



**Australian Government**

**Assessment Requirements for AURETH105  
Diagnose and repair high voltage traction  
motors in battery electric vehicles**

**Release: 1**

# Assessment Requirements for AURETH105 Diagnose and repair high voltage traction motors in battery electric vehicles

## 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) traction motors systems and associated components on at least two different battery electric vehicles (BEVs) to correct at least one of the following performance deficiencies in each:
  - damaged or faulty cabling
  - component failure
  - damaged tractor motor windings.

## 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 traction motors 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 high voltage traction motors 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 high voltage traction motors 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 high voltage traction motors in battery 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 traction motors in battery electric vehicles, including:
  - motor generators
  - types of batteries
  - battery charging
- purpose and operation of high voltage traction motors in battery electric vehicles and components, including:
  - direct current (DC) motor generators
  - alternating current (AC) motor generators
- diagnostic testing procedures for high voltage traction motors in battery electric vehicles, including procedures for:
  - accessing and interpreting scan tool system data, including:
    - diagnostic trouble codes (DTCs)
    - live data
    - freeze frame 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 traction motor windings
- checking insulation resistance of traction motor windings
- checking routing and damage to HV cabling
- conducting vehicle dynamic and static tests
- analysing abnormal noise
- analysing component failure
- repair procedures for high voltage traction motors in battery electric vehicles, including procedures for:
  - tightening connections
  - replacing faulty or damaged cable connections
  - removing and replacing faulty or damaged components
  - removing and replacing the traction motor
- post-repair testing procedures for high voltage traction motors in battery electric vehicles, including procedures for:
  - DTC clearing procedures
  - checking for electrical connector mating
  - static and dynamic performance tests of traction motors.

## 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 HV traction motors 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
- PPE and safety equipment, including electrical safety gloves with 1000 volt rating and high voltage (HV) insulating mat with Australian standards rating
- manufacturer specifications for BEV HV traction motor systems
- AS 5732 Electric vehicle operations: Maintenance and repair
- two different BEVs with HV traction motor systems accessible for diagnosis and repair or replacement activities
- electrical diagnostic equipment appropriate to the BEV being diagnosed and repaired, including:
  - digital multimeter with Cat III 1000 volt rating

- insulation tester
- scan tool
- oscilloscope
- residual voltage tester, if specified in original equipment manufacturer (OEM) test requirements
- tools, equipment and materials appropriate for repairing HV traction motors in BEVs.

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>