



Australian Government

AURTTL112 Diagnose complex faults in LNG fuel systems

Release: 1

AURTTL112 Diagnose complex faults in LNG fuel systems

Modification History

Release	Comments
Release 1	This version first released with AUR Automotive Retail, Service and Repair Training Package Version 6.0

Application

This unit describes the skills and knowledge required to diagnose complex faults in liquefied natural gas (LNG) fuel systems and determine the repair action necessary to restore system performance. It involves confirming the existence of a fault, choosing the diagnostic procedure and tools, applying the diagnostic procedure, reporting conclusions and making repair recommendations. Complex faults are outside the normal scope of a technician's diagnosis and repair work. They include intermittent faults, multi-system faults, faults introduced as a result of system repairs, and indirect faults caused by the influence of external systems, requiring the application of complex diagnostic processes to resolve.

The unit applies to those working in the automotive service and repair industry. The LNG fuel systems include those in vehicles from all sectors of the industry.

Licensing, legislative, regulatory or certification requirements may apply to this unit in some jurisdictions. Users are advised to check with the relevant regulatory authority.

Unit Sector

Mechanical Miscellaneous Technical - Alternative Fuels

Elements and Performance Criteria

ELEMENTS	PERFORMANCE CRITERIA
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Identify and confirm the work requirement	1.1 Determine nature and objective of diagnosis requirements from workplace instructions 1.2 Confirm existence of fault in LNG fuel system from direct or indirect evidence 1.3 Identify hazards associated with the work and manage risks according to workplace procedures, and safety and environmental requirements

ELEMENTS	PERFORMANCE CRITERIA
2. Prepare to diagnose complex faults	2.1 Access and interpret manufacturer specifications and other technical information for LNG fuel system 2.2 Identify diagnostic procedures and options 2.3 Select diagnostic method sequence, tests and testing processes from the range of identified options 2.4 Select and prepare testing equipment according to manufacturer specifications and workplace procedures 2.5 Identify, select and prepare tools, equipment and materials required to support the diagnostic process for use
3. Apply diagnostic procedures	3.1 Follow selected diagnostic process and carry out testing according to manufacturer specifications, workplace procedures, and safety and environmental requirements 3.2 Confirm diagnostic findings, as required, by using alternative or optional process according to manufacturer specifications and workplace procedures 3.3 Draw and document conclusions from findings according to workplace procedures, and develop recommendations for required repairs that comply with AS/NZS 2739 Natural gas (NG) fuel systems for vehicle engines 3.4 Provide conclusions to required personnel or customer to confirm further action to be taken
4. Complete work processes	4.1 Conduct final inspection according to workplace procedures and confirm vehicle is ready for use 4.2 Clear work area and dispose of or recycle materials according to workplace procedures 4.3 Complete documentation according to workplace procedures

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.

SKILL	DESCRIPTION
Learning	• Locates required sources of information efficiently • Applies diagnostic skills to different LNG fuel systems.
Numeracy	• Measures LNG fuel system components and uses basic mathematical operations, including addition and subtraction • Calculates deviations and tolerances from manufacturer specifications • Uses gauges and interprets units, such as kilopascals and

SKILL	DESCRIPTION
	pounds per square inch (PSI).
Oral communication	• Clarifies instructions • Obtains information from customers and supervisors.
Reading	• Organises and interprets technical information from manufacturer and workshop literature when seeking LNG fuel system specifications and procedures.
Planning and organising	• Plans own work requirements • Prioritises actions to achieve required outcomes • Ensures tasks are completed within workplace timeframes.
Technology	• Uses precision measuring equipment • Uses specialised diagnostic equipment.

Unit Mapping Information

Supersedes and is equivalent to AURTTL012 Diagnose complex faults in LNG fuel systems.

Links

Companion Volume Implementation Guide is found on VETNet -

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

Assessment Requirements for AURTTL112 Diagnose complex faults in LNG fuel systems

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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 a complex fault in at least three different liquefied natural gas (LNG) systems
- the above diagnoses must involve at least 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

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 complex faults in LNG fuel systems, including:
 - manufacturer specifications and procedures or equivalent documentation
- workplace procedures required to diagnose complex faults in LNG fuel systems, 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
- work health and safety (WHS) requirements relating to diagnosing complex faults in LNG fuel systems, including procedures for working with lighter-than-air flammable gas

- environmental requirements, including procedures for preventing loss of gas to atmosphere
- types of complex faults relating to LNG fuel systems, including:
 - intermittent
 - multi-system
 - introduced as a result of system repair
 - indirect, caused by the influence of external systems
- types and key features of LNG fuel systems, including:
 - fuel lock-offs
 - injectors
 - mixers
 - metering units
- requirements of AS/NZS 2739 Natural gas (NG) fuel systems for vehicle engines
- testing procedures for LNG fuel systems, including:
 - component failure analysis
 - safety component operation
 - electrical control systems
 - exhaust emissions
 - on-road fuel efficiency
 - data interpretation
- types and key features of diagnostic testing equipment required to diagnose complex faults in LNG fuel 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
 - vehicle continuous and non-continuous monitored systems
- methods and processes for documenting and reporting diagnostic findings and recommendations.

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 LNG fuel 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/NZS 2739 Natural gas (NG) fuel systems for vehicle engines
- manufacturer LNG fuel system specifications
- three different LNG fuel systems with complex faults
- LNG fuel system diagnostic equipment, including:
 - scan tools
 - compression gauges
 - vacuum gauges
- tools, equipment and materials appropriate for diagnosing complex faults in LNG fuel systems.

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>