



Australian Government

MEM27027 Install or modify mobile plant air conditioning systems

Release: 1

MEM27027 Install or modify mobile plant air conditioning systems

Modification History

Release 1: New unit

Application

This unit of competency defines the skills and knowledge required for installing or modifying in cabin air conditioning systems installed in mobile plant and rail vehicles.

The unit covers systems supplying heating, ventilation, air conditioning (HVAC) and cooling systems to operator compartments and includes installing new air conditioning systems into new or operating mobile plant or rail vehicles, modification of existing air conditioning systems, commissioning of systems and replacement and recovery of refrigerant.

This unit forms part of the requirements to obtain an Australian Refrigerant Council (ARC) Refrigerant handling licence – qualified persons (Automotive Air Conditioning Licence).

In some jurisdictions, an occupational licence for refrigeration/air conditioning or electrical restricted licence may be required.

Band: B

Unit Weight: 4

Pre-requisite Unit

MEM09002	Interpret technical drawing
MEM11011	Undertake manual handling
MEM12023	Perform engineering measurements
MEM13015	Work safely and effectively in manufacturing and engineering
MEM16006	Organise and communicate information
MEM18001	Use hand tools
MEM18002	Use power tools/hand held operations
MEM18055	Dismantle, replace and assemble engineering components

Competency Field

Fixed and Mobile Plant

Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

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|--|--|
| 1 Determine job requirements | <ul style="list-style-type: none">1.1 Follow standard operating procedures (SOPs)1.2 Comply with work health and safety (WHS) requirements at all times1.3 Use appropriate personal protective equipment (PPE) in accordance with SOPs1.4 Identify job requirements from specifications, drawings, job sheets or work instructions1.5 Plan job to conform to Australian Refrigeration Council (ARC) code of practice requirements |
| 2 Install air conditioning system in new mobile plant | <ul style="list-style-type: none">2.1 Check that mobile plant is parked and engine/power source are safe for air conditioning system access and work2.2 Check cabin installation site against drawings or specifications for access, dimension and levels2.3 Check supplied air conditioning system matches specification and is complete2.4 Identify locations for structural support brackets and other support and holding components2.5 Identify air conditioning connection location and requirements for power, control modules, fieldbus wiring and sensors2.6 Prepare all surfaces, materials and components for use2.7 Install air conditioning system and connections in conformance with manufacturer and customer specifications2.8 Check air conditioning system is levelled, aligned, coupled and connected in accordance with specifications2.9 Charge system with specified refrigerant according to manufacturer specifications and regulatory requirements |

Elements describe the essential outcomes.		Performance criteria describe the performance needed to demonstrate achievement of the element.	
3	Modify or retrofit mobile plant air conditioning system	3.1	Determine modification requirements from customer specifications, job instructions and drawings, and equipment manuals
		3.2	Check that mobile plant is isolated/made safe according to SOPs
		3.3	De-gas system using approved recovery unit and appropriate refrigerant recovery cylinder for the refrigerant type
		3.4	Recover oil and evacuate system
		3.5	Remove air conditioning system or components requiring modification according to SOPs
		3.6	Retrofit or modify air conditioning system according to manufacturer specifications and customer requirements
		3.7	Pressure test system and identify leaks and non-conformances to specifications
		3.8	Re-charge system with specified refrigerant according to manufacturer specifications and regulatory requirements
4	Test and complete installation of new /retrofitted or modified mobile plant air conditioning system	4.1	Test air conditioning system for correct operation against specifications
		4.2	Trace non-conformances to specifications to root cause and rectify
		4.3	Document installation or modification actions according to workplace procedures

Foundation Skills

This section describes those required skills (reading, writing, oral communication and numeracy) that are essential to workplace performance in this unit of competency.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different 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.

Mobile plant air conditioning systems include one (1) or more of the following:

- in cabin units
- above, behind or below cabin units
- single units that feed two driver cabins e.g. some locomotive systems

Mobile plant air conditioning system components include one (1) or more of the following:

- fieldbus system control unit, modules and sensors relevant to the air conditioning system
- integrated or separate measurement/testing/data logging equipment
- pumps
- motors
- compressors
- condensers
- filters
- pipes and hoses
- switches
- valves
- coils and radiators
- receivers
- ancillary equipment

Unit Mapping Information

No equivalent unit.

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

Assessment Requirements for MEM27027 Install or modify mobile plant air conditioning systems

Modification History

Release 1: New unit

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria on at least two (2) occasions and include:

- following work instructions, standard operating procedures (SOPs) and safe work practices, including refrigerant safe handling procedures
- obtaining and interpreting specifications, air conditioning system/circuit diagrams, system operation and control data records and identifying and inspecting system components for compliance with specifications
- checking of new air conditioning systems and components for quality and completeness
- planning installation, retrofitting or modification to ensure efficient assembly/disassembly of air conditioning systems and compliance with manufacturer specifications and regulatory requirements
- checking and adjusting control and system operation using appropriate test equipment, including checking for:
 - ambient and vent temperature
 - condenser and suction temperature
 - manifold gauge pressure
 - refrigerant leaks
 - heater core and system water coolant leaks
- ensuring that the sequence of operations conforms to specifications and operational requirements
- recording/reporting any required modifications/alterations to new/retrofitted units in accordance with SOPs
- testing air conditioning systems controls and circuits using appropriate test equipment
- repairing/replacing faulty items after testing for compliance to specifications using appropriate tools, equipment and techniques
- reassembling of air conditioning system to meet specifications
- verifying correct operation of air conditioning system after service and repair.

Knowledge Evidence

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- safe work practices and procedures and use of personal protective equipment (PPE)

- types of air conditioning systems used in mobile applications, including:
 - piston, scroll and rotary vane compressors
 - electric compressors
 - variable displacement compressors
 - clutchless compressors
 - single and multi-zone
- system operational and control requirements and specifications, including:
 - high and low pressure switches
 - pressure relief valves
 - temperature sensors
 - sunlight sensors
 - zone temperature sensors
 - carbon dioxide sensors
- heating system components, including core, control valve, blower motor and fan, ducts, controls and sensors
- typical mobile systems refrigerants, their features and applications and relationship to Australian Refrigerant Council (ARC) regulatory requirements
- lubricating oils
- application of air conditioning system components and controls
- digital controllers in mobile fieldbus systems (e.g. controller area network (CAN) bus) and their function and capabilities in regards to air conditioning systems
- controller fault code interrogation and interpretation where installed
- circuit sensors and controllers
- special system installation requirements
- air conditioning system test equipment and test procedures, including use of:
 - manifold gauges
 - surface probe thermocouples
 - temperature gauges
 - scan tools
 - electrical test equipment
 - electronic leak detectors
 - recovery units
 - vacuum pumps
 - electronic scales
 - other test equipment relevant to the vehicle system
- correct operational sequence of the system
- typical adjustments to correct sequencing variations from specification
- procedures for recording/reporting modifications/alterations and consequences of not recording/reporting
- air conditioning system commissioning procedures

- cause of the faulty condition in new components and appropriate procedures for rectifying the faulty condition
- appropriate control component connection procedures
- typical test equipment and its application
- common adjustments that can be made to control systems and their effects.

Assessment Conditions

- Assessors must:
 - have vocational competency in installing or modifying mobile plant air conditioning systems at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015* or its replacement and comply with the *National Vocational Education and Training Regulator Act 2011*, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires
- Where possible assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions. This must cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

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