



Australian Government

**Assessment Requirements for AURETH014
Diagnose complex faults in hybrid and
battery electric vehicle network
management systems**

Release: 1

Assessment Requirements for AURETH014 Diagnose complex faults in hybrid and battery electric vehicle network 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:

- diagnose a complex fault in the embedded network management systems of:
 - one battery electric vehicle (BEV)
 - one hybrid electric vehicle (HEV) or one plug-in hybrid electric vehicle (PHEV)
- the above diagnosis must involve two of the following types of complex faults:
 - an intermittent fault
 - a fault that affects more than one system
 - a fault introduced as a result of a system repair
 - an indirect fault caused by the influence of external systems.

Knowledge Evidence

Individuals must be able to demonstrate knowledge of:

- work health and safety (WHS) and occupational health and safety (OHS) requirements relating to diagnosing complex faults in HEV and BEV network 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 high voltage (HV) rechargeable energy storage system (RESS) electrical supply, and stabilising the vehicle electrical system
- 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
- lifting and moving the RESS using safe manual handling techniques
- using workplace first aid equipment
- types of complex faults relating to HEV and BEV network management systems, including:
 - intermittent
 - multi-system
 - introduced as a result of system repair
 - indirect, caused by the influence of external systems
- methods for locating and content of manufacturer specifications, workplace procedures and other technical information relating to network management systems of BEVs, HEVs and PHEVs
- requirements of AS 5732 Electric vehicle operations: Maintenance and repair
- operating principles of network management systems and data multiplexing in HEVs, PHEVs and BEVs
- types, function and operation of HEV, PHEV and BEV systems, including:
 - direct current (DC) electric motor types, including:
 - separately excited motors
 - permanent magnet motors
 - alternating current (AC) electric motor types, including:
 - induction motors
 - brushless motors
 - motor controllers, including:
 - variable pulse width DC types
 - variable frequency, variable amplitude AC types
 - inverters and converters, including:
 - AC to DC
 - DC to AC
 - batteries, including:
 - lead acid batteries
 - nickel metal hydride batteries
 - lithium ion batteries
 - ultra capacitors and super capacitors
 - parallel hybrid electric vehicles
 - series hybrid electric vehicles

- power split hybrid electric vehicles
- testing procedures for HEV, PHEV and BEV network management systems, including:
 - vehicle dynamic and static testing
 - abnormal noise analysis
 - component failure analysis
 - vehicle continuous and non-continuous monitored systems
- types, functions, operation and limitations of diagnostic testing equipment required to diagnose complex faults in HEV, PHEV and BEV network 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
- methods and processes for documenting and reporting diagnostic findings and recommendations.

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 network 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
- AS 5732 Electric vehicle operations: Maintenance and repair
- manufacturer HEV, PHEV and BEV network management system specifications
- one BEV and one HEV or PHEV with complex network management system faults
- BEV, HEV and PHEV network management system diagnostic equipment, including:
 - digital multimeter
 - scan tool
 - oscilloscope
 - specialist BEV, PHEV and HEV tools and equipment as specified in original equipment manufacturer requirements

- tools, equipment and materials appropriate for diagnosing complex faults in HEV, PHEV and BEV network management systems.

Links

Companion Volume implementation guides are found in VETNet -

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

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