



Heating, Ventilation & Air Conditioning (HVAC)

Training Program



Introduction:

The Heating, Ventilation, Air Conditioning and Refrigeration (HVAC and R) industry designs, builds, maintains and repairs essential indoor comfort and cooling systems including heating, ventilation and air conditioning. Refrigeration equipment for supermarkets used for food processing and cold storage facilities and sports facilities such as hockey and curling rinks are also a vital part of the industry. As a result of the expanding markets for refrigeration and air conditioning and changing technology, a dramatic need exists for qualified personnel both at home and abroad. A refrigeration mechanic fabricates, installs, alters, and repairs/services any system used for cooling and/or heating (i.e. heat pumps) in closed systems that contain a refrigerant or brine and thermoelectric cooling. This includes piping, controls and electrical work. These workers also connect rooftop units to gas and test and balance systems.

This course is designed for engineers and technicians from a wide range of abilities and backgrounds and will provide an excellent introduction to the fundamentals of heating, ventilation and air-conditioning. It commences with a review of psychometric charts and then examines the factors that influence design choices, indoor air quality, load calculations and heating/ventilation and air-conditioning systems. Numerous tips and tricks throughout the course make it very practical and topical to your applications.

Who Should Attend?

Consulting Engineers, Design Engineers, Supervisors, Foremen, Electrical Engineers and Technicians, Maintenance Engineers, Technicians and Staff, Mechanical Engineers and Technicians, Operation, Inspection and repair Managers, Supervisors and Engineers, Plant Engineers, Pharmaceutical and food industry Technical Personnel, Building Operators,

Commercial Loaders, Custom Sheet Metal Workers, Electrical Utility Workers, Furnace/Air Conditioner Installers, Gas Fitters, HVAC Apprentices, Installers, Refrigeration Mechanic Apprentices, Sales Associates

Course Objectives:

At the end of this seminar participants will:

- Maintain and troubleshoot HVAC systems
- Understand and apply the psychometric chart
- Design for good air quality
- Perform basic load calculations
- Initiate an effective inspection and maintenance program
- Minimize forced outages and prevent serious damage to HVAC equipment
- Provide an overview of the legislative requirements plus the essential steps and responsibilities for the maintenance and repair of HVAC systems
- Outline the technologies available for the efficient energy management using HVAC systems

Course Outline:

Introduction to HVAC

- General
- Principles of thermodynamics
- Laws of thermodynamics
- Fundamentals of heat transfer
- Fundamentals of fluid flow
- Temperature and its measurement

- Pressure and temperature relationship

Psychometric

- Introduction to psychometric
- The properties of air
- Psychometric charts
- Air conditioning and psychometric systems
- Psychometric charts as a tool for analysis for A/C performance

Requirements of Comfort Air Conditioning

- Thermodynamics of the human body
- Air purification methods
- Role of clothing
- Temperature and humidity in high heat load
- Inside and outdoor design criteria
- Ventilation and ventilation standards
- Design of ventilation systems
- Air distribution systems
- Air diffusion and performance
- Air purification methods

Heating and Cooling Load Calculation Procedure

- Design considerations
- Load components
- Design criteria – indoor and outdoor
- Heat/load components
- Miscellaneous heat sources
- Fresh air loads

- Design of air-conditioning systems
- Heat gains: transmission, solar, infiltration

HVAC Systems

- All air, all water, air water systems
- Heat systems
- Steam heating systems
- Electric heat systems
- Components of the air conditioning systems in practice

Constant Volume Systems

- System concepts
- Different configurations

Variable Air Volume Systems

- System concepts
- Different Variable Air Volume (VAV) systems

Duct Design, Airflow and its Distribution

- Pressure gradient diagrams
- Duct sizing and design

Insulation of Air-Conditioning Systems

- Properties of insulating materials
- Factors affecting thermal conductivity
- Heat transfer through insulation
- Economical thickness of insulation

- Insulated systems
- Importance of relative humidity for the selection of insulation

Air-Conditioning Equipment

- Packaged units
- Split systems
- Chillers
- Boilers
- Pumps
- Cooling towers
- Adiabatic coolers
- Capacity assessment and selection
- Air filters
- Humidifiers
- Dehumidifiers
- Fans and blowers
- Grills and registers

Refrigeration

- Methods of refrigeration
- Air refrigeration systems
- Vapor compression and absorption refrigeration systems
- Refrigerants
- Refrigeration equipment

Controls and Instrumentation

- Definitions
- Sensors and elements

- Pneumatic and hydraulic controls
- Electrical and electronic controls
- Two position control
- PID control
- Parameters to be controlled (temperature supply and return air)

Typical Control Systems

- Preheat and humidification control (winter air-conditioning)
- Cooling, dehumidification and reheat control (summer air-conditioning)
- Face and by-pass control
- All year round air-conditioning system
- Zone control system

Installation, Commissioning Operation, Testing and Maintenance

- HVAC equipment
- Duct work and air outlets
- Electrical and controls
- Insulation and commissioning process