators to each other, to the industry at large, and to other influences in the public and private sectors.

More than a magazine or website, ASHRAE media draws on a peer review process powered by professionals committed to ASHRAE to provide new information required to sustain the Cycle of Innovation.

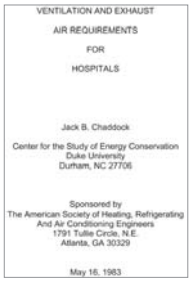
ASHRAE media engages HVAC&R engineers in their professional world, connecting them to each phase of the Cycle of Innovation, not only so they can benefit from it but so that they can create it.

ASHRAE MEDIA IS THE PULSE OF THE ASHRAE COMMUNITY.

ASHRAE JOURNAL

ASHRAE'S CYCLE OF INNOVATION

Healthcare Facilities



ASHRAE Research provides new data & updates ASHRAE Handbook

Ventilation and Exhaust Air Requirements for Hospitals

The research report provides new minimum exhaust air rates based upon energy conservation, odor control and health maintenance. Existing standards were overly conservative and thus energy inefficient in the light of new technologies.

ASHRAE Handbook distributed to all members putting all practitioners "on the same page."

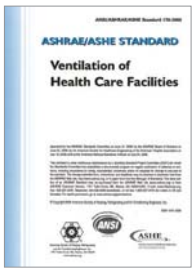
Healthcare Facilities Chapter

Medical evidence shows proper air conditioning prevents and treats many conditions, and ventilation requirements protect against harmful exposures. Relatively high cost of air conditioning demands efficient design and operation to ensure economical energy management. Major considerations for design and operation presented.

ASHRAE Learning Institute provides real-world guidance

Healthcare Facilities: Best Practices for Design & Application

Introduces unique and up-to-date healthcare design considerations and applications. Common medical terminology is introduced to show how terms have different meanings between the medical and engineering communities. Infection particles and their transport mechanisms are covered followed by infection control methods. The second half of the course focuses on air distribution designs for surgical and patient rooms. Various control and energy efficiency techniques for cooling and heating plants are presented along with O&M and other commissioning topics.



ASHRAE knowledge in research and Handbook create standards adopted in codes & regulation

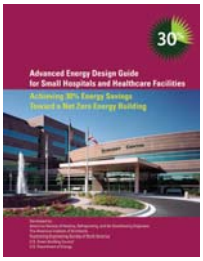
Standard 170 Ventilation of Health Care Facilities

Offer mandatory minimum requirements. Included in Guidelines for Design and Construction of Health Care Facilities, Guidelines for Design and Construction Health Care Facilities, used as code by Federal agencies and 42 states.

ASHRAE manuals for expanded design guidance

HVAC Design Manual for Hospitals and Clinics

In-depth resource for those who design, install & commission hospital systems. Covers environmental comfort, infection control, energy conservation, life safety, and operation & maintenance, providing design strategies applicable to standards and guidelines.



Guidance to Exceed Energy Minimums

Advanced Energy Design Guide for Small Hospitals and Healthcare Facilities

Achieve advanced energy savings without detailed calculations or analyses. Includes recommendations for all 8 U.S. climate zones. More than 20,000 copies distributed with support from DOE.

PRODUCTS SPECIFIED: CHILLERS COOLING TOWERS PUMPS AIR HANDLERS BOILERS TERMINAL BOXES EXHAUST FANS FIRESTOPPING DAMPERS AND LOUVERS HUMIDIFIERS CONTROLS HEPA FILTRATION UNITS PARTICLE COUNTERS MOISTURE METERS INFRARED TEMPERATURE HAND HELD DEVICES TEMPERATURE/HUMIDITY HAND HELD DEVICES WATER QUALITY TESTING DEVICES ENERGY MODELING SOFTWARE

ASHRAE'S CYCLE OF INNOVATION

Data Centers

ASHRAE Research provides new data & updates ASHRAE Handbook

Thermal Energy Storage for Emergency Cooling

A disruption of electrical power causing the lack of cooling to temperature sensitive equipment in data centers can cause failure in a matter of minutes or less. The availability of appropriately designed and built emergency cooling systems would prevent data loss and failure of the equipment. This research developed practical design methodologies for the design of emergency cooling systems.

ASHRAE Handbook distributed to all members putting all practitioners "on the same page."

"Data Processing and Electronic Office Areas" Chapter

The most defining HVAC characteristic of data and communications equipment centers is the potential for exceptionally high sensible heat loads. In addition, the equipment installed in these facilities typically serves mission-critical applications, has special environmental requirements, and has the potential for disruptive overheating and equipment failure caused by loss of cooling. Typical datacom equipment product cycles are 1 to 5 years, whereas facilities and infrastructure have life cycles of 10 to 25 years.

ASHRAE Learning Institute provides real-world guidance

Energy Efficiency & Data Centers

Full-day course examines the best practices for data center energy efficiency by focusing on thermal guidelines for data processing, datacom facility energy efficiency, and actual high density data centers in operation today. Participants gain an understanding of equipment environment specifications while learning methods for measuring performance and developing means to evaluate effectiveness of data center cooling. This course has been presented to thousands of HVAC engineers, IT managers, and facility engineers and managers throughout the US in cooperation with DOE and internationally.

ASHRAE knowledge in research and Handbook create standards adopted in codes & regulation

Standard 127-2007 – Method of Testing for Rating Computer and Data Processing Room Unitary Air Conditioners

Establishes requirements for rating computer and data processing room unitary air conditioners. Rating requirements have been changed to align the test conditions with the recommendations published in ASHRAE's Thermal Guidelines for Data Processing Environments, standards for the testing and rating of the humidification and dehumidification systems have been added, a minimum MERV rating for the air filters has been established and the tolerance of the unit rating vs the test results has been tightened.

ASHRAE manuals for expanded design guidance

ASHRAE Data Com Guides

A series of publications with in-depth guidance: Green Tips for Data Centers; Real-Time Energy Consumption Measurements in Data Centers; Particulate and Gaseous Contamination in Datacom Environments; High Density Data Centers – Case Studies and Best Practices; Best Practices for Datacom Facility Energy Efficiency; Structural and Vibration Guidelines for Datacom Equipment Centers; Liquid Cooling Guidelines for Datacom Equipment Centers; Design Considerations for Datacom Equipment Centers; Datacom Equipment Power Trends and Cooling Applications; Thermal Guidelines for Data Processing Environments.

PRODUCTS SPECIFIED: MODULAR DATA CENTERS CONTAINERIZED DATA CENTERS COMPUTER SERVERS TAPE STORAGE DEVICES STORAGE SERVERS STANDALONE WORKSTATIONS COMPUTER RACKS UPS EQUIPMENT PDUS BACKUP BATTERIES ENGINE-DRIVEN GENERATORS FUEL CELLS FOR CHP SWITCHGEAR COMPUTER ROOM AIR-HANDLING UNITS COMPUTER ROOM AIR-CONDITIONING UNITS DRY-COOLER SYSTEMS CENTRAL-STATION AIR-HANDLING UNITS CENTRAL-STATION HUMIDIFICATION UNITS MONITORING SENSORS FIRE SUPPRESSION SYSTEMS RAISED FLOORS CFD SIMULATION SOFTWARE HEPA FILTERS THERMAL STORAGE EQUIPMENT FOR OFF-PEAK AND BACKUP CONDENSERS CHILLED-WATER DISTRIBUTION SYSTEMS

ASHRAE'S CYCLE OF INNOVATION

Small to Medium Office Buildings

ASHRAE Research provides new data & updates ASHRAE Handbook

Knowledge-Based Tools for Diagnosing HVAC O&M Problems in Small Office Buildings

An expert system has been created for the diagnosis of some of the HVAC problems in small commercial buildings (<20,000 square feet floor area). This project successfully explored the feasibility, advantages and limitations of deploying knowledge-based system techniques to diagnose a wide variety of HVAC operations and maintenance problems. The knowledge base contains about 400 rules addressing problems in seven types of HVAC systems. Knowledge from about 20 experts is represented in the rule base; three additional experts reviewed the final software product.

ASHRAE Handbook distributed to all members putting all practitioners "on the same page."

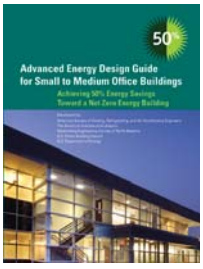
Applications Volume Chapter 3 "Commercial & Public Buildings"

This chapter covers design in accordance with building class, load characteristics, design concepts, system and equipment selection, spatial requirements, and need for special systems such as demand-controlled ventilation.

ASHRAE manuals for expanded design guidance

ASHRAE Advanced Energy Design Guide: Small to Medium Office Buildings

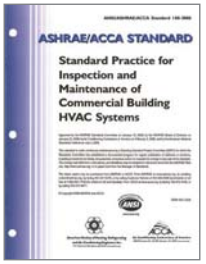
Advanced Energy Design Guide for Small to Medium Office Buildings is the first in a series designed to provide recommendations for achieving 50% energy savings over the minimum code requirements of ASHRAE Standard 90.1-2004. The Guide focuses on small to medium office buildings up to 100,000 ft². Office buildings include a wide range of office types and related activities such as administrative, professional, government, bank or other financial services, and medical offices without medical diagnostic equipment. The specific energy-saving recommendations are summarized in a single table for each climate zone and allow contractors, consulting engineers, architects, and designers to easily achieve advanced levels of energy savings without detailed energy modeling or analyses. Case studies and technical examples are sprinkled throughout the Guide to illustrate the recommendations and to demonstrate the technologies in real-world applications.



ASHRAE knowledge in research and Handbook create standards adopted in codes & regulation

Standard 180 Inspection and Maintenance of Commercial Building HVAC Systems

A collaborative effort between ASHRAE and ACCA, the standard addresses the often inconsistent practices for inspecting and maintaining HVAC systems in commercial and institutional buildings. Many facilities choose to follow rigorous policies that maintain the system in new or nearly new condition. Others either lack policy in this area or have adopted a run-to-failure approach where the system or components of the system are attended to only when there is a failure.



PRODUCTS SPECIFIED: COOLING TOWERS SOUND ABATEMENT EQUIPMENT PACKAGED ROOF TOP UNITS FAN COIL UNITS HEAT PUMPS BOILERS CHILLERS AIR TO AIR ENERGY REVOVERY AIR HANDLING UNIT VAV BOXES HEAT/ ENTHALPY WHEELS PUMPS EXHAUST FANS ELECTRIC HEATERS PHOTOVOLTAICS ENERGY MODELING SOFTWARE

ASHRAE'S CYCLE OF INNOVATION

K–12 Schools

ASHRAE Research provides new data & updates ASHRAE Handbook

Ventilation Rates and Health: Interdisciplinary Review of Scientific Literature

The scientific literature on the effects of ventilation rates on health in non-industrial indoor environments (offices, schools, homes, etc.) has been reviewed by a multidisciplinary group of scientists with expertise in medicine, epidemiology, toxicology, environmental chemistry, aerosol physics, psychology, and engineering. The group found that ventilation rates are associated with sick building syndrome (SBS) symptoms. Increases in ventilation rates up to approximately 25 L/s per person are associated with reduced symptoms.

ASHRAE Handbook distributed to all members putting all practitioners "on the same page."

Applications Volume Chapter 7 "Educational Facilities"

This chapter contains technical, environmental, and design considerations to assist the design engineer in the proper application of heating, ventilation, and air-conditioning systems and equipment for educational facilities, including K-12, preschools, and colleges. Covered are sustainability issues, energy efficiency, commissioning and retrocommissioning, seismic- and wind-restraint considerations.

ASHRAE Conference Papers Promote Learning and Peer Discussion

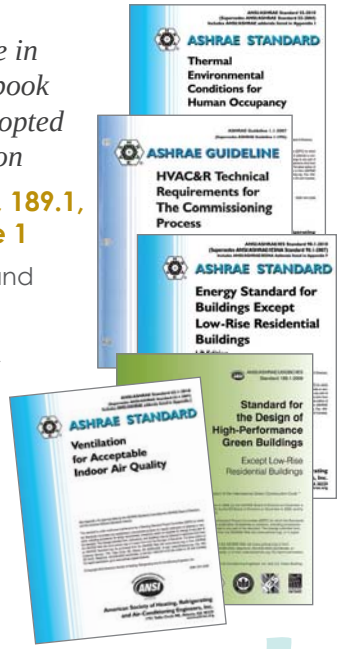
Displacement with Induction: Conditioning Our Classrooms in Accordance with ANSI/ ASA S12.60

Designers of HVAC systems serving educational facilities face considerable acoustical challenges in applying equipment that complies with the acoustical levels specified in ANSI/ ASA Standard S12.60-2002. Displacement with induction offers designers an opportunity to economically design compliant systems using proven current day technologies.

ASHRAE knowledge in research and Handbook create standards adopted in codes & regulation

Standards 90.1, 55, 189.1, 62.1 and Guideline 1

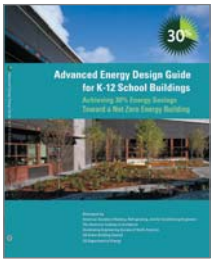
ASHRAE standards and guideless for energy efficiency, comfort, sustainability, indoor air quality and commissioning all serve as the basis of K-12 school design.



ASHRAE manuals for expanded design guidance

ASHRAE Advanced Energy Design Guide: K-12 School Buildings

Energy costs typically account for 16% of a district's "controllable" costs. This Guide helps facilities staff design new construction, renovations, remodeling and modernization projects that use at least 30% less-than those built to minimum energy code requirements. Achieving this 30% target is not only possible, but easy, and the Guide includes case studies that show schools around the country that have achieved or exceeded the target. Includes easy-to-follow recommendations by climate zone for each geographical region and a prescriptive path for LEED® energy efficiency credits.



PRODUCTS SPECIFIED: GROUND SOUCE HEAT PUMP DEDICATED OUTDOOR AIR SYSTEM WATER LOOP HEAT PUMP FAN COIL UNIT BOILER CHILLER AIR-TO-AIR ENERGY RECOVERY AIR HANDLING UNIT VAV BOXES HEAT/ ENTHALPY WHEELS PUMPS EXHAUST FANS ELECTRIC HEATERS PHOTOVOLTAICS ENERGY MODELING SOFTWARE

ASHRAE COMMUNITY

Volunteers from within the ASHRAE Community serve on the following technical committees to create the Cycle of Innovation. ASHRAE members at large, readers of ASHRAE Journal, and visitors to ashrae.org benefit from the cycle through the activities of some 180 chapters globally, 20,000 pages of published content annually, and thousands of hours of training provided annually.

SECTION 1.0–FUNDAMENTALS AND GENERAL
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- 1.2 Instruments and Measurements
- 1.3 Heat Transfer and Fluid Flow
- 1.4 Control Theory and Application
- 1.5 Computer Applications
- 1.6 Terminology
- 1.7 Business, Management & General Legal Education
- 1.8 Mechanical Systems Insulation
- 1.9 Electrical Systems
- 1.10 Cogeneration Systems
- 1.11 Electric Motors and Motor Control
- 1.12 Moisture Management in Buildings

SECTION 2.0–ENVIRONMENTAL QUALITY
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- 2.2 Plant and Animal Environment
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- 2.9 Ultraviolet Air and Surface Treatment TG2 Heating Ventilation and Air-Conditioning Security (HVAC)

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- 8.3 Absorption and Heat Operated Machines
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- 10.2 Automatic Icemaking Plants and Skating Rinks
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- 10.6 Transport Refrigeration
- 10.7 Commercial Food and Beverage Cooling Display and Storage
- 10.8 Refrigeration Load Calculations

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