REFRIGERANT RECOVERY
Course Syllabus

Course Number: ARCO-0934
OCAS Code: None
Course Length: 15 Hours
Career Cluster: Architecture & Construction
Career Pathway: Maintenance/Operations
Career Major(s): HVAC Technician

Pre-requisite(s):
Course Description: This is an introduction to refrigerant safety, and recovery, recycling, and reclamation equipment and methods. Students are prepared to seek EPA certification.

Textbooks:

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


Course Objectives:
A. Complete an Introduction to Refrigerant Recovery.
   1. Describe the environmental issues regarding refrigerant, including legislation, protocol, laws, and regulations.1
   2. Describe the basic refrigerant cycle.1
   3. Determine proper evacuation levels and leak rates.1
   4. Identify three different types of technician certification.1

B. Understand Safety Related to Refrigerants.
   1. Describe the problems associated with mixing of refrigerants.1
   2. Describe the methods of determining when a recovery cylinder is full.1
   3. Describe the problems associated with component isolation where unsafe hydrostatic pressures can occur.1
   4. Describe the problems associated with contaminants left in a refrigerant system after recovery.1

C. Explain Refrigerant Recovery, Recycling, and Reclamation Methods.
   1. Describe how to manually pump down a system.1
   2. Describe how to isolate system components.1
   3. Describe system dependent and self-contained recovery equipment.1
   4. Describe the push-pull method.1
   5. Describe difference between recycled and reclaimed refrigerant.1
   6. Demonstrate or explain how to use a recycle unit.2
   7. Explain options in Industry Recycling Guideline (IRG-2).1
8. List the advantages/disadvantages, and application of liquid and vapor recovery.1
9. List methods for decreasing recovery time.1

D. Identify Refrigerant Recovery, Recycling and Reclamation Equipment.
1. 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.2
2. Identify proper equipment for a particular job.1
3. Describe procedures for recovering multiple refrigerants with the same recovery unit.1
4. Describe maintenance and efficiency testing procedures for recovery units.1
5. Describe maintenance and testing for refrigerant recovery cylinders.1
6. Identify recovery cylinders.1
7. Explain when to change filter-driers in recycling equipment.1
8. Explain methods of purging non-condensables when recycling.1
9. Identify type of refrigerant in a given recovery cycle.1
10. Perform procedures for recovery.1
11. Demonstrate skill in performing refrigerant recovery.2
12. Perform procedures for recycling.1
13. Perform maintenance on recovery machine.1
14. Connect and operate recovery equipment.1

E. 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. Identify the service equipment used for charging refrigerant into a system, and explain why each item of equipment is used.2
6. 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.
7. Charge a unit with a fixed type metering device (superheat method).
8. Charge a unit with a TEV type metering device (subcooling method).
9. Charge a unit using a charging chart.

F. Perform Refrigerant Management.
1. Describe ozone.
2. Differentiate between CFCs, HCFCs, and HFCs.
3. Discuss EPA regulations as they relate to refrigerants.
4. Define the terms: recover, recycle, and reclaim.
5. Describe methods of recovering refrigerants.
6. Differentiate between refillable and disposable refrigerant containers.
7. Demonstrate correct way to operate recovery/recycle unit.
8. Recover refrigerant from system using the recovery/recycle unit.
9. Recycle refrigerant and inject back into system.

G. Prepare for EPA Freon Recovery Certification.
1. Understand Refrigerant and Oil Management – EPA Regulations.
   a. Describe ozone depletion and global warming.
   b. Discuss how CFCs deplete the earth’s ozone layer.
   c. Differentiate between CFCs, HCFCs, HFCs, and HCs.
   d. Discuss refrigerant blends.
   e. Discuss refrigerant oils and their applications.
   f. Discuss EPA regulations as they relate to refrigerants.
   g. Define the terms recover, recycle, and reclaim.
   h. Describe methods of recovering refrigerants.
   i. Identify a DOT-approved recovery cylinder.

2. Core
3. Type I Certification
4. Type II Certification
5. Type III Certification

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.

### College Credit Eligibility:

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