



HVAC Design for High-Rise Buildings

An Online Continuing Education Course for Engineers

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HVAC Design for High-Rise Tall Buildings

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A tall building is defined as a structure, which is more than 328 ft (100 m) in height. There are other categories like “Super tall” buildings, more than 984 ft (300 m) and “Mega tall,” more than 2000 ft (600 m).

The definition of a tall building varies by source and can be based on the building height or the number of floors. The International Building Code (IBC2000) and the Building Construction and Safety Code, NFPA 5000 defines high-rise buildings as buildings with an occupied floor 75 feet or greater in height measured from the lowest level of fire department vehicle access. The ASHRAE Technical Committee for Tall Buildings, TC 9.12, has defined a tall building as one whose height is greater than 300 feet.



The high-rise development and construction bring numerous challenges for engineers who must design sufficiently strong foundations, MEP services, heating, ventilation and air conditioning (HVAC) systems, electrical power distribution, lighting, transportation (elevators, stairs, parking), communication, plumbing, fire protection and building security functions for these buildings in order to make them habitable.

This course outlines the key considerations in the design of HVAC services for tall buildings, which are very often mixed-use, sometimes consisting of low-level retail, office floors, residential floors, and hotel floors.

This course will be of interest to owners, architects, structural engineers, mechanical engineers, electrical engineers, fire engineers, and other specialized engineers and consultants. The course not only focuses on the efforts of designers of the HVAC systems, but it also addresses the importance of an integrated design team and their collective efforts and concerns that are the critical elements in determining the ultimate solutions to project needs of a tall building.

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Chapter - 1

Selection Criteria for HVAC Systems

Heating, Ventilation and Air Conditioning (HVAC) Systems

The purpose of Heating, Ventilating, and Air Conditioning (HVAC) system is to maintain a comfortable environment for the building occupants, which may include the complete conditioning of the interior air, the filtering of dust and odors, adjustment of the air temperature and humidity. Local climates, building size, shape, function, use, occupancy, and construction types are the important variables that affect the design and selection of the HVAC systems.

There are a wide variety of air conditioning systems available, and selection is often dictated by factors other than the air conditioning loads.

System Selection Factors

The determination of the appropriate HVAC system for a high-rise project, as a minimum, must be evaluated on the following factors:

1. Thermal Comfort
2. Real Estate Value
3. Building Type
4. Life Safety
5. Building Area
6. First Cost
7. Life-cycle cost
8. Project Schedule
9. System Flexibility

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