



Australian Government

MEM23147 Contribute to the design of hydronic systems

Release: 1

MEM23147 Contribute to the design of hydronic systems

Modification History

Release 1. Supersedes and is equivalent to MEM23147A Contribute to the design of hydronic systems.

Application

This unit of competency defines the knowledge and skills required to contribute to the design of hydronic systems or to undertake the complete design for less complex systems. It includes analysis of characteristics of water flow in a pipework system, and selection and sizing of pipes, fittings, suitable pumps, and associated fittings and valves.

The unit applies to heating, ventilation, air conditioning and refrigeration (HVACR) technicians in manufacturing, servicing and maintenance enterprises required to undertake design work on hydronic systems.

It applies to design work undertaken as part of a design team comprising engineers and other technicians and to individual design tasks within the scope of the technician's skill and knowledge.

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

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 specification	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 hydronic system to meet client design brief

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	1.3 Consult with appropriate personnel to ensure that work is coordinated effectively with others 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 hydronic 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 Provide solutions to unplanned situations consistent with organisational procedures
3. Analyse and adjust system performance	3.1 Apply knowledge of hydronic system operating parameters to analytical solutions to system design 3.2 Analyse system performance under variable conditions and adjust component selection to meet performance criteria 3.3 Determine fulfilment of required capacity under full and partial load conditions using appropriate resources
4. Validate system design	4.1 Verify final design using organisational procedures for compliance and regulatory requirements 4.2 Document final system design for client approval, using appropriate equipment to industry standards

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.
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.
System operating parameters include:	• pump performance • system friction losses • pipe size.
Resources include:	• manufacturer catalogues • fluids modelling software • scientific calculator • technical charts and tables • building plans • suitable software.
Organisational procedures include:	• use of tools and equipment • instructions, including job sheets, plans, drawings and designs • reporting and communication • manufacturer specifications and manuals • operational procedures • industry standards.
Equipment includes:	• computer workstation and software, either stand alone or networked • test apparatus • appropriate tools of trade, equipment and materials.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM23147A Contribute to the design of hydronic 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 MEM23147 Contribute to the design of hydronic 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, client requirements and specifications 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 designing a hydronic system
- contributing to the design of a hydronic system on at least two occasions including determining performance aspects of the systems, sizing pipes, selecting optimum pump performance, minimising system friction losses and selecting major components and materials using manufacturer data
- 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:

- WHS requirements
- appropriate personnel to consult
- principles of fluid flow
- system operating parameters
- pump performance and selection
- pipe sizes
- valve performance and selection
- pressure loss and static head calculations
- calculating system (static and dynamic) head
- optimum pump selection
- environmental requirements
- organisational procedures

- resource and equipment requirements
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Assessment Conditions

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