HVAC Design

Course Content

For Regular & Weekend Batch

CERTIFICATION & PG DIPLOMA COURSES FOR Oil & Gas / Chemicals/ Energy & Power industries.

Course Outline

The training program deals with fundamentals, designing, drafting, erection, estimation, maintenance &

detail engineering of Central HVAC systems including Central Air Systems & Chilled Water Systems. The dedicated training sessions covers detailed applications & usage of codes & standards ASHRAE, ISHRAE, SMACNA, ASME, ARI, DW 142 and more.

This certificate program introduces the candidates to the following modules:

- Introduction to HVAC
- Documents Approvals
- Refrigerants.
- Project Procurement works
- Cooling Load estimation
- Preparation of Drawings.
- Heating Loss estimation
- Clean Rooms/ Cold Stores
- Air Distribution System.
- Ventilation system.
- Chilled Water system
- Equipment Selection
- Erection of Equipments.
- Maintenance
- Estimation of Projects.

I. Introduction to HVAC

- Scope of HVAC Industry with overview of Consulting & Construction industry.
- Concept of Air conditioning systems.
    - Codes & Standards
    - Principles of air conditioning

- Vapor compression cycle
- Absorption Chilling system

- Air conditioning systems

  - Local cooling comfort System
    - Window Air conditioning
    - Split Air conditioning
    - Multi Split Air conditioning
    - Chilled water Fan coil unit

  - Centrally air conditioned system
    - Central Air Conditioning System
    - Chilled water system.
- Psychometric chart
    - Properties of Air (DBT, %RH, WBT, HR, DPT, ENTHALPY)

  - Components of AHU & its functioning
    - Cooling
    - Heating
    - Humidification Methods
    - Dehumidification Methods
    - Filtration

II. Refrigerant

- Types of refrigerant
- Evaporating & condensing properties of refrigerant.
- Refrigerant Pipe sizing methods

III. Cooling & Heating load estimation.

- Basics of Heat transfer in a building envelop.
- Understanding of Outdoor & Indoor Conditions.
  - Correction to Outdoor temperature & Indoor temperature requirements
  - Exposure of Wall, Latitude of Location, Yearly Range, Daily Range & etc.
  - Factors affecting the loads estimate.

- Sources of Heat Gain
  - External- Sun Gain through Glass/Window, Sun Gain through Roof/Wall, Partition gain
  - Internal - People, Lights, Electrical Equipments, Motors, Kitchen Appliances, Heat gain through Infiltration air, Heat gain thorough Ventilation & By-pass air, Heat gain through ducts. Calculating ESHF, GTH, ADP, Dehumidified CFM.

- Heat loss calculations
    - Basics of Heat loss in a building envelop.
    - Sources of Heat loss -
        - Heat loss through Glass/window
        - Heat loss through Roof/Wall
        - Heat loss through Partition Glass/wall/Floor/slab
        - Heat loss through Infiltration air/Ventilation air & Bypass air
        - Heat loss through slab on Grade

IV. Design of Air Distribution System.

- Components of Air distribution system.
    - Types of Ducts, Duct Fittings, Dampers, Types of Diffusers, RAG, Flexible Duct, Flexible Connector, End Cap, Sound Attenuator etc.
    - Duct Elbows selections (Long radius, Short radius- No throat, Throat elbows, with heel radius, throat radius & radius of elbow).
    - Vanes location & number of vanes required
    - Duct Material Calculation- GI sheet, Total sheet required in kgs. Gauge of duct & Thickness of Gauge. Hanger Spacing, Hanger Rod Diameter and Angle support Size.
    - Duct designing methods.
        - Velocity reduction method.
        - Equal friction Method.
        - Static regain method.
    - Fan selection & Static pressure calculation.
    - Supply & Return Duct configuration, Assigning Velocity of Air (FPM) to each Section of Supply and Return Duct Low Velocity system, Medium Velocity System and High Velocity System.
    - Components of Air Distribution System, Supply and Return Duct configurations (Extended Plenum Systems, Radial System, Trunk and Branch system)
    - Stair Well Pressurization System Designing

V. Design of Ventilation system.

- Introduction to Ventilation system,
    - Components of Ventilation system.

- Restaurant and Residence Kitchen Ventilation System Design
    - Sizing of Hood, Number of filters required & Duct designing.

VI. Chilled Water system design.

- Introduction to Chilled water system, Hot water system.
- Classification of chillers
    - As per Evaporator.
    - As per Condenser.
    - As per compressor.

- Chiller arrangements, Cooling tower arrangement, Types of cooling tower & Expansion tank connections.
- Pumps required in Chilled water system
    - Production Pumps
    - Distribution Pumps

- Pump Classifications.

- Chilled water system pipe designing
  - Piping fundamentals
    - Pipe designators, piping standards.
    - Piping fittings and its Components.
    - Valves used in Chilled water system
  - Chilled water and Hot water GPM calculation.
  - Calculation of Water Velocity FPS on Suction and Discharge side of Pump.
  - Hydraulic Design for Sizing the Pipe for Amount of Flow. (Open & Closed Piping Systems).
  - District Cooling System.
  - Friction loss calculation for the piping system
    - Friction loss in straight pipes.
    - Friction Loss in Fittings.
    - Valves used in Chilled Water System.
    - Friction Loss in Valves & Special components.
  - Calculating TDH for Pump (Open Piping System and Closed Piping System).
  - Pipe Sizing Manual Method Hazen-Williams Equation for Calculating Friction Loss.
  - Pump Cavitations & NPSH Calculation for Pump.

VII. Equipment Selection

- AHU & FCU classification and selection.
- Package Unit Selection DX- Chiller Selection.
- Condenser Selection (Air cooled, Water Cooled, Evaporative).
- Cooling Tower Selection Mixed Air Temperature Calculation.
- HRF for Open and Closed Compressor.
- Expansion Tank Selection

VIII. Erection of Equipments

- Detailing & Installation of Chillers
- Detailing & Installation of Air handling units.
- Detailing & Installation of Package units.
- Detailing & Installation of Fan coil units.
- Detailing & Installation of Condensing units

IX. Estimation of Project

- Understanding the tendering requirements
- Quantity take off
- Preparing Inquiry for Suppliers & Finalizing the suppliers.
- Final Billing & Quotations finalization

X. Documents Approvals

- Preparation of Material submittals,
- Shop drawing submittals,
- Types of approval.
- Preparation of BOQ and design documents,
- Specifications.

XI. Project Procurement works

- identifying the critical equipments
- preparation of purchase orders
- Letter of Intent
- Letter of credit
- Minutes of meeting

XII. Drafting of HVAC Systems-

- Introduction to Drafting,
- Types of Drawings used in the industry
- Study & Preparation of
  - Floor Drawings,
  - Roof Drawings,
  - Sectional Drawings
  - Builders Work Drawings
  - Co- ordination Drawings & Riser Diagram
  - Abbreviations & Symbols used.

Registration Process

Pay your registration fee to confirm your seat for the Training Program and send us scan copy of payment details & registration form.

"For registration form & payment details send enquiry on info@mecciengineers.com"

Discounts Schemes:

10 % Discount on Group Registration on minimum of three.

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