Australian Government

Department of Education, Employment and Workplace Relations

CPCPFS5000A Design fire-compliant hydraulic services

Release: 1

CPCPFS5000A Design fire-compliant hydraulic services

Modification History

Not Applicable

Unit Descriptor

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 should ensure that hydraulic services maintain integrity, insulation and structural adequacy in case of fire.

Application of the Unit

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

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. 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 briefs. 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 collars 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.
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

ELEMENT	PERFORMANCE CRITERIA
	prepared. 4.3. Compliance report 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:

- ability to use tools and equipment, including:
  - computer-aided design (CAD) software
  - drawing instruments
  - measuring equipment
- applying design principles relating to hydraulic systems
- 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
  - plan and sequence tasks with others
  - read and interpret drawings, specifications and documentation from a variety of sources, including:
    - Australian standards
    - building codes
    - OHS and environmental requirements
    - plumbing regulations
  - 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

REQUIRED SKILLS AND KNOWLEDGE

- 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 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
- 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:

- 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 set
  - 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

REQUIRED SKILLS AND KNOWLEDGE

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 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, BCA and Australian and New Zealand standard requirements for a range of fire-compliant hydraulic services
- planning and detailing system components, including:
  - 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.

EVIDENCE GUIDE

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 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.

EVIDENCE GUIDE

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 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 include:

- architectural specifications
- builder specifications

RANGE STATEMENT

	• 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*** include:	• AS/NZS3500 National plumbing and drainage set
	• manual of authorisation procedures for plumbing and drainage products (MP52)
	• material and authorisation standards specified by:
	  • statutory plumbing authority
	  • local authority
	  • Building Code of Australia (BCA)
	• relevant Acts, regulations and local and state government policies.

Manufacturer requirements include:	• material specifications • technical and trade manuals.

Desktop study includes:	• collection and interpretation of existing data for design purposes from:
	  • architectural and building plans
	  • council requirements
	  • developer requirements
	  • regulatory requirements
	  • other documents and reports as available.

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

Layout of pipework systems:	• includes:
	  • car park systems
	  • concealed pipework
	  • duct systems
	  • exposed pipework

RANGE STATEMENT

	• fire-rated pipework • non fire-rated pipework • sprinklered and non-sprinklered areas • should have principles of economy, serviceability, durability and fit for use applied • should not unduly affect building integrity and aesthetic appeal.
Fire check collars include:	• range of intumescent collars available.
Fire-rated materials include:	• fittings • pipework • valves.
Penetration techniques include:	• concrete floors • galvanised decking systems • ply formwork systems • post and pre-tensioned concrete flooring systems • pre-cast flooring systems.
Insulation and fill materials include:	• caulking compounds • fibreglass • foams • proprietary fill materials • rock wool.
Fire-resistance level includes:	• insulation • integrity • structural adequacy.
Pipe fixings include fire-rated:	• anchors • bracket spacing • corrosion protection • hanging brackets • material requirements • saddles • wall and ceiling brackets.
Installation requirements include:	• clipping • installation details • insulation • jointing requirements • level of workmanship.
Compliance inspection includes checking that:	• approved materials appropriate to fire-rated compartments and required fire-resistance

RANGE STATEMENT

	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 include:	• brick • concrete • masonry • plasterboard.
Fire-rated building materials include:	• brick • concrete • masonry • plasterboard • other building materials as applicable.

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:	• clipping and specialised components • jointing • manufacturer • materials • valve selection • workmanship.
Compliance report includes:	• conclusions • documentation of the compliance inspection • evaluation of findings • recommendations.
Operation and maintenance manual includes:	• maintenance requirements • yearly inspection requirements.

Unit Sector(s)

Unit sector Plumbing and services

Co-requisite units

Co-requisite units Nil

Functional area

Functional area