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# HIGH-PERFORMANCE BUILDING DESIGN PROFESSIONAL - HBDP EXAM REFRESHER

ONLINE PROFESSIONAL COURSES LED BY THE  
WORLD'S TOP SPECIALISTS

ONLINE TRAINING BY KRISHNAJI PAWAR

LEED AP(BD+C), GSAS CGP, GCP, ISO 14001

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# HVAC Processes

KRISHNAJI PAWAR - CEO & FOUNDER

LEED AP(BD+C),GSAS CGP,GCP,ISO 14001

[WWW.BEYONDSMARTCITIES.IN](http://WWW.BEYONDSMARTCITIES.IN)



# HIGH-PERFORMANCE BUILDING DESIGN PROFESSIONAL HBDP OVERVIEW

HVAC systems, which include heating, ventilation, and air conditioning, are crucial for maintaining comfortable indoor environments. Understanding these processes and their interaction is essential for efficient operation. Proper maintenance and regular inspections are crucial for the longevity and effectiveness of HVAC systems, ensuring optimal comfort and air quality for building occupants.

# Learning Objectives

- Introduction to High Performance Buildings
- Sustainability Concepts
- What is sustainable development?
- Sustainable Development: Definitions and Applications
- Sustainable Buildings
- Sustainable Transportation
- Alternative Energy & Carbon Reduction
- Environmental Improvement Programs and Rating Systems
- HVAC Processes



# INTRODUCTION

- HVAC systems control temperature, humidity, and air quality to ensure occupant health and well-being.
- Heating is achieved through a furnace or boiler burning fuel, distributed throughout the building using ducts or pipes.
- Ventilation involves the exchange of indoor and outdoor air to maintain air quality and remove pollutants.
- Systems can be simple or complex, ranging from natural to mechanical.
- Air conditioning is responsible for cooling indoor spaces during hot weather.
- Refrigerants absorb heat from indoor air and release it to the outside, cooled air is distributed throughout the building.
- Air conditioning systems also dehumidify the air by removing excess moisture.
- Proper maintenance and regular inspections are crucial for the longevity and effectiveness of HVAC systems.

# HVAC DESIGN PROCESS: OWNER'S PROJECT REQUIREMENTS

- The Owner's Project Requirements (OPR) guide the HVAC designer in understanding the specific needs and expectations of the building owner or operator.
- The OPR includes information like desired indoor air quality, temperature and humidity levels, occupancy schedules, energy efficiency goals, and any special requirements or constraints.
- The HVAC designer meets with the building owner or operator to discuss their needs and preferences, asking detailed questions and clarifying any ambiguous or conflicting requirements.



# HVAC DESIGN PROCESS: OWNER'S PROJECT REQUIREMENTS +

- The designer selects appropriate HVAC equipment and systems to meet the identified requirements, including heating and cooling equipment, ventilation systems, and energy-saving technologies.
- The designer refers back to the OPR throughout the design process to ensure all aspects of the HVAC system align with the owner's expectations.
- Effective communication and attention to detail are key to a successful HVAC design.



# DESIGN SIMULATION SOFTWARE ELEMENTS



- Design simulation software requires a user interface, a method of creating or receiving 3D geometry, and an engine.
- A graphical user interface (GUI) is the look and feel of the software, allowing the simulator to input and change parameters.
- GUIs detect thermal zones and material properties from 3D software and can locate grids of sensors within base 3D geometry.
- GUIs suggest design alternatives based on climates, typologies, and simulation results, but are not a substitute for architectural skill, knowledge, and research.

# HVAC DESIGN AND COMPLIANCE

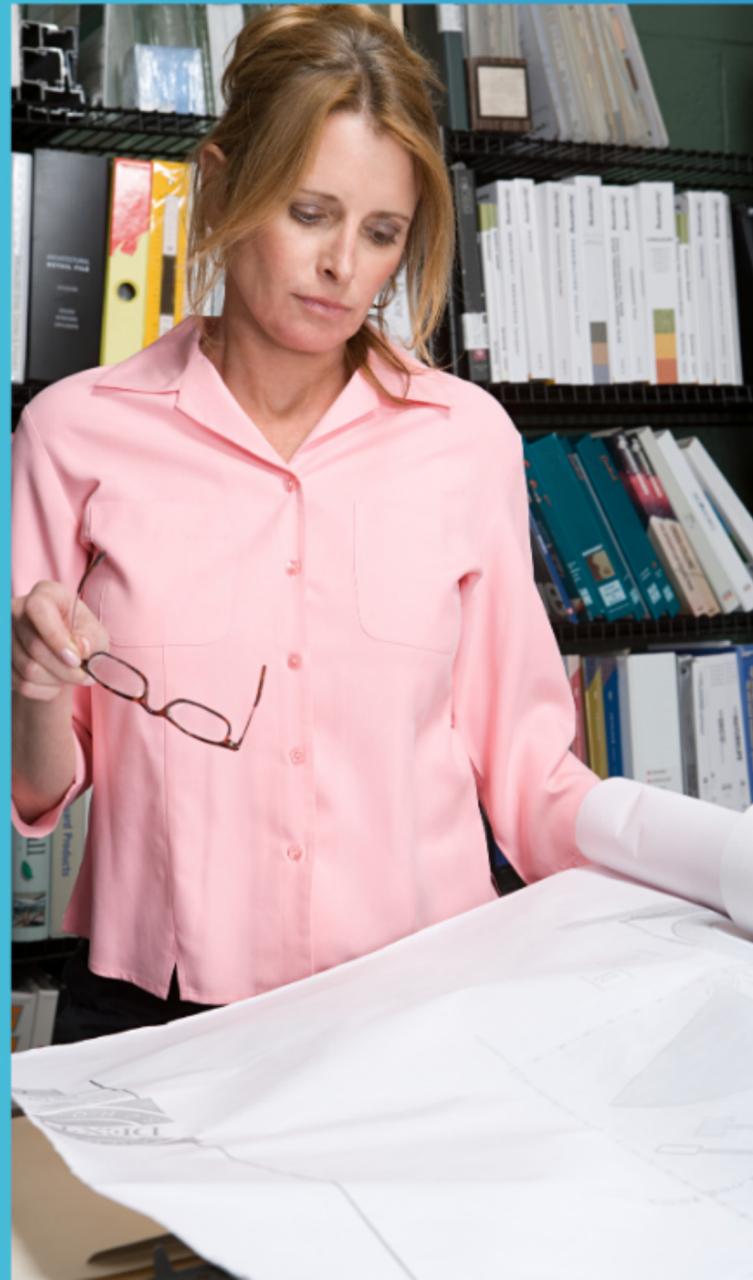
- Importance of adhering to codes and standards in HVAC design.
- International Mechanical Code (IMC) sets minimum requirements for HVAC systems.
- ASHRAE and NFPA provide guidelines for HVAC design, energy efficiency, and fire safety.
- ASHRAE Standard 90.1 outlines energy efficiency requirements for HVAC systems.
- Detailed construction documents specify all components, materials, and installation requirements.
- Compliance ensures safe, efficient, and reliable systems.
- Ensures projects meet regulatory requirements and provide comfort and safety for building occupants.



# Key ASHRAE Standards

Standard	Topic	Partners
90.1	Energy Conservation Except Low-Rise Residential	IES
189.1	High Performance Green Building Design	USBGC, IES
55	Thermal Comfort	
62.1	Ventilation & IAQ	
180	HVAC System Maintenance	

# ASHRAE'S ROLE IN BUILDING DESIGN AND CONSTRUCTION



- ASHRAE is a professional organization that sets standards for the design and construction of HVAC systems.
- ASHRAE 90.1 provides minimum requirements for energy-efficient building design, covering building envelope, lighting systems, HVAC systems, and water heating systems.
- Buildings designed with ASHRAE 90.1 should be well-insulated and airtight, and energy-efficient lighting and HVAC equipment should be selected.
- ASHRAE 62.1 sets minimum ventilation requirements for indoor air quality, ensuring a healthy indoor environment and preventing the buildup of pollutants and contaminants.
- Adherence to ASHRAE standards ensures the highest level of quality in building design, making buildings comfortable, energy-efficient, and safe for occupants.

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**CONTACT US**



+91 6363032722



info@beyondsmartcities.in



learn.beyondsmartcities.in



#55,HMR Layout ,Bengaluru ,India



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