



Australian Government

AURTTE009 Remove and replace engine cylinder heads

Release: 1

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Modification History

Release	Comment
Release 1	New unit of competency

Application

This unit describes the performance outcomes required to remove and replace an engine cylinder head. It requires the learner to plan and prepare the task; remove and dismantle the cylinder head, inspect the components, and reassemble and replace the cylinder head; check the engine operation; and maintain the work area, tools and equipment.

It applies to those undertaking a Vocational Education and Training in Schools (VETiS) or pre-vocational qualification as preparation to entering the automotive service and repair or automotive manufacturing industry.

The unit is designed for use in a highly supervised context and is not suitable for use in a vocational qualification.

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

Competency Field

Mechanical Miscellaneous

Unit Sector

Technical - Engines

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 italicised text is used, further information is detailed in the range of conditions section
1. Prepare to remove and replace an engine cylinder head	1.1 <i>Safety and environmental requirements</i> are sourced and interpreted 1.2 Task instruction is interpreted and engine assembly to be worked on is identified

ELEMENTS	PERFORMANCE CRITERIA
	1.3 Manufacturer specifications and workplace procedures for engine cylinder head removal and replacement are sourced and interpreted 1.4 Potential hazards and risks associated with task are identified and reported to workplace supervisor 1.5 Tools and equipment required for removing and replacing an engine cylinder head are identified according to manufacturer specifications
2. Remove engine cylinder head	2.1 Tools, equipment and materials are selected and checked according to manufacturer procedures 2.2 Engine cylinder head is removed according to safety and environmental requirements, and without causing damage to components, tools or equipment 2.3 Removal procedures are recorded
3. Clean, dismantle and inspect engine cylinder head	3.1 Cleaning methods and materials are selected and checked according to manufacturer specifications and workplace procedures 3.2 Engine cylinder head is cleaned according to safety and environmental requirements 3.3 Engine cylinder head is dismantled without causing damage to components, tools or equipment 3.4 Engine cylinder head and components are cleaned and arranged for identification 3.5 Engine cylinder head and components are measured and results compared against manufacturer specifications 3.6 Engine cylinder head and components inspection results are recorded
4. Reassemble and replace engine cylinder head	4.1 Engine cylinder head and components are prepared for assembly according to manufacturer specifications and safety requirements 4.2 Engine cylinder head is assembled according to manufacturer specifications and workplace procedures, and without causing damage to components, tools or equipment 4.3 Engine cylinder head is replaced onto engine assembly according to manufacturer specifications and workplace procedures, and without causing damage to components, tools or equipment 4.4 Engine is tested for correct assembly and operation
5. Complete work processes	5.1 Final inspection is made to ensure work meets task instruction and workplace standards, and engine is presented ready for use or storage according to workplace procedures 5.2 Work area is cleaned, waste and non-recyclable materials are

ELEMENTS	PERFORMANCE CRITERIA
	disposed of, and recyclable material is collected and stored according to environmental requirements and workplace procedures 5.3 Tools and equipment are checked and stored in a condition ready for use according to workplace procedures, or tagged and reported where necessary 5.4 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 vehicle engine information and engine cylinder head removal, dismantle, reassembly and replacement procedures.
Reading skills to:	- select and interpret key information from manufacturer specifications, safety requirements and workplace procedures to safely remove and replace engine cylinder head - select and interpret key information from environmental requirements and workplace procedures to ensure a clean and safe work site.
Writing skills to:	legibly and accurately fill out workplace documentation using correct industry terminology and conventions.
Oral communication skills to:	participate effectively in verbal exchanges using questioning and active listening to request, clarify and clearly convey information.
Numeracy skills to:	- read and interpret numerical information in engine information - use specialist tools and measuring equipment correctly, including feeler gauges, verniers, micrometers and torque wrenches, and report and record the results correctly using relevant mathematical symbols and conventions (e.g. mm for millimeters) - use basic mathematical operations, including addition, subtraction, multiplication and division, to calculate length, volume, clearances and ratios.
Planning and organising skills to:	plan own work requirements and prioritise actions to achieve required outcomes.

Skills	Description
Self-management skills to:	recognise own limitations when selecting and using tools and equipment and seek timely advice.
Problem-solving skills to:	- identify potential or actual hazards and take action to minimise risk - refer problems that cannot be readily resolved and seek assistance from workplace supervisor.
Technology skills to:	set up and operate equipment and tools required to remove and replace an engine cylinder head.

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>Safety and environmental requirements</i> must include:	- information about key aspects of work health and safety (WHS), occupational health and safety (OHS) and environmental requirements, including: - use of safety glasses, ear protection and safety footwear - use of engine cylinder head removal, dismantling, reassembly and replacement equipment - collection and disposal of used engine lubricants and coolant.
<i>Tools and equipment</i> must include:	automotive hand tools and cylinder head lifting equipment and attachments.
<i>Engine cylinder head</i> must include:	the cylinder head of a multi-cylinder engine assembly, including all operational fitting attachments.
<i>Engine cylinder head is dismantled</i> must include:	removing the valve operating mechanisms and valves from the cylinder head.
<i>Engine cylinder head is replaced</i> must include	correctly torqueing cylinder head bolts and associated component retaining bolts

Unit Mapping Information

No equivalent unit.

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 AURTTE009 Remove and replace engine cylinder heads

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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:

- correctly remove and replace at least two different cylinder heads.

Knowledge Evidence

Individuals must be able to demonstrate knowledge of:

- key aspects of work health and safety (WHS), occupational health and safety (OHS) and environmental requirements, including:
 - use of safety glasses, ear protection and safety footwear
 - use of cylinder head removal and replacement equipment
 - collection and disposal of used engine lubricants and coolant
- types of engines and engine operating principles for:
 - four and two-stroke engines
 - single and multi-cylinder configuration
 - petrol and diesel classification
- construction, function and operating principles of major engine components
- component lubricating systems, including:
 - principles and function
 - splash and pressure systems, including system components
- engine cooling systems, including:
 - principles and function
 - air-cooled and water-cooled systems, including system components
- types and application of:
 - seals
 - gaskets
 - bearings

- measurement and calculation methods for:
 - swept volume
 - clearance volume
 - compression ratio and engine capacity
- engine cylinder head removal procedures
- engine cylinder head dismantling procedures
- engine cylinder head inspection procedures, including testing for warping
- engine cylinder reassembly procedures
- engine cylinder head replacement procedures, including methods for torquing cylinder head to engine
- work area clean-up and maintenance requirements.

Assessment Conditions

Assessors must satisfy SNR/AQTF assessor requirements.

Competency is to be assessed in the workplace or a simulated environment that accurately reflects performance in a real workplace setting.

Where assessment of competency includes third-party evidence, individuals must provide evidence that links them to having removed and replaced engine cylinder heads, 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 workplace or simulated workplace
- personal protective equipment appropriate to the workplace
- two different vehicle or stand-mounted operable engines
- tools and measuring instruments
- cylinder head lifting equipment and attachments.

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