



Australian Government

CPCPFS5012A Design fire hydrant and hose reel systems

Release 1

CPCPFS5012A Design fire hydrant and hose reel systems

Modification History

Changes to performance criteria, required skills, range statement and critical aspects
Not equivalent to CPCPFS5002A

Unit Descriptor

This unit of competency specifies the outcomes required to design fire hydrant, hose reel and storage systems to Australian and New Zealand standards, the National Construction Code (NCC) and other relevant legislative requirements in order to meet fire protection standards.

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 construction hydraulics.

Licensing/Regulatory Information

The design of fire hydrants, hose reels and storage systems must comply with Australian and New Zealand standards, the National Construction Code (NCC) and other relevant legislative requirements in order to meet fire protection standards.

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 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

- | | | |
|---|------------------------------------|--|
| 1 | Evaluate design parameters. | <p>1.1 <i>Scope of work</i> is established for fire hydrants, hose reels and distribution systems for wide span and high-rise building projects.</p> <p>1.2 <i>Design requirements</i> are determined from plans, specifications and client brief.</p> <p>1.3 <i>Cost-benefit analysis</i> is conducted comparing a range of pipe materials and system designs.</p> <p>1.4 Fire department, <i>statutory and regulatory requirements</i> and <i>Australian and New Zealand standards</i> for the design of fire hydrants, hose reels and distribution systems are analysed, interpreted and applied.</p> <p>1.5 <i>Manufacturer requirements</i> and trade, technical and sizing manuals are interpreted.</p> <p>1.6 Additional research, including a <i>desktop study</i>, is conducted to outline design parameters.</p> <p>1.7 <i>Flow and pressure tests</i> are conducted.</p> <p>1.8 <i>Performance requirements</i> are established.</p> |
| 2 | Plan and detail system components. | <p>2.1 <i>Layout of pipework</i> and type and location of <i>fittings and valves</i> are planned.</p> <p>2.2 Type, location and requirements for backflow prevention devices are detailed.</p> <p>2.3 Pipe sizes, velocities, flows and pressures are calculated for a range of applications.</p> |

- 2.4 Approved **materials, jointing methods** and **installation requirements** are specified.
 - 2.5 Hydrant **booster, standpipe** and **hose reel assemblies** are detailed.
 - 2.6 **Thrust blocks** are designed for a range of applications.
 - 2.7 **Pipe fixings** are designed for a range of applications.
 - 2.8 **Pump, pump controls and pumphouse requirements** are sized and detailed.
 - 2.9 **Water storage systems** are designed and detailed.
- 3 Design and size systems.
 - 3.1 Fire hydrant and hose reel systems are designed for a range of wide span and high-rise building applications.
 - 3.2 Combined water supply, fire hydrant, hose reel and sprinkler systems are designed for a range of wide span and high-rise building applications.
 - 3.3 Range of **delivery systems** is designed.
 - 3.4 Fire hydrant and hose reel systems are designed and sized using computer software packages.
 - 3.5 **Sustainability principles and concepts** are observed when preparing for and undertaking work process.
- 4 Prepare documentation.
 - 4.1 **Plans** are prepared for a range of fire hydrant and hose reel systems.
 - 4.2 Block plan is prepared for booster cabinet according to Australian and New Zealand standards.
 - 4.3 **Specification** for a fire hydrant and hose reel system is prepared.
 - 4.4 **Testing and commissioning schedule** is prepared.
 - 4.5 **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:
 - access information
 - 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
 - identify and accurately report to appropriate personnel any faults in tools, equipment or materials
- literacy skills to:
 - prepare written documentation, including:
 - operation and maintenance manual
 - plans, specifications and reports
 - read and interpret:
 - documentation from a variety of sources
 - plans and specifications
- 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 fire-compliant hydraulic systems
 - take initiative and make decisions
- problem-solving skills to:
 - analyse requirements
 - carry out tests
 - consider options
 - design an appropriate system
 - identify typical faults and action required to rectify problems
- 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 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

- Australian and New Zealand standards, manufacturer specifications, NCC and other applicable codes or standard operating procedures relevant to the sector
- hazards associated with devices and systems used in the hydraulic sector
- installation methods used in hydraulic systems
- nature of materials used and effects of performance under various conditions
- terminology and definitions used in hydraulic design
- 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.

It may be assessed on its own or as part of an integrated assessment activity involving effective performance and application of principles used to design fire hydrant and hose reel systems.

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:

- establishing and evaluating design parameters for a range of fire hydrant and hose reel systems
- planning system components for a range of fire hydrant and hose reel systems, including:
 - application of sustainability principles and concepts
 - booster assemblies
 - hose reels
 - hydrants
 - storage tanks
 - thrust blocks
- complying with WHS regulations applicable to workplace operations
- applying organisational quality procedures and processes within context of restoring plastered surfaces to conservation requirements
- designing and sizing a range of fire hydrant and hose reel systems
- developing a checklist with all information and formulas required to carry out flow and pressure tests
- preparing plans for a range of fire hydrant and hose reel systems
- preparing a specification for a fire hydrant and hose reel system
- preparing a testing and commissioning schedule

- producing an operation and maintenance manual
- 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
- tools and equipment appropriate to applying safe work practices
- support materials appropriate to activity
- workplace instructions relating to safe work 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 may include:

- interpretation of plans and specifications
- sizing and documenting layout of fire hydrant and hose reel systems, including:
 - combined fire sprinkler, hydrant and hose reel systems
 - combined hydrant and hose reel systems
 - emergency egress
 - separate hydrant and hose reel systems
- equipment that may be for residential, commercial

and industrial projects and for a new or an existing structure being renovated, extended, restored or maintained.

Design requirements may include:

- architectural specifications
- builder specifications
- owner requirements
- specialist water use applications
- relevant statutory authorities.

Cost-benefit analysis may include:

- comparison of range of suitable materials and system choices available to enable cost-effective choices to be made without compromising project
- life cycle cost-benefit analysis.

Statutory and regulatory requirements may include:

- Acts and regulations
- local and state government policies.

Australian and New Zealand standards may include:

- AS/NZS3500 National plumbing and drainage: Part 1
- AS2419 Fire hydrant installations – system design, installation and commission
- AS2441 Installation of fire hose reels
- AS/NZS2118 Automatic fire sprinkler systems – general requirements
- NCC.

Manufacturer requirements may include:

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

Desktop study may include:

- collection and interpretation of existing data for design purposes from:
 - architectural and building plans
 - council requirements
 - developer requirements
 - regulatory requirements
 - environmental, social and economic

considerations

- other documents and reports as appropriate.

Flow and pressure tests may include:

- results of flow and pressure tests
- on-site measurement of flow (l/s), velocity (m/s) and pressure (kPa).

Performance requirements may include:

- flow, velocity, pressure and discharge requirements, established using Australian and New Zealand standards and local statutory authority's plans.

Layout of pipework may include:

- dual feed
- ring main
- single pipe.

Fittings and valves may include:

- fittings:
 - mechanical fittings
 - bends
 - elbows
 - tees
 - unions
- valves:
 - backflow prevention
 - pressure relief
 - isolating
 - pressure limiting
 - pressure reduction.

Materials may include:

- copper
- galvanised steel
- fittings and fixtures
- other approved materials.

Jointing methods may include:

- flanged
- mechanical joints
- silver braze
- threaded
- welded

- other approved methods of jointing.

Installation requirements may include:

- corrosion and elements protection
- installation details
- jointing requirements
- supports
- workmanship and quality control.

Booster and standpipe assemblies may include:

- cabinet and block plans
- non-return and isolating valves
- fire appliance (hard stand) access
- pressure gauges
- suction and delivery outlets
- testing points
- signage.

Hose reel assemblies may include:

- Australian standards' requirements for clearances and requirements
- non-return and backflow prevention valves
- pipe sizes.

Design elements of **thrust blocks** may include:

- designed and installed to AS/NZS3500
- design details for tees, elbows and valves
- keying and anchorage points
- sizes
- soil characteristics
- velocity and flow forces to be resisted.

Pipe fixings may include:

- bedding and thrust blocks
- corrosion protection
- covers
- masonry fixing
- material requirements
- pipe supports spacings and locations
- vertical support fixing.

Pump, pump controls and pumproom requirements may

- electrical supply requirements
- heating

include:

- inlet and outlet design requirements
- installation and mounting requirements
- manual and automatic controls
- pump selection
- space requirements
- valve requirements
- ventilation requirements.

Water storage systems may include:

- inlet valve design and sizing
- outlet valve design and sizing
- overflow requirements
- safe tray requirements
- tank sizes
- vortex plates.

Delivery systems may include:

- gravity feed
- mains pressure
- pump supply.

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
 - efficient use and recycling of material
 - disposing of waste material to ensure minimal environmental impact
 - efficient water usage, harvesting and/or disposal
 - life cycle cost-benefit analysis
 - consideration of the Green Building Council of Australia rating scheme.

Plans may include:

- axonometrics
- cross-sections
- details
- elevations
- isometrics

- schematics, which may be produced using:
 - computer generation
 - drawing equipment
- sections
- submission for client approval
- pipework fabrication sheets and stores lists
- service coordination.

Specification may include:

- support and specialised components
- jointing
- manufacturer
- materials
- valve selection
- workmanship and quality control.

Testing may include:

- air pressure test
- flow
- hydrostatic test.

Commissioning schedule may include:

- checking and flushing the system
- inspecting for defects
- flow testing
- checking system operation.

Operation and maintenance manual may include:

- as installed drawings
- certificate reference
- hydraulic calculations and water supply details
- manufacturer data
- relevant standards of maintenance of all maintainable equipment
- system description and operating instructions.

Unit Sector(s)

Functional area

Unit sector Plumbing and services

Custom Content Section

Not applicable.