

Course Objectives/Course Outline
Spokane Community College

Course Title: System Servicing and Troubleshooting of Heat Pumps 1

Prefix and Course Number: AIRC 207

Students will explore heat pump fundamentals, types of heat pump systems, and system accessories. Topics include heat pump compressors, flow control, thermostats, check valves, heat pump controls, control strategies, and piping. Lab exercises will assist students with the study of heat pump systems and the typical heat pump refrigeration cycle.

Course Learning Outcomes:

By the end of this course, a student should be able to:

- Explain principles of physics that ally to heat transfer and the refrigeration
- Explain the heating and cooling modes of heat pump operation as well as performance ratings used for each
- Explain the types of compressors used in heat pump systems and the primary functions of a compressor
- Explain components needed to reverse the refrigeration cycle
- Explain refrigeration circuit components as they apply to cooling only and heart pump systems
- Explain the differences among the various types of electrical wiring diagrams used in servicing heat pump systems
- Explain the use of electrical schematic diagrams to trace various heat pump operation sequences
- Explain the components that are generally found in control and power circuits
- Explain how the control strategies used for heat pumps differ from those used for cooling-only systems
- Discusses type of thermostats and explain operating difference between voltage and current anticipation
- Explain droop, outdoor reset, night setback, and their effect on heat pump performance
- Explain why defrost controls are needed for air-to-air heat pumps and describe common functions of same
- Explain the heat transfer process that occurs at the outdoor coil, causing humidity to condense and freeze
- Understand when an application needs supplemental heat. Explain recommended installation procedures
- Explain why fossil fuel backup heat is not controlled in the same way as electric resistive supplemental heat
- Explain selection criteria for water-side components used in water-source heat pump systems
- Explain ARI procedures for sizing the refrigerant tubing used to connect split-system components
- Explain capacity and oil return issues related to refrigerant line set tubing size
- Explain the ARI Standards used to establish performance criteria for heat pumps
- Explain tools and procedures needed to check the heating and cooling performance of a heat pump system
- Explain location criteria for installing packaged and split-systems heat pump equipment

Course Outline:

- I. Heat Pump Fundamentals

Print Date: 7/10/14

- A. Heat Pump Systems
- B. Flow Controls and Accessories Heat Pump Electrical Systems
- C. Heat Pump Electrical Components
- D. Heat Pump Thermostats Air-to-Air Heat Pump Defrost Supplemental Electric Heat
- E. Fossil Fuel Backup Heat
- F. Water-Source Heat Pump Systems
- G. Installing and Servicing Water-Source Heat Pumps
- H. Heat Pump Performance Criteria
- I. Heat Pump Performance Checks
- J. Heat Pump Installation Procedures
- K. Heat Pump Piping