Australian Government

Assessment Requirements for AURETR023 Diagnose and repair spark ignition engine management systems

Release: 1

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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 the unit's elements and performance criteria, range of conditions and foundation skills:

- diagnose and repair a fault in the spark ignition engine management systems of three different vehicles or machinery, including:
  - faults in two system input sensors
  - faults in one system output actuator.

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 and repairing spark ignition engine management systems, including procedures for:
  - using specialised tools and equipment
  - using appropriate personal protective equipment (PPE)
  - identifying hazards and controlling risks associated with:
    - working on vehicle high voltage ignition systems
    - wearing jewellery while working around high current wiring systems
    - working with high pressure petrol fuel systems
- operating principles of spark ignition engine management systems and associated components, including:
  - combustion, including:
    - air-fuel ratios and chemistry of combustion
    - composition of petrol fuel, including octane rating
    - indirect and direct fuel injection

- application, purpose and operation of spark ignition engine management systems and components, including:
  - fuel system, including:
    - fuel filters
    - fuel pumps
    - fuel pressure regulators
    - fuel injectors
  - electronic control system, including the following system inputs:
    - throttle position sensors
    - coolant temperature sensors
    - oxygen sensors
    - load sensors and air flow meters
    - intake air temperature sensors
    - crankshaft position sensors
    - camshaft position sensors
    - battery voltage
    - accessory load sensors
    - knock sensors
  - key features of electronic control units (ECUs), including:
    - read-only memory (ROM)
    - programmable read-only memory (PROM)
    - electronically erasable programmable read-only memory (EEPROM)
    - random access memory (RAM)
    - multiplexing
    - adaptive learning
    - short-term fuel trim (STFT)
    - long-term fuel trim (LTFT)
    - sensor reference voltages and sensor grounds
  - system outputs, including:
    - injectors
    - idle speed control devices
    - fuel pump relays
    - engine cooling fans
    - air conditioning compressor controls
    - broadband intake manifolds
    - exhaust gas recirculation solenoid controls
    - carbon canister purge controls
    - throttle motor (drive by wire) controls
    - variable valve timing controls
    - assembly line diagnostic link (ALDL)

- ignition systems and components, including:
  - spark plugs
  - ignition leads
  - ignition coils, including electromagnetic induction
  - ignition timing, including varying ignition timing according to engine load, speed and knock sensor input
  - dwell period
- ECU control of ignition coil switching and methods of generating timing signals, including:
  - profile ignition pick-up (PIP) and crankshaft position sensor signals, including inductive pick-up, Hall effect and light emitting diode (LED)
  - waste spark ignition systems
  - coil-on-plug ignition systems
  - integrated ignition systems
- diagnostic testing procedures for spark ignition engine management systems, including:
  - diagnostic flow charts
  - fuel system testing, including:
    - low pressure fuel system testing
    - high pressure fuel system testing
  - testing electrical systems, including procedures for:
    - accessing electrical terminals and using test probes without damaging connectors, fuse holders or wiring
    - injector testing
    - sensor testing
    - actuator testing
  - accessing and interpreting industry-relevant test equipment data, including:
    - fault codes
    - live data
    - freeze frame data
    - waveforms
- repair or replacement procedures for spark ignition engine management systems, including procedures for:
  - removing and replacing the following electrical or electronic components:
    - sensors
    - actuators, including fuel injectors and fuel pumps
  - adjusting and recalibrating components and associated systems
- post-repair testing procedures, including procedures for:
  - clearing fault codes
  - assessing engine performance
  - checking for electrical connector mating.

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 spark ignition engine 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
- manufacturer specifications for spark ignition engine management systems
- three different vehicles or machinery with spark ignition engine management system faults
- diagnostic equipment for spark ignition engine management systems, including:
  - multimeter
  - scan tool
- tools, equipment and materials appropriate for repairing spark ignition engine 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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