



Australian Government

MEM23150 Contribute to the design of heating systems

Release: 1

MEM23150 Contribute to the design of heating systems

Modification History

Release 1. Supersedes and is equivalent to MEM23150A Contribute to the design of heating systems.

Application

This unit of competency defines the skills and knowledge required to contribute to the design of appropriate heating equipment to provide optimum performance or to undertake the complete design for less complex systems. It includes determination of best piping configurations and system pipe sizes, taking into account thermal heat losses.

The unit applies to technicians in organisational that design heating systems or undertake design modifications to existing systems as part of manufacturing, installation, commissioning, servicing and maintenance activities.

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

Pre-requisite Unit

MEM23004 Apply technical mathematics

MEM23006 Apply fluid and thermodynamics principles in engineering

MEM23140 Determine operational parameters for building HVAC hydronic systems

MEM23147 Contribute to the design of hydronic systems

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. Prepare design specifications	1.1 Obtain and implement work health and safety (WHS) and environmental requirements for the work area 1.2 Identify the essential elements of a heating system to meet client design brief 1.3 Consult appropriate personnel to ensure that work is coordinated effectively with others

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	1.4 Obtain equipment and resources needed for the task in accordance with organisational procedures and check for correct operation and safety
2. Design system	2.1 Select a heating system design to meet the client requirements 2.2 Plan design development work to meet scheduled timelines 2.3 Check system design draft for compliance with the design brief, regulatory requirements and environmental standards 2.4 Calculate heating loads and matching heating capacity 2.5 Select appropriate heating equipment to satisfy design specifications 2.6 Provide solutions to unplanned situations consistent with organisational procedures 2.7 Document method of capacity rating and sizing for each discrete component in the system to industry standards using organisational procedures
3. Analyse system and adjust system performance	3.1 Evaluate system performance under variable conditions 3.2 Adjust component selection where required to meet heating system performance criteria 3.3 Determine fulfilment of required heating capacity under full and partial load conditions
4. Validate final design	4.1 Verify final design using organisational procedures for compliance and regulatory requirements 4.2 Document final system design for client approval according to industry standards and 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.

WHS requirements include:	• legislation • protective equipment • material safety management systems • hazardous substances and dangerous goods code • local safe operation procedures • awards provisions.
Environmental requirements include:	• relevant legislation, regulations and codes • correct handling and disposal of liquid and solid waste • elimination or minimisation of gas, fume, vapour and smoke emissions, including fugitive emissions • dust elimination, minimisation and control • minimisation of energy and water use • elimination or control of excessive noise • use and recycling of refrigerants.
Appropriate personnel include:	• supervisor, leading hand, foreman or manager • engineer • technician • trainer or mentor • team member • customer.
Resources include:	• scientific calculator • componentry catalogues • technical charts and tables • design brief • suitable software.
Organisational procedures include:	• use of tools and equipment • instructions, including job sheets, plans, drawings and designs • reporting and communication • manufacturer specifications • operational procedures • industry procedures.
Equipment includes:	• computer workstation and software, either stand alone or networked • test apparatus • appropriate tools of trade, equipment and materials.
Heating equipment	• heat pumps, boilers and coils

includes:	• expansion tanks, pumps, control valves and air purge points • water treatment, pipe anchors and expansion joints.
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Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM23150A Contribute to the design of heating systems.

Links

Companion Volume Implementation Guides are available on VETNet -

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

Assessment Requirements for MEM23150 Contribute to the design of heating systems

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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:

- identifying and interpreting drawings and specifications and client requirements appropriate to the design task
- implementing work health and safety (WHS) procedures and practices including the use of risk control measures
- demonstrate the use of software tools related to design heating systems
- determining performance aspects of systems and sizing of pipes on at least two occasions, minimising system heat losses
- designing a heating system on at least two occasions including selecting major system components and materials using manufacturer data and appropriate heating equipment and evaluating piping configuration
- communicating technical and procedural requirements to others
- dealing with unexpected situations
- documenting technical information and designs in accordance with procedures.

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:

- heating equipment and techniques including relative advantages and disadvantages of:
 - heat pumps
 - boilers and hydronic systems including underfloor systems
 - gas
 - electric
 - solar
 - solid fuel
- system configuration
- piping configuration including:

- standard materials and sizes
- sources of information
- system pipe sizes
- appropriate personnel to consult
- WHS and environmental requirements relevant to heating systems
- organisational procedures
- resource and equipment requirements.
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Assessment Conditions

- Assessors must:
 - have vocational competency in contributing to the design of heating 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 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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