



Australian Government

MEM23140 Determine operational parameters for building HVAC hydronic systems

Release: 1

MEM23140 Determine operational parameters for building HVAC hydronic systems

Modification History

Release 1. Supersedes and is equivalent to MEM23140A Determine operational parameters for building HVAC hydronic systems.

Application

This unit of competency defines the skills and knowledge required to identify fluid flow and distribution characteristics of hydronic systems and measure system component performance, including chillers, boilers and flow control devices.

The unit applies to technicians required to determine features and performance of heating, ventilation and air conditioning (HVAC) hydronic systems, including performance and characteristics of components, piping and the overall system. It applies to design, manufacture, installation or servicing work in HVAC enterprises.

The unit is suitable for people working as, supervisors, technicians, and HVAC draftspersons, and for those pursuing manufacturing engineering or related technical qualifications and careers.

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

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. Determine parameters of HVAC hydronic system assessment	1.1 Obtain and implement work health and safety (WHS) and environmental requirements for the work area 1.2 Identify consultation and coordination requirements with client and other HVAC and building systems team members 1.3 Identify characteristics and specifications of the HVAC hydronic

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	system from installations and/or mechanical service drawings, data sheets and manufacturer specifications 1.4 Identify system components relevant to determination of operational parameters 1.5 Predict system and component performance using installation and/or service drawings, data sheets and manufacturer specifications 1.6 Identify sources of professional and technical assistance 1.7 Obtain resources required for HVAC hydronic task in accordance with organisational procedures
2. Determine flow component performance	2.1 Identify operating characteristics and performance data of pumps 2.2 Identify flow control devices and check piping for correct sizing 2.3 Measure and check fluid flow against specifications
3. Identify required hydronic piping system	3.1 Establish the operational requirements of the piping system in HVAC installation 3.2 Select a suitable hydronic piping system from piping specifications and data 3.3 Apply organisational risk management procedures for contingencies and unexpected situations
4. Analyse hydronic system performance	4.1 Verify system performance using practical or software modelling techniques 4.2 Model HVAC system to determine system expected performance 4.3 Document system performance analysis 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.

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.
Componentry includes:	• valves • pumps • heat exchangers • bladder tanks • flow switchers • flow control devices • chillers • boilers • cooling towers • hydronic piping systems.
Resources include:	• reference manuals • scientific calculator • 3D computer-aided design (CAD) software • computer workstation and software, either stand alone or networked • test apparatus • appropriate tools of trade, equipment and materials.

	• standard duct sizes and gauges.
Contingencies and unexpected situations include:	• cost or time overruns • unavailability of required resources • regulatory change • system, site or building features not on plans or drawings • other situations not included in original brief or normal organisational procedures.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM23140A Determine operational parameters for building HVAC 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 MEM23140 Determine operational parameters for building HVAC 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:

- interpreting drawings, specifications and manuals and recognising system features and operational modes
- implementing work health and safety (WHS) workplace procedures and practices including risk control measures
- determining operational parameters for building heating, ventilation and air conditioning (HVAC) hydronic systems on at least two occasions, including selecting and testing of pumps and measuring flow rates
- measuring individual component performance on at least two occasions
- communicating technical requirements to others, including preparation of required documents
- dealing with unexpected situations.

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 and environmental requirements related to building HVAC hydronic systems
- sources of professional and technical assistance
- system operation features including:
 - closed/open systems
 - pump head/lift and static head (high-rise building)
 - system friction losses
 - net positive suction head
 - system curves
- pumps including:
 - types
 - selection criteria
 - performance characteristics

- valves including:
 - types and applications
 - throttle characteristics
 - flow measurements
 - selection and applications
- ancillary equipment including:
 - bladder tanks
 - coil characteristics
 - heat exchangers (plate, shell and tube, tube in tube)
 - flow measurements
 - flow switchers
 - boilers (types and performance characteristics)
 - types of cooling towers and elementary cooling thermodynamics
- pipe sizing and relationship to system performance
- standard pipe sizes and specifications
- resource requirements
- contingency planning.
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Assessment Conditions

- Assessors must:
 - have vocational competency in determining operational parameters for building HVAC 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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