

**Project Delivery Method:**

- Design-Build (D-B)
- Integrated Project Delivery (IPD)
- Construction Management at Risk (CM) with Guaranteed Maximum Price (GMP)
- Design-Bid-Build (D-B-B)
- Performance Contract (PC)

**Owner Team:**

- Data Center Building Owner
- Owner Representative (consultant)
- Facility Manager (in-house staff)
- Data Center Operations Manager
- Facility Manager (outsource staff)

**Project Delivery Team:**

- Design-Build (D-B) Project Manager
- Mission Critical (MC) Project Manager
- Mechanical-Electrical Coordinator
- Service Technician
- Architect, Acoustical, Plumbing, Electrical, Structural, Fire Protection, and Security Consultants

**HVAC Project Team:**

- BAS Technician (in-house staff)
- BAS Technician (outsource staff)
- Third-Party Commissioning Consultant (Cx/C)
- Third-Party Testing, Adjusting, and Balancing (TAB) Technician
- Sheet Metal Foreman
- Piping Foreman

**OWNER'S PROGRAM REQUIREMENTS (OPR)**

**Application:**

- Retail Facilities, Chapter 2
- Commercial and Public Buildings, Chapter 3
- Industrial Facilities, Chapter 15
- Clean Spaces, Chapter 19
- Data Centers and Telecommunication Facilities, Chapter 20

**Project Type:**

- New Construction
- Addition
- Renovation
- Infrastructure (central heating, cooling, and/or cogeneration)
- Tenant Fit-Out

**References:**

- 2017 ASHRAE Handbook – Fundamentals
- 2018 ASHRAE Handbook – Refrigeration
- 2019 ASHRAE Handbook – HVAC Applications
- 2020 ASHRAE Handbook – HVAC Systems and Equipment
- Refer to "Codes & Standards" in the back of each ASHRAE Handbook for additional reference

**Other References:**

- ASHRAE Design Guide for Cleanrooms: Fundamentals, Systems, and Performance
- ASHRAE UFAD Guide and O&M Guide Set
- ASHRAE Humidity Control Design Guide for Commercial and Institutional Buildings
- ASHRAE Indoor Air Quality Guide: Best Practice for Design, Construction, & Commissioning
- ASHRAE Design Guide for Dedicated Outdoor Air Systems
- ASHRAE Standard 90.1 (Minimum Energy Standards)
- ASHRAE Standard 90.4 (Energy Standards for Data Centers)

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- ASHRAE Standard 170 (Ventilation of Healthcare Facilities)
- ASHRAE Standard 202 (Commissioning Process for Buildings and Systems)

**DESIGN INTENT DOCUMENT (DID)**

**HVAC Design Intent:**

- The HVAC System Selection and Design Intent are based on the process outlined in ASHRAE Handbook 2020, Chapter 1, "HVAC System Analysis and Selection," and include the following:
  - Owner Building Program Goals and Additional Goals
  - System Constraints and Constructability Constraints
  - Specialized Systems Shall Include General Exhaust, Toilet Exhaust, and Smoke Exhaust
  - Utility: Gas (natural)
  - Utility: Electrical Power and Emergency Power
  - Utility: Distilled Water Humidification
  - Existing Conditions: Commercial Tenant Space
  - CRAC Units with Electric Heat, DX Cooling, Electric Heated Water Humidifier, and Underfloor Air Distribution
  - Supply Air Systems - Single Duct-Single Zone Units with Electric Heat, Chilled Water Cooling, and Steam Humidifiers
  - MERV-18 Air Filters

**DESIGN CRITERIA DOCUMENT**

- The System Shall Consist of Four CRAC Units with Underfloor Discharge Air to the Raised Computer Room Space. Each 10-Ton Unit Shall Include Electric Reheat and Distilled Water Humidifiers to Maintain 75°F and 50% Relative Humidity 24 Hours a day and Shall Be Fitted with a MERV-13 Filter.
  - Raised-Floor, 2-by-2-Foot Floor Tiles Shall Be Coordinated in Anticipation of the Data Center Equipment Arrival. Underfloor Supply Air Shall Also Be Provided Directly Below Specific Pieces of Computer Equipment.
  - Utilities Shall Be Natural Gas to Serve the Existing Central Boiler Plant that Shall Include One Firetube Hot Water Boiler. The Size Shall Be 800 Boiler Horsepower (BHP) Units. The New Automatic Controls Shall Be Interfaced with the Existing Building Automation System (BAS) System.
  - Each CRAC Unit Shall Be Served By a 20-Ton Air-Cooled Condensing Unit.
  - Each CRAC Unit Shall Be Served By a 15-Ton Air-Cooled Condensing Unit Taking Into Account Cooling Diversity Factor.
  - D-B contractor Shall Provide Conceptual Drawings that Include Equipment Weight and Electric Data as well as Emergency Power Requirement and Plumbing Criteria.