

HVAC System Selection Criteria

17.01 HVAC System Selection Criteria

A. Building Type:

1. Institutional. Hospital, Prisons, Nursing Homes, Education
2. Commercial. Offices, Stores
3. Residential. Hotel, Motel, Apartments
4. Industrial, Manufacturing
5. Research and Development. Laboratories

B. Owner Type:

1. Government
2. Developer
3. Business
4. Private

C. Performance Requirements:

1. Supporting a Process. Computer Facility, Telephone Facility
2. Promoting an Germ Free Environment
3. Increasing Sales and Rental Income
4. System Efficiency
5. Increasing Property Salability
6. Standby and Reserve Capacity
7. Reliability, Life Expectancy. Frequency of Maintenance and Failure
8. How will Equipment Failures affect the Building? Owner Operations?

D. Capacity Requirements:

1. Cooling Loads. Magnitude and Characteristics
2. Heating Loads. Magnitude and Characteristics
3. Ventilation
4. Zoning Requirements:
 - a. Occupancy
 - b. Solar Exposure
 - c. Special Requirements
 - d. Space Temperature and Humidity Tolerances

E. Spatial Requirements:

1. Architectural Constraints:
 - a. Aesthetics
 - b. Structural Support
 - c. Architectural Style and Function
2. Space Available to House Equipment and Location
3. Space Available for Distribution of Ducts and Pipes
4. Acceptability of Components Obtruding into Occupied Space, Physically and Visually
5. Furniture Placement
6. Flexibility
7. Maintenance Accessibility
8. Roof
9. Available Space Constraints
10. Are Mechanical Rooms/Shafts Required?

F. Comfort Considerations:

1. Control Options
2. Noise and Vibration Control
3. Heating, Ventilating, and Air Conditioning
4. Filtration
5. Air Quality Control

G. First Cost:

1. System Cost. Return on Investment
2. Cost to Add Zones
3. Ability to Increase Capacity
4. Contribution to Life Safety Needs
5. Air Quality Control
6. Future Cost to Replace and/or Repair

H. Operating Costs:

1. Energy Costs
2. Energy Type:
 - a. Electricity. Voltage Available, Rate Schedule
 - b. Gas
 - c. Oil
 - d. District Steam
 - e. Other Sources
3. Energy Types Available at Project Site
4. Equipment Selection

I. Maintenance Cost:

1. Cost to Repair
2. Capabilities of Owners Maintenance Personnel
3. Cost of System Failure on Productivity
4. Economizer Cycle
5. Heat Recovery
6. Future Cost to Replace
7. Ease and Quickness of Servicing
8. Ease and Quickness of Adding Zones
9. Extent and Frequency of Maintenance

J. Codes

1. Codes govern HVAC and other building systems design.
2. Most building codes are adopted and enforced at the local level.
3. It is estimated that there are 13,000 building codes in the U.S.
4. Codes are not enforceable unless adopted by municipality, borough, county, state, etc.
5. Codes Regulate:
 - a. Design and Construction
 - b. Allowable Construction Types
 - c. Building Height
 - d. Egress Requirements
 - e. Structural Components
 - f. Light and Ventilation Requirements
 - g. Material Specifications

6. Code Approaches:
 - a. Prescriptive. Dictate specific materials and methods (ASTM A53, Steel Pipe, Welded)
 - b. Performance. Dictate desired results (HVAC system to provide and maintain design temperature of 72°F winter and 75°F/50% RH summer.)
7. Codes Developed Because of:
 - a. Loss of Life
 - b. Loss of Property
 - c. Pioneered by Insurance Industry
8. Model Codes:
 - a. Basic/National Building Code (BOCA), Northeastern U.S.
 - b. Southern Building Code (SBCCI), Southern U.S.
 - c. Uniform Building Code (ICBO), Western U.S.
 - d. Model codes are similar in their requirements, but quite different in format and technical language.

17.02 Heating System Selection Guidelines

A. If heat loss exceeds 450 Btu/Hr. per lineal feet of wall, heat should be provided from under the window or from the base of the wall to prevent downdrafts.

B. If heat loss is between 250 and 450 Btu/Hr. per lineal feet of wall, heat should be provided from under the window or from the base of the wall, or it may be provided from overhead diffusers, located adjacent to the perimeter wall, discharging air directly downward, blanketing the exposed wall and window areas.

C. If heat loss is less than 250 Btu/Hr. per lineal feet of wall, heat should be provided from under the window or from the base of the wall, or it may be provided from overhead diffusers, located adjacent to or slightly away from the perimeter wall, discharging air directed at or both directed at and directed away from the exposed wall and window areas.