REFRIGERANT RETROФITS
Course Syllabus

Course Number: ARCO-0719
OCAS Code: None
Course Length: 15 Hours
Career Cluster: Architecture & Construction
Career Pathway: Maintenance/Operations
Career Major(s): HVAC Technician

Pre-requisite(s):
This course covers appropriate procedures in retrofitting an air conditioning or refrigeration system to run efficiently on a different refrigerant than originally equipped. Compatibility issues of refrigerants with various compressors, evaporators, condensers, expansion devices, and lubricants will be covered in depth. Proper refrigerant/lubricant recovery techniques will be reviewed and practiced.

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

Course Objectives:
A. Demonstrate Knowledge of Refrigerant Retrofits.¹
   1. Determine if the Alternative Refrigerant and/or Lubricant:¹
      a. is applicable for retrofitting specific system.¹
      b. is on the EPA SNAP list.¹
      c. is U.L. listed.¹
      d. meets the equipment manufacturers' approval.¹
   2. Determine the lubricant required for the alternate refrigerants.¹
   3. Procure the Manufacturers' Changeover Guidelines and follow the retrofit procedures.¹
   4. Measure the residual mineral oil in a system being changed from a CFC to an HFC refrigerant.¹

B. Understand Refrigerant Leak Detection, Evacuation, and Charging.
   1. Identify the common types of leak detectors and explain how each is used.²
   2. Demonstrate skill in performing leak detection tests.²
      a. Check oil level in compressor and add oil if needed.
      b. Inject refrigerant vapor into system as a tracer.
      c. Inject nitrogen into system to increase pressure.
      d. Perform leak checks using soap bubbles, halide leak detector and electronic leak detector.
   3. Identify the service equipment used for evacuating a system and explain why each item of equipment is used.²
4. Demonstrate skill in performing system evacuation and dehydration.²
   a. Purge nitrogen from system.
   b. Run vacuum pump and check efficiency.
   c. Replace oil in vacuum pump if needed.
   d. Connect vacuum pump and indicator to refrigeration gauges and turn on.
   e. Run vacuum pump until a satisfactory deep vacuum is achieved.
   f. Valve off system and turn vacuum pump off.
5. Demonstrate or explain how to use a recycle unit.²
6. Identify the service equipment used for charging refrigerant into a system, and explain why each item of equipment is used.²
7. Demonstrate skill in charging refrigerant into a system.²
   a. Inject refrigerant vapor into high and low sides of system to break vacuum.
   b. Valve off system from refrigerant container and start compressor.
   c. Add refrigerant vapor to low side of system until a Full refrigerant charge is achieved.
8. Charge a unit with a fixed type metering device (superheat method).
9. Charge a unit with a TEV type metering device (subcooling method).
10. Charge a unit using a charging chart.

¹ ODCTE objective
² NCCER 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%.

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.
REFRIGERANT RETROFITS

College Credit Eligibility: The student must maintain a grade point average of 2.0 or better.