



Australian Government

CPCPPS5002B Design gas reticulation systems

Release 1

CPCPPS5002B Design gas reticulation systems

Modification History

Minor changes throughout the unit
Equivalent to CPCPPS5002A

Unit Descriptor

This unit of competency specifies the outcomes required to design and size gas reticulation systems, including determining material, placement and ventilation requirements. The unit also covers the analysis and interpretation of relevant gas codes and standards, the preparation of documentation for testing and commissioning, and testing for safe operation.

Application of the Unit

This unit of competency supports development of skills and knowledge required for competent workplace performance in a consultancy or supervisory capacity in relation to plumbing services and hydraulics.

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	Evaluate design parameters.	1.1	Scope of work for gas reticulation systems is established.
		1.2	Design requirements are determined from plans, specifications and client brief.
		1.3	Cost-benefit analysis is conducted comparing a range of pipe materials and system designs.
		1.4	Statutory and regulatory requirements and Australian and New Zealand standards for the design of gas reticulation systems are analysed and applied.
		1.5	Manufacturer requirements and trade and technical manuals are interpreted.
		1.6	Additional research, including a desktop study , is conducted to outline design parameters.
		1.7	Performance requirements are established.
2	Plan and detail system components.	2.1	Layout of pipework systems and type and location of fittings and valves are planned.
		2.2	Pipe sizes are calculated for a range of applications.
		2.3	Ventilation and flue requirements are specified for a range of applications.
		2.4	Gas metering and measurement of gas consumption are conducted.
		2.5	Distribution pressures and specifications of regulators and appliances are detailed for a range of applications.
		2.6	Cylinder and tank systems are designed and detailed.
		2.7	Safety, ignition, thermostat and gas control devices are specified in compliance with relevant standards and codes.
		2.8	Pipe fixings are designed for a range of applications.
		2.9	Approved materials, jointing methods and installation requirements for gas reticulation systems are specified.

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| 3 | Design and size systems. | 3.1 | Gas reticulation systems are designed for a range of applications. |
| | | 3.2 | Gas reticulation systems are designed and sized using computer software packages. |
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| 4 | Prepare documentation. | 4.1 | Plans are prepared for a range of gas reticulation systems. |
| | | 4.2 | Specification for a gas reticulation system is prepared. |
| | | 4.3 | Testing and commissioning schedule is prepared. |
| | | 4.4 | Operation and maintenance manual is produced. |

Required Skills and Knowledge

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

Required skills

- analysing and interpreting relevant gas codes and standards
- communication skills to:
 - communicate with others to ensure safe and effective work practices
 - confirm job specifications and client requirements
 - enable clear and direct communication, using questioning to identify and confirm requirements, share information, listen and understand
 - use language and concepts appropriate to cultural differences
 - use and interpret non-verbal communication, such as hand signals
- initiative and enterprise skills to develop creative and responsive approaches
- literacy skills to:
 - prepare documentation, including:
 - operation and maintenance manual
 - plans, specifications and schedules
 - read and interpret:
 - documentation from a variety of sources
 - plans, specifications, drawings and design briefs
 - standards and manufacturer requirements and manuals
 - statutory and regulatory requirements
- numeracy skills to apply measurements and calculations
- planning and organising skills to:
 - research, collect, organise and understand information relating to the design of gas reticulation systems
 - take initiative and make decisions
- problem-solving skills to analyse requirements, consider options and design an appropriate system
- 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:
 - determine material, placement and ventilation requirements for a gas reticulation system
 - prepare documentation for testing and commissioning a gas reticulation system
 - test a gas reticulation system for safe operation

Required knowledge

- common terminology and definitions used in design of gas reticulation systems for all classes of building
- principles of technology used in design of gas reticulation systems
- requirements of state regulatory authorities, Australian standards and manufacturer specifications, including hazards identified in relation to devices and systems used
- workplace safety requirements, including relevant statutory regulations, codes and standards

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:

- evaluating and documenting design parameters, including client, regulatory, manufacturer and Australian and New Zealand standard requirements for a range of gas reticulation systems
- producing an appropriate layout for gas reticulation systems planned according to manufacturer and regulatory requirements
- calculating pipe sizes according to regulations and manufacturer requirements
- designing and sizing gas reticulation systems using appropriate software
- preparing plans for a range of gas reticulation systems
- preparing specifications for gas reticulation systems
- preparing testing and commissioning schedules
- producing operation and maintenance manuals.

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, including design brief drawings, specifications, codes, design concepts and construction schedules
- tools and equipment appropriate to applying safe work practices, including computers, software and calculators
- 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.

Scope of work:

- must include:
 - interpretation of plans and specifications
 - sizing and documenting layout of gas reticulation systems for applications, including residential, commercial and industrial
 - may be for new projects or an existing structure being renovated, extended, restored or maintained.

Design requirements must include:

- architectural specifications
- builder specifications
- owner requirements
- specialist use applications.

Cost-benefit analysis:

- compares the range of suitable materials and system choices available to enable cost-effective choices to be made without compromising integrity of project.

Statutory and regulatory

- Acts, regulations and local and state government

requirements and Australian and New Zealand standards include:

- policies, including group and strata titling
- AS/NZS1596 The storage and handling of LP gas
- AS5601 (AG601) Gas installations
- Gas Act 1965 and amendments
- gas regulations
- gas utility and supplier information and requirements
- industry standards
- manufacturer requirements
- National Construction Code.

Manufacturer requirements include:

- material specifications
- pump tables
- sizing tables
- technical and trade manuals.

Desktop study includes collection and interpretation of existing data for design purposes in:

- architectural and building plans
- council plans
- developer plans
- other documents, including:
 - applications
 - forms
 - other reports as available.

Layout of pipework systems must:

- have principles of economy, serviceability, durability and fit for use applied
- not unduly affect building integrity and aesthetic appeal.

Fittings and valves include:

- bends
- couplings
- regulators
- tees
- unions.

Calculations must include:

- energy
- gas volume
- pressure
- sizing

- storage.

Ventilation and flue requirements must include:

- appliance flue design and ventilation requirements according to standards, regulations and gas authorities' requirements.

Specifications of regulators include:

- adjustment procedures of regulators
- excessive pressure protection types of regulators
- gas regulation method
- identification, analysis and documentation of regulator faults
- principles of operation
- selection and installation requirements
- sizing of regulators
- types of gas regulators.

Specifications of appliances include:

- commercial appliances
- components
- construction of the appliance
- domestic appliance design
- electronic controls
- industrial appliances.

Design of cylinder and tank systems is based on:

- anticipated use
- appropriate time period between refilling
- gas storage requirements calculations.

Pipe fixings include:

- anchors
- bracket spacing
- corrosion protection
- cover
- hanging brackets
- material requirements
- saddles
- wall and ceiling brackets.

Materials include:

- copper (Cu)
- fittings and fixtures
- galvanised steel

- polyethylene (PE)
- unplasticised polyvinyl chloride (PVC-U).

Jointing methods include:

- brazing and threading
- gluing
- mechanical joints
- rubber ring
- solvent cement welding.

Installation requirements include:

- clipping, bedding and installation detail
- installation requirements for mobile, marine installation and portable appliances (high and low-pressure)
- jointing requirements
- level of workmanship.

Plans include:

- axonometrics
- cross-sections
- details
- elevations
- isometrics
- schematics, which may be produced using:
 - computer generation
 - drawing equipment
- sections.

Specification includes:

- appliances
- bedding
- clipping
- details of specialised components
- jointing
- manufacturer requirements
- materials
- valves
- workmanship.

Testing includes:

- bubble leak testing
- electronic gas leak detection
- flow testing

- inspection checklist
- pressure testing
- quality assurance (QA) audit.

Commissioning schedule must include:

- checking for burrs and obstructions
- commissioning appliances
- confirming fit for purpose
- purging system
- removing contaminants.

Operation and maintenance manual includes:

- check for blockages
- leak detection
- regular inspection
- regular maintenance requirements.

Unit Sector(s)

Functional area

Unit sector Plumbing and services

Custom Content Section

Not applicable.