



Australian Government

**Assessment Requirements for AURETH110
Diagnose and repair high voltage
rechargeable energy storage systems in
hybrid electric vehicles**

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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 high voltage (HV) rechargeable energy storage systems (RESS) in two different hybrid electric vehicles (HEVs) or plug-in hybrid electric vehicles (PHEVs) 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 high voltage rechargeable energy storage systems in hybrid 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 high voltage rechargeable energy storage systems in hybrid 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 high voltage rechargeable energy storage systems in hybrid electric vehicles, including procedures for:
 - identifying hazards and controlling risks associated with:
 - working with high voltages in HEV and PHEV 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 high voltage rechargeable energy storage systems in hybrid electric vehicles, including procedures for trapping, storing and disposing of waste produced during repair
- safe operating procedures for tools and equipment, including:
 - digital multimeter with Cat III 1000 volt rating
 - insulation tester
 - residual voltage tester
 - scan tool
 - oscilloscope
- operating principles of high voltage rechargeable energy storage systems in HEVs and PHEVs, including:
 - battery pack construction, including:
 - battery types
 - battery internal resistance
 - battery pack system, including:
 - charging characteristics
 - open circuit cells
 - reverse polarisation
 - series cell configuration
 - strapping and layout
- purpose and operation of RESS, including:
 - HV battery charger and direct current (DC) to DC converter
 - battery management system (BMS)
 - power distribution unit (PDU)

- diagnostic testing procedures for high voltage rechargeable energy storage systems in hybrid 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
 - testing controller input and output signals and waveforms
 - vehicle dynamic and static testing procedures
 - analysing abnormal noise
 - analysing component failure
 - RESS cooling system testing
 - repair procedures for high voltage rechargeable energy storage systems in hybrid electric vehicles, including procedures for:
 - tightening connections
 - replacing faulty or damaged cable connections
 - removing and replacing faulty or damaged components
 - removing and replacing motor controller
- post-repair testing procedures for high voltage rechargeable energy storage systems in hybrid electric vehicles, including procedures for:
 - DTC clearing procedures
 - checking for electrical connector mating
 - performance testing RESS.

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 RESS in HEVs and PHEVs that they have repaired, 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
- PPE, including electrical safety gloves with 1000 volt rating and Australian standards rated HV insulating mat
- manufacturer specifications for HEV or PHEV RESS

- AS 5732 Electric vehicle operations - Maintenance and repair
- two different HEVs or PHEVs RESS and associated components accessible for diagnosis and repair or replacement activities
- electrical diagnostic equipment appropriate to the HEVs or PHEVs being diagnosed and repaired, including:
 - digital multimeter with Cat III 1000 volt rating
 - insulation tester
 - residual voltage tester, if specified in original equipment manufacturer (OEM) specifications
 - scan tool
 - oscilloscope
- tools, equipment and materials appropriate for repairing HEV or PHEV RESS and their components.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

Companion Volume Implementation Guide is found on VETNet -

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