

# South Carolina Career & Technical Education

## Air-Conditioning Refrigeration Technology (ACRT)

### Course Codes: 6003, 6004, 6005, and 6006

BASIC SAFETY	SC	NCCER	ARI	HRs
1. Identify the responsibilities and personal characteristics of a professional craftsperson.	60030101	00101-00	24.B	
2. Explain the role that safety plays in the construction crafts.	60030101	00101-00	03.A	
3. Describe what job-site safety means.	60030101	00101-00	03.A.08	
4. Explain the appropriate safety precautions around common job-site hazards.	60030102	00101-00	03.A.08	
5. Demonstrate the use and care of appropriate personal protective equipment.	60030101	00101-00	03.A.07	
6. Follow safe procedures for lifting heavy objects.	60030101	00101-00	03.A.10	
7. Describe safe behavior on and around ladders and scaffolds.	60030101	00101-00	03.A.09	
8. Explain the importance of the HazCom (Hazard Communication Standard) requirement and MSDSs (Material Safety Data Sheets).	60030101	00101-00	03.C.01 03.C.03	
9. Describe fire prevention and fire fighting techniques.	60030103	00101-00	03.A.12	
10. Define safe work procedures around electrical hazards.	60030101	00101-00		15
BASIC MATH				
1. Add, subtract, multiply, and divide whole numbers, with and without a calculator.		00102-00	02.D	
2. Use standard ruler and a metric ruler to measure.		00102-00	02.D	
3. Add, subtract, multiply, and divide fractions.		00102-00	02.D	
4. Add, subtract, multiply, and divide decimals, with and without a calculator.		00102-00	02.D	
5. Covert decimals to percents and percents to decimals.		00102-00	02.D.02	
6. Convert fractions to decimals and decimals to fractions.		00102-00	02.D.02	
7. Explain what the metric system is and how it is important in the construction trade.		00102-00		
8. Recognize and use metric units of length, weight, volume, and temperature.		00102-00	02.D.03	
9. Recognize some of the basic shapes used in the construction industry and apply basic geometry to measure them.		00102-00		
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INTRODUCTION TO HAND TOOLS				
1. Recognize and identify some of the basic hand tools used in the construction trade.	60030104	00103-00	04.A	
2. Use these tools safely.	60030104	00103-00		
3. Describe the basic procedures for taking care of these tools.	60030104	00103-00		
				7.5
INTRODUCTION TO POWER TOOLS				
1. Identify commonly used power tools of the construction trade.	60030104	00104-00	04.A.02	
2. Use power tools safely.	60030104	00104-00	03.D	
3. Explain how to maintain power tools properly.	60030104	00104-00		
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INTRODUCTION TO BLUEPRINTS				
1. Recognize and identify basic blueprint terms, components, and symbols.		00105-00		
2. Relate information on blueprints to actual locations on the print.		00105-00		
3. Recognize different classifications of drawings.		00105-00		
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**BASIC RIGGING**

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|--|----------|--|
| 1. Identify and describe the use of slings and common rigging hardware.                          | 00106-00 |  |
| 2. Describe the basic inspection techniques and rejection criteria used for slings and hardware. | 00106-00 |  |
| 3. Describe the basic hitch configurations and their proper connections.                         | 00106-00 |  |
| 4. Describe basic load-handling safety practices.  | 00106-00 |  |
| 5. Demonstrate proper use of American National Standards Institute (ANSI) hand signals.          | 00106-00 |  |

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**INTRODUCTION TO ACRT**

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|--|----------|----------------------|
| 1. Explain the basic principles of heating, ventilation, and air conditioning. | 03101-00 | 01.B<br>01.C<br>15.A |
| 2. Identify career opportunities available to people in the ACRT trade.        | 03101-00 |                      |
| 3. Explain the purpose and objectives of an apprentice training program.       | 03101-00 | 24.B                 |
| 4. Describe how certified apprentice training can start in high school         | 03101-00 | 24.B                 |
| 5. Describe what the Clean Air Act means to the ACRT trade.                    | 03101-00 | 23.B                 |

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**TRADE MATHEMATICS INSTRUCTOR'S GUIDE**

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|---|----------|------------|
| 1. Identify similar units of measurement in both the inch-pound (English) and metric systems and know which units are larger. | 03102-01 |            |
| 2. Convert measured values in the inch-pound system to equivalent metric values and vice versa.                               | 03102-01 |            |
| 3. Express numbers as powers of ten.  | 03102-01 | 02.D       |
| 4. Determine the powers and roots of numbers.   | 03102-01 | 02.D       |
| 5. Solve basic algebraic equations.   | 03102-01 | 02.D<br>09 |
| 6. Recognize various geometric figures.   | 03102-01 | 15.A       |
| 7. Use the Pythagorean theorem to make calculations involving right triangles   | 03102-01 | 15.A       |
| 8. Convert decimal feet to feet and inches and vice versa.  | 03102-01 |            |

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**TOOLS OF THE TRADE**

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|---|----------|------|
| 1. Identify and state the use of the following tools:   | 03103-01 | 04.A |
| Pipe wrenches   | 03103-01 | 04.A |
| Torque wrenches   | 03103-01 | 04.A |
| Tanner's and soft-faced hammers   | 03103-01 | 04.A |
| Hand cutting snips  | 03103-01 | 04.A |
| Hand and power hacksaws   | 03103-01 | 04.A |
| Drill press   | 03103-01 | 04.A |
| Measuring tools   | 03103-01 | 04.A |
| 2. Describe the general procedures for maintenance of most hand and power tools.                                      | 03103-01 | 04.A |
| 3. Describe or demonstrate the general safety precautions that must be followed when using most hand and power tools. | 03103-01 | 04.A |
|   | 03103-01 | 04.A |

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**COPPER AND PLASTIC PIPING PRACTICES**

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|---|----------|----------|-------|
| 1. State the precautions that must be taken when installing refrigerant piping.           | 60030200 | 03104-01 | 05.A. |
| 2. Select the right tubing for a job.   | 60030200 | 03104-01 | 05.A. |
| 3. Cut and bend tubing.   | 60030203 | 03104-01 | 05.A. |
| 4. Safely join tubing by using flare and compression fittings.                            | 60030201 | 03104-01 | 05.A. |
| 5. Determine the kinds of hangers and supports needed for refrigerant piping.             | 60030200 | 03104-01 | 05.A. |
| 6. State the basic requirements for pressure-testing a system once it has been installed. | 60030200 | 03104-01 | 05.A. |

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**SOLDERING AND BRAZING**

1. Assemble and operate the tools used for soldering.	60030200	03105-01	05.A
2. Prepare tubing and fittings for soldering.	60030200	03105-01	05.A
3. Identify the purposes and uses of solder and solder fluxes.	60030200	03105-01	05.A
4. Solder copper/brass/steel tubing and fittings.	60030206	03105-01	05.A
	60030207		05.A
	60030208		05.A
5. Assemble and operate the tools used for brazing.	60030204	03105-01	05.A
	60030205		05.A
6. Prepare tubing and fittings for brazing.	60030200	03105-01	05.A
7. Identify the purposes and uses of filler metals and fluxes used for brazing.	60030200	03105-01	05.A
8. Brace copper tubing and fittings.	60030200	03105-01	05.A
9. Identify the inert gazes that can safely be used to purge tubing when brazing.	60030200	03105-01	05.A
10. Construct a swage joint.	60030202		05.A
11. Braze saddle valve on suction line.	60030307		05.A

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**FERROUS METAL PIPING PRACTICES**

1. Identify the types of ferrous metal pipes.		03106-01	05.A
2. Measure the sizes of ferrous metal pipes.		03106-01	05.A
3. Identify the common malleable iron fittings.		03106-01	05.A
4. Cut, ream, and thread ferrous metal pipe.	60030209	03106-01	05.A
5. Join lengths of threaded pipe together and install fittings.		03106-01	05.A
6. Describe the main points to consider when installing pipe runs.		03106-01	05.A
7. Describe the method used to join grooved piping.		03106-01	05.A

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**BASIC ELECTRICITY**

1. State how electrical power is generated and distributed.		03107-01	06.B
2. Describe how the voltage, current, resistance, and power are related.		03107-01	06.A.01
3. Use Ohm's law to calculate the current, voltage, and resistance in a circuit.		03107-01	06.A.09
4. Use the power formula to calculate how much power is consumed by a circuit.		03107-01	06.A.01
5. Describe the differences between series and parallel circuits.		03107-01	06.A.15
6. Recognize and describe the purpose and operation of the various electrical components used in ACRT equipment.		03107-01	06.C
7. State and demonstrate the safety precautions that must be followed when working on electrical equipment.		03107-01	03.D
8. Make voltage, current, and resistance measurements using electrical test equipment.	60030407	03107-01	06.B.05
	60030702		
9. Wire a relay.	60030504		06.E
10. Wire a contactor and or a starter	60030509		06.E

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**INTRODUCTION TO COOLING**

1. Explain how heat transfer occurs in a cooling system, demonstrating an understanding of the terms and concepts used in the refrigeration cycle.	60030300	03108-01	02.A
2. Calculate the temperature and pressure relationships at key points in the refrigeration cycle.	60030802	03108-01	02.A
	60030308		
3. Under supervision, use temperature- and pressure-measuring instruments to make readings at key points in the refrigeration cycle.	60030409	03108-01	04.C
	60030410		
	60030412		
4. Identify commonly used refrigerants and demonstrate the procedures for handling these refrigerants.	60030300	03108-01	22.A
5. Recognize and draw the major components of a cooling system and explain how each type works.	60030301	03108-01	10
6. Recognize the major accessories available for cooling systems and explain how each type works.	60030300	03108-01	10.E
7. Recognize the control devices used in cooling systems and explain how each type works.	60030300	03108-01	10.A
8. State the correct methods to be used when piping a refrigeration or cooling system.	60030300	03108-01	05.A
9. Front Seat, mid position, and back service valve.	60030305		10.F
10. Install filter dryer	60030302		10.E.04

11. Install capillary tube.
12. Install liquid line indicator
13. Install an access core types service valve.

60030303  
60030304  
60030306

10.A.08  
10.E.01.u  
10.F.01.e

## INTRODUCTION TO HEATING

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|--|----------|------|
| 1. Explain the three methods by which heat is transferred and give an example of each.                                 | 03109-01 | 01.C |
| 2. Describe how combustion occurs and identify the byproducts of combustion.   | 03109-01 | 01.C |
| 3. Identify the various types of fuels used in heating.  | 03109-01 | 01.C |
| 4. Identify the major components and accessories of a forced-air furnace and explain the function of each component.   | 03109-01 | 01.C |
| 5. State the factors that must be considered when installing a furnace.  | 03109-01 | 01.C |
| 6. Identify the major components of a gas furnace and describe how each works.   | 03109-01 | 01.C |
| 7. With supervision, use a manometer to measure and adjust manifold pressure on a gas furnace.                         | 03109-01 | 01.C |
| 8. Identify the major components of an oil furnace and describe how each works.  | 03109-01 | 01.C |
| 9. Describe how an electric furnace works.   | 03109-01 | 01.C |
| 10. With supervision, perform basic furnace preventive maintenance procedures such as cleaning and filter replacement. | 03109-01 | 01.C |

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## AIR DISTRIBUTION SYSTEMS

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|---|-------------------|---------|
| 1. Describe the airflow and pressures in a basic forced-air distribution system.                              | 03201-01          | 15.A    |
| 2. Explain the differences between propeller and centrifugal fans and blowers.                                | 03201-01          | 15.C    |
| 3. Identify the various types of duct systems and explain why and where each type is used.                    | 03201-01          | 15.A.01 |
| 4. Demonstrate or explain the installation of metal, fiberboard, and flexible duct.                           | 03201-01          | 15.A    |
| 5. Demonstrate or explain the installation of fittings and transitions used in duct systems.                  | 03201-01          | 15.A    |
| 6. Demonstrate or explain the use and installation of diffusers, registers, and grilles used in duct systems. | 03201-01          | 15.A.08 |
| 7. Demonstrate or explain the use and installation of dampers used in duct systems.                           | 03201-01          | 15      |
| 8. Demonstrate or explain the use and installation of insulation and vapor barriers used in duct systems.     | 03201-01          | 15.A    |
| 9. Identify the instruments used to make measurements in air systems and explain the use of each instrument.  | 03201-01          | 15.A.16 |
| 10. Make basic temperature, air pressure, and velocity measurements in an air distribution system.            | 60030801 03201-01 | 15.A.07 |

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## CHIMNEYS, VENTS, AND FLUES

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|--|-------------------|--|
| 1. Describe the principles of combustion and explain complete and incomplete combustion. | 03202-01          |  |
| 2. Describe the content of flue gas and explain how it is vented.                        | 03202-01          |  |
| 3. Identify the components of a furnace vent system.                                     | 03202-01          |  |
| 4. Describe how to select and install a vent system.                                     | 03202-01          |  |
| 5. Perform the adjustments necessary to achieve proper combustion in a gas furnace.      | 60030602 03202-01 |  |
| 6. Describe the techniques for venting different types of furnaces.                      | 60030603 03202-01 |  |
| 7. Explain the various draft control devices used with natural-draft furnaces.           | 03202-01          |  |

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**MAINTENANCE SKILLS FOR THE SERVICE TECHNICIAN**

1. Identify the types of threaded and non-threaded fasteners and explain their use.		03203-01	
2. Install threaded and non-threaded fasteners.		03203-01	
3. Identify the types of gaskets, pickings, and seals and explain their use.		03203-01	
4. Remove and install gaskets, pickings, and seals.		03203-01	
5. Identify the types of lubricants and explain their use.		03203-01	06.D
6. Use lubrication equipment to lubricate motor bearings.		03203-01	06.D
7. Identify the types of belt drives and explain their use.		03203-01	06.D
8. Demonstrate and/or explain procedures used to install or adjust a belt drive.	60030518	03203-01	06.D
9. Identify the types of couplings and explain their use.		03203-01	06.D
10. Demonstrate and/or explain procedures used to remove, install, and align couplings.		03203-01	06.D
11. Identify the types of bearings and explain their use.		03203-01	06.D
12. Explain causes of bearing failures.		03203-01	06.D
13. Demonstrate and/or explain procedures used to remove and install bearings.		03203-01	06.D
14. Perform basic preventive maintenance inspection and cleaning procedures.	60030411	03203-01	19
15. List work and personal habits that contribute to good customer relations.		03203-01	24.A
16. Identify steps in the handling of a typical service call that will contribute to good customer relations.		03203-01	24.A
17. Legibly fill out forms used for installation and service calls.		03203-01	24.A.09

**17.5****ALTERNATING CURRENT**

1. Describe the operation of various types of transformers.		03204-01	06.A
2. Explain how alternating current is developed and draw a sine wave.		03204-01	06.A
3. Identify single-phase and three-phase wiring arrangements.		03204-01	06.B
4. Explain how phase shift occurs in inductors and capacitors.		03204-01	06.A
5. Describe the types of capacitors and their applications.		03204-01	06.C
6. Explain the operation of single-phase and three-phase induction motors.	60030505	03204-01	06.A
7. Identify the various types of single-phase motors and their applications.		03204-01	06.A
8. Use a wattmeter, megger, capacitor analyzer, and chart recorder.	60030514	03204-01	06.A
9. Test inductors and capacitors using an ohmmeter.		03204-01	06.C
10. State and demonstrate the safety precautions that must be followed when working with electrical equipment.		03204-01	03.D

**7.5****BASIC ELECTRONICS**

1. Explain the basic theory of electronics and semiconductors.		03205-01	08.A
2. Explain how various semiconductor devices such as diodes, LEDs, and photo diodes work, and how they are used in power and control circuits.		03205-01	08.A
3. Identify different types of resistors and explain how their resistance values can be determined.		03205-01	08.A
4. Describe the operation and function of thermistors and cad cells.		03205-01	08.A
5. Test semiconductor components.		03205-01	08.A
6. Identify the connectors on a personal computer.		03205-01	

**5****ELECTRIC HEATING**

1. Describe and explain the basic operation of a fan coil equipped with electric heating elements.		03206-01	13.G
2. Identify and describe the functions of major components of a fan coil equipped with electric heating elements.		03206-01	13.G
3. Identify and describe the functions of electric heating controls.		03206-01	13.G
4. Measure resistances and check components and controls for operation and safety.	60030703	03206-01	13.G
5. Determine the cubic feet per minute (cfm) using the temperature rise method.	60030601	03206-01	13.G
	60030701		
6. Describe and explain the basic operation of other electric heating systems.		03206-01	13.G

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## INTRODUCTION TO CONTROL CIRCUIT TROUBLESHOOTING

1. Explain the function of a thermostat in an ACRT system.	03207-01	17.B
2. Describe different types of thermostats and explain how they are used.	03207-01	17.B
3. Demonstrate the correct installation and adjustment of a thermostat using proper siting and wiring techniques.	60030503 60030606	03207-01 17.B
4. Explain the basic principles applicable to all control systems.	03207-01	17.B
5. Identify the various types of electromechanical, electronic, and pneumatic ACRT controls, and explain their function and operation.	03207-01	17.B
6. Describe a systematic approach for electrical troubleshooting of ACRT equipment and components.	60030405	03207-01 17.B
7. Recognize and use equipment manufacturer's troubleshooting aids to troubleshoot ACRT equipment.	03207-01	17.B
8. Exhibit competence in isolating electrical problems to faulty power distribution, load, or control circuits.	03207-01	17.B
9. Identify the service instruments needed to troubleshoot ACRT electrical equipment.	03207-01	17.B
10. Make electrical troubleshooting checks and measurements on circuits and components common to all ACRT equipment.	60030501 60030504 60030506 60030507 60030508 60030515 60030516 60030517	03207-01 17.B

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## ACCESSORIES AND OPTIONAL EQUIPMENT

1. Explain how heat transfer by conduction, convection, radiation, and evaporation relates to human comfort.	03208-01	02.A
2. Explain why it is important to control humidity in a building.	03208-01	13.D
3. Recognize the various kinds of humidifiers used with ACRT systems and explain why each is used.	03208-01	13.D
4. Demonstrate or describe how to install and service the humidifiers used in ACRT systems.	03208-01	13.D
5. Recognize the kinds of air filters used with ACRT systems and explain why each is used.	03208-01	15.B
6. Demonstrate or describe how to install and service the filters used in ACRT systems.	03208-01	15.B
7. Use a manometer or differential pressure gauge	03208-01	04.E.01
8. Identify accessories commonly used with air conditioning systems to improve indoor air quality and reduce energy costs, and explain the function of each.	03208-01	11.C

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## METERING DEVICES

1. Explain the function of metering devices.	03209-01	10.A
2. Describe the operation of selected metering devices and expansion valves.	03209-01	10.A
3. Identify types of thermal expansion valves (TXVs).	03209-01	10.A
4. Describe problems associated with replacements of TXVs.	03209-01	10.A
5. Describe the procedure for installing and adjusting selected TXVs.	03209-01	10.A

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## COMPRESSORS

1. Identify the different kinds of compressors.		03210-01	10.C
2. Demonstrate or describe the mechanical operation for each type of compressor.		03210-01	10.C
3. Demonstrate or explain compressor lubrication methods.		03210-01	10.C
4. Demonstrate or explain methods used to control compressor capacity.	60030408	03210-01	10.C
5. Demonstrate or describe how compressor protection devices operate.	60030510	03210-01	10.C
	60030511		
	60030512		
6. Perform the common procedures used when field servicing open and semi-hermetic compressors.			
Shaft seal removal and installation		03210-01	10.C
Valve plate removal and installation		03210-01	10.C
Unloader adjustment		03210-01	10.C
7. Demonstrate the procedures used to identify system problems that cause compressor failures.		03210-01	10.C
8. Demonstrate the system checkout procedure performed following a compressor failure.		03210-01	10.C
9. Demonstrate or describe the procedures used to remove and install a compressor.		03210-01	10.C
10. Demonstrate or describe the procedures used to clean up a system after a compressor burnout.		03210-01	10.C
11. Install a start capacitor with different types of relays	60030514		10.C

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## HEAT PUMPS

1. Describe the principles of reverse-cycle heating.	60030804	03211-01	12.A
	60030808		
2. Identify heat pumps by type and general classification.		03211-01	12.A
3. List the components of heat pump systems.		03211-01	12
4. Demonstrate heat pump installation and service procedures.		03211-01	16.B
5. Identify and install refrigerant circuit accessories commonly associated with heat pumps.		03211-01	16.B
		03211-01	16.B.06
6. Analyze a heat pump control circuit.			

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## LEAK DETECTION, EVACUATION, RECOVER, AND CHARGING

1. Identify the common types of leak detectors and explain how each is used.		03212-01	20.C
2. Demonstrate skill in performing leak detection tests.		03212-01	20.C
3. Identify the service equipment used for evacuating a system and explain why each item of equipment is used.	60030401	03212-01	20.C
	60030402		
4. Demonstrate skill in performing system evacuation and dehydration.		03212-01	20.D
5. Identify the service equipment used for recovering refrigerant from a system and for recycling the recovered refrigerant, and explain why each item of equipment is used.		03212-01	20.D
	60030404	03212-01	20.C
7. Demonstrate or explain how to use a recycle unit.		03212-01	20.D
8. Identify the service equipment used for charging refrigerant into a system, and explain why each item of equipment is used.	60030309	03212-01	20.D
	60030403	03212-01	22.A
9. Demonstrate skill in charging refrigerant into a system.			

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## PLANNED MAINTENANCE

1. Describe planned maintenance and service procedures required for selected ACRT equipment and components.		03301-02	19
2. Develop a planned maintenance and service checklist for selected ACRT equipment and accessories.		03301-02	19.A.08
4. Identify the tools and materials necessary for performing service and maintenance tasks.		03301-02	19.A.07
5. State the safety practices associated with the servicing of selected ACRT equipment, components, and accessories.		03301-02	03

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**TROUBLESHOOTING GAS HEATING**

1. Describe the basic operating sequence for natural-draft and induced-draft gas heating equipment.		03302-02	17.C
2. Demonstrate skill in interpreting control circuit diagrams for gas heating systems		03302-02	17.C
3. Develop a troubleshooting chart for a gas heating system.		03302-02	17.C
4. Identify the tools and instruments used when troubleshooting gas heating systems.		03302-02	17.C
5. Demonstrate skill in using the tools and instruments required for troubleshooting gas heating systems.		03302-02	17.C
6. Isolate and correct malfunctions in gas heating systems.	60030603 60030604 60030605 60030607	03302-02	17.C

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**TROUBLESHOOTING ELECTRIC HEATING**

1. Explain the operating principles of various types of electric heating systems.		03303-02	13.G
2. Describe the ways in which electric heating systems and components are likely to fail.		03303-02	13.G
3. Analyze circuit diagrams to determine the operating sequence of a fan coil equipped with electric heaters.		03303-02	13.G
4. Determine the operating sequence of an electric heater package for a cooling unit or heat pump.		03303-02	13.G
5. Troubleshoot electric furnaces, accessory heater packages, baseboard heating systems, duct heaters, and radiant heating systems.	60030803	03303-02	13.G
6. State the safety practices associated with the troubleshooting of selected electric heating systems.		03303-02	03

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**TROUBLESHOOTING COOLING**

1. Describe a systematic approach for troubleshooting cooling systems and components	60030405	03305-02	17.E
2. Isolate problems to electrical and or mechanical functions in cooling systems.		03305-02	17.E
3. Recognize and use equipment manufacturer's troubleshooting aids to troubleshoot cooling systems.		03305-02	17.E
4. Identify and use the service instruments needed to troubleshoot cooling systems.		03305-02	17.E
5. Successfully troubleshoot selected problems in cooling systems.		03305-02	17.E
6. State the safety precautions associated with cooling troubleshooting.		03305-02	17.E

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**TROUBLESHOOTING HEAT PUMPS**

1. Describe a systematic approach for troubleshooting cooling systems and components.	60030405	03306-02	17.D
2. Isolate problems to electrical and/or mechanical functions in cooling systems.		03306-02	17.D
3. Recognize and use equipment manufacturer's troubleshooting aids to troubleshoot cooling systems.		03306-02	17.D
4. Identify and use the service instruments needed to troubleshoot cooling systems		03306-02	17.D
5. Successfully troubleshoot selected problems in cooling equipment.		03306-02	17.D
6. State the safety precautions associated with cooling troubleshooting.	60030805 60030806 60030807	03306-02	17.D

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**TROUBLESHOOTING ACCESSORIES**

1. Describe a systematic approach for troubleshooting ACRT system accessories.		03307-02	17
2. Exhibit competence in isolating problems to electrical and/or mechanical functions of ACRT system accessories.		03307-02	17
3. Recognize and use equipment manufacturer's troubleshooting aids to troubleshoot ACRT system accessories.		03307-02	17
4. Identify and properly use the service instruments needed to troubleshoot ACRT system accessories.		03307-02	17
5. Troubleshoot problems in selected ACRT system accessories.		03307-02	17
6. State the safety precautions associated with the troubleshooting of ACRT accessories.		03307-02	17

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**AIR PROPERTIES AND AIR SYSTEM BALANCING**

1. Explain the gas laws (Dalton, Boyle, and Charles) used when dealing with air and its properties.	03311-02	02.A
2. Explain how the properties of air relate to one another.	03311-02	02.A
3. Use a psychrometric chart to evaluate air properties and changes in air properties.	03311-02	09.B
4. Explain the principles involved in the balancing of air distribution systems.	03311-02	15.A
5. Define common terms used by manufacturers when describing grilles, registers, and diffusers.	03311-02	15.A.08
6. Identify and use the tools and instruments needed to balance air distribution systems.	03311-02	15.A
7. Demonstrate and/or describe the general procedures used to balance air distribution systems.	03311-02	15.A
8. Demonstrate and/or describe the methods used to change the speed of air distribution system supply fans.	03311-02	15.C

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**DOMESTIC REFRIGERATION**

1. Adjust refrigeration door.	60030901
2. Remove and replace a gasket.	60030902
3. Remove and replace breaker trim.	60030903
4. Install capillary tubing.	60030904
5. Install in-line service stub.	60030905
6. Remove and replace the temperature control.	60030906
7. Locate and repair an evaporator leak.	60030907
8. Test the refrigeration thermostat.	60030908
9. Test the defrost heater.	60030909
10. Locate, test, remove, and replace the defrost timer.	60030910
11. Test the defrost termination thermostat.	60030911
12. Test, remove, and replace evaporator fan motor.	60030912
13. Test, remove, and replace condenser fan motor.	60030913
14. Determine operating pressures.	60030914
15. Identify components and determine condition of an electrical defrost system.	60030915
16. Test, remove, and replace defrost thermistors.	60030916

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**TOTAL HRS:**

**445**