



Australian Government

AURRTE4011 Overhaul two and four cycle outboard engines

Release 1

AURRTE4011 Overhaul two and four cycle outboard engines

Modification History

Release	Comment
Release 1	Replaces AURR401103A Overhaul two and four cycle outboard engines Unit code updated to meet policy requirements Reference to OHS legislation replaced with new WHS legislation

Unit Descriptor

Unit descriptor	This unit of competency describes the skills and knowledge required to overhaul two and four cycle outboard engines and components. It requires the ability to interpret work requirements, logically dismantle the engine system, overhaul and reassemble the engine and finalise work processes. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
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Application of the Unit

Application of the unit	This unit applies to individuals who undertake the overhauling of two and four cycle water cooled outboard engines with significant repair in a marine environment.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare to carry out engine overhaul	1.1. Confirm nature and scope of work to be carried out 1.2. Locate workplace health and safety (WHS) and workplace environmental and sustainable procedures and practices, applicable to the work 1.3. Access and interpret overhaul method, workshop manuals and manufacturer information 1.4. Check and prepare tools, equipment and materials 1.5. Set up work area
2. Dismantle engine and components	2.1. Dismantle engine and components in a logical sequence without causing damage 2.2. Clean engine and arrange components ready for inspection 2.3. Measure and compare components against supplier specifications and tolerances 2.4. Decide serviceability and repair method of each component in accordance with WHS, environmental and industry regulations and guidelines, and enterprise procedures 2.5. Source replacement parts as required 2.6. Determine and arrange outsourcing of third-party repair
3. Overhaul and assemble engine and components	3.1. Perform overhaul operations in accordance with workplace procedures and manufacturer and component supplier specifications and tolerances 3.2. Re-assemble engine following manufacturer and component supplier procedures 3.3. Measure running clearances against component manufacturer and supplier specifications 3.4. Make the necessary adjustments 3.5. Apply appropriate lubricants to engine 3.6. Complete assembly of engine within established industry guidelines and timeframes and without causing damage to system or components
4. Undertake engine pre-start check	4.1. Mount engine securely in preparation for starting 4.2. Conduct pre-start checks, make required adjustments and re-test 4.3. Seal engine openings against ingress of foreign matter 4.4. Make final inspection to ensure protective features

ELEMENT	PERFORMANCE CRITERIA
	are in place and according to workplace requirements 4.5.Determine the need for water testing
5. Clean up work area and finalise work	5.1.Clean and store engine according to workplace requirements 5.2.Clean and inspect equipment and tooling according to workplace requirements 5.3.Tag unserviceable equipment and faults identified in accordance with workplace requirements 5.4.Finalise and process work completion documentation, update customer and warranty information and give to appropriate persons as required 5.5.Clean work area, dispose of waste and scrap, and store tools and equipment in accordance with workplace procedures

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

Required skills include:

- technical skills to the level required to use workplace technology related to the overhaul of two and four cycle engines and components, including use of specialist tooling, measuring equipment, use of communication devices and workplace technology to record results of repair work
- communication skills to the level required to confirm work requirements and specifications, to communicate effectively regarding work requirements with supervisor, other workers and customers, to relate to people from a range of social, cultural and ethnic backgrounds and of varying physical and mental abilities, and to report work outcomes and problems
- literacy skills to the level required to understand information related to work orders, including common industry terminology, plans and safety procedures, to interpret technical information and specifications and to prepare reports
- numeracy skills to the level required to correctly calculate time, assess tolerances, apply accurate measurements, calculate material requirements and establish quality checks
- problem-solving skills to the level required to identify technical and procedural problems to avoid planning and scheduling problems and time and material wastage
- team skills to the level required to work effectively and cooperatively with others to optimise workflow and productivity
- analytical skills to the level required to analyse technical information and issues related to the overhaul of two and four cycle engines and components

Required knowledge

Required knowledge includes:

- operating principles, construction and types of two and four cycle engines and components
- engine overhaul procedures and methodologies
- component evaluation methods
- dismantling, assembling and adjustment methods
- measuring, testing and adjustment procedures
- types of lubricants and application methods
- manufacturer and component supplier specifications and tolerances, including workshop manuals and repair guides
- applicable commonwealth, state or territory legislation, regulations, standards and codes of practice, including WHS, personal safety and environment, relevant to the

REQUIRED SKILLS AND KNOWLEDGE

- overhaul of two and four cycle engines and components
- organisational policies and procedures, including quality requirements, reporting and recording procedures, related to repairing engines and components,
- WHS regulations and requirements, equipment, and material and personal safety requirements, related to the overhaul of two and four cycle engines and components

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessors must be satisfied that the candidate can competently and consistently:

- observe safety procedures and requirements
- communicate effectively with others involved in or affected by the work
- select methods and techniques which are appropriate to overhauling marine engines and components
- complete preparatory activity in a systematic manner
- overhaul a range of two and four cycle outboard engines to industry and manufacturer specifications and within workplace timeframes
- test prior to placing in service
- complete workplace records as required by the workplace.

Context of, and specific resources for assessment

- The application of competency is to be assessed in the workplace or a simulated environment that reflects as far as possible the actual working environment.
- Assessment is to occur using standard and authorised work practices, safety requirements and environmental constraints.
- Assessment is to comply with relevant regulatory requirements, including specified Australian standards.
- Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.
- The following resources should be made available:
 - appropriate worksite
 - range of two and four cycle outboard engines
 - work instructions
 - equipment, hand and power tooling appropriate to repairing marine engines
 - relevant information, including manufacturer

EVIDENCE GUIDE	
	specifications .
Method of assessment	• Assessment must satisfy the endorsed Assessment Guidelines of this Training Package. • Assessment methods must confirm consistency and accuracy of performance (over time and in a range of workplace relevant contexts) together with application of Required Skills and Knowledge. • Assessment methods must be by direct observation of tasks and include questioning on Required Skills and Knowledge to ensure its correct interpretation and application. • Assessment may be applied under project-related conditions (real or simulated) and require evidence of process. • Assessment must confirm a reasonable inference that competency is able not only to be satisfied under the particular circumstance, but is able to be transferred to other circumstances. • Competence in this unit may be assessed in conjunction with other functional units which together form part of the holistic work role.
Guidance information for assessment	Assessment processes and techniques must be culturally sensitive and appropriate to the language and literacy capacity of the candidate and the work being performed.

Range Statement

RANGE STATEMENT	
The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.	
Engines	Engines may include: • 2-stroke spark ignition for marine craft • 4-stroke compression ignition engines for marine craft
Overhaul	Overhaul may include:

RANGE STATEMENT	
	• complete dismantling of an assembly and component parts • measuring and evaluation of wear • the replacement, repair, rebuilding or reconditioning of parts comparable to original parts • re-assembly procedures • performance of functional testing • completion of records
Pre-start checking procedures	Pre-start checking procedures may include: • running to operating temperature • priming oil • checking engine fluid levels, including lubrication and coolant • checking fuel system for leaks • checking for abnormal noises • checking for pressures • checking gauges and warning devices for operation
Safe operating procedures	Safe operating procedures may include operational risk assessments associated with: • toxic substances • electrical safety • machinery movement and operation • manual and mechanical lifting and shifting • working in proximity to others
Environmental work practices	Environmental work practices may include: • use of renewable, recyclable, reusable and recoverable resources • minimisation and appropriate disposal of waste and packaging • prevention of contaminants and wastewater entering stormwater drains, waterways or marine environments • minimisation and containment of hazards to air quality • minimisation of noise generating activities • safe storage of parts and components containing environmentally hazardous material

RANGE STATEMENT

	• provision of appropriate storage or recycling containers for solid and liquid waste • use of impervious paved area for surface cleaning, engine degreasing and preparation • use of an approved parts washer • use of drip trays under vehicles • cleaning hands over drains connected to an oil/water separator or liquid waste collection drums • minimisation of vehicle exhausts and emissions and provision of ventilated work areas • use of a ventilated, enclosed booth or chamber for spray painting and abrasive sanding • recovering chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) and blends from air conditioning systems for recycling or approved disposal • prevention of tributyltin, arsenic, mercury and dichlorodiphenyltrichloroethane (DDT) entering the marine environment
Information/documents	Information/documents may include: • verbal, written and graphical instructions issued by authorised internal and external persons • parts listing prices and catalogues • inventory systems • material safety data sheets (MSDS) • diagrams or sketches • engineer's design specifications and instructions • manufacturer specifications • industry standards (e.g. American Boat and Yacht Council, National Marine, Manufacturer's Association and US Coast Guard) • Australian standards • workplace specifications and requirements
Legislative requirements	Legislative requirements are to be in accordance with applicable commonwealth, state or territory legislation, regulations, certification requirements and codes of practice, and may include:

RANGE STATEMENT	
	• Environment Protection Regulations related to diesel fuels • award and enterprise agreements • industrial relations • Australian standards • Australian Design Rules • confidentiality and privacy • WHS • the environment • equal opportunity • anti-discrimination • duty of care
WHS requirements	WHS requirements are to be in accordance with applicable commonwealth, state or territory legislation and regulations, and organisational safety policies and procedures, and may include: • personal protective equipment and clothing • safety equipment • first aid equipment • hazard and risk control • elimination of hazardous materials and substances • manual handling, including shifting, lifting and carrying of engine cradles, slings and shackles and the safety ratings against the load to be lifted • emergency procedures
Environmental requirements	Environmental requirements may include: • waste management • noise • dust • clean-up management
Organisational policies and procedures	Organisational policies and procedures may include: • quality policies and procedures, including Australian standards • WHS, sustainability, environment, equal opportunity and anti-discrimination • manufacturer specifications and industry codes of practice

RANGE STATEMENT

	• safe work procedures • reporting and recording procedures
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Unit Sector(s)

Unit sector	Marine
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Co-requisite units

Not applicable.

Competency field

Competency field	Technical - Engines
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