



Australian Government

Assessment Requirements for MEM23129 Evaluate thermal loads for heating, ventilation, air conditioning and refrigeration

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Modification History

Release 1. Supersedes and is equivalent to MEM23129A Evaluate thermal loads for heating, ventilation, air conditioning and refrigeration.

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:

- determining heating, ventilation, air conditioning and refrigeration (HVACR) system parameters from plans, specifications and site inspections
- investigating sustainability implications of HVACR systems
- identifying relevant thermodynamic principles and techniques for HVACR system thermal load evaluations
- reviewing features and functions of HVACR systems and components
- testing and measuring HVACR systems and component performance parameters on at least two occasions
- evaluating system and component performance with tabulated and software generated data on at least two occasions
- applying and validating software for analysis and simulation
- reporting and documenting processes, results and recommendations.

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:

- work health and safety (WHS) and regulatory requirements, codes of practice, standards, risk management and registration requirements
- sources of professional and technical assistance
- current options and trends in performance analysis software, including underpinning program techniques
- thermal load measuring equipment and test apparatus
- sustainability implications of HVACR systems, including consideration of energy sources and energy efficiency
- thermodynamic principles required by thermal loading analysis and HVACR management systems
- thermodynamic concepts related to HVACR including:
 - properties, process and state

- mass, conservation of mass, specific volume and density, specific volume, relative density, force, weight, pressure, temperature, Zeroth law, absolute scales and International System of Units (SI) units
- systems, cycles and steady state
- energy forms
- effects of heating of solids and liquids
- heat transfer, conduction, convection and radiation including:
 - property tables for conductivity, convection and radiation coefficients
 - Fourier law of conduction and conductivity of materials
 - convection including:
 - mechanism of convection
 - convection heat transfer coefficient and factors affecting the coefficient
 - fluid flow characteristics including geometry of convection surfaces, natural and forced convection and flow regime
 - units, kinematic viscosity and dynamic viscosity
 - convective heat transfer coefficients for conduit and annular flow and hydraulic diameter
 - heat exchangers including types, efficiency and measurements
 - radiators including:
 - emission, absorption and reflection (properties and measurements)
 - Wien's displacement law
 - Kirchhoff's law
 - solar energy, heating and power generation
 - radiant energy on surfaces
 - variations including Azimuth and zenith angles, path length, cloud cover and water vapour, and shade factors for windows
 - combined heat transfer
 - conduction plus convection, including heat exchangers using air and water as transfer mediums
 - conduction, convection and radiation (qualitative)
 - cooling fins
 - heat flow, electrical analogy, graphical solution techniques and qualitative understanding of numerical methods
- vapour-compression refrigeration including:
 - vapour-compression cycle for refrigeration
 - system components, including throttling valves and capillary tubes as throttling devices
 - performance criteria for refrigeration system evaluation
 - types of refrigerants
 - refrigerant properties and p-h diagrams including:
 - ideal vapour compression cycle on the p-h diagram

- energy balance and heat transfers in compressor, evaporator and condenser
- variation of actual cycles from the ideal
- vapour-compression cycle with suction superheating, liquid sub-cooling and pressure drop in system components
- mechanical components of vapour compression including refrigeration and HVAC systems
- refrigeration enclosures, cabinets, cold rooms and freezer rooms
- factors affecting refrigeration heat transfer
- building thermal performance survey procedures
- factors affecting building heat gains
- standard thermal values in relation to a commercial or industrial building
- equipment size for constant and variable volume systems and central refrigeration and boiler capacities
- thermal properties of buildings and building materials
- people loads, occupant comfort and safety factors
- cost implications of air conditioning and heating designs
- heat loads and thermal lag.
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Assessment Conditions

- Assessors must:
 - have vocational competency in evaluating thermal loads for heating, ventilation, air conditioning and refrigeration 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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Links

Companion Volume implementation guides are found in VETNet -

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