

Refrigeration and HVAC Operating Engineer

(For Supervisors and Service Managers)

Qualifications

Minimum age - Adult

Education - High School Diploma, GED or equivalent

Experience - Two years as a Refrigeration and HVAC Technician or AS Degree Air Conditioning and Supervise one or more Technicians. and Hold EPA CFC License

Minimum Time in Previous Grade - 2 years

Examination - Written (Oral or Practical when necessary)

Maximum Prime Mover Horsepower (Unsupervised) - unlimited

Maximum Refrigeration or Air Conditioning (Unsupervised) unlimited

Curriculum at the Minimum

- Thermodynamics, Heat Transfer Theory
- Principles of heat and temperature measurement
- States of Matter
- Gas Laws
 - Boyle's Law, Charles' Law, Dalton's Law, General Principles of Perfect gases
- Safe Handling, Transportation, and Disposal of Refrigerants, Manufacturer Certification R410A
- Hydrocarbon Refrigerant Oils
- Ammonia (Refrigerant)
- Lithium Bromide (Absorbent)
- Principles of Pressure and Pressure Measurement
- Refrigeration Cycle (Compression/Hydrocarbon Refrigerants)
- Hydrocarbon Refrigerant
- EPA Universal Certified for
- Refrigeration System Components
 - Evaporators and Condensers, Heat Exchangers
- Compressors (Electric Motor or Engine-Driven)
 - Reciprocating, Screw, Scroll, Rotary-Helical, Centrifugal
- Metering Devices (Direct Expansion/Hydrocarbon Refrigerants)
 - Capillary Tube, Orifice, Expansion Valves (TXV, AXV, TAXV)
 - Hot Gas Bypass Valves, Condenser Pressure Regulating Valves
- Air Conditioning Systems
 - Package Systems (Gas/Electric, Heat Pump, Oil/Electric, Etc.), Window Units, Portal Units (Thru-The-Wall), Rooftop Units (HVAC, Vav), Unitary Systems (Split Systems), Condensing Units, Air Handling or Fan Coil Units, Refrigerant Piping, Line Sizing, Installation
- Heat Pump Systems
 - Air Source, Water Source, Ground Source, Supplemental or Cascade
- Cooling Towers /Evaporative Coolers
- Thermal Storage Systems
- Refrigeration Systems (Commercial)
 - Coolers and Freezers (Walk-In, Reach-In, Display), Refrigerated Air Dryers and Ice Machines
- Psychometrics

- Temperature and Humidity Control Systems
- Air Filtration and Duct Cleaning
- Air Quality Measurement And Control
CO², Co, O₂, O & Contaminant Testing
- Fans
- Pumps (Water/Fluids)
- HVAC Electrical Fundamentals
- HVAC Electrical Components
Wiring Insulation And Sizing, Fuses, Breakers, Starters – Low Voltage (480 Volts Or Less), High Voltage (208 Through 4,800 Volts Or More), Automated Switchgear, Current Sensing Meters and Motor Control
- Electromechanical Controls
- Pneumatic Controls
- DDC Controls For Building Automation
- Computer Literacy
Identify And Work With Existing Applications (Excel, Word, Powerpoint, Access, Outlook)
- Electric Transformers
- DC Power Supplies And Converters
- Ups Systems
- Variable Frequency Drives
- Electric Motors (AC And DC)
- Engine Driven Suppressers and Pumps
- Troubleshooting ACR Electrical Systems
Personal Protective Equipment, Lockout/Tagout Practices, Meter Categories, Test Procedures, Electrical Diagrams, Schematic (Ladder) Diagrams, Pictorial Diagrams, Installation Diagrams, Fundamentals Of Electrical Trouble Shooting, Trouble Shooting Electrical Components.
- ACR System Service
System Base Lining, Service Equipment And Practices, System Start-Up, Operational Checks. Preventive Maintenance and Mechanical Troubleshooting