



Australian Government

CPCPMS4022A Commission air and water systems

Release 1

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Modification History

Changes to performance criteria, required skills and knowledge, range statement and critical aspects

Not equivalent to CPCPMS4002A

Unit Descriptor

This unit of competency specifies the outcomes required to test and commission air and water heating and cooling systems.

It covers preparing for the work, determining testing requirements, preparing systems for balancing, and the physical balancing, testing and commissioning of the systems and completion of work finalisation processes, including recording.

Application of the Unit

This unit applies to:

- ducting systems for air conditioning, heating or ventilation purposes in buildings Class 1 or 2 with a maximum static pressure of 0.75kPa and a maximum velocity of 12.5 metres per second
- piping systems conveying heating and chilled water operating at a maximum pressure of 700kPa or a maximum temperature of 100°C, with a maximum output of 50kW and total air quantities not exceeding 950 litres per second.

Site location for work application will be residential and commercial, and may be a new work site or an existing structure being renovated, extended, restored or maintained.

Licensing/Regulatory Information

In some jurisdictions, this unit of competency may form part of accreditation, licensing, legislative, regulatory or certification requirements.

Pre-Requisites

Nil

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 required performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

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|---|---------------------------------|-----|--|
| 1 | Prepare for work. | 1.1 | Information, plans and specifications are obtained. |
| | | 1.2 | <i>Work health and safety</i> (WHS) and <i>environmental requirements</i> testing and commissioning air and water systems are adhered to throughout the work. |
| | | 1.3 | <i>Quality assurance requirements</i> are identified and adhered to according to workplace requirements. |
| | | 1.4 | Tasks are planned and sequenced in conjunction with others involved in or affected by the work and <i>statutory and regulatory authorities'</i> requirements. |
| | | 1.5 | <i>Tools and equipment</i> for testing and commissioning air and water systems, including personal protective equipment, are selected and checked for serviceability. |
| | | 1.6 | Work area is prepared to support efficient testing and commissioning process. |
| 2 | Determine testing requirements. | 2.1 | Equipment is checked for safe operation and correct functioning. |
| | | 2.2 | Equipment performance data is checked against plans, specification requirements and other relevant <i>information</i> . |
| | | 2.3 | Instruments and associated equipment suitable for measuring quantities are selected according to job specification. |

- 3 Prepare system for balancing.
- 3.1 Dampers are set in the open or specified position and operational check of system-related fans and ducting is carried out according to workplace procedures.
- 3.2 Automatic control devices are energised to provide maximum demand for airflow.
- 3.3 Piping system is checked for flow direction and leaks, and operational check of system and related pumps is carried out.
- 3.4 All manual and automatic valves are set in the specified position.
- 4 Balance, test and commission system.
- 4.1 Valves or throttling devices are adjusted to achieve specified water flow ratings.
- 4.2 Air volumes moved by system fans are measured.
- 4.3 Dampers and terminal devices are correctly adjusted to achieve specified airflow ratings.
- 4.4 Automatic controls and devices are set to specified settings.
- 4.5 Testing and balancing of system is carried out according to job specification, manufacturer recommendations and *sustainability principles and concepts*.
- 4.6 Test and monitored results are documented in format required by job specification and/or manufacturer.
- 5 Restore work area.
- 5.1 Work area is cleared and materials disposed of, reused or recycled according to legislation, regulations, codes of practice, and job specification.
- 5.2 Tools and equipment are cleaned, checked, maintained and stored according to manufacturer recommendations and workplace procedures.
- 5.3 Documentation is completed according to workplace requirements.

Required Skills and Knowledge

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

Required skills

- communication skills to:
 - access information
 - determine requirements
 - enable clear and direct communication, using questioning to identify and confirm requirements, share information, listen and understand
 - follow instructions
 - use language and concepts appropriate to cultural differences
 - use and interpret non-verbal communication, such as hand signals
- literacy skills to:
 - complete workplace documentation
 - read and interpret:
 - documentation from a variety of sources
 - plans and specifications
 - record test and monitored results
- numeracy skills to apply measurements and calculations
- planning and organising skills to:
 - plan and sequence tasks with others
 - plan and set out work
- teamwork skills to work with others to action tasks and relate to people from a range of cultural and ethnic backgrounds and with varying physical and mental abilities
- technical skills to:
 - identify and accurately report to appropriate personnel any faults in tools, equipment or materials
 - test, balance and commission air conditioning, heating and ventilation ducting and piping systems
- technology skills to:
 - access and understand site-specific instructions in a variety of media
 - use mobile communication technology

Required knowledge

- application of mechanical, hydraulic, electric and electronic principles and safety requirements
- design concepts, tests and performance standards for measuring various water and air

systems

- effect of bacteria in water, and potential impact on health
- environmental impact of gases and Environment Protection Authority (EPA) requirements
- job safety analysis (JSA) and safe work method statements (SWMS)
- operating principles and characteristics of system components used in water and air systems
- performance standards for balancing systems
- processes of commissioning air and water systems
- relevant information sources for the work activity
- relevant statutory requirements related to installing, testing, balancing, commissioning and operation of air and water systems
- SI system of measurements
- standards applicable to testing, balancing and commissioning air and water systems
- workplace and equipment safety requirements

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

This unit of competency could be assessed in the workplace or a close simulation of the workplace environment providing that simulated or project-based assessment techniques fully replicate plumbing and services workplace conditions, materials, activities, responsibilities and procedures.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

A person who demonstrates competency in this unit must be able to provide evidence of:

- locating, interpreting and applying relevant information, standards and specifications to testing, balancing and commissioning air and water systems
- applying safety requirements throughout the work sequence, including electrical safety requirements and the use of personal protective clothing and equipment
- as a minimum, the ability to balance and commission an air conditioning system (up to 150 megajoules) for a domestic situation and a commercial air conditioning system for a structure of at least four floors, plus balance and commission a hydronic water heating system for a structure of at least four floors, ensuring:
 - application of sustainability principles and concepts
 - correct identification of details of the plan
 - correct selection and use of appropriate processes, tools and equipment
 - completion of all work to specification
 - compliance with regulations, standards and organisational quality procedures and processes
 - communicating and working effectively and safely with others.

Context of and specific resources for assessment

This competency is to be assessed using standard and authorised work practices, safety requirements and environmental constraints.

Assessment of essential underpinning knowledge will usually be conducted in an off-site context.

Assessment is to comply with relevant regulatory or Australian standards' requirements.

Resource implications for assessment include:

- an induction procedure and requirement
- realistic tasks or simulated tasks covering the minimum task requirements
- relevant specifications and work instructions
- tools and equipment appropriate to applying safe work practices
- support materials appropriate to activity
- workplace instructions relating to safe work practices and addressing hazards and emergencies
- material safety data sheets
- research resources, including industry-related systems information.

Reasonable adjustments for people with disabilities must be made to assessment processes where required. This could include access to modified equipment and other physical resources, and the provision of appropriate assessment support.

Method of assessment

Assessment methods must:

- satisfy the endorsed Assessment Guidelines of the Construction, Plumbing and Services Training Package
- include direct observation of tasks in real or simulated work conditions, with questioning to confirm the ability to consistently identify and correctly interpret the essential underpinning knowledge required for practical application
- reinforce the integration of employability skills with workplace tasks and job roles
- confirm that competency is verified and able to be transferred to other circumstances and environments.

Validity and sufficiency of evidence requires that:

- competency will need to be demonstrated over a period of time reflecting the scope of the role and the practical requirements of the workplace
- where the assessment is part of a structured learning

experience the evidence collected must relate to a number of performances assessed at different points in time and separated by further learning and practice, with a decision on competency only taken at the point when the assessor has complete confidence in the person's demonstrated ability and applied knowledge

- all assessment that is part of a structured learning experience must include a combination of direct, indirect and supplementary evidence.

Assessment processes and techniques should as far as is practical take into account the language, literacy and numeracy capacity of the candidate in relation to the competency being assessed.

Supplementary evidence of competency may be obtained from relevant authenticated documentation from third parties, such as existing supervisors, team leaders or specialist training staff.

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.

Work health and safety is to be according to commonwealth, state and territory legislation and regulations and may include:

- handling of materials
- hazard control
- personal protective clothing and equipment prescribed under legislation, regulations and workplace policies and practices
- safe operating procedures, including recognising and preventing hazards associated with:
 - hazardous materials and substances
 - identifying and testing for electrical hazards
 - other machines
 - surrounding structure and facilities
 - trip hazards
 - underground services
 - use of tools and equipment
 - work site visitors and the public

- working at heights
- working in confined spaces
- working in proximity to others
- use of firefighting equipment
- use of first aid equipment
- workplace environment and safety.

Environmental requirements are to cover water quality management and may include:

- clean-up protection
- ozone management
- stormwater protection
- waste management.

Quality assurance requirements may include:

- Environment Protection Authority (EPA)
- internal company quality assurance policy and risk management strategy
- International Standards Organisation
- site safety plan
- workplace operations and procedures.

Statutory and regulatory authorities include:

- commonwealth, state or territory, and local authorities administering applicable Acts, regulations and codes of practice.

Tools and equipment may include:

- elevated work platforms
- hand and power tools
- ladders
- scaffolds
- test equipment:
 - tachometer
 - anemometer
 - differential pressure gauges.

Information may include:

- charts and hand drawings
- instructions issued by authorised organisational or external personnel
- job drawings
- manufacturer specifications and instructions
- material safety data sheets (MSDS)
- memos

- organisation work specifications and requirements
- plans and sketches
- regulatory and legislative requirements, particularly those pertaining to:
 - building codes
 - WHS and environmental requirements
 - plumbing regulations
- relevant Australian standards
- safe work procedures relating to testing, balancing and commissioning air and water systems
- signage
- verbal, written and graphical instructions
- work bulletins
- work schedules, plans and specifications.

Sustainability principles and concepts:

- cover the current and future social, economic and environmental use of resources
- may include:
 - efficient use of material
 - correct handling of hazardous materials
 - efficient water usage
 - selecting appropriate components to ensure minimal environmental impact.

Unit Sector(s)

Functional area

Unit sector Plumbing and services

Custom Content Section

Not applicable.