Australian Government

Department of Education, Employment and Workplace Relations

AURT202166B Repair cooling systems

Release: 1

AURT202166B Repair cooling systems

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit of competency describes the skills and knowledge required to carry out fault diagnosis and repair of air and liquid cooling systems. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.

Application of the Unit

Application of the unit	This unit applies to individuals who undertake testing, analysis and repair of cooling systems in light vehicles, heavy vehicles, motorcycles, marine craft and outdoor power equipment.

Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units		

Employability Skills Information

Employability skills	This unit contains employability skills.

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.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare for work	1.1. Determine job requirements, including method, processes and equipment 1.2. Read and interpret job specifications 1.3. Access and interpret information from manufacturer/component supplier specifications and workshop manuals 1.4. Determine technical and/or calibration requirements for testing and repairing cooling systems 1.5. Identify equipment and tooling and check for safe and effective operation 1.6. Determine procedures to minimise task time
2. Test cooling systems and analyse results	2.1. Observe occupational health and safety (OHS) requirements, including individual state/territory regulatory requirements and personal protection needs, throughout the work 2.2. Observe warnings in relation to working with pressurised cooling systems 2.3. Perform cooling systems tests in accordance with workplace procedures and manufacturer/component supplier specifications 2.4. Compare test results with manufacturer/component supplier specifications to indicate compliance or non-compliance 2.5. Document results with evidence and supporting information and make recommendations 2.6. Process report in accordance with workplace procedures
3. Carry out repair	3.1. Carry out repairs, component replacement and adjustments in accordance with workplace procedures and manufacturer/component supplier specifications 3.2. Select and use appropriate tooling, techniques and materials 3.3. Repair cooling system without causing damage to component or system 3.4. Make final inspection to ensure work is to workplace expectations 3.5. Complete workplace and equipment documents in accordance with site requirements
4. Clean up work area and maintain	4.1. Collect and store material that can be reused 4.2. Remove waste and scrap following workplace

ELEMENT	PERFORMANCE CRITERIA
equipment	procedures 4.3. Clean equipment and work area and inspect for serviceable condition in accordance with workplace procedures 4.4. Tag unserviceable equipment and identify faults in accordance with workplace requirements 4.5. Complete operator maintenance in accordance with manufacturer/component supplier specifications and site procedures 4.6. Maintain and store tooling 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 and tools related to the repair of cooling systems, including the use of specialist tooling and equipment, measuring equipment, computerised technology and communication devices
- 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 apply common industry terminology, to report work outcomes and problems, and to relate to people from a range of social, cultural and ethnic backgrounds and of varying physical and mental abilities
- literacy skills to the level required to understand information related to work orders, and to locate, interpret and apply manufacturer/component supplier technical information and specifications, workplace policies and safety procedures
- numeracy skills to the level required to correctly calculate time, complete tests and measurements to determine repair/replacement requirements, calculate material requirements and establish quality checks
- problem-solving skills to the level required to plan and organise activities and establish safe and effective work processes which anticipate and/or resolve problems and downtime, and to systematically develop solutions to avoid or minimise reworking and avoid wastage
- team skills to the level required to work effectively and cooperatively with others

REQUIRED SKILLS AND KNOWLEDGE
to optimise workflow and productivity • organisational skills to the level required to plan and organise activities, including preparation and layout of worksite, and obtaining equipment and materials to avoid backtracking or workflow interruptions
Required knowledge
Required knowledge includes: • OHS and environmental regulations/requirements, equipment, material and personal safety requirements • dangers of working with coolants • identification of application, purpose and operation • identification of component parts to include physical, fluid, gases and heat generation • types and layout of service/repair manuals (hard copy and electronic) • test procedures • repair procedures • selection, checking and use of tooling and equipment • manufacturer and/or component supplier specifications • applicable commonwealth, state or territory legislation, regulations, standards and codes of practice, including OHS and environment, relevant to testing and repairing cooling systems • organisational policies and procedures, including quality requirements, reporting and recording procedures, and work organisation and planning processes, related to testing and repairing cooling systems

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 appropriate to the circumstances • complete preparatory activity in a systematic manner • conduct the repair of not less than two (2) different cooling systems in accordance with workplace and manufacturer/component supplier requirements • accurately interpret test results • complete work within workplace timeframes • present equipment to customer in compliance with workplace requirements.

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:
	  • a range of cooling systems and components relevant to the application
	  • materials relevant to testing and repairing of cooling systems
	  • equipment, hand and power tooling appropriate to testing and repairing of cooling systems
	  • specifications and work instructions.

EVIDENCE GUIDE	
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.	
Cooling systems	Cooling systems may be: • fluid cooled • air cooled • combination systems • fitted to light vehicles, heavy vehicles, motorcycles, marine craft and outdoor power equipment

RANGE STATEMENT	
Faults	Faults may include: • overheating • engine running below operating temperature • external leaks
System components	System components may include: • thermostats, water pumps, plumbing, ducting, fans (electric and viscous), drive belts, heat exchanger, sealed and non-sealed systems, interior heater and coolant heater manifolds • cooling fins size, material, colour and finish • ferrous and non-ferrous metals • keel cooling, heat exchanger, raw water cooling and sacrificial anodes • cooling system additives
Repair methods	Repair methods are to include: • functional testing, pressure testing and coolant testing • visual, aural and functional assessments, including damage, corrosion, fluid levels/leaks, wear and deterioration • isolation of faults, dismantling, inspection, evaluation and replacement of component parts, assembly and completion of operational tests and documents
Tooling and equipment	Tooling and equipment may include: • hand tooling • meters, gauges and pressure testing devices
Materials	Materials may include: • coolants • spare parts • cleaning materials
Information/documents	Information/documents may include: • verbal or written and graphical instructions, signage, work schedules/plans/specifications, work bulletins, memos, material safety data sheets (MSDS), diagrams or sketches • safe work procedures related to testing and repairing cooling systems

RANGE STATEMENT	
	• regulatory/legislative requirements pertaining to testing and repairing cooling systems • engineer's design specifications and instructions • organisation work specifications and requirements • instructions issued by authorised enterprise or external persons • Australian standards
OHS requirements	OHS 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 • electrical safety • elimination of hazardous materials and substances • manual handling, including shifting, lifting and carrying • emergency procedures
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: • award and enterprise agreements • industrial relations • Australian standards • Australian Design Rules • confidentiality and privacy • OHS • the environment • equal opportunity • anti-discrimination • relevant industry codes of practice • duty of care
Environmental requirements	Environmental requirements may include: • waste management

RANGE STATEMENT	
	• pollution • noise • dust • clean-up management
Quality requirements	Quality requirements may include: • regulations, including Australian standards • internal organisational quality policies and procedures • enterprise operations and procedures
Organisational policies and procedures	Organisational policies and procedures may include: • quality policies and procedures, including Australian standards • OHS, sustainability, environment, equal opportunity and anti-discrimination • manufacturer specifications and industry codes of practice • safe work procedures • reporting and recording procedures

Unit Sector(s)

Unit sector	Technical

Co-requisite units

Co-requisite units		

Competency field

Competency field	