



Australian Government

MEM23141 Complete a building thermal performance survey

Release: 1

MEM23141 Complete a building thermal performance survey

Modification History

Release 1. Supersedes and is equivalent to MEM23141A Complete a building thermal performance survey.

Application

This unit of competency defines the skills and knowledge required to carry out a detailed heat load estimate for a multiple zone commercial or industrial building and then analyse building thermal performance and document results.

It applies to technicians in heating, ventilation and air conditioning (HVAC) manufacturing, servicing and maintenance organisations who are required to conduct a building performance survey to inform the design and specification of HVAC equipment and system/s, including consideration of improvements to building design.

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

MEM23142 Determine psychrometric processes and system performance

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. Estimate heat load for a multiple zone commercial or industrial building	1.1 Obtain and implement work health and safety (WHS) and environmental requirements for the work area 1.2 Determine extent of the performance survey from work sheets, drawings, building specifications or other documentation and discussions with appropriate personnel 1.3 Determine sources of heat gains 1.4 Coordinate work effectively with all team members

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	1.5 Obtain and check resources and equipment required for the performance survey
2. Analyse the air conditioning heat and cooling load	2.1 Complete room sensible and latent heat estimates of a multiple zone building 2.2 Identify peak effective room latent and sensible and latent heat loads over time of day and year for each zone 2.3 Determine the thermal performance of the building using simulation software
3. Investigate building design improvement options	3.1 Analyse alternative building design improvement options with respect to the effect on thermal performance using simulation software 3.2 Identify unacceptably high thermal loads on the building using check figures and industry standards 3.3 Prepare recommendations for changes in building design and/or treatment to eliminate unacceptably high thermal loads 3.4 Document and recommend improvements of thermal performance of the building to appropriate personnel 3.5 Consult as required on unexpected situations and take appropriate action
4. Specify system design	4.1 Determine equipment size, including coil and air handling unit capacities for constant and variable volume systems, and central refrigeration and boiler capacities based on the recommendations 4.2 Document the completed survey in accordance with organisational procedures, including all recommendations, building design improvements and/or treatments, and appropriate system design specifications 4.3 Prepare a formal survey report in consultation with appropriate personnel and 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.
Heat gains include those related to:	• external factors • internal factors • system • U-values and infiltration rates for various wall and/or roof constructions • measurement of sun azimuth and altitude angles, and overall shade factors for various windows.
Resources and equipment include:	• computer workstation • appropriate simulation and reporting software • reference manuals and charts • appropriate measurement equipment • building codes and codes of conduct • access to legislative and regulatory requirements • technical library

	• stationery • scientific calculator • appropriate tools of trade, equipment and materials.
Industry standards include:	• AS 1668.1 The use of ventilation and air conditioning in buildings, Part 1: Fire and smoke control in buildings • AS 1668.2 The use of ventilation and air conditioning in buildings, Part 2: Mechanical ventilation in buildings • EU Guidelines for Ventilation Requirements in Buildings (European Commission) • ASHRAE 62-89 ventilation standard • National Construction Code (NCC).
Organisational procedures include:	• use of tools and equipment • instructions, including job sheets, plans, drawings and designs • reporting and communication • manufacturer specifications • site operational procedures.
Building performance surveys include:	• minimum five zones • internal and system heat gains • infiltration and fresh air rates • heat flow through windows accounting for internal and external shading • heat flows through building fabric • use of simulation software.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM23141A Complete a building thermal performance survey.

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 MEM23141 Complete a building thermal performance survey

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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:

- sourcing appropriate drawings, documentation and specifications for buildings
- interpreting building design information for sources of heat gains
- implementing work health and safety (WHS) procedures and practices including the use of risk control measures
- completing a building thermal performance survey including using industry standards and in accordance with organisational procedures
- demonstrating competency within a timeframe typically expected of the discipline, work function and industrial environment
- carrying out a building survey and load estimate for a multiple zone commercial building on at least two occasions
- completing a building thermal performance survey for different buildings on at least two occasions
- communicating technical and procedural requirements to others
- 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 requirements
- personnel to consult
- heat gains in buildings
- heat transfer theory
- thermal properties of building materials including materials designed to promote thermal conductivity or insulation
- heat transfer in buildings including effects of:
 - ambient conditions
 - materials and equipment
 - windows and films

- design effects including external design, room and door design, and sun position calculations
- building heat flow, losses and gains including:
 - convection
 - radiation
 - conduction
 - heat paths
- building heat loss and gain calculations
- thermal properties of buildings including losses
- people loads
- cost implications of air conditioning and heating designs
- heat loads calculations including lighting and equipment
- thermal lag
- environmental considerations
- resource and equipment requirements
- relevant legislation and codes of practice
- industry standards
- organisational procedures
- energy efficiency and sustainability.
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Assessment Conditions

- Assessors must:
 - have vocational competency in completing a building thermal performance survey 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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