



Australian Government

MEM234034 Manage heating, ventilation, air conditioning and refrigeration systems or projects

Release: 1

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Modification History

Release 1. Supersedes and is equivalent to MEM234034A Manage heating, ventilation, air conditioning and refrigeration systems or projects.

Application

This unit of competency defines the skills and knowledge required to provide a technical leadership role in the installation, modification, commissioning or ongoing management of heating, ventilation, air conditioning and refrigeration (HVACR) systems.

It includes awareness of current options and trends in HVACR design, analysis of existing sites and systems, interpreting manufacturer specifications, determining implications of relevant regulations and internal or external client brief, liaison with designers, and ensuring that team members are aware of technical and performance requirements.

This unit applies to all forms of manufacturing and engineering where a technician who is providing technical leadership in HVACR system projects or management and assumes that the system or modification has already been designed. Work may relate to specific projects or regular scheduled operation and maintenance tasks. Environments for work are diverse and may include residential sites hospitality venues and health facilities as well as industrial locations.

The unit applies to individuals who are required to provide high-level technical leadership to others. The other members of the team will normally include engineering tradespersons and can also include technicians and production personnel.

Prior or concurrent experience in the HVACR control systems, hydronic and refrigeration systems and thermal loads, electrical principles, controller programming and computing is assumed.

The unit complements the more general technical leadership and management skills found in unit MEM234001 Plan and manage engineering-related projects or operations. Informal technical or engineering advice situations are covered by the unit MEM234030 Provide specialised technical and engineering guidance to other technical employees.

This unit does not reflect all technical skills and knowledge required for HVACR-related tasks. The required technical skills will depend on the particular task and will normally be covered through the combined skill and knowledge of the team. However, the unit presumes engineering skill and knowledge to at least Advanced Diploma level.

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

Pre-requisite Unit

Nil

Competency Field

Engineering science

Elements and Performance Criteria

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Identify scope of HVACR system work requirements	1.1 Review HVACR system drawings, manufacturer manuals and other technical data for system specifications 1.2 Determine HVACR system performance requirements 1.3 Determine if any commissioning or modification actions are required to ensure performance requirements are met 1.4 Determine relevant regulatory requirements 1.5 Inspect site and any existing HVACR equipment to confirm or determine suitability, availability of other services and control requirements 1.6 Produce or review HVACR system management schedule including any required installation, commissioning, and modification or maintenance requirements 1.7 Integrate building management systems (BMS) considerations into the schedule based on work requirements
2. Brief team on HVACR system work requirements	2.1 Distribute and discuss drawings, schedules, and major materials and equipment with team 2.2 Arrange for required request for further information (RFIs) with designers 2.3 Brief team on key compliance and risk factors, including regulatory, work health and safety (WHS) and environmental requirements 2.4 Agree with team on critical control points and reporting requirements
3. Commence installation, commissioning, modification or maintenance tasks	3.1 Supervise any equipment shutdowns required for task 3.2 Confirm availability of equipment components and materials for scheduled tasks. 3.3 Check and determine that supply of services to work are adequate for task commencement 3.4 Ensure all tradespersons have correct drawings
4. Monitor progress and	4.1 Establish procedures to ensure work is completed to design

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
deal with contingencies	specifications 4.2 Ensure electrical and HVACR control systems and circuits are consistent with specifications and regulations 4.3 Identify problems and contingencies and establish and rectify root cause
5. Finalise HVACR system work requirements	5.1 Conduct final check to ensure completed work is consistent with drawings, manufacturer manuals and any regulatory requirements 5.2 Conduct test run of equipment and system 5.3 Identify and correct any malfunctions or errors in required output.
6. Conduct handover and finalise documentation	6.1 Brief client and operators on machine or equipment operation after completion of work 6.2 Prepare and submit required reports in accordance with organisational procedures

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

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.

Sustainability includes:	- resources and energy - social and economic - life cycle design of product raw material, solids and hazardous waste, and production by-products - contamination of land, air and stormwater pollutants, and discharge to sewerage - climate change.
Appropriate software	computer-aided design (CAD)

includes:	• HVACR design and analysis including: • animation • simulation • modelling • performance analysis.
Validation techniques include:	• comparison of traditional solutions for simple design problems with software solutions to the same design problems • review of previously implemented designs which were completed using the software • use of failure modes and effects analysis (FMEA).
HVACR system maintenance includes:	• safety and integrity of the system • adequacy and correct operations of controls • user performance requirements • adequacy of standard operating procedures (SOPs) for users • safe integration with other systems, including mechanical, electrical and fuel-fired equipment.
System specifications include:	• ducts and duct systems: • materials • supports • factory and field fabricated • sealants • layout and placements • capacity • zoning • heating and cooling loads • air flow and pressures • refrigerants • energy efficiency • air intake points • control equipment • monitoring equipment.
WHS requirements include:	• WHS acts, regulations and relevant standards • industry codes of practice • risk assessments • registration requirements • safe work practices • state and territory regulatory requirements.
Standards include:	• AS/NZS 4024.1 Safety of machinery • AS/NZS ISO 31000 Risk management – Principles and guidelines • NOHSC:1010 National standard for Plant • NOHSC:1014 National standard for the Control of Major Hazard

	Facilities • AS 61508.1 Functional safety of electrical/electronic/programmable electronic safety-related systems – General requirements.
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Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM234034A Manage heating, ventilation, air conditioning and refrigeration systems or projects.

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 MEM234034 Manage heating, ventilation, air conditioning and refrigeration systems or projects

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Performance Evidence

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

- interpreting plans, specifications and other documentation to determine features and performance characteristics and requirements of heating, ventilation, air conditioning and refrigeration (HVACR) systems
- advising other technicians, tradespersons and production personnel on HVACR system installation, modification, commissioning, operation or maintenance on at least two occasions
- determining adequacy of standard operating procedures (SOPs) for HVACR systems and making required adjustments
- selecting and using software and validation techniques including 2D and 3D modelling
- checking HVACR systems for safe operation
- determining situations that require other technical and professional assistance
- researching sustainability implications and current HVACR systems design techniques
- evaluating solutions for feasibility against the installation, modification, commissioning, operation or maintenance criteria, including relevant engineering and financial calculations and analysis
- determining work health and safety (WHS), regulatory and risk management requirements
- communicating, negotiating and reviewing with stakeholders and client throughout HVACR project or management activity.

Note: Where a volume and/or frequency is not specified, demonstration must be provided at least once.

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:

- current options and trends in HVACR system modelling and simulation software including underpinning program techniques and software validation techniques
- research and investigations methods
- principles of HVACR systems
- HVACR system work requirements

- validation techniques
- types of control equipment
- common HVACR system hardware including industrial and commercial refrigeration systems, hydronic systems and automated controls
- HVACR load cycles
- HVACR system specifications
- HVACR system maintenance
- principles of building management systems (BMS)
- interface principles for HVACR system components
- building management control system software
- dimensions, capacity and position of system components
- electrical, electronic and mechanical features of HVACR systems including interface principles and techniques for electrical, electronic, pneumatic and hydraulic sensors and actuators
- WHS and regulatory requirements, codes of practice, standards, risk minimisation and registration requirements.

Assessment Conditions

- Assessors must:
 - have vocational competency in managing heating, ventilation, air conditioning and refrigeration systems or projects 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 that 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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