



Australian Government

**Assessment Requirements for AURETU104
Diagnose and repair air conditioning and
HVAC components**

Release: 1

Assessment Requirements for AURETU104 Diagnose and repair air conditioning and HVAC components

Modification History

Release	Comments
Release 1	This version first released with AUR Automotive Retail, Service and Repair Training Package Version 6.0

Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- diagnose and repair a fault in the air conditioning and heating, ventilation and cooling (HVAC) systems of two different vehicles or machinery, in which the work must involve removing, refitting or replacing two of the following:
 - condenser
 - evaporator
 - expansion valve
 - compressor
 - heater box
- remove, refit or replace two different types of refrigerant.

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- methods to locate and interpret information required to diagnose and repair air conditioning and HVAC systems, including:
 - information provided by customers and supervisors
 - air conditioning and HVAC system manufacturer specifications
 - Australian automotive code of practice: control of refrigerant gases during manufacture, installation, servicing or de-commissioning of motor vehicle air conditioners
- workplace procedures required to diagnose and repair air conditioning and HVAC systems, including:
 - establishing the serviceability of tools and equipment
 - documentation procedures
 - housekeeping procedures, including:

- examination of tools and equipment
- storage of equipment
- identification, tagging and isolation of faulty equipment
- safe disposal of materials
- recycling procedures
- workplace health and safety (WHS) requirements relating to diagnosing and repairing air conditioning and HVAC systems, including procedures for:
 - working with refrigerants at boiling point given risk of frostbite
 - working with system lubricants, including carcinogenic oils
 - identifying refrigerant and oil type, including:
 - service decal sticker
 - testing refrigerant
 - types and location of service ports
 - handling, storing and transporting refrigerant cylinders and recovery cylinders, including:
 - pressure ratings
 - pressure relief devices
 - outlet connection type
 - selecting and using personal protective equipment (PPE)
 - emergency procedures and incident management requirements and procedures
 - handling flammable refrigerants
 - identifying and using fire safety equipment
- procedures for recovering automotive refrigerant, including:
 - testing refrigerant to determine its type
 - connecting manifold and gauge set and recovery unit, including types and location of service ports
 - identifying recovery cylinder suitable to the refrigerant
 - operating recovery unit, including weighing recovery cylinder before and after recovery
 - disconnecting and storing recovery unit and cylinder
- system performance testing, including:
 - using manifold gauges and thermometers to check system pressures and vent temperatures
 - checking blower fan output
 - checking engine fan output
 - checking filters
- environmental requirements relating to servicing air conditioning and HVAC, including procedures for:
 - preventing loss of refrigerant to the atmosphere
 - handling materials and refrigerant recovery equipment
- air conditioning and HVAC system principles, including:

- heat transfer principles, including convection, conduction and radiation
- functions of the following air conditioning components:
 - compressor
 - condenser
 - receiver-drier
 - evaporator
 - blower fan
 - refrigerant
- functions of the following heating components:
 - radiator
 - thermostat
 - radiator and heater hoses
 - heater tap
 - heater box
- single zone and multi-zone vehicle layouts
- purpose and operation of air conditioning and HVAC systems and components, including:
 - high pressure and low pressure sides of air conditioning systems
 - compressors, including:
 - axial type, including variable capacity compressors
 - scroll type
 - vane type
 - electromagnetic clutches
 - condensers
 - receiver-dryer, including filters and desiccants
 - expansion valves, including capillary tube
 - evaporator
 - thermostat
 - refrigerants, including R12, R134, R1234yf and hydrocarbon refrigerants
 - compressor oils
 - air conditioner and heating controls, including levers and ducting
 - air conditioner and heating electrical circuits and sensors, including:
 - high and low pressure switches
 - pressure relief valves
 - temperature sensors
 - climate control systems
- diagnostic testing procedures for air conditioning and HVAC systems, including:
 - accessing and interpreting scan tool system data, including:
 - diagnostic trouble codes (DTCs)
 - live data
 - freeze frame data

- waveforms
- using diagnostic flow charts
- using manifold gauges on systems with different refrigerants, including analysis of high and low pressure readings in conjunction with temperature probes
- testing electrical systems, including procedures for:
 - accessing electrical terminals and using test probes without damaging connectors, fuse holders or wiring
 - resistance and voltage drop tests
 - open and short circuit tests
 - checking shorts to signal, power circuits and grounds
- repair procedures for air conditioning and HVAC systems, including procedures for:
 - using manifold gauges to discharge, evacuate and charge system refrigerants
 - removing and replacing system components
- post-repair testing procedures for air conditioning and HVAC systems, including procedures for checking for:
 - refrigerant leaks
 - heater core and system water coolant leaks
 - ambient temperature
 - centre vent temperature
 - condenser and suction line temperature
 - manifold gauge pressure readings
- static and dynamic performance tests of air conditioning and HVAC systems, including checking:
 - ambient temperature
 - vent temperature
 - condenser and suction line temperature
- procedures for completing ARCTick service decal sticker, including:
 - name of service organisation
 - ARCTick business authority number
 - quantity of refrigerant added
 - refrigerant and oil type
 - service date
 - technician name and licence number.

Assessment Conditions

Competency is to be assessed in the workplace or a simulated environment that accurately reflects performance in a real workplace setting.

Assessment must include direct observation of tasks.

Where assessment of competency includes third-party evidence, individuals must provide evidence that links them to the air conditioning and HVAC systems that they have worked on, e.g. repair orders.

Assessors must verify performance evidence through questioning on skills and knowledge to ensure correct interpretation and application.

The following resources must be made available:

- automotive repair workplace or simulated workplace
- workplace instructions
- manufacturer specifications for air conditioning and HVAC systems
- Australian automotive code of practice: Control of refrigerant gases during manufacture, installation, servicing or de-commissioning of motor vehicle air conditioners
- ARCTick service decal stickers
- procedures for servicing and adjusting vehicle air conditioning and HVAC systems
- two different vehicles or machinery with air conditioning and HVAC system faults
- minimum of two different types of refrigerant
- diagnosis and repair equipment for air conditioning and HVAC systems, including:
 - manifold and gauge set
 - recovery unit
 - vacuum pump
 - electronic leak detector
 - nitrogen cylinder and regulator
 - multimeter
 - electronic scales
 - oil injector
 - infra-red thermometer
 - temperature probe
 - scan tool.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards; and hold an Australian Refrigerant Council (ARC) Refrigerant Handling licence.

Links

Companion Volume Implementation Guide is found on VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b4278d82-d487-4070-a8c4-78045ec695b1>