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HEALTHCARE FACILITY DESIGN PROFESSIONAL HFDP OVERVIEW

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MODULE

4

Health Care HVAC System Design Standards and Guidelines

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HEALTHCARE FACILITY DESIGN PROFESSIONAL HFDP OVERVIEW

Health care facilities require specialized HVAC systems to maintain indoor air quality, control temperature, and ensure patient comfort and safety. These systems are governed by a set of standards and guidelines developed by organizations like ASHRAE, AIA, and CMS.

Learning Objectives

- Introduction and Course Outline
- General Elements of Healthcare
- Health and built environment
- Health Care HVAC System Design Standards and Guidelines
- Certified Healthcare Facility Design Specialist Certification
- Testing, Balancing, and Commissioning
- Summary and Resources
- HFDP Practice Test V.4.1_Test Your Knowledge



INTRODUCTION

- HVAC systems in healthcare facilities are crucial for maintaining indoor air quality, controlling temperature, and ensuring patient comfort and safety.
- The design of these systems is guided by standards and guidelines developed by organizations like ASHRAE, AIA, and CMS.

Role of HVAC in Health Care Facilities

- HVAC systems are essential for infection control, comfort, and safety in healthcare settings.
- The integrity of experiments in sterile laboratory environments depends on controlled conditions in healthcare settings.

RELEVANCE OF ASHRAE STANDARDS +

- ASHRAE Standard 170 outlines ventilation requirements for health care facilities.
- AIA Guidelines emphasize spatial organization and easy accessibility for maintenance and repair.
- CMS regulations set forth requirements for federally funded health care facilities.

Design Considerations

- Effective air quality management involves filtering and pressurization strategies.
- System type and configuration include centralized systems for heating and cooling, decentralized systems for flexibility and localized control, and energy efficiency strategies like Variable Air Volume (VAV) Systems and Heat Recovery Systems.



BUILDING SYSTEMS STANDARDS AND GUIDELINES

ASHRAE's Common Standards

- Standard 62.1: Ventilation for Acceptable Indoor Air Quality: Establishes minimum ventilation rates to ensure indoor air quality is acceptable to human occupants.
- Standard 90.1: Energy Standard for Buildings Except Low-Rise Residential Buildings: Outlines minimum energy efficiency requirements for buildings.
- Standard 55: Thermal Environmental Conditions for Human Occupancy: Provides guidelines on thermal conditions acceptable for human occupancy.



BUILDING SYSTEMS STANDARDS AND GUIDELINES +

Notable Guidelines:

- ASHRAE Guideline 0: The Commissioning Process: Outlines the commissioning process for building systems.
- ASHRAE Guideline 16: Thermal Energy Storage: Addresses methods for storing thermal energy to optimize energy use and minimize peak load demands.
- ASHRAE Guideline 24: Energy Management: Provides strategies for ongoing energy management in buildings.





BUILDING SYSTEMS STANDARDS AND GUIDELINES +

Accreditation Organizations:



- International Organization for Standardization (ISO): Develops and publishes international standards across various industries, including those relevant to HVAC&R.
- American National Standards Institute (ANSI): Oversees the development of standards for products, services, processes, and systems in the United States.
- National Institute of Building Sciences (NIBS): Promotes a comprehensive approach to building design and construction, including sustainable practices.
- The requirements set forth by these organizations often include adherence to established standards, participation in training and continuing education, and completion of periodic evaluations.

REGULATORY CODES IN BUILDING DESIGN

Importance of Regulatory Codes

- Regulatory codes govern the design, construction, and operation of buildings.
- They establish safety, promote energy efficiency, and safeguard public health and welfare.
- ASHRAE energy code is a critical component in sustainable building practices.

ASHRAE Energy Code Requirements

- Building Envelope: Must meet specific thermal performance criteria.
- Lighting Power Density: Limited electricity consumption per square foot of space.
- Heating, Ventilation, and Air Conditioning (HVAC) Systems: Outlines efficiency metrics for HVAC systems.
- Renewable Energy Sources: Encourages integration of renewable energy technologies.
- Energy Modeling: Used to predict energy use during the design phase.

Local Authority Requirements and Their Impact on Design

- Understanding Local Codes and Ordinances: Local authorities enforce building codes and regulations.
- Interaction Between ASHRAE Standards and Local Codes: Local Climate Adaptations, Zoning and Land Use Regulations, Sustainability Initiatives, and Permitting Process.



ASHRAE STANDARD 211-20XX: ENERGY AUDIT FRAMEWORK

- Provides a systematic approach for conducting energy audits in commercial and institutional buildings.
- Serves as a guideline for professionals in building and energy management fields.
- Covers a wide range of building types, including small commercial spaces to large institutional complexes.
- Classifies energy audits into three levels: Level 1 Energy Audit (Walkthrough Audit), Level 2 Energy Audit (Detailed Analysis), and Level 3 Energy Audit (Comprehensive Analysis).
- Emphasizes a systematic approach to data collection and analysis, including preliminary data collection, site assessment, energy use analysis, identification of energy conservation measures (ECMs), and reporting.
- Key steps include preliminary data collection, site assessment, energy use analysis, identification of ECMs, and reporting.
- Essential for driving sustainable practices within the built environment, enabling professionals to systematically evaluate energy use, identify improvement opportunities, and implement energy-saving measures.



ENERGY SIMULATION: A KEY TOOL FOR ENERGY EFFICIENCY AND SUSTAINABILITY

Types of Energy Models

- Bottom-up models: Start with detailed data on individual components to assess overall energy use.
- Top-down models: Analyze the energy system at an aggregate level, focusing on macroeconomic indicators and sectoral outputs.
- Static models: Provide a snapshot of energy usage at a given point in time.
- Dynamic models: Take into account changes in the system over time, capturing interactions and feedback loops.
- Simulation-based models: Use computational simulations to replicate the behavior of energy systems under various scenarios.

Key Components of Energy Simulation Models

- Input data: Essential for reliable simulations.
- Assumptions: Crucial for understanding the model's scope and limitations.
- Model algorithms: Define how the model processes input data to produce outputs.
- Output metrics: Include total energy demand, cost savings, greenhouse gas emissions, and system reliability.

Implications for Design Teams

- Insights from simulation allow informed decisions about building design, ensuring it meets energy efficiency goals while remaining within budget.
- Simulation will become increasingly critical in guiding the transition towards a more sustainable and resilient energy future.





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