

# Air Conditioning and Refrigeration for Electricians

This five-day, lecture-based course is designed to cover the fundamentals of AC&R equipment, systems, and controls. The course is particularly oriented around troubleshooting controls and electrical equipment, such as compressors, fans, and valves.

## I. Fundamentals of Refrigeration

- Overview of Refrigeration Development
- AC & R Terminology
- Heat, Cold, Heat Transfer
- Measurements
- Units of Heat, BTUs
- Change of State
- Link to Food Industry
- Safety

## II. Refrigeration Tools and Materials

- Common Tools
- Piping and Tubing
- Instruments and Gauges
- Measuring Tools

## III. Basic Refrigeration Systems

- Controlled Expansion Systems
- Ice Makers
- Compression Systems w/Expansion Valves
- Defrost Systems

## IV. Compression Systems

- Laws of Refrigeration
- Compression Cycle
- Components

## V. Electromagnetic Fundamentals

- AC & R Circuit Fundamentals
- Electrical Motors
- Motor Circuits
- Hermetic System Motors
- Motor Protection
- Fan Motors
- Servicing Electrical Motors
- Motor Testing

## VI. Electrical Circuits and Controls

- Wiring Diagrams
- Ladder Diagrams
- Control Systems
- Refrigeration and Freezer Controls
- Pressure Sensing Controls
- Motor Safety Controls
- Automatic Defrost Controls
- Remote Temperature Sensing Elements

## VII. Refrigerants

- Requirements of Refrigerants
- Temperature Curves
- Refrigerant Temperatures
- Food Freezants

## VIII. Small Hermetic Systems

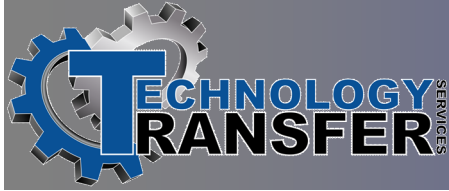
- Instruments Tools and Supplies
- Troubleshooting Refrigeration Units
- Diagnosing Component Problems
- Evacuating Systems With a Vacuum Pump

## IX. Commercial Systems

- Mechanical Cycle
- Motor Controls
- Commercial Evaporators
- Refrigerant Controls
- Valves, Pressure Regulating
- Electrical Heater Defrost Systems

## X. Servicing and Installing Commercial Systems

- Electrical Connections
- Starting a System
- Servicing Condensing Units
- Locating Troubles



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## **XI. Fundamentals of Air Conditioning**

- Physical Properties of Air
- Humidity
- Climate
- Air Movement

## **XII. Control Systems**

- Control Mechanisms
- Thermostats
- Electronic Thermostats
- Controllers
- Primary Controls
- Sequential Operating Controls
- Limit Controls

## **XIII. Servicing and Troubleshooting**

- Troubleshooting Techniques
- Troubleshooting Procedures
- Troubleshooting Charts