



# Advanced Air Conditioning & Refrigeration Troubleshooting

## Advanced Air Conditioning & Refrigeration Troubleshooting

This five-day course is designed to provide experienced HVAC technicians with advanced training on some of the more complex topics in this field. Topics such as control circuits, air balancing, and heat load calculation are discussed in detail in this course.

### I. Refrigerant Controls

- Compression System Refrigerant Controls
- Comparing Refrigerant Controls
- Check Valve
- Suction Pressure Valves

### II. Electrical - Magnetic Fundamentals

- Generating Electricity
- Types of Electricity
- Circuit Fundamentals
- Electrical Materials
- Magnetism
- Electronics
- Electrical Power
- Electrical Codes
- Circuit Protection

### III. Electric Motors

- Electric Motor Applications
- The Motor Structure
- Types of Electric Motors
- Motor Speeds
- Starting and Running Windings
- Starting Current
- Motor Connections
- Hermetic System Motors
- Direct Current and Universal Motors
- Motor Horsepower and Motor Characteristics
- Electric Motor Grounding
- Motor Protection
- Motor Temperature
- Standard Motor Data

- Fan Motors
- Shaded-Pole Motors
- Electronic Variable Speed Motors
- Servicing Electric Motors
- Pulleys
- Belts
- Motor Testing Stand
- Servicing and Repairing Hermetic Motors

### IV. Electric Circuits and Controls

- Electrical Circuits-Complete Wiring Diagram
- Electrical Circuits-Ladder Diagram
- Control Systems-Fundamentals
- Refrigerator and Freezer Controls
- Ice Maker Controls
- Comfort Cooling Air Conditioning Controls
- Central Air Conditioning Controls
- Water Cooler Controls
- Remote Temperature Sensing Elements
- Pressure Motor Controls
- Motor Safety Controls
- Motor Starting Relays
- Automatic Defrost Controls
- Semiautomatic Defrost Controls
- Hot-Gas Defrost Controls
- Ice Bank Controls
- Humidity Controls
- Defrosting Timers

## **V. Commercial Systems - Heat Loads and Piping**

- Heat Load
- Thermodynamics
- Evaporator and Condensing Unit Capacities
- Evaporator Installations
- Water-Cooling Loads
- Ice Cream Freezing and Storage Load
- System Capacity
- Compressor Capacities
- Cascade System
- Two-Stage Compressor
- Bypass Cycle
- Refrigerant Lines and Piping
- Seasonal Energy Efficiency Ratio (SEER)

## **VI. Air Conditioning and Heating Control Systems**

- Controls
- Thermostats
- Controllers
- Total Energy Management Systems
- Energy Management System Types and Functions
- Control System Diagnostics

## **VII. Air Conditioning Systems - Heat Loads**

- Heat Loads
- Design Temperatures
- Insulation and Vapor Barriers
- Energy Conservation
- Construction Types and Designs

## **VIII. Servicing and Troubleshooting Simplified**

- Servicing and Troubleshooting
- Troubleshooting Procedure
- Troubleshooting Charts