Australian Government

Department of Education, Employment and Workplace Relations

CPCPFS4014A Design residential and domestic fire sprinkler systems

Release: 1

INDUSTRY SKILLS COUNCILS

Creating Australia's Future

CPCPFS4014A Design residential and domestic fire sprinkler systems

Modification History

Not Applicable

Unit Descriptor

Unit descriptor

This unit of competency specifies the outcomes required to design domestic and residential fire sprinkler systems using hydraulic calculations.

It covers preparation for the work, determination of system requirements, detailed design and recording of system plans, and work finalisation processes.

Application of the Unit

Application of the unit

Site location for work application will be domestic and residential, and may be a new work site 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. Prepare for design process.	1.1. Nature and scope of design task are identified and confirmed. 1.2. ***Safety*** (***OHS***) requirements associated with designing residential and domestic fire sprinkler systems, and workplace ***environmental requirements***, are adhered to throughout the work. 1.3. ***Quality assurance*** requirements are identified and adhered to in accordance with workplace requirements. 1.4. Work is organised and sequenced in conjunction with others involved in or affected by the work. 1.5. ***Tools***, ***equipment*** and ***materials*** required for designing ***domestic and residential fire sprinkler systems***, including personal protective equipment, are selected and checked for serviceability. 1.6. Work area in which the design process is to be conducted is prepared.
2. Determine system requirements.	2.1. ***Information*** and specifications for the required work are obtained and confirmed, if necessary by site inspection. 2.2. Regulations and standards relevant to the work are consulted and applied to all aspects of the work. 2.3. Relevant data is extracted from plans and specifications. 2.4. Building classification and hazard ratings are established in accordance with standards and other relevant regulations.
3. Design sprinkler system.	3.1. Water supply needs are established and graphs are drawn for the automatic fire sprinkler system. 3.2. Pipework is sized to manufacturer specifications and standards using hydraulic calculations. 3.3. Sprinkler system is designed to meet plans, specifications, standards, manufacturer recommendations and water supply data. 3.4. Sprinkler heads are selected for appropriate size, spray pattern, temperature and finish. 3.5. Sprinklers are spaced in accordance with manufacturer specifications, standards and relevant ***statutory and regulatory authority*** regulations. 3.6. Pipe layout drawings are prepared in accordance with standards and workplace requirements.

ELEMENT	PERFORMANCE CRITERIA
	3.7. Computations and other supporting evidence are appropriately documented to support design. 3.8. Materials required are specified and optimised in accordance with standards from the proposed design. 3.9. Fabrication sheets and material lists are prepared. 3.10. Plans are recorded in accordance with regulatory authorities' and workplace requirements.
4. Restore work area.	4.1. Work area is restored in accordance with workplace procedures. 4.2. Tools and equipment used in the design process are refurbished and left in accordance with workplace procedures. 4.3. Information is accessed and documentation, including work backup, is completed in accordance with workplace requirements.

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:

- collecting design data, spacing sprinkler heads, and sizing and arranging pipework using hydraulic calculations
- 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:
    - 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

REQUIRED SKILLS AND KNOWLEDGE

- written skills to:
  - document computations and other supporting evidence
  - prepare fabrication sheets, material lists and other relevant workplace documentation
- developing domestic and residential fire sprinkler system designs using hydraulic calculations
- identifying and accurately reporting to appropriate personnel any faults in tools, equipment or materials
- preparing layout drawings, fabrication sheets and material lists for system installation
- numeracy skills to apply measurements and calculations
- organisational skills, including the ability to plan and set out work
- 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

- accessing information and the processes for calculating material requirements
- calculating and measuring techniques and their application
- components and materials of fire suppression sprinkler systems and their operating characteristics
- design techniques and technology
- job safety analysis (JSA) and safe work method statements (SWMS)
- National Fire Protection Association (NFPA) and Factory Mutual Performance based codes of practice
- process of designing fire sprinkler systems
- properties of water, including pressure and flow rates
- relevant statutory and authority requirements related to commissioning domestic and residential fire suppression sprinkler systems
- SI system of measurements
- standards applicable to the design
- workplace and equipment safety requirements.

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:

- locating, interpreting and applying relevant information, standards and specifications to the design of domestic and residential fire sprinkler systems
- applying safety requirements throughout the work sequence, including the use of personal protective clothing and equipment
- as a minimum the ability to, using hydraulic calculations, design a fire sprinkler system for a residential complex containing a minimum of a communal catering and living area and multiple residential quarters (or equivalent) and also a fire sprinkler system for a domestic residence containing a minimum of two rooms, ensuring:
  - correct identification of location, design specification and details of proposed service
  - correct selection and use of appropriate processes, tools and equipment
  - completion of all work to specification
  - compliance with regulations, standards and organisational quality procedures and processes
  - communicating and working effectively and safely with others.

Context of and specific resources for assessment

This competency is to be assessed using standard and authorised work practices, safety requirements

EVIDENCE GUIDE

	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. 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.

Safety (***OHS***) is to be in accordance with commonwealth, state and territory legislation and regulations and may include:

- handling of materials
- hazard control
- personal protective clothing and equipment prescribed under legislation, regulations and

RANGE STATEMENT

	workplace policies and practices
	• safe operating procedures, including recognising and preventing hazards associated with:
	  • hazardous materials and substances
	  • other machines
	  • surrounding structure and facilities
	  • trip hazards
	  • underground services
	  • use of tools and equipment
	  • work site visitors and the public
	  • working at heights
	  • working in confined spaces
	  • working in proximity to others
	• use of firefighting equipment
	• use of first aid equipment
	• workplace environment and safety.

Environmental requirements cover water quality management and may include:	• clean-up protection • stormwater protection • waste management.
Quality assurance requirements may include:	• Australian standards • Environment Protection Authority (EPA) • internal company quality assurance policy and risk management strategy • International Standards Organisation • site safety plan • workplace operations and procedures.

Tools and equipment:	• include:
	  • calculators
	  • design data
	  • design tables
	  • drawing and drafting equipment
	  • reference materials
	• may include:
	  • computers running appropriate computer-aided design (CAD) software.

Materials may include:	• drafting materials • plans.
Domestic and residential fire	• actuating devices

RANGE STATEMENT

sprinkler systems include:	• alarms • control valve assemblies • piping • sprinkler heads.

Information may include:	• charts and hand drawings
	• diagrams or sketches
	• instructions issued by authorised organisational or external personnel
	• job drawings
	• manufacturer specifications and instructions
	• material safety data sheets (MSDS)
	• memos
	• organisation work specifications and requirements
	• regulatory and legislative requirements, particularly those pertaining to:
	  • building codes
	  • OHS and environmental requirements
	  • plumbing regulations
	• relevant Australian standards, including AS2118 Automatic fire sprinkler systems
	• safe work procedures relating to designing domestic and residential fire sprinkler systems
	• signage
	• verbal, written and graphical instructions
	• work bulletins
	• work schedules, plans and specifications.

Statutory and regulatory authorities include:	• state or territory statutory authority • statutory plumbing authority.

Unit Sector(s)

Unit sector Plumbing and services

Co-requisite units

Co-requisite units Nil

Functional area

Functional area