Australian Government

Department of Education, Employment and Workplace Relations

CPCPPS5012A Design siphonic stormwater drainage systems

Release: 1

CPCPPS5012A Design siphonic stormwater drainage systems

Modification History

Not Applicable

Unit Descriptor

Unit descriptor This unit of competency specifies the outcomes required to design siphonic stormwater drainage systems, determine installation details, and prepare specifications for a range of residential, commercial and industrial buildings.

Application of the Unit

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

Not Applicable

Pre-Requisites

Prerequisite units Nil

Employability Skills Information

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

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Evaluate design parameters.	1.1. ***Scope of work*** is established for siphonic stormwater drainage systems. 1.2. ***Design requirements*** are determined from plans, specifications and client briefs. 1.3. ***Siphonic system attributes*** are evaluated and ***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 siphonic stormwater drainage systems are analysed and applied. 1.5. Stormwater design manuals, ***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. Siphonic stormwater drainage systems are integrated with the building structure. 2.2. Volume of roof water and stormwater is calculated using a range of approved methods. 2.3. ***Layout of pipework systems*** and type and location of ***fittings and valves*** are planned. 2.4. ***Pipe size and pipe grade requirement calculations*** are performed for a range of applications in accordance with regulations and manufacturer requirements. 2.5. ***Pipe fixings*** are designed for a range of applications. 2.6. Approved ***materials and components***, ***jointing methods*** and ***installation requirements*** for siphonic stormwater drainage systems are specified.
3. Design and size systems.	3.1. Siphonic stormwater drainage systems are designed for a range of applications. 3.2. Catchment areas are calculated, guttering requirements determined and siphonic systems sized. 3.3. Siphonic stormwater drainage systems are designed and sized using ***computer software packages***.
4. Prepare documentation.	4.1. ***Plans*** are prepared for a range of siphonic stormwater drainage systems. 4.2. ***Specification*** for a siphonic stormwater drainage

ELEMENT	PERFORMANCE CRITERIA
	system is prepared. 4.3. ***Testing*** and ***commissioning schedule*** is prepared. 4.4. ***Operation and maintenance manual*** is produced.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

Required skills for this unit are:

- 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
  - read and interpret:
    - plans, specifications, drawings and design briefs
    - standards and manufacturer requirements and manuals
    - statutory and regulatory requirements
  - use language and concepts appropriate to cultural differences
  - use and interpret non-verbal communication, such as hand signals
- written skills to prepare documentation, including:
  - operation and maintenance manual
  - plans, specifications and schedules
- determining installation details for siphonic stormwater drainage systems
- innovation skills to develop creative and responsive approaches
- numeracy skills to:
  - apply measurements and calculations
  - interpret data
- planning and organisational skills to:
  - research, collect, organise and understand information relating to the design of siphonic stormwater systems
  - take initiative and make decisions
- preparing specifications for siphonic stormwater drainage systems
- problem solving skills to analyse requirements, consider options and design an

REQUIRED SKILLS AND KNOWLEDGE

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.

Required knowledge

Required knowledge for this unit is:

- common terminology and definitions used in design of siphonic stormwater drainage 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 siphonic stormwater drainage 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

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 siphonic stormwater drainage systems
- producing an appropriate layout for siphonic stormwater drainage systems, planned in accordance with manufacturer and regulatory requirements
- calculating pipe sizes in accordance with regulations and manufacturer requirements
- designing and sizing siphonic stormwater drainage systems using appropriate software
- preparing plans for a range of siphonic stormwater drainage systems
- selecting materials and components for compliance, fit for purpose, durability, compatibility and cost-effectiveness
- preparing specifications for siphonic stormwater drainage 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

EVIDENCE GUIDE

	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:

EVIDENCE GUIDE

- 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

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:

- calculation of rainfall intensities in given catchment areas, including:
  - average rainfall intervals
  - meteorological information

RANGE STATEMENT

	• rainfall intensities • roof calculations • surface and subsurface calculations • time and concentration • interpretation of plans and specifications • sizing and documenting layout of siphonic stormwater drainage systems for residential, commercial or industrial applications and for either new projects or an existing structure being renovated, extended, restored or maintained.
Design requirements include:	• owner requirements • architectural specifications • builder specifications • specialist water use applications.
Siphonic system attributes include:	• availability • cost • installation requirements • risks • site conditions.
Cost-benefit analysis includes:	• comparison of 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 include:	• Acts, regulations and local and state government policies, including group and strata titling • AS/NZS3500 National plumbing and drainage set • AS2200 Design charts for water supply and sewerage • Building Code of Australia.
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 from:	• architectural and building plans • council plans • developer plans • other documents, including: • applications

RANGE STATEMENT

	• forms • sewer detail maps • other reports as available.
Performance requirements include:	• pipe grades, cover, flow conditions and discharge requirements, established using Australian and New Zealand standards and local authority plans.
Layout of pipework systems:	• includes consideration of: • amenity of the building • clipping and pipe support • fireproofing • function of the building • impingement on floor heights • materials to be used • size of penetrations • type of building structure • should not unduly affect building integrity and aesthetic appeal • should have principles of economy, serviceability, durability and fit for use applied.
Fittings and valves include:	• bends • inspection openings • junctions.
Pipe size and pipe grade requirement calculations include:	• discharge • flow • freeboard • manufacturers' tables • sizing, according to Australian and New Zealand standards • urban drainage requirements • velocity • volumes.
Pipe fixings include:	• anchors • bracket spacing • corrosion protection • cover • hanging brackets • material requirements • saddles

RANGE STATEMENT

	• wall and ceiling brackets.

Materials and components include:	• appropriate materials specified, based on fit for purpose, durability, compatibility and cost-effectiveness, including:
	  • high density polyethylene (HDPE)
	  • polyvinyl chloride (PVC)
	  • stainless steel
	• components, including:
	  • clips
	  • fasteners
	  • fittings
	  • pipework
	  • siphonic outlets
	  • valves.

Jointing methods include:	• brazing • gluing • mechanical joints • rubber ring • solvent cement welding • threading.
Installation requirements include:	• bedding • clipping • concrete support • installation details • jointing requirements • level of workmanship.
Computer software packages include:	• manufacturers' software • proprietary design software.

Plans include:	• elevations
	• details
	• cross-sections
	• isometrics
	• axonometrics
	• schematics, which may be produced using:
	  • pencil
	  • Indian ink
	  • pigment liner
	  • computer generation
	• sections.

RANGE STATEMENT

Specification includes:	• bedding • clipping • concrete support • details of specialised components • jointing • manholes • manufacturer requirements • materials • workmanship.
Testing includes:	• air pressure test • hydrostatic test • inspection • quality assurance (QA) audit.
Commissioning schedule includes:	• charging traps • checking leaks • cleaning grates • purging system.
Operation and maintenance manual includes:	• check for blockages • leak detection • regular inspection • regular maintenance requirements.

Unit Sector(s)

Unit sector Plumbing and services

Co-requisite units

Co-requisite units Nil

Functional area

Functional area