



Australian Government

AURTTF005 Diagnose and repair engine forced-induction systems

Release: 1

AURTTF005 Diagnose and repair engine forced-induction systems

Modification History

Release	Comment
Release 1	New unit of competency.

Application

This unit describes the performance outcomes required to diagnose and repair faults in engine forced-induction systems. It involves preparing for the task, selecting the correct diagnostic procedure, carrying out the diagnosis and the repair, performing post-repair testing, and completing workplace processes and documentation.

It applies to those working in the automotive service and repair industry. Forced-induction systems include those in agricultural machinery, heavy commercial vehicles, light vehicles, marine vessels, mobile plant machinery, motorcycles or outdoor power equipment.

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Competency Field

Mechanical Miscellaneous

Unit Sector

Technical – Fuel Systems

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold and italicised text is used, further information is detailed in the range of conditions section.
1. Prepare to diagnose and repair a forced-induction system	1.1 Job requirements are determined from workplace instructions 1.2 Diagnostic information is sourced and interpreted 1.3 Diagnostic options are analysed and those most appropriate to the

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	circumstances are selected 1.4 Hazards associated with the work are identified and risks are managed 1.5 Diagnostic tools and equipment are selected and checked for serviceability
2. Diagnose a forced-induction system	2.1 <i>Diagnostic tests</i> are carried out according to workplace procedures and <i>safety requirements</i> 2.2 Faults are identified from diagnostic test results and causes of faults are determined 2.3 Diagnosis findings are reported according to workplace procedures, including recommendations for necessary repairs or adjustments
3. Repair a forced-induction system	3.1 Repair information is sourced and interpreted 3.2 Repair options are analysed and those most appropriate to the circumstances are selected 3.3 Repair tools, equipment and materials are selected and checked 3.4 Repairs and component replacements and adjustments are carried out according to manufacturer specifications, workplace procedures and safety requirements, and without causing damage to components or system 3.5 Post-repair testing is carried out according to workplace procedures to confirm fault rectification, and any further problems detected as having been introduced during the repair process are rectified
4. Complete work processes	4.1 Final inspection is made to ensure work is to workplace expectations and system or vehicle is presented ready for use 4.2 Work area is cleaned, waste and non-recyclable materials are disposed of, and recyclable material is collected 4.3 Tools and equipment are checked and stored according to workplace procedures 4.4 Workplace documentation is processed according to workplace procedures

Foundation Skills

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

Skills	Description
Learning skills to:	locate appropriate sources of information efficiently.
Reading skills to:	interpret information from manufacturer and workshop literature when seeking engine forced-induction specifications and procedures.
Writing skills to:	legibly and accurately fill out workplace documentation when reporting diagnostic findings, making repair recommendations, and recording parts and material used.
Oral communication skills to:	- clarify instructions - report diagnostic findings and make repair recommendations.
Numeracy skills to:	measure engine forced-induction components and use basic mathematical operations, including addition, subtraction, multiplication and division and subtraction, to calculate distances, areas, volumes, tolerances and deviations from manufacturer specifications.
Planning and organising skills to:	plan own work requirements and prioritise actions to achieve required outcomes and ensure tasks are completed within workplace timeframes.
Technology skills to:	use precision measuring equipment including dial indicator, vacuum and pressure gauges, and temperature gauges.

Range of Conditions

This section specifies work environments and conditions that may affect performance.

Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included. Bold italicised wording, if used in the performance criteria, is detailed below.

<i>Diagnostic tests</i> must include:	- assessing oil supply and return system - assessing intake and exhaust system for leaks and blockages - assessing turbocharger cooling system - testing turbocharger boost air pressure.
<i>Safety requirements</i> must include:	work health and safety (WHS) and occupational health and safety (OHS) requirements, including procedures for working with high temperature exhaust and intake system components.

Unit Mapping Information

Equivalent to AURTTF3005 Inspect and repair engine forced induction systems

Links

Companion Volume implementation guides are found in VETNet -

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

Assessment Requirements for AURTTF005 Diagnose and repair engine forced-induction systems

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Performance Evidence

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

- diagnose and repair a turbocharger fault in an engine forced-induction system
- diagnose and repair a fault in two of the following components of engine forced-induction systems:
 - variable turbocharger
 - compound turbocharger
 - waste-gate actuator
 - intercooler
 - supercharger.

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 engine forced-induction systems, including procedures for working with high temperature exhaust and intake system components
- operating principles of engine forced-induction systems and associated components, including volumetric efficiency
- application, purpose and operation of engine forced-induction systems and components, including:
 - turbochargers, including:
 - twin scroll
 - twin turbocharger
 - turbo compounding

- variable geometry turbocharger
- waste-gate operation
- lubrication and cooling
- intercooler operation, including air to air and water to air
- supercharger operation
- diagnostic testing procedures for engine forced-induction systems, including:
 - intake manifold pressure and vacuum testing
 - intake and exhaust system leak testing
 - turbo boost air pressure
 - intercooler pressure and temperature checks, types include air to air and air to water
 - oil supply
 - oil return to sump
 - turbocharger waste-gate testing
 - visual inspection for oil leakage
 - turbine rotating assembly end float and axial movement
- repair procedures for engine forced-induction systems, including procedures for:
 - removing and replacing turbochargers
 - testing, removing, replacing and adjusting waste-gates
- post-repair testing procedures for engine forced-induction 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 engine forced-induction 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 engine forced-induction system specifications
- one vehicle or machinery with engine forced-induction systems and a fault in turbocharger
- diagnostic equipment for engine forced-induction systems, including dial indicator, vacuum and pressure gauges, and temperature gauges
- tools, equipment and materials appropriate for repairing engine forced-induction systems.

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