Australian Government

MEM23142A Determine psychrometric processes and system performance

Release: 1

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

MEM23142A Determine psychrometric processes and system performance

Modification History

Release 1 (MEM05v9).

Unit Descriptor

This unit of competency covers the skills and knowledge required to identify psychrometric processes and determine system performance in a commercial building.

Application of the Unit

The unit applies to technicians in enterprises designing, manufacturing, installing, servicing or maintaining heating, ventilation, air conditioning and refrigeration (HVAC/R) equipment. The unit is suitable for people working as, supervisors, technicians and HVAC/R draftspersons, and those pursuing manufacturing engineering or related technical qualifications and careers.

Licensing/Regulatory Information

No licensing, legislative, regulatory or certification requirements apply to this unit.

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	Review psychrometric processes	1.1	Obtain and implement work health and safety (WHS) and environmental requirements for a given work area
		1.2	Apply knowledge of psychrometric processes to analytical solutions to HVAC/R systems according to enterprise procedures
		1.3	Diagnose air temperature and humidity problems using psychrometric charts
		1.4	Consult appropriate personnel to ensure that work is coordinated effectively with others
2	Analyse the psychrometric and system performance of HVAC/R systems	2.1	Determine plant/system capacity and airflow requirements for effects of coil bypass factor and apparatus dew point (ADP) and partial load control
		2.2	Calculate dehumidified air quantity using both target superheat (TSH) and effective room sensible heat (ERSH) methods
		2.3	Establish plant capacity and air flow rates for the system/building
		2.4	Establish air side systems and determine system performance
		2.5	Determine systemic performance parameters
		2.6	Consult as required on any contingencies and unexpected situations and take appropriate action based on specifications, codes and standards, and enterprise

			procedures
3	Document and report on psychrometric and HVAC/R system performance	3.1	Evaluate solutions to psychrometric and system performance to determine their effectiveness
		3.2	Report and document analysis, including details of all findings, calculations and assumptions, according to enterprise procedures
		3.3	Prepare and justify recommendations for any required actions in relation to HVAC/R equipment

Required Skills and Knowledge

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

Required skills

Required skills include:

- plotting the psychrometric performance of a given HVAC/R coil
- calculating the psychrometric performance of the coil
- calculating the psychrometric performance of HVAC/R spray equipment
- calculating required plant capacity and airflow rates
- determining the psychrometric performance of a HVAC/R system in operation, including partial load control
- interpreting drawings and specifications
- 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:

- adiabatic/evaporative cooling
- isothermal humidification
- cooling and dehumidification with high latent load
- cooling and dehumidification with all outdoor air
- cooling and dehumidification with all outdoor air and with dehumidified air requirements less than supply air
- cooling with evaporative humidification
- spray processes to include cooling and dehumidification, cooling and humidification with heated spray water, heating and humidification:
  - partial load processes
  - reheat
  - bypass of return air and mix of return air and outside air:
    - variable air volume
    - variable coil effective surface temperature
- analysis of cooling coil selection and performance
- psychrometric analyses, formulae and charts
- indirect evaporative coolers

- analysis of cooling coil selection and performance
- cooling tower characteristics

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.

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 the use of risk control measures • demonstrate essential knowledge and skills to determine psychrometric processes and system performance • demonstrate competency within a timeframe typically expected of the discipline, work function and industrial environment • demonstrate the ability to determine psychrometric processes and system performance consistently for commercial buildings. This includes determining the plant capacity and airflow rates for a building and the ability to analyse system 'air side systems' and determine system performance.
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
Systemic performance parameters	Systemic performance parameters may include: • coil characteristics • spray processes
Enterprise procedures	Enterprise procedures may include: • the use of tools and equipment • instructions, including job sheets, plans, drawings and designs • reporting and communication • manufacturer specifications • operational procedures • industry standards

Unit Sector(s)

Competency field

Unit sector Engineering science

Custom Content Section

Not applicable.