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CERTIFIED HVAC DESIGNER

CHD OVERVIEW

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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MODULE 7

Certified HVAC Designer (CHD) Specialty Certification

KRISHNAJI PAWAR - CEO & FOUNDER

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

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CERTIFIED HVAC DESIGNER CHD OVERVIEW

The Certified HVAC Designer (CHD) certification is a ASHRAE-awarded credential for professionals who have a thorough understanding of HVAC system design principles and practices. It aims to improve HVAC design standards by validating the knowledge and skills of individuals involved in heating, ventilation, and air conditioning system design.

Learning Objectives

- Introduction
- HVAC Fundamentals
- The Air-Conditioning Process
- HVAC System Concepts and Process
- HVAC Systems Design
- Engineering, Economics, and Design Decision-Making
- Certified HVAC Designer (CHD) Specialty Certification
- Summary and Resources
- Certified HVAC Designer - CHD Practice Test V.4.1

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INTRODUCTION

- Aims to elevate HVAC design standards by validating knowledge and skills in the design and installation of HVAC systems.
- Aims to create systems that operate efficiently, sustainably, and effectively in various environments.
- Eligible candidates must have a combination of education and experience in HVAC design.
- Requirements include an associate degree or equivalent in mechanical engineering, two years of hands-on experience in HVAC system design, and ongoing professional development through workshops, seminars, or courses.
- The CHD certification examination covers topics like thermodynamics, HVAC system components, system design methodology, codes and standards, and indoor air quality.
- CHD holders must complete a specified number of continuing education units (CEUs) within a designated time frame for continuous professional development.

CERTIFIED HVAC DESIGNER (CHD) CERTIFICATION OVERVIEW

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- ASHRAE's CHD certification signifies high expertise in HVAC system design.
- It opens up new career opportunities and potentially leads to higher-level positions in the HVAC industry.
- CHD certification assures competence in designing effective and energy-efficient HVAC systems.
- Professional development is essential for obtaining the CHD certification.
- The CHD exam covers four domains: System Design, Design Calculations, Procedureal, and Coordination.
- Common areas covered include HVAC System Design Principles, Psychometrics and Air Properties, Load Calculations, Equipment selection and size, Energy codes and standards, HVAC Controls and Automation, Indoor air quality, and Sustainability and Energy Efficiency.
- Candidates should have 2 to 3 months of preparation.

HOW TO BECOME CERTIFIED:

- Eligibility requirements include a certain level of education and professional experience.
- Candidates must pass a comprehensive examination testing their knowledge of high-performance building design and construction principles.
- Some certification programs may require candidates to complete a certain number of hours of continuing education or professional development activities to maintain their certification.

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1. SYSTEM DESIGN		8	24	8	40
A.	Size supply, return, and exhaust ducts.				
B.	Prepare HVAC zoning plans and sensor locations in accordance with building design.				
C.	Prepare control sequences and schematics.				
D.	Design ductwork and piping including shaft and ceiling space requirements.				
E.	Differentiate and design HVAC system types (e.g., variable air volume, VRF, radiant, thermal storage, underfloor systems, perimeter and process systems).				
F.	Design HVAC flow diagrams.				
G.	Design duct and fluid systems to minimize pressure loss and resultant power requirements.				
H.	Select HVAC system based on calculations (e.g., AHUs, fans, pumps, chillers, cooling towers).				
I.	Design proper air diffusion and devices following codes and standards.				
J.	Develop a detailed HVAC design based on the approved preliminary building design concept and site information.				
K.	Prepare HVAC schematics, plan drawings, elevation views, section views, and installation details.				
L.	Select diffusers and grilles to meet thermal comfort and ventilation needs and coordinate with architectural plans (e.g., ceiling grid, under floor systems, sidewalls, architectural specialties, transfers).				
M.	Evaluate proposed building design concept modifications for HVAC implications.				
N.	Integrate new system technologies into HVAC design (e.g., VRF, ECM motor control, integrated automation).				
O.	Research and confirm capacities of existing equipment and obtain shop drawings of existing equipment (e.g., air handling systems, chillers, cooling towers).				
P.	Prepare HVAC demolition drawings of the equipment and systems that must be moved or relocated to accomplish retrofit.				
Q.	Recommend system design options to minimize machine or system down time (e.g., N+1, 2N, fan array, direct drive fans, VRF).				
R.	Recommend system configurations to facilitate future maintenance (e.g., system access, coil pull space, motor replacement, safety concerns).				
S.	Design for balancing air and fluid systems (e.g., balancing dampers, balance valves, self-balancing control valves).				
T.	Prepare ductwork and piping flow diagrams to convey the design intent (e.g., primary/secondary systems, pumping and isolation systems, duct loops, exhaust risers with sub-ducts)				
U.	Design piping and ductwork layout based on calculated sizing and required routing.				
V.	Select expansion tanks.				
W.	Select major airside units.				
X.	Size major heating plant components.				
Y.	Design leak detection systems.				
Z.	Select major cooling plant components:				
	1. fans.				
	2. coils				
	3. piping.				
	4. pumps.				

2. DESIGN CALCULATIONS		6	6	18	30
A.	Calculate HVAC system requirements (e.g., water flows, airflows, pump heads, suction heads, expansion compensation).				
B.	Assist in the preparation of project estimates for comparative system selection (e.g., installed cost, operating cost, space limitations, water availability, power requirements).				
C.	Calculate all piping and ductwork sizing based on flow rates received from the project engineer and adapted in size and route to comply with the existing physical constraints.				
D.	Adjust thermal load or HVAC requirement estimates based on modifications to building.				
E.	Calculate head loss through the critical path.				
F.	Calculate heat loads for each assigned space in the building.				
G.	Calculate the building load heat loss and gain.				
H.	Calculate external static and total pressures for air distribution units and specify in the equipment schedule.				
I.	Calculate ventilation rate requirements by space use, thermal comfort parameters, and air quality per applicable codes and standards.				
J.	Design piping system to account for various fluid properties (e.g., freeze protection, fluid expansion compensation, fluid density, transfer capacity).				

3. PROCEDURAL		4	6	0	10
A.	Analyze buildings, building designs or HVAC plans for compliance with applicable codes, standards and regulations.				
B.	Apply Building Information Modeling (BIM) standards throughout drawing production.				
C.	Review shop drawings and equipment submittals for compliance with contract documents.				
D.	Interpret design documents during bidding/tender and construction phases.				
E.	Review and comply with HVAC codes and standards.				
F.	Verify and document as-built field conditions for existing structures.				
G.	Verify and document as-built field conditions for projects in construction.				
H.	Perform periodic field investigations to (e.g., punch-lists, quality control, shop drawings).				
I.	Perform review of Request For Information (RFI) and incorporate into bidding/tender documents.				
J	Prepare HVAC documentation for building permit application and coordinate with Authority Having Jurisdiction (AHJ).				
K.	Incorporate field "as-built" documents into final documents.				

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4. COORDINATION		8	12	0	20
A.	Assist in the development of the Basis of Design.				
B.	Review HVAC drawings with Commissioning Authority.				
C.	Coordinate space requirements for HVAC equipment placement with other design team members.				
D.	Modify the HVAC design documents concept based on the outcome of the design team reviews.				
E.	Coordinate system expansion compensation design with structural engineer and piping vendor (e.g., thrust blocks, expansion joints, anchor points).				
F.	Analyze architectural plans, sections, and elevations for use in HVAC design.				
G.	Comply with client specifications and performance requirements to determine mechanical designs.				
H.	Collaborate in the development of HVAC systems and design parameters.				
I.	Review architectural life safety plan relative to mechanical plan and apply fire and smoke damper requirements.				
J.	Coordinate with life and safety engineer to design the smoke management and ventilation system per fire code and regulation.				
K.	Coordinate with other design team members during each design phase (e.g., architects, structural designers, plumbing designers, electrical designers).				
L.	Coordinate HVAC implications for the building electrical loads and electrical space mechanical requirements with electrical design team members.				
M.	Coordinate with structural engineer for HVAC requirements (e.g., duct and piping runs, anchorage, seismic bracing, sound isolation, support requirements, vibration).				
N.	Coordinate with project design and construction schedules.				
O.	Coordinate electrical requirements for HVAC equipment.				
P.	Coordinate requirements of HVAC system for domestic water and waste with plumbing designer.				
Q.	Coordinate with acoustical engineer for selection of ventilation equipment including sizing of ventilation distribution and air handling equipment to meet designated sound pressure levels.				
R.	Coordinate with energy modeler for HVAC system input.				
S.	Coordinate site piping and utility requirements with civil engineer.				
T.	Coordinate with vendors to prepare equipment schedules.				
U.	Review drawings and identify potential obstructions that may impact the HVAC system (e.g., structural, fire proofing, lighting, sprinklers, walls).				
Totals		**26**	**48**	**26**	**100**

PREPARING FOR CHD EXAM RESOURCES:

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- ASHRAE Handbooks: Fundamentals, HVAC Applications, and HVAC Systems and Equipment.
- ANSI/ASHRAE Standard 15: Safety Standard for Refrigeration Systems and Designation and Classification of Refrigerants.
- ANSI/ASHRAE Standard 55: Thermal Environmental Conditions for Human Occupancy.
- ANSI/ASHRAE Standard 62.1: Ventilation for Acceptable Indoor Air Quality.
- ANSI/ASHRAE/IES Standard 90.1 & User's Manual.
- ANSI/ASHRAE/IES Standard 202: Commissioning Process for Buildings and Systems.
- ASHRAE Standard 209: Energy Simulation Aided Design for Building Except Low-Rise Residential Buildings.
- Guideline 36: High-Performance Sequences of Operation for HVAC Systems.
- International Mechanical Code.
- ASHRAE Principles of Heating, Ventilating, and Air Conditioning.

HIGH-PERFORMANCE BUILDING DESIGN PROFESSIONAL - ASHRAE

- Enhances reputation and career opportunities.
- Demonstrates competency in critical high-performance building design knowledge.
- Ensures fairness and validity through ANSI National Accreditation Board (ANAB) accredited personnel certification program.
- Skills include analyzing renewable energy sources, air quality strategies, energy compliance modeling, water reduction, O&M procedures, and HVAC systems.
- Includes implementing maintenance plans, commissioning processes, and integrating controls with equipment and systems.

BEYOND SMART CITIES

CONTACT US

+91 6363032722

info@beyondsmartcities.in

learn.beyondsmartcities.in

#55,HMR Layout ,Bengaluru ,India

BEYOND SMART CITIES

ENERGY MANAGEMENT SPECIALIST
BEYOND SMART CITIES

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