Australian Government

CPCPPS5000B Design gas bulk storage systems

Release 1

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

CPCPPS5000B Design gas bulk storage systems

Modification History

Minor changes throughout the unit
Equivalent to CPCPPS5000A

Unit Descriptor

This unit of competency specifies the outcomes required to design gas bulk storage systems, determine relevant installation details and prepare system specifications for a range of residential, commercial and industrial buildings.

Application of the Unit

This unit of competency supports the 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 bulk storage 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 bulk storage 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 a liquefied petroleum gas (LPG) bulk storage installation is determined according to regulatory authorities.
		2.2	Site plans for bulk installations are prepared, including ***layout of pipework systems***.
		2.3	Fire protection systems are specified according to Australian and New Zealand standards and deluge systems are detailed.
		2.4	***Control valves and fittings*** are designed and detailed.
		2.5	Content gauges are analysed and located according to code requirements, and ***meters*** and regulators are specified.
		2.6	Vaporisers are evaluated and specified and vaporisation rates are calculated.
		2.7	***System calculations*** are performed for a range of applications according to regulations and manufacturer requirements.

		2.8	***Pipe fixings*** are designed for a range of applications.
		2.9	Approved ***materials***, ***jointing methods*** and ***installation requirements*** for gas bulk storage systems are specified.
3	Design and size systems.	3.1	Gas bulk storage systems and circuits are designed for a range of applications.
		3.2	Deluge systems are designed.
		3.3	Gas bulk storage systems are designed and sized using computer software packages.
4	Prepare documentation.	4.1	***Plans*** are prepared for a range of gas bulk storage systems.
		4.2	***Specification*** for a gas bulk storage 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

- 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
- literacy skills to:
  - prepare written documentation, including:
    - operation and maintenance manual
    - plans, specifications and schedules
  - read and interpret:
    - documentation from a variety of sources
    - standards and manufacturer requirements and manuals
    - plans, specifications, drawings and design briefs
    - statutory and regulatory requirements
- initiative and enterprise skills to develop creative and responsive approaches
- numeracy skills to apply measurements and calculations
- planning and organising skills to:
  - research, collect, organise and understand information relating to the design of gas bulk storage 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 relevant gas storage installation details
  - prepare gas storage system specifications

Required knowledge

- common terminology and definitions used in design of gas bulk storage systems for all

classes of building
- drafting principles
- nature of materials used and effects of performance under various conditions
- principles of technology in the design of gas bulk storage 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 bulk storage systems
- planning and detailing system components, including:
  - meters
  - pipes
  - regulators
  - valves
  - vaporisers
- designing a deluge system
- designing and sizing gas bulk storage systems using appropriate software
- preparing plans for a range of gas bulk storage systems to industry standards
- preparing specifications for gas bulk storage system installations
- 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
- tools and equipment appropriate to applying safe work practices and relevant to planning processes, including calculators
- support materials appropriate to activity, including computers and software
- 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 includes:

- interpretation of plans and specifications
- principles of operation of various types of LPG components and fault conditions in LPG components
- sizing and documenting layout of gas bulk storage installations, including fire protection systems, such as:
- chemical injection
- extinguishers
- hose reels
- hydrants
- monitors
- portable and fixed types of firefighting equipment
- spray systems.

Design requirements must include:

- architectural specifications
- builder specifications

	• owner requirements • specialist gas 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 requirements and Australian and New Zealand standards must include:	• Acts, regulations and local and state government policies, including group and strata titling • AS/NZS1596 The storage and handling of LP gas • AS2430 Classification of hazardous areas • AS5601 (AG601) Gas installations • National Construction Code.
Manufacturer requirements include:	• pump tables • sizing tables • specifications • 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.

Performance requirements must include:	• operational and safety requirements, established using Australian and New Zealand standards, and local and state authority plans.
Layout of pipework systems must:	• not unduly affect building integrity and aesthetic appeal • have principles of economy, serviceability, durability and fit for use applied.
Control valves and fittings may include:	• valves: • applications of valves and code requirements for

installation
- emergency shutdown valves
- excess flow valves
- hydrostatic relief valves
- individual valve types

- fittings:
  - bends
  - inspection openings
  - junctions
  - meters
  - reflux valves
  - staged regulators
  - traps
  - vaporisers.

Meters include:

- mass flow
- positive displacement
- turbine.

System calculations must include:

- determination of flow and appliance loadings
- interpretation of design charts and tables
- pipe sizing calculations.

Pipe fixings include:

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

Materials include:

- concrete
- copper
- fittings and valves
- high density polyethylene (HDPE)
- measures to prevent the spread of fire.

Jointing methods include:

- brazing
- mechanical joints
- solvent cement welding
- threading.

Installation requirements include:

- bedding
- clipping
- concrete support
- installation details
- 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:

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

Testing includes:

- air pressure test
- gas leak test
- quality assurance (QA) audit.

Commissioning schedule must include:

- flow testing
- leak check
- vaporisation rate check.

Operation and maintenance manual may include:	• leak detection • regular maintenance requirements • safety inspection • yearly inspection.

Unit Sector(s)

Functional area

Unit sector Plumbing and services

Custom Content Section

Not applicable.