


Appendix A: CHD Exam Blueprint

	Complexity Level and Number of Items			
	Recall	Application	Analysis	TOTALS
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).				



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	Recall	Application	Analysis	TOTALS
	8	24	8	40
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).				



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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.				
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).				

 Certified HVAC Designer Certification Exam Blueprint		Recall	Application	Analysis	TOTALS
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

Appendix B

Acceptable Professional Development Activities and PDHs Earned

Activity	PDHs
Completion of short courses, workshops, webinars, and seminars in a related field, including those held at Conferences	1 PDH for each hour of documented attendance
Participate in HVAC design project (up to 3 max). For each project, the applicant must have participated in a minimum of two of the following four activities: System Design, Design Calculations, Procedural and Coordination.	5 PDHs per project
Successful completion of a course in a related field from an accredited institution of higher learning Note: <i>To qualify for this credit, a course must be offered regularly and must conclude with a test that sets a passing grade.</i>	15 PDHs per credit hour (semester system) OR 10 PDHs (quarter system)
Patent in a related field Note: <i>PDHs can be claimed after a patent is issued and the inventor submits details to the board. The invention must be related to engineering.</i>	10 PDHs per patent
Publication of article/paper/book in a recognized, peer reviewed journal in a related field (max. 3 per year). Note: <i>A "news" article in a technical or professional bulletin is not considered a published paper.</i>	10 PDHs per published item
Active participation in a professional or technical society in a related field Note: <i>The certificant must serve as an officer and/or must actively participate in a committee of the organization. PDHs are earned at the end of each year of service.</i>	2 PDHs per year per organization
Write ASHRAE certification exam items in a related field	5 PDHs per 10 acceptable exam questions, annually
Retake and pass the CHD exam for 30 PDHs, in which case no mandatory HVAC design project will be required.	30 PDHs
Professional awards	2 PDHs per award
Teach courses and workshops in a related field. Faculty performing regular duties may earn PDHs	2 PDHs per hour taught for the first presentation, then 1 per hour for subsequent equivalent presentations.

Certificants are not required to submit a report of Professional Development activities as part of the recertification application; however, a percentage of Certificants are randomly chosen for audit each year. If audited, a report of continuing professional development with documentation must be submitted for review.

For questions about any of the information about ASHRAE certification renewal requirements, including clarification of acceptable and reportable qualifying activities, please contact ASHRAE at certification@ASHRAE.org.