

# APSM 152B: CHARGING REFRIGERANT SYSTEMS

## Foothill College Course Outline of Record

Heading	Value
<b>Units:</b>	2
<b>Hours:</b>	20 lecture, 20 laboratory per quarter (40 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the Sheet Metal Apprenticeship Program.
<b>Degree &amp; Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade Only
<b>Repeatability:</b>	Not Repeatable

## Student Learning Outcomes

- A successful student will be able to use pressure and temperature measuring instruments to evaluate refrigerant condition in a typical hvac system.
- A successful student will be able to use charging equipment to achieve the desired refrigerant charge for a common air conditioning system.

## Description

Students learn the fundamentals of charging refrigerant systems.

## Course Objectives

The student will be able to:

- Determine the proper charging method for a specific system
- Use temperature measuring instruments
- Use pressure test instruments
- Use refrigerant leak detection devices
- Use charging equipment to achieve the proper charge for the system
- Determine factors that may adversely affect the correct charge of the system (existing duct design, piping size, ambient temperature, component location)
- Demonstrate other refrigerant charging techniques

## Course Content

- Determine the proper charging method for a specific system
  - Describe how refrigerant is charged into systems in the vapor and liquid states (Lec and Lab)
  - Describe how refrigerant is charged into systems in the vapor and liquid states (Lec and Lab)
  - Describe two types of charging devices (Lec and Lab)
- Use temperature measuring instruments
  - Demonstrate the use of type K and bead probe measuring instruments (Lec and Lab)
- Use pressure test instruments
  - Demonstrate use of manifold gauge pressure sets (Lec and Lab)
- Use refrigerant leak detection devices

- Describe various types of leak detectors and demonstrate their use (Lec and Lab)
- Use charging equipment to achieve the proper charge for the system
  - State the advantage of using electronic weighing scales (Lec and Lab)
  - Determine factors that may adversely affect the correct charge of the system (existing duct design, piping size, ambient temperature, component location) (Lec and Lab)
  - Demonstrate other refrigerant charging techniques
    - Describe system charging using two different weighing methods (Lec and Lab)
    - Use the sub-cooling method of charging units with a TXV (Lec and Lab)
    - Charge fixed orifice, capillary tube and piston tube systems using charging charts and curves (Lec and Lab)
    - Charge refrigerant blends incorporating a temperature glide and fractionation potential (Lec and Lab)

## Lab Content

- Demonstrate proper use of refrigerant pressure test instruments.
- Demonstrate proper use of refrigerant leak detection devices.
- Demonstrate use of refrigerant charging equipment to achieve proper charge for system.

## Special Facilities and/or Equipment

- Laboratory with sheet metal service tools
- Personal protective equipment

## Method(s) of Evaluation

- Results of written quizzes and tests
- Responses in class discussions
- Comprehensive written final examination
- Comprehensive final project
- Demonstration of assigned skills to acceptable level per instructor

## Method(s) of Instruction

- Lecture
- Discussion
- Demonstration
- Lab assignments followed by discussion

## Representative Text(s) and Other Materials

Whitman, B., B. Johnson, J. Tomczyk, and E. Silberstein. Refrigeration and Air Conditioning Technology. 8th ed. Boston, MA: Cengage Learning, 2016.

## Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

- Sample reading assignment: From the textbook, Unit 10, "System Charging"
- Sample writing assignment: Answer review questions related to the assigned reading

## Discipline(s)

Sheet Metal, Air Conditioning, Refrigeration, Heating