Australian Government

MEM23140A Determine operational parameters for building HVAC hydronic systems

Release: 1

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

MEM23140A Determine operational parameters for building HVAC hydronic systems

Modification History

Release 1 (MEM05v9).

Unit Descriptor

This unit of competency covers 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.

Application of the Unit

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. The unit 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 those pursuing manufacturing engineering or related technical qualifications and careers.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

MEM23004A	Apply technical mathematics
MEM23006A	Apply fluid and thermodynamics principles in engineering

Employability Skills Information

This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

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

Elements and Performance Criteria

1	Determine parameters of HVAC hydronic system assessment	1.1	Obtain and implement work health and safety (WHS) and environmental requirements for a given 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 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/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 enterprise 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 a HVAC installation
		3.2	Select a suitable hydronic piping system from given piping specifications and data
		3.3	Apply enterprise 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 according to enterprise procedures

Required Skills and Knowledge

This section describes the skills and knowledge required for this unit.

Required skills

Required skills include:

- interpreting drawings and specifications
- recognising system features and operational modes from drawings, manuals and specifications
- selecting and testing of pumps
- measuring of flow rates
- selecting valve/flow control devices and piping for given applications
- determining system performance parameters and analysing against specifications
- using appropriate modelling software
- communicating effectively with others
- working in teams with others
- communicating technical and procedural requirements to others
- dealing effectively with unexpected situations

Required knowledge

Required knowledge includes:

- system operation features:
  - closed/open systems
  - pump head/lift and static head (high rise building)
  - system friction losses
  - net positive suction head
  - system curves
- pumps:
  - types
  - selection criteria
  - performance characteristics
  - bladder tanks
  - coil characteristics
  - heat exchangers (plate, shell and tube, tube in tube)
  - flow measurements
  - flow switchers

  - boilers (types and performance characteristics)
  - cooling towers types and elementary cooling thermodynamics
- valves:
  - types and applications
  - throttle characteristics
  - flow measurements
  - selection and applications
- pipe sizing and relationship to system performance
- standard pipe sizes and specifications

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment	A person who demonstrates competency in this unit must be able to identify fluid flow and distribution characteristics of hydronic systems and measure system component performance, including chillers, boilers and flow control devices.

Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessors must be satisfied that the candidate can competently and consistently:
	• implement WHS workplace procedures and practices, including risk control measures
	• determine operational parameters for building HVAC hydronic systems
	• measure individual component performance of:
	  • chillers
	  • boilers
	  • pumps
	  • piping
	  • flow control devices
	• communicate technical requirements to others, including preparation of required drawings, CAD files and reports.

Context of and specific resources for assessment	• This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, then an appropriate simulation must be used where the range of

	conditions reflects realistic workplace situations. • The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.
Method of assessment	• Assessment must satisfy the endorsed Assessment Guidelines of the MEM05 Metal and Engineering Training Package. • Assessment methods must confirm consistency and accuracy of performance (over time and in a range of workplace relevant contexts) together with application of underpinning knowledge. • Assessment methods must be by direct observation of tasks and include questioning on underpinning knowledge to ensure correct interpretation and application. • Assessment may be applied under project-related conditions (real or simulated) and require evidence of process. • Assessment must confirm a reasonable inference that competency is not only able to be satisfied under the particular circumstance, but is able to be transferred to other circumstances. • Assessment may be in conjunction with assessment of other units of competency where required.
Guidance information for assessment	Assessment processes and techniques must be culturally appropriate and appropriate to the language and literacy capacity of the candidate and the work being performed.

Range Statement

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

WHS requirements	WHS requirements include: • legislation • protective equipment • material safety management systems • hazardous substances and dangerous goods code

	• local safe operation procedures • awards provisions
Environmental requirements	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	Appropriate personnel may include: • supervisor • leading hand • foreman • manager • engineer • technician • trainer • mentor • team member • customer • client
Componentry	Componentry includes: • valves • pumps • heat exchangers • bladder tanks • flow switchers • boilers • cooling towers • hydronic piping systems
Resources	Resources may include: • reference manuals • scientific calculator • 3-D 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	Contingencies and unexpected situations that arise during the course of the assessment process may 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 enterprise procedures

Unit Sector(s)

Competency field

Unit sector Engineering science

Custom Content Section

Not applicable.