



Australian Government

Department of Education, Employment and Workplace Relations

CPCSFS5008A Create detailed designs for fire detection and warning systems

Release: 1

CPCSFS5008A Create detailed designs for fire detection and warning systems

Modification History

Not Applicable

Unit Descriptor

<p>Unit descriptor</p>	<p>This unit of competency specifies the outcomes required to obtain, process and set up drawings for the detailed design of fire detection and warning systems. The unit also involves assessing and selecting component requirements, setting out the locations of components and creating final notated drawings.</p> <p>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.</p>
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Application of the Unit

<p>Application of the unit</p>	<p>This unit of competency supports the role of fire systems' designers with responsibility for creating detailed designs for fire detection and warning systems.</p> <p>Fire systems designs are limited to those within the deemed-to-satisfy provisions of the Building Code of Australia or detailed fire systems designs for alternative solutions designed by fire engineers. This unit does not apply to fire systems for special hazard locations.</p>
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Licensing/Regulatory Information

Refer to Unit Descriptor

Pre-Requisites

Prerequisite units	Nil
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Employability Skills Information

Employability skills	This unit contains employability skills.
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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.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Set up fire systems design drawings.	1.1. Relevant project drawings and documentation are requested, received, named and filed according to workplace procedures. 1.2. Drawings are cleaned to leave minimal essential information. 1.3. Layers showing designs of other services are imported into clean architectural or structural drawings. 1.4. Details from drawings of the floor of the level above are added if these affect the design. 1.5. The detailed design drawing is named, filed and backed up according to workplace procedures.
2. Lay out the fire systems design.	2.1. A site visit is conducted if possible to confirm dimensions and assess installation risks and constraints. 2.2. The exact location of detectors is determined and notated on the drawing according to relevant codes and standards . 2.3. The most efficient and workable layout and location of detection and warning system components are determined and notated on the drawing according to workplace procedures. 2.4. Dimensions are calculated, checked and notated on the drawing according to workplace procedures.
3. Specify component capacities and characteristics.	3.1. Electrical calculations are completed to assess requirements and confirm cable ranges. 3.2. Specific components most suitable for the application are selected and specified. 3.3. Electronic interfaces with other services are designed and specified. 3.4. Component requirements are communicated to suppliers with detailed drawings, as required, and within project timelines.
4. Submit drawings for approval and finalise design process.	4.1. Fire detection and warning system design drawings are submitted to relevant personnel within the scheduled timeframe. 4.2. Required amendments to design drawings are made or negotiated as required. 4.3. Final approved design drawings are processed and distributed according to project and workplace requirements. 4.4. Fittings and components are selected and ordered according to project and workplace requirements.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

Required skills

- accurate measuring
- accurate naming and filing of drawings, including:
 - formal document control
 - formal amendments, including:
 - history
 - transmittal notices
- editing and creating drawings, including:
 - layout
 - section
 - detail
 - external references
 - freezing layers
- operating computer software packages and systems, including:
 - word processing
 - spreadsheet
 - email
 - internet
 - proprietary project management software
 - proprietary estimating software
 - parametric modelling of services coordination using proprietary software, such as Navis-Works or MEP-REVIT
- using BASIC computer programming language to write logic for electronic system interfaces
- numeracy skills for calculating:
 - voltage drops
 - battery capacity
 - battery back-up
 - power supplies
 - cabling sizes and types
- language and literacy skills for:
 - listening to and communicating clearly with colleagues, installers, suppliers

REQUIRED SKILLS AND KNOWLEDGE

- and contractors
- participating in meetings, such as negotiations with fire engineering consultant, architect, builder or other service contractors
- researching, accessing, reading, interpreting and applying current relevant legislation, codes and standards
- letter writing, especially to formalise:
- recognition of conflicts and errors on drawings supplied by other service contractors
- agreements with other services, for example whichever service is fitted last must fit around existing services
- updating knowledge of products, software systems and technology
- reading and interpreting drawings, plans and specifications, including:
 - architectural
 - structural
 - mechanical
 - hydraulic
 - electrical
- researching and evaluating competing technologies in new products and systems
- developing constructive and cooperative working relationships with project team members, workplace colleagues, suppliers, installers and clients
- negotiation and conflict management
- initiating and running meetings with lead contractor and other service contractors
- organising own work, including creating personal systems and checklists for planning, managing and checking work
- lateral thinking and problem solving
- maintaining concentration, focus and attention to detail for long periods
- managing detailed input to concurrent fire systems design projects at different stages of the process and with diverse sets of regulatory requirements

Required knowledge

- workplace design tools and processes
- level of accuracy required in detailed design drawings
- naming conventions for design drawings and drawing register
- fire science, including:
 - fire behaviour and dynamics
 - impact of fire on structures and materials
 - products of combustion
 - fire control strategies
 - fire retardants

REQUIRED SKILLS AND KNOWLEDGE

- fire detection technologies
- fire suppression technologies
- fire containment
- computer software functions and operation, including:
 - word processing
 - spreadsheet
 - email
 - internet
 - proprietary project management software
 - proprietary estimating software
 - parametric modelling software, such as Navis-Works or MEP-REVIT
- BASIC computer programming language
- relevant current legislation, codes and standards, including:
 - building Acts
 - building regulations
 - infrastructure supply regulations
 - the Building Code of Australia
 - Australian standards for fire systems
 - international standards for fire systems
 - other fire system standards commonly required by building insurers
- protection requirements for different buildings
- fire detection and warning systems technology and components, including:
 - emergency warning and intercommunications systems (EWIS)
 - fire detection and alarm systems
 - smoke control systems
 - emergency lighting systems
- purpose and operation of fire systems, including:
 - layout
 - special products and hazards
 - system operation
 - performance requirements
 - maintenance standards
 - system activation and operation
- characteristics and limitations of products and materials used in fire systems and issues relating to material compatibility
- passive fire safety elements:
 - identification of passive elements
 - impact of fire systems design on passive elements

REQUIRED SKILLS AND KNOWLEDGE

- specifications required to safeguard integrity of passive fire element performance where penetrations are necessitated by the fire systems design
- interconnection of fire systems, including:
 - cause and effect matrix
 - interface with other services
- basic principles of structural engineering
- characteristics of building materials
- construction industry terminology
- roles and responsibilities of relevant building project personnel, including:
 - architect
 - lead contractor
 - mechanical engineer
 - hydraulic engineer
 - electrical engineer
- on-site issues that can arise during the construction phase and impose changes to the designs of fire systems and other services
- installation methods, including:
 - access requirements
 - health and safety requirements
- sustainability requirements and ratings, including:
 - energy conservation
 - water conservation
- mathematic principles, equations and calculation methods, including:
 - financial calculations, for example to assess cost-effectiveness of fire systems
 - electrical calculations, including:
 - voltage drops
 - battery capacity
 - battery back-up
 - power supplies
 - cabling sizes and types
- electrical and electronics theory, including:
 - units used to measure current (AC and DC), power, capacitance, inductance and sound attenuation
 - effects of AC and DC current in series and parallel circuit paths that includes resistive, inductive and capacitive loads
 - relationship between voltage drops around a circuit and applied voltage
 - definition of voltage ratings as defined in communication and electrical safety regulations, including extra low voltage, low voltage and hazardous

REQUIRED SKILLS AND KNOWLEDGE

- voltages
 - layout of electrical wiring systems to meet communication and electrical safety regulations applicable to fire detection and warning systems
 - basic operation of common electronic and electrical components used in fire detection and warning systems
 - basic operation of communication protocols on addressable systems, peripheral devices (printers) and high-level interfaces to other communication devices used in fire detection and warning systems
- communication technologies, including:
 - data transfer
 - networking
 - communication protocols
 - radio frequency technologies
- acoustics and speech intelligibility for occupant warning systems
- human psychology, especially fire avoidance behaviour
- financial management, including:
 - budgeting
 - cost-effectiveness
- contractual processes

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, provided that the simulated or project-based assessment fully replicates workplace conditions, materials, activities, responsibilities and procedures.

This unit could be assessed as an activity involving the effective performance and application of principles relating to the design of fire detection and occupant warning systems for a range of different types of buildings.

Critical aspects for assessment

A person who demonstrates competency in this

EVIDENCE GUIDE	
and evidence required to demonstrate competency in this unit	<p>unit must be able to provide evidence of the required skills and knowledge specified within this unit.</p> <p>In particular the person should demonstrate:</p> <ul style="list-style-type: none">• the ability to:<ul style="list-style-type: none">• read and interpret a range of design drawings• create, manipulate, save, file and share design drawings• identify, interpret and apply relevant current legislation, codes, standards and regulatory requirements impacting on fire detection and warning system designs• interpret and apply fire engineer's designs for alternative solutions• a comprehensive understanding of technical issues impacting on fire detection and occupant warning system designs• a comprehensive understanding of the relevant regulatory approval and fire systems design certification processes• the ability to produce fully compliant designs which also meet client requirements for fire detection and warning systems for a range of types of sites, including:<ul style="list-style-type: none">• low-rise buildings• medium-rise buildings• high-rise buildings (over 25 metres)• buildings over 45 metres in height.

EVIDENCE GUIDE	
Context of and specific resources for assessment	<p>Assessment of essential underpinning knowledge may be conducted in an off-site context. It is to comply with relevant regulatory or Australian standards' requirements.</p> <p>Resource implications for assessment include:</p> <ul style="list-style-type: none"> • relevant design briefs, drawings, plans and specifications • copies of relevant codes, standards, legislation and regulatory requirements • access to relevant information and communications technology - hardware and software • access to relevant manufacturer's information regarding fittings and components.
Method of assessment	<p>Assessment must:</p> <ul style="list-style-type: none"> • 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.
Guidance information for assessment	<p>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.</p> <p>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.</p>

Range Statement

RANGE STATEMENT	
<p>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.</p>	
<p><i>Project drawings and documentation</i> may include:</p>	<ul style="list-style-type: none"> • architectural • structural • mechanical • electrical • hydraulic • water-based fire suppression systems • fire engineer's or estimator's specifications.
<p><i>Codes and standards</i> may include:</p>	<ul style="list-style-type: none"> • the Building Code of Australia • current relevant Australian standards for fire systems • current relevant international standards for fire systems • codes and standards stipulated by the building insurer.
<p><i>Efficient and workable layout and location</i> relate to:</p>	<ul style="list-style-type: none"> • selection of cost-effective components and materials • consideration of: <ul style="list-style-type: none"> • penetrations • conflict with other services • interfaces with other services • occupational health and safety risks • access constraints • installation problems • aesthetic requirements • efficiencies to facilitate work on site and reduce labour costing.
<p><i>Detection and warning system components</i> may include:</p>	<ul style="list-style-type: none"> • components for: <ul style="list-style-type: none"> • emergency warning and intercommunications systems (EWIS) • fire detection and alarm systems • smoke control systems • emergency lighting systems • fire alarm and control panels:

RANGE STATEMENT	
	<ul style="list-style-type: none"> • conventional • addressable • detectors, including: <ul style="list-style-type: none"> • heat • smoke • flame sensing • spot • projected beam • aspiration type • power source • batteries • cabling.
<i>Electrical calculations</i> may include the calculation of:	<ul style="list-style-type: none"> • the voltage drop in a wiring path given the required electrical parameters • battery capacity requirements given the required performance parameters • power supply and battery charge capacity requirements given the required performance parameters • Cable Services Australia (CSA) cable size and cabling medium type given the required electrical performance parameters • total power supply consumption requirements of field equipment in normal and active (alarm) state given the required electrical performance parameters of equipment installed • the number of points, circuits and zones on a system given the required performance parameters of a wiring path.
<i>Negotiations</i> regarding amendments to design drawings may arise due to:	<ul style="list-style-type: none"> • non-compliance with applicable legislation, codes and standards • impact on installation risks and constraints • impact on cost-effectiveness.
<i>Fittings and components</i> may include:	<ul style="list-style-type: none"> • smoke alarms • smoke detectors • manual call buttons • fire alarm panels • fireproof cable • batteries

RANGE STATEMENT

	<ul style="list-style-type: none">• amplifiers• speakers• emergency lighting.
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Unit Sector(s)

Unit sector	Fire systems design
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Co-requisite units

Co-requisite units	Nil
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Competency field

Competency field	
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