



**Australian Government**

# **CPCPFS3030A Design pre-calculated fire sprinkler systems**

**Release 1**

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## **Modification History**

Changes to performance criteria, required skills and knowledge, range statement and critical aspects

Not equivalent to CPCPFS3010A

## **Unit Descriptor**

This unit of competency specifies the outcomes required to design fire sprinkler systems using pre-calculated tables and charts.

## **Application of the Unit**

Work will normally be performed in a design office environment. The design application may be either domestic or commercial, and may be a new work site 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 | Prepare for work.             | 1.1 Drawings and job specifications are obtained.                                                                                                                                   |
|   |                               | 1.2 <b>Work health and safety</b> (WHS) and <b>environmental requirements</b> associated with design and installation of fire sprinkler systems are adhered to throughout the work. |
|   |                               | 1.3 <b>Quality assurance requirements</b> are identified and adhered to according to workplace requirements.                                                                        |
|   |                               | 1.4 Tasks are planned and sequenced in conjunction with others involved in or affected by the work.                                                                                 |
|   |                               | 1.5 <b>Tools, equipment</b> and <b>materials</b> for the design of fire sprinkler systems, including personal protective equipment, are selected and checked for serviceability.    |
|   |                               | 1.6 Work area is prepared to support efficient design of fire sprinkler systems.                                                                                                    |
| 2 | Identify design requirements. | 2.1 Relevant data is extracted from job specifications.                                                                                                                             |
|   |                               | 2.2 Building classification and hazard ratings are established according to standards and other relevant regulations.                                                               |
|   |                               | 2.3 Water supply needs are established and graphs are drawn for the automatic fire sprinkler system.                                                                                |
| 3 | Design sprinkler system.      | 3.1 Sprinkler system is designed according to job specifications, standards, manufacturer recommendations and water supply data.                                                    |
|   |                               | 3.2 Pipework is sized to manufacturer specifications, standards and pre-calculated tables.                                                                                          |
|   |                               | 3.3 Sprinkler heads are selected for appropriate size, spray pattern, temperature and finish.                                                                                       |
|   |                               | 3.4 Sprinklers are spaced according to manufacturer specifications, standards and relevant regulations.                                                                             |
|   |                               | 3.5 Pipe layout drawings are prepared according to standards and workplace requirements.                                                                                            |

- 3.6 Computations and other supporting evidence are appropriately documented to support design.
  - 3.7 Fabrication sheets and material lists are prepared.
  - 3.8 ***Sustainability principles and concepts*** are observed when preparing for and undertaking work process.
- 4 Clean up.
- 4.1 Work area is cleared and materials disposed of, reused or recycled according to legislation, regulations, codes of practice and job specification.
  - 4.2 Tools and equipment are cleaned, checked, maintained and stored according to manufacturer recommendations and workplace procedures.
  - 4.3 ***Information*** is accessed and documentation completed according to regulatory authorities and workplace requirements.

## 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
- literacy skills to:
  - document computations and other supporting evidence
  - prepare fabrication sheets, material lists and other relevant workplace documentation
  - read and interpret:
    - documentation from a variety of sources
    - plans and specifications
- initiative and enterprise skills to identify and report to appropriate personnel any faults in tools, equipment or materials
- numeracy skills to apply measurements and calculations
- planning and organising skills to:
  - plan and sequence tasks with others
  - 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
- technical skills to:
  - collect design data, space sprinkler heads, size pipework using charts and tables, and arrange pipework
  - prepare layout drawings, fabrication sheets and material lists for the installation of the system
- technology skills to:
  - access and understand site-specific instructions in a variety of media
  - use mobile communication technology

### Required knowledge

- function, specifications and operation of system components
- 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 using pre-calculated charts and tables
- properties of water, including pressure and flow rates
- relevant statutory and authority requirements related to designing and installing fire sprinkler systems
- SI system of measurement
- sources of information on performance characteristics of fire sprinkler systems, including theory underpinning pre-calculated charts and tables, and hydraulic calculations
- structural systems, building materials and building services
- technologies for fire sprinkler systems, measurements and drawings
- workplace design standards and safety requirements

## Evidence Guide

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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 test and maintain automatic fire sprinklers
- applying safety requirements throughout the work sequence, including electrical safety requirements and the use of personal protective clothing and equipment
- given the plans and specifications for an office complex (requiring at least 15 sprinkler heads and two branches), using pre-calculated charts and tables, design a fire sprinkler system indicating the spacing of sprinkler heads, the size and arrangement of pipework to include layout drawings, fabrication sheets and material lists, ensuring:
  - application of sustainability principles and concepts
  - correct identification of the requirement, design and details of the proposed system
  - correct selection and use of appropriate processes, tools and equipment
  - completing 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 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

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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.

***Work health and safety*** is to be according to commonwealth, state and territory legislation and regulations and may include:

- handling of materials
- hazard control, including of electrical hazards
- hazardous materials and substances
- personal protective clothing and equipment prescribed under legislation, regulations and workplace policies and practices
- use of firefighting equipment
- use of first aid equipment
- use of tools and equipment
- workplace environment and safety.

***Environmental requirements*** may include:

- clean-up protection
- waste management.

***Quality assurance requirements***

- Australian standards

may include:

- 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** may include:

- calculator
- computer design software
- design data
- design tables
- drawing and drafting equipment
- reference materials.

**Materials** may include:

- drafting materials
- plans.

**Sustainability principles and concepts:**

- cover the current and future social, economic and environmental use of resources
- may include:
  - efficient energy usage
  - efficient use of material
  - selecting appropriate components (sprinkler head, pump, etc.) to ensure minimal environmental impact.

**Information** may include:

- charts and hand drawings
- instructions issued by authorised organisational or external personnel
- manufacturer specifications and instructions
- material safety data sheets (MSDS)
- memos
- NFPA and Factory Mutual performance-based codes of practice
- organisation work specifications and requirements
- plans and sketches
- regulatory and legislative requirements, particularly those pertaining to:
  - building codes
  - WHS and environmental requirements

- plumbing regulations
- relevant Australian standards
- safe work procedures relating to designing fire sprinkler systems
- signage
- verbal, written and graphical instructions
- work bulletins
- work schedules, plans and specifications.

## **Unit Sector(s)**

### **Functional area**

**Unit sector** Plumbing and services

## **Custom Content Section**

Not applicable.