



Mechanical Engineering

HVAC System Utilization, Operation & Effective Maintenance Strategies

Course Introduction

Either it is a small warehouse or a complex high-rise building, there is an increasing demand by Owners and Engineers to design and install the HVACR Systems in a more Efficient and Cost-Effective manner. Due to the on-going advances in HVACR Technology, this demand is becoming a must and often controlled by New Governmental Regulations and Engineering Codes.

The details of Heat Load Calculations, Selection of appropriate Equipment/System and the design of the Ducts and Piping Networks. A comprehensive design case study of a complete cold store including heat loads of individual rooms and the total Cold Store, Selection of the appropriate equipment, design of the best layout including handling areas.

Troubleshooting Technique

This course is designed specially to improve the Knowledge of Refrigeration and Air Conditioning Personnel as mostly forgotten or have not applied it in the field. Also to develop & improve the Troubleshooting Technique for the HVACR personnel to maintain the Effective & Efficient Equipment. It will explain the latest and old model HVACR equipment's comparison and the difference in the Service Technique.

The course train the participants in Electrical Field, Inspection and Troubleshooting techniques related to mechanical portion of the HVACR Equipment. Also will cover all aspects of HVACR Operation. Maintenance & logging system to find out the efficiency of the entire system. This will help to cut down power consumption and operational cost of the HVACR system.

Target Audience

- Automotive Engineer
- Boiler Engineer
- Ceramics Engineer
- Equipment Engineer
- High-Pressure Engineer

- Marine Engineer
- Mechanical Design Engineer
- Mechanical Engineer
- Naval Architect
- Pipeline Engineer
- Power Engineer
- Rotating Equipment Engineer
- Senior Mechanical Engineer
- Turbine Engineer
- Validation Engineer

Learning Objectives

- Learn the Principles of Refrigeration Cycle
- Learn the Principles of Air-Conditioning
- Identify and test the Special tools & equipment's
- Learn about HVACR Preventive & Corrective maintenance
- The Ozone depletion and global warming potential
- Gain knowledge about replacement refrigerants
- Know the New Refrigerants effects on Old Equipment's
- Learn the Servicing of Chilled water system
- Learn the Electrical circuits In HVACR
- Learn troubleshooting and fault findings
- Learn diagnosis, repairs and Servicing

Course Outline

- **01 DAY ONE**

Module (01) Principles of HVACR

- 1.1 Fundamentals of HVACR
- 1.2 Refrigeration Cycle
- 1.3 Parts of Refrigeration Cycle
- 1.4 What is Air Conditioning?
- 1.5 Air Conditioning Cycle
- 1.6 Major Parts of Air Conditioning
- 1.7 Different Types of HVACR Systems
- 1.8 Mechanical & Chemical Cooling Systems
- 1.9 Mechanical Controls Temperature and Humidity

Module (02) Serviceman Tools & Equipment

- 2.1 Vacuum Pump and Charging Cylinder
- 2.2 Manifold Gauge and Brazing Equipment
- 2.3 Pinch-off Tool Capable
- 2.4 Leak detector and Tubing Cutter
- 2.5 Hand Tools to Remove Components
- 2.6 Digital clamp-on Meter and Thermometer
- 2.7 Pliers and Clippers
- 2.8 Soldering & brazing Equipment
- 2.9 Air Velocity measuring Instrument

• 02 DAY TWO

Module (03) Refrigerants & Ozone Depletion

- 3.1 Ozone Depletion
- 3.2 Global Warming Potential
- 3.3 New and Replacement Refrigerants
- 3.4 Reclaiming the Refrigerant
- 3.5 Changing the Refrigerant
- 3.6 Compressor Lubricating Oils
- 3.7 Refrigerant Leak Detection
- 3.8 Dye Systems
- 3.9 Equipment Test Pressures
- 3.10 Methods of Leak Testing

- 3.11 Pressure Leak Testing
- 3.12 Handling Refrigerants: Safety Precautions

Module (4) Servicing of HVACR Equipment

- 4.1 Service Valves and Gauges
- 4.2 Service Gauge Manifold
- 4.3 Fitting and Removing Gauges
- 4.4 Refrigerant PT Charts
- 4.5 Pumping down
- 4.6 Pumping down and charging
- 4.7 Adding & Removing Refrigerants
- 4.8 Vapor Charging
- 4.9 Liquid Charging
- 4.10 Future of used Refrigerants

• 03 DAY THREE

Module (05) HVACR Diagnosis and Repairs

- 5.1 Evaporator Icing
- 5.2 Slugging at Compressor
- 5.3 Compressor Efficiency Test
- 5.4 Metering Devices and Defects
- 5.5 Replacing a Thermostatic Expansion Valve
- 5.6 Replacing the Filter Drier
- 5.7 Sight glass or Moisture Indicator
- 5.8 Moisture in the System
- 5.9 Compressor Overhauling
- 5.10 Excessive Operating Head Pressure
- 5.11 Compressor Motor burn-out: System Flushing

• 04 DAY FOUR

Module (06) Electrical Circuits for HVACR

- 6.1 Basic Electrical
- 6.2 Understanding of Electrical Symbols

- 6.3 Safety Precautions
- 6.4 Fuses & Circuit Breakers
- 6.5 Disconnect Switches
- 6.6 Ground-Fault circuit interrupters
- 6.7 Solenoid Valve and Relay
- 6.8 Compressor Motor Starting Methods
- 6.9 Contactors & Relays
- 6.10 Electrical circuit's legends
- 6.11 Electrical Component Arrangements
- 6.12 Control & Power Diagrams
- 6.13 Sequence of Operation
- 6.14 Set Points

• **05 DAY FIVE**

Module (07) Inspection & Maintenance of HVACR

- 7.1 What is the Maintenance?
- 7.2 Types of maintenance
- 7.3 Routine inspection
- 7.4 Preventive maintenance in HVACR systems
- 7.5 Corrective Maintenance for HVACR system
- 7.6 What should to do when season begin?
- 7.7 What to do during season?
- 7.8 What should to do during off-season?
- 7.9 HVACR Operation and Maintenance Log Sheets

Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
May 12, 2025	May 16, 2025	5 days	5950.00 \$	USA - Texas
July 14, 2025	July 18, 2025	5 days	4250.00 \$	UAE - Abu Dhabi
Sept. 21, 2025	Sept. 25, 2025	5 days	2150.00 \$	Virtual - Online

FROM	TO	DURATION	FEES	LOCATION
Oct. 12, 2025	Oct. 16, 2025	5 days	4250.00 \$	KSA - Jeddah
Oct. 12, 2025	Oct. 16, 2025	5 days	4250.00 \$	oman - salalah