

Mechanics Local 701 Training Fund
Automotive Technician Apprenticeship Course
AUTO 107 – Heating Ventilation & Air Conditioning (HVAC)
130 Contact Hours – Classroom & Shop
SYLLABUS

Course Description

This course covers component repair operations and adjustments of automotive heating, ventilation, and air conditioning systems. It includes pressure and leak testing of the refrigeration system and performance testing of the heater, air conditioner, ventilation systems and defrosters. It also covers refrigerant system retrofitting and refrigerant recovery/recycling.

Course Divisions:

- A/C Systems Diagnosis & Repair
- Refrigeration System Component Diagnosis & Repair
- Heating, Ventilation & Engine Cooling Systems Diagnosis & Repair
- Operating Systems & Related Controls Diagnosis & Repair
- Refrigerant Recovery, Recycling & Handling

ASE Educational Foundation Master Automobile Service Technology Task Credits

(15) P-1 (14) P-2 (3) P-3

Instruction References and Resources

- CDX Learning Systems Online
- Electude E-Learning Solutions Online
- Textbook: Fundamentals of Automotive Technology, Principles and Practice;
VanGelder 2nd Edition

Expected Competencies/Outcomes

At the completion of this course, the students will be able to safely perform the attached list of ASE Education Foundation tasks with a degree of proficiency and in a period of time deemed satisfactory by the instructor.

- ❖ Identify and interpret heating and air conditioning problems; determine necessary action.
- ❖ Research vehicle service information including refrigerant/oil type, vehicle service history, service precautions, and technical service bulletins.
- ❖ Performance test A/C system; identify problems.
- ❖ Identify abnormal operating noises in the A/C system; determine necessary action.
- ❖ Identify refrigerant type; select and connect proper gauge set/test equipment; record temperature and pressure readings.
- ❖ Leak test A/C system; determine necessary action.

- ❖ Determine recommended oil and oil capacity for system application.
- ❖ Using a scan tool, observe and record related HVAC data and trouble codes.
- ❖ Inspect, remove, and/or replace A/C compressor drive belts, pulleys, tensioners and visually inspect A/C components for signs of leaks; determine needed action.
- ❖ Inspect, test, service and/or replace A/C compressor clutch components and/or assembly; check compressor clutch air gap; adjust as needed.
- ❖ Remove, inspect, reinstall, and/or replace A/C compressor and mountings; determine recommended oil quantity.
- ❖ Determine need for an additional A/C system filter; perform necessary action.
- ❖ Remove and inspect A/C system mufflers, hoses, lines, fittings, O-rings, seals, and service valves; perform necessary action.
- ❖ Remove, inspect, and install expansion valve or orifice (expansion) tube.
- ❖ Inspect evaporator housing water drain; perform necessary action.
- ❖ Diagnose A/C system conditions that cause the protection devices (pressure, thermal, and PCM) to interrupt system operation; determine necessary action.
- ❖ Determine procedure to Remove and reinstall evaporator; determine required oil type and quantity.
- ❖ Remove, inspect, reinstall and/or replace condenser; determine required oil type and quantity.
- ❖ Inspect engine cooling and heater systems hoses and pipes; perform needed action.
- ❖ Inspect and test heater control valve(s); perform necessary action.
- ❖ Diagnose temperature control problems in the heater/ventilation system; determine necessary action.
- ❖ Determine procedure to remove, inspect, reinstall and/or replace heater core.
- ❖ Inspect and test HVAC system blower motors, resistors, switches, relays, wiring, and protection devices; determine needed action.
- ❖ Diagnose A/C compressor clutch control systems; determine necessary action.
- ❖ Diagnose malfunctions in the vacuum, mechanical, and electrical components and controls of the heating, ventilation, and A/C (HVAC) system; determine necessary action.
- ❖ Inspect and test HVAC system control cables, motors, and linkages; perform needed action.
- ❖ Inspect HVAC system ducts, doors, hoses, cabin filters, and outlets; perform needed action.
- ❖ Identify the source of HVAC system system odors.
- ❖ Check operation of automatic or semi-automatic heating, ventilation, and air-conditioning (HVAC) control systems; determine necessary action.

- ❖ Perform correct use and maintenance of refrigerant handling equipment according to equipment manufacturer's standards.
- ❖ Identify A/C system refrigerant; test for sealants; recover, evacuate and charge A/C system; add refrigerant as required.
- ❖ Recycle, label, and store refrigerant.

Testing & Certification

On conclusion of the classroom & shop floor course work, apprentices will sit for the the National Institute for Automotive Service Excellence (ASE) Entry-Level A7 HVAC Certification Test

Eye Protection:

Eye protection is required at ALL times while working in the lab area. Students observed without proper eye protection will be removed from the lab area.