

# Unit of Competency CPCSFS5006

## Create detailed designs for fire sprinkler systems

### Application

This unit of competency specifies the outcomes required to obtain, process and set up drawings for the detailed design of fire sprinkler systems. The unit also involves assessing and selecting component requirements, setting out the locations of components, and creating final notated drawings.

This unit of competency supports the role of fire systems designers with responsibility for creating detailed designs for sprinkler fire suppression systems.

Licensing, legislative, regulatory or certification requirements may apply to this unit and so the varying state or territory requirements should be confirmed with the relevant body.

### Prerequisite Unit

Nil.

### Elements and Performance Criteria

1. Set up fire systems design drawings.	<ul style="list-style-type: none"><li>1.1 Request, receive, name and file relevant project drawings and documentation according to workplace procedures.</li><li>1.2 Clean drawings to leave minimal essential information.</li><li>1.3 Import layers showing designs of other services into clean architectural or structural drawings.</li><li>1.4 Add details from drawings of the floor of the level above, if these affect the design.</li><li>1.5 Name, file and back up the detailed design drawings according to workplace procedures.</li></ul>
2. Calculate preliminary data.	<ul style="list-style-type: none"><li>2.1 Develop floor area calculations to determine the number of sprinkler zones.</li><li>2.2 Determine the sprinkler occupancy classifications, minimum sprinkler flow and initial fire flow demands based on classifications for the site.</li><li>2.3 Determine and analyse the town main water capabilities for the fire services serving the site to identify if fire pumps and fire tanks are required.</li><li>2.4 Calculate the proposed fire pump flow and pressure and fire tank sizes.</li><li>2.5 Prepare a comparison list of equipment which can be used across the site.</li></ul>
3. Lay out the fire sprinkler system design.	<ul style="list-style-type: none"><li>3.1 Determine and notate the exact location of sprinklers on the drawing according to relevant codes and standards.</li><li>3.2 Determine and notate the most efficient and workable layout and location of sprinkler system components on the drawing according to regulatory requirements, standards and regulations.</li><li>3.3 Design pipework layout and coordinate with building elements and services and identify pipework sizes and elevations across the systems.</li></ul>

	<p>3.4 Calculate, check and notate dimensions on the drawing according to regulatory requirements, standards and regulations.</p> <p>3.5 Undertake hydraulic analysis of the fire systems using both hand calculation procedures and computer modelling programs.</p> <p>3.6 Validate fire pump and tank sizes with initial estimates.</p> <p>3.7 Develop detailed designs of pipework for complicated interaction of pipework and building elements and services.</p> <p>3.8 Develop detailed designs of pipework configurations for fire tanks, fire pumps, brigade booster and suction points and alarm valves, including manifold systems and flow switch arrangements.</p>
4. Submit drawings for approval and finalise design process.	<p>4.1 Submit fire sprinkler system design drawings to relevant personnel within the scheduled timeframe.</p> <p>4.2 Make or negotiate required amendments to design drawings as required.</p> <p>4.3 Process and distribute final approved design drawings according to project and regulatory requirements, standards and regulations.</p> <p>4.4 Select fittings and components according to project and regulatory requirements, standards and regulations.</p>

## Foundation skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

## Unit Mapping Information

Supersedes and is equivalent to CPCSF55006A Create detailed designs for fire sprinkler systems.

## Links

Companion Volume Implementation Guide:

<https://vetnet.education.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad>

# Assessment Requirements for CPCSFS5006

## Create detailed designs for fire sprinkler systems

### Performance Evidence

To demonstrate competency, a candidate must meet the performance criteria for this unit by:

- designing fire sprinkler systems for four different types of buildings, including:
  - o commercial building
  - o factory
  - o residential nursing home
  - o high-rise building.

### Knowledge Evidence

To be competent in this unit, a candidate must demonstrate knowledge of:

- workplace design tools and processes:
  - o effective and workable layout and location:
    - selection of cost-effective components and materials
    - consideration of:
      - penetrations
      - conflict with other services
      - work health and safety (WHS) risks
      - access constraints
      - installation problems
      - aesthetic requirements
      - efficiencies to facilitate work on site and reduce labour costing
  - o negotiations regarding amendments:
    - non-compliance with applicable legislation, codes and standards
    - impact on installation risks and constraints
    - impact on cost-effectiveness
- level of accuracy required in detailed design drawings
- storage and sharing design drawings
- naming conventions for design drawings and drawing register
- computer software functions and operation:
  - o word processing
  - o spreadsheet
  - o email
  - o internet
  - o proprietary hydraulic calculation software
- relevant current legislation, codes and standards:
  - o building Acts

- o building regulations
  - o infrastructure supply regulations
  - o the Building Code of Australia (BCA)
  - o National Construction Code (NCC)
  - o Australian standards for fire systems
  - o international standards for fire systems
  - o jurisdictional authorities in addition to the BCA and NCC
  - o other fire system standards commonly required by building insurers
- fire systems technology and components for water-based systems:
  - o wet pipe sprinkler systems
  - o deluge and drencher systems
  - o dry pipe sprinkler systems
  - o pre-action sprinkler systems
  - o early suppression fast response (ESFR)
  - o discharge nozzles
  - o pipework
  - o pipework supports
  - o system valves
  - o zone valves
  - o sprinkler heads
  - o Pipework fittings
  - o control valves
- purpose and operation of fire systems:
  - o layout
  - o system operation
  - o performance requirements
  - o maintenance standards
  - o system activation and operation
- characteristics and limitations of products and materials used in fire systems and issues relating to material compatibility
- regulatory approval and fire systems design certification processes
- compliant designs for fire sprinkler systems for a range of types of sites, including:
  - o low-rise buildings
  - o medium-rise buildings
  - o high-rise buildings (over 25 metres)
  - o buildings over 50 metres in height
- construction industry terminology
- roles and responsibilities of relevant building project personnel:
  - o architect
  - o lead contractor
  - o mechanical engineer
  - o hydraulic engineer
  - o electrical engineer
- installation methods:
  - o access requirements
  - o WHS requirements

- sustainability requirements and ratings:
  - energy conservation
  - water conservation
- pipe fabrication methods and constraints
- mathematic principles, equations and calculation methods:
  - flow calculations:
    - area of operations
    - discharge rates and quantities
    - discharge times
    - pressure gain and loss
    - K-factors
    - pressure, temperature and volume relationship
    - Hazen-Williams equation
    - Darcy-Weisbach equation
    - computational fluid dynamics
- project drawings and documentation:
  - architectural
  - structural
  - mechanical
  - electrical
  - hydraulic
  - fire engineer's or estimator's specifications.

## Assessment Conditions

Assessors must meet the requirements for assessors contained in the Standards for Registered Training Organisations.

This unit must be assessed in the workplace or a close simulation using realistic workplace conditions, materials, activities, responsibilities, procedures, safety requirements and environmental considerations.

## Links

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<https://vetnet.education.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad>