



Australian Government

**Assessment Requirements for AURETH013
Analyse and evaluate electrical and
electronic faults in HEV and BEV
management systems**

Release: 1

Assessment Requirements for AURETH013 Analyse and evaluate electrical and electronic faults in HEV and BEV management systems

Modification History

Release	Comment
Release 1	New unit of competency.

Performance Evidence

Before competency can be determined, individuals must demonstrate they can perform the following according to the standard defined in this unit's elements, performance criteria, range of conditions and foundation skills:

- analyse and evaluate an electrical or electronic fault in the network management systems of one hybrid electric vehicle (HEV) and one battery electric vehicle (BEV)
- the above faults must involve two of the following:
 - battery management system (BMS)
 - rechargeable energy storage system (RESS)
 - power distribution unit (PDU)
 - high voltage traction motor drive assembly
 - direct current (DC) to DC converter assembly
 - RESS cooling system.

Knowledge Evidence

Individuals must be able to demonstrate knowledge of:

- work health and safety (WHS) and occupational health and safety (OHS) requirements relating to analysing and evaluating electrical and electronic faults in HEV and BEV management systems, including procedures for:
 - identifying hazards and controlling risks associated with:
 - working with high voltages on vehicle electrical systems
 - working with hazardous materials and toxic substances
 - wearing jewellery while working around high electrical currents
 - minimising risk, including:

- analysing task to define risk
- applying electrical safety precautions, including ‘one hand’ rule, live system warning tags and signs, depowering the vehicle, isolating the HV RESS electrical supply, and stabilising the vehicle HV electrical systems
- using personal protective equipment (PPE), including electrical safety gloves with 1000 volt rating and Australian standards rated HV insulating mat
- identifying and using fire safety equipment
- methods for locating and content of manufacturer specifications, workplace procedures, Australian standards and Australian Design Rules (ADRs) relating to embedded network management systems of HEV, plug-in hybrid electric vehicle (PHEV) and BEV
- principles and processes involved in planning and implementing analysis and evaluation of electrical and electronic faults in HEV, PHEV and BEV embedded network management systems
- design and planning of diagnostic procedures for electrical and electronic faults in HEV and BEV management systems, including procedures for diagnosing:
 - mechanical faults
 - electrical faults
 - electronics faults
- types, function and operation of hybrid and battery electric vehicle systems, including:
 - DC electric motor types, including:
 - separately excited motors
 - permanent magnet motors
 - alternating current (AC) electric motor types, including:
 - induction motors
 - brushless motors
 - HV traction motor drive assembly and motor controllers, including:
 - variable pulse width DC types
 - variable frequency and variable amplitude AC motor types
 - on-board RESS system and batteries, including:
 - lead acid
 - nickel metal hydride
 - lithium ion
 - ultra capacitors and super capacitors
 - key features of associated components and systems, including:
 - BMS
 - PDU
 - DC to DC converter assembly
 - RESS cooling system, including the vehicle HVAC system
 - parallel HEVs and PHEVs
 - series HEVs and PHEVs
 - power split HEVs and PHEVs

- testing procedures for HEV and BEV management systems, including:
 - vehicle dynamic and static testing procedures
 - abnormal noise analysis
 - component failure analysis
- types, functions, operation and limitations of diagnostic testing equipment required to analyse and evaluate electrical and electronic faults in HEV, PHEV and BEV management systems
- procedures for accessing and interpreting scan tool system data, including:
 - diagnostic trouble codes (DTCs), including:
 - conditions that set the DTCs
 - conditions for running DTCs
 - live data
 - freeze frame data
 - waveforms
- procedures for documenting and reporting the analysis and evaluation process
- requirements of AS 5732 Electric vehicle operations: Maintenance and repair relating to HEV, PHEV and BEV management systems.
- requirements of Australian Design Rules (ADRs) relating to HEV, PHEV and BEV management systems.

Assessment Conditions

Assessors must satisfy NVR/AQTF assessor requirements.

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 HEV, PHEV and BEV management 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
- PPE, including electrical safety gloves with 1000 volt rating and Australian standards rated HV insulating mat
- AS 5732 Electric vehicle operations: Maintenance and repair
- manufacturer HEV, PHEV or BEV management system specifications
- one HEV with a network management system fault
- diagnostic equipment for HEV and BEV management systems, including:
 - digital multimeter

- scan tool
- oscilloscope
- tools, equipment and materials appropriate for analysing and evaluating electrical and electronic faults in HEV and BEV management systems.

Links

Companion Volume implementation guides are found in VETNet -

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

Companion Volume implementation guides are found in VETNet -

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