HVAC/R CONTROLS 1
Course Syllabus

Course Number: ARCO-1134A          OHLAP Credit: No
OCAS Code: None                      Course Length: 22 Hours
Career Cluster: Architecture & Construction
Career Pathway: Maintenance/Operations
Career Major(s): HVAC Technician

Pre-requisite(s): Electricity for HVAC/R

Course Description: This course is an introduction to controls, gas valves, fuel controls, residential control systems-heating/cooling, commercial control systems, heat pump controls, direct digital controls (DDC), and energy management systems (EMS).

Textbooks:


* Refrigeration & Air Conditioning Technology, 7th Ed, (2013), Whitman /Johnson/ Tomczyk Silberstein / Publisher Delmar Cengage


Course Objectives: A. Understand Gas Valves
1. Identify types of gas valves.¹
   a. Low voltage¹
   b. Line voltage¹
   c. Redundant¹
   d. Two-stage¹
   e. Modulating¹
2. Explain the operation of solenoid valves used to control gas flow.¹
3. Describe function and application of regulators.¹
4. Describe the methods of pilot/burner ignition:¹
   a. Standing pilot thermocouple¹
   b. Glow coil pilot ignition¹
   c. Intermittent spark pilot ignition¹
   d. Direct spark burner ignition¹
   e. Hot surface burner ignition¹
5. Describe methods of fan control for the three categories of gas furnaces:¹
   a. Low-efficiency - 60-70% efficient¹
   b. Mid-efficiency - 78-80% efficient¹
   c. High-efficiency - 90%+ efficient¹
6. Describe the sequence of operation for 78-80% efficient gas furnaces.¹
7. Identify the components used in all types of gas furnaces.¹
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a. Low-efficiency - 60-70% efficient
b. Mid-efficiency - 78-80% efficient
c. High-efficiency - 90%+ efficient
8. Explain the operation of a redundant gas valve.
9. Check gas valve operation.
10. Check flame sensing current of flame sensing device.
11. Check and adjust inlet and outlet pressure of a gas valve.
12. Perform conversion on gas valve from natural gas to liquified petroleum (LP) or reverse.
13. Check the operation of an induced draft blower by blocking flue outlet.

B. Explain Fuel Control.
1. Explain the operation of ignition and pilot proving devices.
2. Explain operation of an oil delay valve.
3. Test and change a thermocouple flame sensor.
4. Test spark ignition modules.
5. Perform safety lockout procedures for burners.
6. Measure resistance of cad cell.

1. Identify residential heating and cooling thermostats.
2. Identify controls for heating and cooling.
3. Explain heat and cooling anticipators.
4. Install and test a fan/limit control to identify set point of control.
5. Wire a complete heating system - line and low voltage.
6. Wire a humidistat into electrical circuit.
7. Wire an electronic air cleaner into an electrical circuit.
8. Program a programmable thermostat for heating, cooling and heat pump operation including set-up and set back.
9. Set heat anticipator on system thermostat.
10. Install residential heating and cooling thermostats.

1 ODCTE objective
All unmarked objectives are TTC instructor developed.

Teaching Methods: The class will primarily be taught by the lecture and demonstration method and supported by various media materials to address various learning styles. There will be question and answer sessions over material covered in lecture and media presentations. Supervised lab time is provided for students to complete required projects.

Grading Procedures: 1. Students are graded on theory and shop practice and performance.
2. Each course must be passed with seventy (70%) percent or better.
3. Grading scale: A=90-100%, B=80-89%, C=70-79%, D=60-69%, F=50-59%.
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Description of Classroom, Laboratories, and Equipment:

Tulsa Technology Center campuses are owned and operated by Tulsa Technology Center School District No. 18. All programs provide students the opportunity to work with professionally certified instructors in modern, well-equipped facilities.

Available Certifications/College Credit

The student may be eligible to take state, national or industry exam after completion of the program. College credit may be issued from Oklahoma State University-Okmulgee or Tulsa Community College. See program counselor for additional information.

College Credit Eligibility:

The student must maintain a grade point average of 2.0 or better.