



Australian Government

CPCPPS5025A Design grey water re-use systems

Release 1

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Modification History

Changes to unit title, descriptor, application, performance criteria, required skills and knowledge, range statement and critical aspects
Not equivalent to CPCPPS5005A

Unit Descriptor

This unit of competency specifies the outcomes required to design grey water re-use systems. The unit requires the ability to consider legislation, risk implications, and collection, treatment, diversion and storage options when designing these systems.

Application of the Unit

This unit of competency supports the needs of experienced tradespeople with a responsibility for designing grey water re-use systems.

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. | <p>1.1 Scope of work is established for design of grey water reuse systems for wide span and high-rise building projects.</p> <p>1.2 Design requirements are determined from relevant Australian standards, codes, plans, specifications and client brief.</p> <p>1.3 Potential household or community health and environmental risks are identified and measures to protect public health are identified and implemented.</p> <p>1.4 Cost-benefit analysis is conducted.</p> <p>1.5 National water programs, statutory and regulatory requirements, and relevant Australian standards and codes for the design of grey water re-use systems are interpreted, analysed and applied.</p> <p>1.6 Manufacturer requirements and trade and technical manuals are interpreted.</p> <p>1.7 Additional research, including a desktop study, is conducted to outline design parameters.</p> <p>1.8 Performance requirements are established, considering safety of system users or building occupants.</p> |
| 2 | Plan and detail system components. | <p>2.1 Primary, secondary and advanced secondary treatment and tertiary systems are detailed.</p> <p>2.2 Layout of pipework systems and type and location of fittings, valves, controls and other system components are planned.</p> <p>2.3 Changes to building drainage system are designed and detailed, and inspection requirements are identified.</p> <p>2.4 Diversion, storage, disposal, wet weather storage, and land application options are evaluated and detailed, problems are identified and solutions applied.</p> <p>2.5 Stored and pressurised grey water systems for irrigation, sanitary flushing and other approved use are detailed.</p> |

- 2.6 **Storage tanks** and approved disposal options are designed and detailed.
 - 2.7 **Pipe size and pump duty calculations** are made and **pumpwell, pump and pump control requirements** are sized and detailed.
 - 2.8 Approved **materials** and **jointing methods** for grey water re-use systems are evaluated, **pipe supports** are designed and **installation requirements** are specified.
- 3 **Design and size systems.**
 - 3.1 Grey water reuse systems are designed for a range of residential, commercial and industrial applications to include water treatment and backflow protection of drinking and non-drinking water supply systems.
 - 3.2 Grey water reuse systems are designed to ensure that the system can be properly and safely maintained.
 - 3.3 Grey water reuse systems are designed and sized using calculations and computer software packages.
 - 3.4 **Sustainability principles and concepts** are applied throughout the design process.
- 4 **Prepare documentation.**
 - 4.1 Client brief of the desired design is prepared.
 - 4.2 **Plans** and **specifications** are prepared for a range of grey water re-use systems.
 - 4.3 **Testing** and **commissioning schedule** is prepared.
 - 4.4 **Operation and maintenance manual** is produced, including information on how to properly and safely maintain the system.

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
- 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:
 - plans, specifications, drawings and design briefs
 - standards and manufacturer requirements and manuals
 - statutory and regulatory requirements
- numeracy skills to:
 - apply measurements and calculations
 - interpret data
- planning and organising skills to:
 - research, collect, organise and understand information relating to the design of grey water re-use systems
 - take initiative and make decisions
 - problem-solving skills to analyse requirements, consider options and design an appropriate system
- technical skills to apply design concepts and principles relating to hydraulic systems
- technology skills to:
 - access and understand site-specific instructions in a variety of media
 - use mobile communication technology

Required knowledge

- approved installation methods are identified

- hazards associated with devices and systems used in the hydraulic sector
- nature of materials and effect of their performance in a variety of conditions
- organisational quality procedures and processes
- principles of technology in the design of grey water re-use systems for residential, commercial and industrial applications to include water treatment and backflow protection of drinking and non-drinking water supply systems
- required Australian standards, codes, manufacturer specifications, National Construction Code (NCC) and operating procedures relevant to the sector
- terminology and definitions used in hydraulic design
- work drawings and specifications
- work health and safety (WHS) 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, as a minimum, provide evidence of the ability to:

- design, size and document the layout details, including a specification for a high-rise mixed development building and a wide span project, such as a school or industrial complex, including:
 - evaluating and documenting design parameters, including client, regulatory, manufacturer and relevant Australian standard code requirements for a range of grey water re-use systems
 - planning and detailing system components, including:
 - storage tanks
 - system overflow
 - treatment systems
 - piping systems
 - plumbing systems
 - usage systems
- designing and sizing a grey water reuse system
- preparing plans and specifications for a range of grey water reuse systems to industry standards
- preparing testing and commissioning schedules
- preparing operation and maintenance manuals
- applying sustainability principles and concepts throughout the system design
- communicating with others to ensure safe and effective work site operations.

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 grey water re-use systems for residential, commercial and industrial applications to include water treatment and backflow protection of drinking and non-drinking water supply systems
- may be for new projects or an existing structure being renovated, extended, restored or maintained.

Design requirements must include:

- architectural plans
- building specifications
- owner requirements
- pipework identification
- sizing of pipework
- backflow protection of drinking and non-drinking water supply systems
- water treatment
- specialist water use applications.

Health and environmental risks include:

- health risks, which may include:
 - abdominal pain
 - acute enteritis
 - bacillary dysentery
 - chest pain
 - cholera
 - common colds
 - coughing
 - diarrhoea
 - digestive and nutritional disturbances
 - dysentery
 - fever
 - gastroenteritis
 - giardiasis
 - helminthes, including flukes and worms
 - hepatitis
 - hookworm disease
 - infectious hepatitis
 - meningitis
 - muscle aches
 - neurological symptoms, including nervousness and insomnia
 - poliomyelitis
 - respiratory infections, such as pneumonia
 - restlessness
 - salmonellosis (food poisoning)
 - taeniasis
 - toxoplasmosis

- typhoid fever
- vomiting
- weight loss
- environmental risks, which may include:
 - algal blooms
 - excess nutrient loads
 - fish kills
 - oxygen depletion.

Measures to protect public health must include:

- auditing
- contact avoidance
- contact minimisation
- disinfection and sterilisation
- education
- legislation
- licensing
- maintenance
- separation barriers
- set back distances
- timing discharges
- wet weather storage.

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, such as suitable treatment, disposal options and disinfection options
- water savings and environmental benefits compared to initial and ongoing maintenance costs.

National water programs, statutory and regulatory requirements, relevant Australian standards, and codes may include:

- Acts and regulations
- Australian standard requirements, including:
 - AS/NZS1546 On-site domestic wastewater treatment units
 - AS/NZS1547 On-site domestic wastewater management
 - AS/NZS3500 National plumbing and drainage
 - AS2200 Design charts for water supply and sewerage
- National Construction Code

- commonwealth, state or territory government policies, including health departments.

Manufacturer requirements must include:

- material specifications
- grey water treatment systems
- pump installation
- pipe sizing
- storage systems
- technical and trade manuals.

Desktop study may include collection and interpretation of data for design purposes in:

- architectural and building plans
- developer plans
- manufacturer data
- other documents, including:
 - applications
 - brochures
 - forms
 - policies
 - other reports as available.

Performance requirements may include:

- compliance limits for:
 - bacteria levels
 - chlorine levels
 - nutrients
 - pH
 - phosphates
- requirements established using relevant Australian standards, codes and local authority plans, including:
 - cover
 - discharge
 - flow conditions
 - pipe grades.

Layout of pipework systems:

- may include:
 - drainage systems
 - elevated pipework systems
 - gravity systems
 - pumped and rising mains

- stack systems, may include:
 - fully vented
 - fully vented modified
 - single stack
 - single stack modified
 - waste stack
 - two-pipe system
 - reduced velocity aerator system
- should not unduly affect building integrity and aesthetic appeal
- includes location of pipework (fire rating of enclosure)
- should demonstrate principles of economy, serviceability, durability and fit for use.

Fittings, valves and controls must include:

- backflow prevention devices
- irrigation control systems
- isolating valves
- level indicators
- pump controls.

Land application options may include:

- surface irrigation
- subsurface irrigation
- spray irrigation.

Storage tanks may include:

- connections
- containment
- location
- material
- overflow provision
- pumps
- sizing
- support
- switches
- valves
- vermin control.

Pipe size and pump duty calculations may include:

- calculating pipe sizing
- calculating pressure and flow requirements

- determining flow and fixture loadings
- interpreting design charts and tables.

Pumpwell, pump and pump control requirements may include:

- automatic controls
- capacity
- corrosion-resistant materials
- detailing
- high and low-level water controls and alarms
- inlet and outlet design requirements
- installation and mounting requirements
- macerator requirements
- pump sizing
- pumpwell sizing
- selection of pump type
- valve requirements
- warning system.

Materials may include:

- copper (Cu)
- polypropylene (PP)
- polybutylene (PB)
- polyethylene (PE)
- unplasticised polyvinyl chloride (PVC-U)
- other approved material.

Jointing methods may include:

- brazing
- compression joints
- electrofusion welding
- mechanical joints
- solvent cement
- threading
- other approved jointing methods.

Pipe supports include:

- anchors
- bedding
- bracket spacing
- concrete support
- corrosion protection
- manufacturer-recommended specific fixings
- material requirements

- provision for expansion
- saddles.

Installation requirements may include:

- pipe protection, which may include:
 - cover
 - corrosion
 - impact
- fire rating
- level of workmanship
- manufacturer-recommended specific fixings
- pipe support
- provision for expansion
- serviceability and access.

Sustainability principles and concepts:

- cover the current and future social, economic and environmental use of resources
- may include:
- selecting appropriate material to ensure minimal environmental impact
- efficient use of material
- efficient energy usage/capital outlay comparison
- local environment consideration
- water efficiency
- reuse of greywater
- consideration of the Green Building Council of Australia rating scheme.

Plans:

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

Specification may include:

- backflow prevention

- flow requirements
- jointing
- manufacturer requirements
- materials
- residual pressures
- safety (WHS)
- specialised components
- storage
- support
- testing
- valve selection
- water treatment
- workmanship.

Testing may include:

- air pressure
- backflow protection
- defect inspection
- drainage inspection
- hydrostatic
- performance:
 - flow
 - pressure
- water quality
- quality assurance (QA) audit.

Commissioning schedule may include:

- balancing disposal system
- flow and pressure adjustments
- leak check
- pump settings
- pressure test
- safety requirements
- system certification
- system flushing
- system defects
- system functions as per design
- system purge
- valve operation
- ventilation
- vermin control.

Operation and maintenance manual may include:

- as installed drawings
- certification documentation
- land application compliance checks
- maintenance schedules
- manufacturer brochures
- ongoing maintenance requirements
- pump maintenance
- regular inspections
- results of commissioning test
- safety management system
- surface ponding checks
- system detail, setting and operations
- valve function
- system operational parameter adjustments and checks, including:
 - chlorine levels
 - dissolved oxygen
 - nitrates
 - pH
 - phosphates
 - suspended solids
 - water quality.

Unit Sector(s)

Functional area

Unit sector Plumbing and services

Custom Content Section

Not applicable.