



Australian Government

**Assessment Requirements for AURETH108
Diagnose and repair HVAC and
rechargeable energy storage cooling systems
in battery electric vehicle**

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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 heating, ventilation and air conditioning (HVAC) system and rechargeable energy storage system (RESS) cooling system components on two different battery electric vehicles (BEVs), in which the work must involve:
 - repairing or replacing one HVAC system component to correct performance deficiencies
 - repairing or replacing one RESS cooling system component to correct performance deficiencies.

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 HVAC and rechargeable energy storage cooling systems in battery electric vehicles, including:
 - information provided by customers and supervisors
 - Australian Standards (AS) 5732 Electric vehicle operations - Maintenance and repair
 - manufacturer specifications and procedures
- workplace procedures required to diagnose and repair HVAC and rechargeable energy storage cooling systems in battery electric vehicles, including:
 - establishing 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

- disposal of excess materials
- recycling procedures
- workplace health and safety (WHS) requirements relating to diagnosing and repairing HVAC and rechargeable energy storage cooling systems in battery electric vehicles, including procedures for:
 - identifying hazards and controlling risks associated with:
 - working with high voltages in BEV electrical systems
 - wearing jewellery while working around high electrical currents
 - determining appropriate procedures for minimising risk associated with hazards, including applying electrical safety precautions when:
 - using personal protective equipment (PPE), including electrical safety gloves with 1000 volt rating and Australian standards rated HV insulating mat
 - identifying and using firefighting equipment
 - using the one hand rule
 - following live system warning tags and signs
 - depowering vehicle
 - isolating HV RESS electrical supply
 - stabilising vehicle electrical system
- environmental requirements relating to diagnosing and repairing HVAC and rechargeable energy storage cooling systems in battery electric vehicles, including:
 - trapping, storing and disposing of waste released from HVAC and RESS cooling systems
 - preventing the escape of refrigerant to the atmosphere
- safe operating procedures for tools and equipment, including:
 - those specified in the specific vehicle service maintenance procedures, including:
 - digital multimeter with Cat III 1000 volt rating
 - insulation tester
 - residual voltage tester
 - scan tool
 - oscilloscope
 - temperature and pressure measuring equipment, including:
 - manifold and gauge set
 - contact thermometer
 - infrared thermometer (pyrometer)
 - electronic temperature probe
 - psychrometer (humidity detector)
 - digital vacuum gauge (vacrometer)
 - refrigerant leak detecting equipment, including electronic leak detector
 - refrigerant recovery equipment, including:
 - recovery unit
 - vacuum pump

- electronic scales
- miscellaneous equipment, including:
- valve core removing or replacement tool
- oil injector
- operating principles of HVAC and rechargeable energy storage cooling systems in battery electric vehicles, including:
 - types of HVAC systems, including engine operated and electric motor operated systems
 - types of RESS and RESS charging
 - reasons for cooling the RESS
- purpose and operation of HVAC systems and RESS cooling systems and components, including:
 - alternating current (AC) electric motor compressors
 - HVAC control units
 - HVAC control unit inputs and outputs
 - HVAC ejector cycle systems
 - RESS cooling systems, including air cooling, liquid cooling and HVAC cooled systems
- diagnostic testing procedures for HVAC and rechargeable energy storage cooling systems in battery electric vehicles, including procedures for:
 - accessing and interpreting scan tool system data, including:
 - diagnostic trouble codes (DTCs)
 - live data
 - using diagnostic flow charts
 - electrical system testing, including procedures for:
 - accessing electrical terminals and using test probes without damaging connectors, fuse holders or wiring
 - determining damage to compressor motor windings
 - checking insulation resistance of compressor motor windings
 - checking routing and damage to HV cabling
 - HVAC dynamic and static testing
 - analysing abnormal noise
 - analysing component failure
- repair procedures for HVAC and rechargeable energy storage cooling systems in battery electric vehicles, including procedures for:
 - tightening connections
 - replacing faulty or damaged cable connections
 - removing and replacing faulty or damaged components
- post-repair testing procedures for HVAC and rechargeable energy storage cooling systems in battery electric vehicles, including procedures for:
 - DTC clearing procedures

- checking for electrical connector mating
- static and dynamic performance tests of HVAC systems and RESS cooling systems
- 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 BEV HVAC and RESS cooling 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
- ARC accredited service decal sticker (ARCTick)
- PPE and safety equipment, including electrical safety gloves with 1000 volt rating and HV insulating mat with Australian standards rating
- manufacturer specifications for BEV HVAC and RESS cooling systems
- AS 5732 Electric vehicle operations: Maintenance and repair
- two different BEVs with HVAC and RESS cooling system components accessible for diagnosis and repair or replacement activities
- electrical diagnostic equipment appropriate to the BEV HVAC and RESS cooling being diagnosed and repaired as specified under tools and equipment in the range of conditions
- tools, equipment and materials appropriate for repairing HVAC and RESS cooling systems in BEVs.

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>

