



Australian Government

MEM23154A Analyse and service HVACR systems

Release 1

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Modification History

Release 1 (MEM05v9)

Unit Descriptor

This unit of competency covers the skills and knowledge required to analyse and evaluate heating, ventilation, air conditioning and refrigeration (HVAC/R) control system requirements for a specific application.

This includes evaluation of existing automatic control systems; interpreting and producing control diagrams; commissioning, fault-finding and repairing a HVAC/R control system.

Application of the Unit

The unit applies to HVAC/R technicians in manufacturing, servicing and maintenance enterprises. The unit applies to existing HVAC/R control systems and does not cover the design of new HVAC/R systems.

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

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

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| 1 | Prepare for analysis and service task | 1.1 | Obtain and implement work health and safety (WHS) and environmental requirements for a given work area |
| | | 1.2 | Identify essential elements of a control system |
| | | 1.3 | Determine the function of electrical, pneumatic and electronic control and flow devices using control circuit diagrams and/or specifications or other specialised resources |
| | | 1.4 | Obtain sequence of control, specify settings and adjust control devices from system's specifications |
| | | 1.5 | Consult appropriate personnel to ensure that work is coordinated effectively with others |
| | | 1.6 | Obtain equipment and resources needed for the task in accordance with enterprise procedures and check for correct operation and safety |
| 2 | Analyse performance of control system | 2.1 | Identify HVAC/R system operating parameters and system features |
| | | 2.2 | Use appropriate equipment and HVAC/R energy management principles to evaluate the operating economy of the system |
| | | 2.3 | Produce control diagrams according to applicable standards and practices |
| | | 2.4 | Report analysis to appropriate personnel and establish appropriate action to be taken based on findings |

- 3 Adjust and service control system
 - 3.1 Confirm plant control compliance with desired conditions through appropriate measurements and recordings of system performance
 - 3.2 Adjust system to required specification
 - 3.3 Isolate, replace or repair components not performing to specification
 - 3.4 Arrange appropriate tests and measurements on an electrically live system in accordance with WHS and regulatory requirements
 - 3.5 Provide solutions to unplanned situations consistent with enterprise procedures

- 4 Make recommendations to improve the performance of plant
 - 4.1 Document analysis, including details of all findings, calculations and assumptions
 - 4.2 Prepare recommendations on control system modifications and discuss with appropriate personnel
 - 4.3 Ensure work area is cleaned and made safe in accordance with enterprise procedures

Required Skills and Knowledge

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

Required skills

Required skills include:

- interpreting standards, codes and regulations relevant to HVAC/R control systems
- producing control diagrams
- evaluating automatic control systems
- determining control requirements, including:
 - full and partial load performance requirements
 - automated and manual control sequences
 - integration with energy management system requirements
- commissioning control systems
- using relevant software tools effectively
- interpreting drawings and specifications
- communicating effectively with others
- working in teams and with others
- communicating technical and procedural requirements to others
- dealing effectively with unexpected situations

Required knowledge

Required knowledge includes:

- thermodynamic principles relevant to HVAC/R controls
- control fundamentals
- types of control equipment, including microprocessors, sensors, and so on
- direct data control (DDC) systems
- supervisory control systems

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.

<p>Critical aspects for assessment and evidence required to demonstrate competency in this unit</p>	<p>Assessors must be satisfied that the candidate can competently and consistently:</p> <ul style="list-style-type: none"> • implement WHS workplace procedures and practices, including the use of risk control measures • demonstrate essential knowledge and skills to analyse and service HVAC/R control systems • demonstrate the competency within a timeframe typically expected of the discipline, work function and industrial environment • demonstrate analysing and servicing HVAC/R control systems consistently in different applications.
<p>Context of and specific resources for assessment</p>	<ul style="list-style-type: none"> • 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.
<p>Method of assessment</p>	<ul style="list-style-type: none"> • 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.
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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. 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	<p>WHS requirements include:</p> <ul style="list-style-type: none"> • relevant legislation • protective equipment • material safety management systems • hazardous substances and dangerous goods code • local safe operation procedures • awards provisions
Environmental requirements	<p>Environmental requirements include:</p> <ul style="list-style-type: none"> • 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	<p>Appropriate personnel may include:</p> <ul style="list-style-type: none"> • supervisor • leading hand • foreman • manager • engineer • technician • trainer • mentor • team member • customer • client
Resources	<p>Resources may include:</p> <ul style="list-style-type: none"> • reference manuals • scientific calculator • appropriate manuals

	<ul style="list-style-type: none"> • stationery • suitable computer software
Enterprise procedures	<p>Enterprise procedures may include:</p> <ul style="list-style-type: none"> • the use of tools and equipment • instructions, including job sheets, plans, drawings and designs • reporting and communication • operational procedures • industry standards
Equipment	<p>Equipment may include:</p> <ul style="list-style-type: none"> • computer workstation and software, either stand alone or networked • appropriate tools • appropriate spare parts • cables and connectors • test equipment • consumables • appropriate software licences • manufacturer specifications and manuals • diagnostics software • personal computer

Unit Sector(s)

Competency field

Unit sector Engineering science

Custom Content Section

Not applicable.