



Australian Government

Department of Education, Employment and Workplace Relations

CPCPFS5002A Design fire hydrant and hose reel systems

Release: 1

CPCPFS5002A Design fire hydrant and hose reel systems

Modification History

Not Applicable

Unit Descriptor

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 Building Code of Australia (BCA) and other relevant legislative requirements in order to meet fire protection standards.

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 construction 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.	<p>1.1. Scope of work is established for fire hydrants, hose reels and distribution systems for wide span and high-rise building projects.</p> <p>1.2. Design requirements are determined from plans, specifications and client briefs.</p> <p>1.3. Cost-benefit analysis is conducted comparing a range of pipe materials and system designs.</p> <p>1.4. Fire department, statutory and regulatory requirements and Australian and New Zealand standards for the design of fire hydrants, hose reels and distribution systems are analysed, interpreted and applied.</p> <p>1.5. Manufacturer requirements and trade, technical and sizing manuals are interpreted.</p> <p>1.6. Additional research, including a desktop study, is conducted to outline design parameters.</p> <p>1.7. Flow and pressure tests are conducted.</p> <p>1.8. Performance requirements are established.</p>
2. Plan and detail system components.	<p>2.1. Layout of pipework and type and location of fittings and valves 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> <p>2.4. Approved materials, jointing methods and installation requirements are specified.</p> <p>2.5. Hydrant booster, standpipe and hose reel assemblies are detailed.</p> <p>2.6. Thrust blocks are designed for a range of applications.</p> <p>2.7. Pipe fixings are designed for a range of applications.</p> <p>2.8. Pump, pump controls and pumphouse requirements are sized and detailed.</p> <p>2.9. Water storage systems are designed and detailed.</p>
3. Design and size systems.	<p>3.1. Fire hydrant and hose reel systems are designed for a range of wide span and high-rise building applications.</p> <p>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.</p>

ELEMENT	PERFORMANCE CRITERIA
4. Prepare documentation.	3.3. Range of <i>delivery systems</i> is designed. 3.4. Fire hydrant and hose reel systems are designed and sized using computer software packages. 4.1. <i>Plans</i> are prepared for a range of fire hydrant and hose reel systems. 4.2. Block plan is prepared for booster cabinet in accordance with Australian and New Zealand standards. 4.3. <i>Specification</i> 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

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:
 - access information
 - enable clear and direct communication, using questioning to identify and confirm requirements, share information, listen and understand
 - read and interpret:
 - documentation from a variety of sources
 - drawings and specifications
 - 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 reports
- identifying and accurately reporting to appropriate personnel any faults in tools, equipment or materials
- innovation skills to develop creative and responsive approaches
- numeracy skills to:
 - apply measurements and calculations

REQUIRED SKILLS AND KNOWLEDGE

- interpret data
- planning and organisational 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, including the ability to apply design concepts and principles relating to hydraulic systems
- technological skills to:
 - access and understand site-specific instructions in a variety of media
 - use mobile communication technology.

Required knowledge

Required knowledge for this unit is:

- Australian and New Zealand standards, manufacturer specifications, BCA 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

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:
 - booster assemblies
 - hose reels
 - hydrants
 - storage tanks
 - thrust blocks
- complying with OHS 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

EVIDENCE GUIDE

hose reel system

- preparing a testing and commissioning schedule
- producing an operation and maintenance manual
- interactive communication and teamwork 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 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

EVIDENCE GUIDE

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

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different

RANGE STATEMENT

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
- sizing and documenting layout of fire hydrant and hose reel systems, including:
 - combined domestic fire 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.

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.

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 set: Parts 1.1 and 1.2
- AS2419 Fire hydrant installations - system design, installation and commission
- AS/NZS1221 Fire hose reels
- AS/NZS2118 Automatic fire sprinkler systems - general requirements
- AS2200 Design charts for water supply and sewerage
- BCA.

Manufacturer requirements may include:

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

RANGE STATEMENT

- Desktop study*** collection and interpretation of existing data for design purposes from:
- architectural and building plans
 - council plans
 - developer plans
 - other documents and reports as available.
- Flow and pressure tests*** may include:
- interpretation of flow and pressure tests conducted by a contractor
 - on-site measurement of flow (l and s), velocity (m and s) and pressure (kPa).
- Performance requirements*** include:
- flow, velocity, pressure and discharge requirements, established using Australian and New Zealand standards and local authority plans.
- Layout of pipework*** may include systems such as:
- dual feed
 - ring main
 - single pipe.
- Fittings and valves*** may include:
- fittings:
 - bends
 - elbows
 - tees
 - unions
 - valve trains
 - valves:
 - backflow prevention
 - excess pressure valves
 - isolating
 - pressure limiting
 - pressure reduction
 - strainers.
- Materials*** may include:
- composite pipe materials and other pipe materials as specified
 - copper
 - fittings and fixtures
 - polybutylene.
- Joining methods*** may include:
- brazing
 - compression
 - flaring
 - mechanical joints
 - rubber ring joints
 - screwing

RANGE STATEMENT

- Installation requirements*** may include:
- soldering.
 - clipping
 - installation details
 - jointing requirements
 - level of workmanship.
- Booster and standpipe assemblies*** may include:
- block plan
 - configuration of valves and hydrants
 - non-return valves
 - pressure gauges
 - suction and delivery outlets
 - testing points
 - valves and fittings.
- Hose reel assemblies*** may include:
- cabinet
 - configuration of valves and hose reels
 - location and number of hose reels required
 - non-return and backflow prevention valves
 - pipe sizes
 - space requirements for valves and fittings.
- Design elements of ***thrust blocks*** may include:
- design details for tees, elbows, valves and meter assemblies
 - keying and anchorage points
 - sizes
 - soil characteristics
 - velocity and flow forces to be resisted.
- Pipe fixings*** may include:
- anchors
 - bedding
 - bracket spacing
 - corrosion protection
 - cover
 - hanging brackets
 - material requirements
 - saddles
 - wall and ceiling brackets.
- Pump, pump controls and pumphouse requirements*** may include:
- automatic controls
 - inlet and outlet design requirements
 - installation and mounting requirements
 - space requirements
 - valve requirements.
- Water storage systems*** may
- access
 - automatic controls

RANGE STATEMENT

include:

- inlet valve design and sizing
- location
- number of hours of firefighting supply required
- outlet sizing
- overflow requirements
- safe tray requirements
- tank sizes.

Delivery systems may include:

- constant flow variable speed pump
- downfeed
- hydropneumatic
- pressure ratio
- upfeed.

Plans may include:

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

Specification may include:

- bedding
- clipping
- concrete support
- jointing
- manholes
- manufacturer requirements
- materials
- workmanship.

Testing may include:

- air pressure test
- hydrostatic test
- quality assurance (QA) audit.

Commissioning schedule may include:

- balancing the system
- checking and flushing the system
- temperature setting.

Operation and maintenance

- check for blockages

RANGE STATEMENT

manual may include:

- leak detection
- pump maintenance
- water auditing
- yearly inspection
- yearly maintenance requirements.

Unit Sector(s)

Unit sector Plumbing and services

Co-requisite units

Co-requisite units Nil

Functional area

Functional area