



Australian Government

CPCPWT4011B Design and size heated and cold water services and systems

Release 1

CPCPWT4011B Design and size heated and cold water services and systems

Modification History

Minor changes throughout the unit
Equivalent to CPCPWT4011A

Unit Descriptor

This unit of competency specifies the outcomes required to design, size and document the layout of heated, tempered and cold water services, flushing systems, and hydrant and hose reel systems for multi-floor buildings.

It covers preparation for work, identification of water service and system requirements, planning the service and system layout and completion of work finalisation processes.

Application of the Unit

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

- | | | |
|---|--------------------------------------|---|
| 1 | Prepare for planning. | <p>1.1 Nature and scope of planning task are identified and confirmed.</p> <p>1.2 <i>Work health and safety</i> (WHS) and <i>environmental requirements</i> associated with planning, sizing and documenting the layout of heated, tempered and cold water services and systems are adhered to throughout the work.</p> <p>1.3 Work is organised and sequenced in conjunction with others involved in or affected by the work and <i>statutory and regulatory authorities</i>' requirements.</p> <p>1.4 <i>Tools and equipment</i> required for planning, sizing and documenting the layout of heated, tempered and cold water services and systems, including personal protective equipment, are selected and checked for serviceability.</p> <p>1.5 Work area in which planning process is to be conducted is prepared.</p> |
| 2 | Identify system requirements. | <p>2.1 Information and specifications for required work are obtained and confirmed, if necessary by site inspection using relevant <i>information</i>.</p> <p>2.2 Regulations and Australian standards relevant to the work are consulted and applied to all aspects of the work.</p> <p>2.3 Quantity, location and type of take-off points and fixtures are determined from plans and specifications.</p> |

- 2.4 Heated, tempered and cold **water services and systems** are sized according to relevant Australian standards and regulatory authorities' and workplace requirements.
- 3 **Plan service and system layout.**
- 3.1 Layout of heated, tempered and cold water services and systems to **point of discharge** are planned according to building plans, relevant Australian standards and workplace procedures.
- 3.2 **Materials** required are specified and optimised according to relevant Australian standards from the proposed design.
- 3.3 Plans are recorded according to regulatory authorities' and workplace requirements.
- 3.4 **Sustainability principles and concepts** are observed when preparing for and undertaking work process.
- 4 **Restore work area.**
- 4.1 Work area is restored according to workplace procedures.
- 4.2 Tools and equipment used in the process are refurbished and left according to workplace procedures.
- 4.3 Documentation, including work backup, 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
 - 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
- initiative and enterprise skills to identify and accurately report to appropriate personnel any faults in tools, equipment or materials
- literacy skills to:
 - complete workplace documentation, including work backup
 - read and interpret:
 - documentation from a variety of sources
 - regulations, relevant Australian standards, plans, specifications and drawings
 - record written plans
- 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 requirements, including system requirements
- technology skills to:
 - access and understand site-specific instructions in a variety of media
 - use mobile communication technology

Required knowledge

- characteristics and application of different pipes and fittings, including fixing and joining techniques and methods
- characteristics and application of water heating systems
- characteristics and application of water pumps and water storage tanks for multiple floor buildings
- drafting techniques, which may include the use of computers and computer-aided design

(CAD) software

- job safety analysis (JSA) and safe work method statements (SWMS)
- levelling and alignment processes
- process of designing, sizing and documenting the layout of heated, tempered and cold water services and systems
- processes for accessing information and for calculating material requirements
- properties of water, including pressure and flow rates
- relevant statutory requirements related to designing, sizing and laying out:
 - heated, tempered and cold water services and flushing systems, and fire hydrant and hose reel systems, including non-drinking water requirements
 - both mains pressure and low pressure flushing devices
- selection for installation of:
 - thermostatic mixing valves
 - backflow prevention devices
- SI system of measurements
- Australian standards applicable to the service and system
- water treatment processes
- 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, Australian standards and specifications to the design, sizing and layout of heated, tempered and cold water services and 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 design, size and document the layout of:
 - a water supply system for a building with a minimum of six floors (including a non-drinking supply)
 - a flush valve system for a multi-floor complex, for a building that is a minimum of 35 metres high
 - a heated/tempered water supply system for a building
 - a hydrant and hose reel system for a building with a minimum of six floors; ensuring:
 - application of sustainability principles and concepts
 - correct identification of location, design and details of proposed services and systems
 - correct selection and use of appropriate processes, tools and equipment
 - completion of all work to specification
 - compliance with regulations, relevant Australian 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 working 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:

- electricity
- hazardous materials and substances
- 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 cover water quality management and may include:

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

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:

- computers running appropriate CAD software
- drawing instruments
- measuring equipment.

Information may include:

- charts and hand drawings
- instructions issued by authorised organisational or external personnel
- 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, including AS/NZS3500 National plumbing and drainage
- safe work procedures relating to designing, sizing and documenting the layout of heated and cold water services and systems
- signage
- verbal, written and graphical instructions
- work bulletins
- work schedules, plans and specifications.

- Water services and systems*** include:
- drinking water from a water meter or storage tank to a point of discharge or storage
 - fire hydrant and hose reel systems
 - heated and tempered water service to a point of discharge
 - flushing systems
 - non-drinking water from a source to a point of discharge or storage.

- Point of discharge*** may be:
- fixture
 - isolating valve.

- Materials*** may include:
- building plans
 - job specifications
 - manufacturer specifications.

- Sustainability principles and concepts:***
- cover the current and future social, economic and environmental use of resources
 - may include:
 - efficient design principles to minimise environmental impact
 - efficient use of material in the design, including recycling of material
 - efficient energy and water use
 - disposing of waste material to ensure minimal environmental impact.

Unit Sector(s)

Functional area

Unit sector Plumbing and services

Custom Content Section

Not applicable.