

REFRIGERATION & AIR CONDITIONING MECHANIC

APPENDIX A

O*NET CODE 49-9021.02

This training outline is a minimum standard for Work Processes and Related Instruction. Changes in technology and regulations may result in the need for additional on-the-job or classroom training.

WORK PROCESSES

	Approximate Hours
A. Orientation	100
1. Physical Facilities	
a. Work Areas	
b. Stock areas	
c. Tools and equipment	
2. Company policy: customer satisfaction	
3. Employee – Supervisory relationship	
B. Safety	200
1. In shop – power tools	
a. Proper uniform for work	
b. Goggles – guards	
c. Instruction books	
2. In shop – fumes and dangers:	
a. Paint	
b. Solvent	
c. Oxidation of freon	
3. Fire Safety – extinguishers; cleanliness	
4. Steam cleaning generator	
5. Vehicular: truck driving	
6. Use of ladders	
7. Use of lift equipment	

- C. Installation of Room Units** **500**
1. Double hung window
 2. Upper sash
 3. Cut casement – operable window
 4. Cut casement – picture window
 - a. Ransom installation
 - b. Thru – wall wood
 - c. Thru – wall brick veneer
 - d. Thru – wall solid brick
- D. Operation of Room Units and Shop Repairs** **200**
1. Principle of operation – gas vs. liquid
 2. Vocabulary – condenser, evaporator, relay capacitor, etc. – definitions.
 3. Take apart and reassemble room units.
 4. In shop steam cleaning; rust proofing; and painting.
 5. Replacement of motors, capacitors, relays.
 6. Replacement of fans and alignment.
 7. Replacement of shrouds.
 8. Introduction to gas problems; leaks; charges.
- E. Ducting Needed to Modify Room Units** **100**
1. Supply systems
 2. Return systems
 3. Condenser air - in - or out
 4. Introduction to duct systems for central air conditioning.
- F. Central Air Condition Duct Work** **300**
1. Air flow: static pressure; velocity; duct size.
 2. Use of existing forced hot air duct systems for air conditioning.
 3. New duct systems for existing homes; attics; basements; closets.
 - a. Ranch
 - b. Split
 - c. Two story
 - d. High ranch
 - e. Splanch

- f. Luxury home – mansions.
- g. Duct system for new construction: in walls.

G. Installation of piping and tubing 900

- 1. Measuring
- 2. Cutting and cleaning
- 3. Layout and alignment
- 4. Connection both flare and sweat
- 5. Pipe bending
- 6. Valves, coupling and connections.
 - a. Function of valves
 - b. Installation
 - c. Packing and sealing
 - d. Testing

H. Installation of various types of controls 900

- 1. Pressure controls
 - a. Motor control
 - b. High pressure cut out
 - c. Low pressure cut out
- 2. Temperature controls
 - a. Thermostatic
 - b. Gas or liquid pressure
 - c. Humidity controls
 - d. Study of various types

I. Testing, charging and adjusting refrigeration systems 900

- 1. Testing for leaks
 - a. Pressure test
 - b. Vacuum test
 - c. Indicator test
 - d. Color
 - e. eOdor
 - f. Fumes
- 2. Cleaning and drying
 - a. Pump dry air through systems

3. Charging with refrigerants
 - a. Making charging connections
 - b. Charging gas
 - c. Charging liquid
 - d. Prepare and charge secondary refrigerants

J. Starting and adjusting system 700

1. Install necessary gauges and instruments
2. Adjust refrigerant metering controls
3. Adjust pressure, temperature and electric controls
4. Adjust condensing medium controls

K. Installation of motors 500

1. Wiring place
2. Test for A.C. or D.C.
 - a. Hook A.C. terminals
 - b. Align motor base
 - c. Adjust swivel base
 - d. Check amperage
 - e. Install bolts, adjust pulley, align belts

L. Installation of: 900

1. Reciprocating and rotary compressors.
2. Automatic expansion valve system.
3. Low and high side float system.
4. Capillary system.

M. Air Conditioning 800

1. Aero-dynamics-Distribution
2. Cleaning-Dehydrating-Cooling-Heating
3. Insulation-Valves
4. Motor-Fans-Pump-Comp.-Torque

O. Humidifier-Residential and Commercial	400
1. Explanation	
2. Installation	
3. Service	
P. Air Purifiers, Auto Static	400
1. Central units	
2. Portable units	
3. Installation	
4. Service	
Q. Heat Pumps Residential and Commercial	200
1. Installation	
2. Service	

Approximate Total Hours 8,000

Apprenticeship work processes are applicable only to training curricula for apprentices in approved programs. Apprenticeship work processes have no impact on classification determinations under Article 8 or 9 of the Labor Law. For guidance regarding classification for purposes of Article 8 or 9 of the Labor Law, please refer to <https://dol.ny.gov/public-work-and-prevailing-wage>

REFRIGERATION AND AIR CONDITIONING MECHANIC

APPENDIX B

RELATED INSTRUCTION

Safety

1. Fundamentals
2. Trade Safety
3. Asbestos Awareness – minimum 4 hours (see attachment)
4. First Aid (6.5 hours every 3 years)
5. Sexual Harassment Prevention Training – must comply with section 201-g of the Labor Law

Industrial and Labor Relations (20 hours)

1. History and Background (6 hours, 1st year)
2. Current Laws and Practices (14 hours, 2nd year)

Blueprint Reading and Sketching

1. Fundamentals
2. Specifications, Equipment Design, Schematics and Wiring Diagrams

Mathematics

1. Basic Fundamentals
2. Algebra and Geometry as Applied to the Trade
3. Estimating and Bookkeeping

Trade Theory

1. Tools, Machines and Equipment
2. Care, Operation and Maintenance
3. Terminology
4. Materials
5. Tricks of the Trade, Technology of Jobs, Processes and Operation

Trade Science

1. History of the Industry
2. Trade Physics
3. Trade Chemistry

4. Equipment Controls, Gauges, etc.
5. Hydraulics
6. Machines
7. A.C. and D.C. Motors
8. Pumps, Motors and Fans

Other Courses as Necessary

144 Hours of Related Instruction are Required for Each Apprentice for Each Year.

Appendix B topics are approved by New York State Education Department.

ATTACHMENT TO APPENDIX B

Asbestos Awareness

This course must be delivered by one of the following:

1. A provider currently approved by the New York State Department of Health to deliver asbestos safety training.
2. A person holding a current Asbestos Handler certificate from the New York State Department of Labor in the title of: Inspector, Supervisor, Project Monitor, Management Planner, or Project Designer.
3. Anyone otherwise approved by the New York State Education Department.

Minimum course contents must include the following:

1. Definition of asbestos
2. Types and physical characteristics
3. Uses and applications
4. Health effects:
 - a. Asbestos-related diseases
 - b. Risks to families
 - c. Cigarette smoking
 - d. Lack of safe exposure level
5. Employer-specific procedures to follow in case of potential exposure, including making a supervisor or building owner immediately aware of any suspected incidental asbestos disturbance so that proper containment and abatement procedures can be initiated promptly.

Notwithstanding the above course requirement, employers are advised that they must also be in compliance with New York State Department of Labor Industrial Code Rule 56 at all times.

Employers are further advised, and must advise all apprentices, that completion of the above course requirement does not authorize any person to remove, encapsulate, enclose, repair, disturb, or abate in any manner, any friable or non-friable asbestos, asbestos containing material, presumed asbestos containing material, or suspect miscellaneous asbestos containing material.