Australian Government

CPCPFS5010A Design fire-compliant hydraulic services

Release 1

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

CPCPFS5010A Design fire-compliant hydraulic services

Modification History

Changes to descriptor, performance criteria, required skills, range statement and critical aspects
Not equivalent to CPCPFS5000A

Unit Descriptor

This unit of competency specifies the outcomes required to design fire protection systems for hydraulic services in wide span and high-rise buildings. The fire protection systems ensure that hydraulic services maintain integrity, insulation and structural adequacy in case of fire.

Application of the Unit

This unit of competency supports development of skills and knowledge required for competent workplace performance of experienced tradespeople in a consultancy or supervisory capacity in relation to fire-compliant hydraulic service design.
It involves interpretation of plans and specifications and the design, detailing and documentation of fire-compliant hydraulic services for applications including residential, commercial and industrial and may be for new projects or an existing structure being renovated, extended, restored or maintained.

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 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.	1.1	Fire and non fire-rated compartments of buildings are evaluated and the application of evaluation to hydraulic services is specified.
		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, system designs and penetration protection systems.
		1.4	***Statutory, regulatory, Australian and New Zealand standards and relevant building code requirements*** for the design of fire-compliant hydraulic services are interpreted and applied.
		1.5	***Manufacturer requirements*** and trade and technical manuals are interpreted and applied.
		1.6	Additional research, including a ***desktop study***, is conducted and ***performance requirements*** are established.
2	Plan and detail system components.	2.1	***Layout of pipework systems*** and type and location of ***fire check materials*** are planned.
		2.2	Approved ***fire-rated materials***, ***penetration techniques***, ***insulation and filler materials*** are specified to

			appropriate ***fire-resistance level***.
		2.3	***Pipe fixings*** are designed for a range of applications.
		2.4	Pipework for sprinklered and non-sprinklered areas is designed for a range of applications.
		2.5	***Installation requirements*** are specified.
		2.6	***Compliance inspection*** is conducted.
3	Design and size systems.	3.1	Fire-compliant hydraulic services are designed for a range of wide span and high-rise building applications.
		3.2	Range of ***fire-compliant duct systems*** is designed using ***fire-rated building materials***.
		3.3	Hydraulic services using non fire-rated materials are designed to comply with building fire ratings.
		3.4	Fire-compliant hydraulic distribution 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 and detailed for a range of fire-compliant hydraulic services.
		4.2	***Specification*** for fire-compliant hydraulic services is prepared.
		4.3	***Compliance report*** 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:
  - access information
  - determine requirements
  - enable clear and direct communication, using questioning to identify and confirm requirements, share information, listen and understand
  - follow and give instructions
  - 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:
  - read and interpret drawings, specifications and documentation from a variety of sources, including:
    - Australian standards
    - National Construction Code
    - WHS and environmental requirements
    - plumbing regulations
  - prepare written documentation, including:
    - operation and maintenance manual
    - plans, specifications and reports
- numeracy skills to:
  - apply measurements and calculations
  - interpret data
- planning and organising skills to:
  - plan and sequence tasks with others
  - 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
  - consider options

    - 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:
    - apply design principles relating to hydraulic systems
    - use tools and equipment, including:
        - computer-aided design (CAD) software
        - drawing instruments
        - measuring equipment
- technology skills to:
    - access and understand site-specific instructions in a variety of media
    - use mobile communication technology

Required knowledge

- requirements of state regulatory authorities, Australian standards and manufacturer specifications
- application of terminology, definitions, installation methods and hazards identified in relation to devices and systems used, according to:
    - AS/NZS3500 National plumbing and drainage
    - environmental requirements
    - manual of authorisation procedures for plumbing and drainage products (MP52)
    - other standards, codes or standard operating procedures
- quality assurance requirements, including:
    - Environment Protection Authority
    - internal company quality assurance policy and risk management strategy
    - International Standards Organisation
    - nature of materials used and effects of performance under various conditions
    - site safety plan
    - workplace operations and procedures
- variety of applications of technology principles in design of fire-compliant hydraulic services for all classes of building
- 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 preparing designs and associated documentation for fire-compliant hydraulic services for two different categories of wide span and high-rise buildings.

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, NCC and Australian and New Zealand standard requirements for a range of fire-compliant hydraulic services
- planning and detailing system components, including:
  - applying sustainability principles and concepts
  - conducting a compliance inspection
  - designing fire-compliant hydraulic systems
  - designing fire-compliant systems for fire-rated materials
  - designing fire-compliant systems for non fire-rated materials
  - ducts
  - fire check collars
  - insulation and filler materials
  - penetrations
  - preparing a compliance report
  - preparing a specification for fire-compliant hydraulic services
  - preparing an operation and maintenance manual.

Context of and specific resources

This competency is to be assessed using standard and

for assessment

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.

Design requirements may include:

- architectural specifications
- builder specifications
- design of fire-compliant hydraulic services should ensure that hydraulic services maintain the integrity, insulation and structural adequacy of a building in case of fire.
- owner requirements
- specialist design applications.

Cost-benefit analysis includes:

- comparison of range of suitable materials and system choices available to enable cost-effective choices to be made without compromising the integrity of the project.

Statutory, regulatory, Australian and New Zealand standards and relevant building code requirements may include:	• AS/NZS3500 National plumbing and drainage
	• manual of authorisation procedures for plumbing and drainage products (MP52)
	• material and authorisation standards specified by:
	  • statutory plumbing authority
	  • local authority
	  • National Construction Code (NCC)
	• relevant Acts, regulations and local and state government policies
	• relevant fire standards.

Manufacturer requirements may include:	• material specifications • 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.

Performance requirements may include:	• Australian and New Zealand standards • NCC requirements • local authority performance requirements • site and application specific performance requirements.

Layout of pipework systems:	• may include:
	  • car park systems
	  • concealed pipework
	  • duct systems
	  • exposed pipework
	  • fire-rated pipework
	  • non fire-rated pipework

- sprinklered and non-sprinklered areas
- should have principles of economy, serviceability, durability and fit for use applied.

Fire check materials may include:

- fire pillows
- fire-rated sealants
- smoke seals
- range of intumescent collars.

Fire-rated materials may include:

- fittings
- pipework
- valves.

Penetration techniques may include:

- concrete floors
- fire and smoke doors
- fire dampers
- galvanised decking systems
- ply formwork systems
- post and pre-tensioned concrete flooring systems
- pre-cast flooring systems.

Insulation and fill materials may include:

- caulking compounds
- fibreglass
- fire pillows
- foams
- proprietary fill materials
- rock wool.

Fire-resistance level may include:

- insulation
- integrity
- structural adequacy.

Pipe fixings may include fire and load-rated:

- bedding and thrust blocks
- corrosion protection
- cover
- masonry fixing
- material requirements
- pipe supports spacings and locations

- vertical support fixing.

Installation requirements may include:

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

Compliance inspection may include checking that:

- approved materials appropriate to fire-rated compartments and required fire-resistance level are used
- clipping and insulation comply with regulatory requirements
- fire compartments are not compromised by hydraulic services
- installation is appropriate for the fire-resistance level.

Fire-compliant duct systems may include:

- brick
- concrete
- masonry
- plasterboard.

Fire-rated building materials may include:

- brick
- concrete
- masonry
- plasterboard
- other building materials as applicable.

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
- lifecycle cost-benefit analysis
- consideration of the Green Building Council of Australia rating scheme.

Plans:

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

Specification may include:

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

Compliance report may include:

- conclusions
- documentation of the compliance inspection
- evaluation of findings.

Operation and maintenance manual may include:

- detailed alternative (fire-engineered) solutions
- maintenance requirements
- system plans
- yearly inspection requirements.

Unit Sector(s)

Functional area

Unit sector Plumbing and services

Custom Content Section

Not applicable.