



Australian Government

Department of Education, Employment and Workplace Relations

CPCSFS5005A Research and evaluate fire system technologies and components

Release: 1

CPCSFS5005A Research and evaluate fire system technologies and components

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit of competency specifies the outcomes required to research, evaluate and select existing, new and incoming technologies and components for fire system detection and suppression systems. The unit also involves developing a broad understanding of the range of products available and their application, operation, performance and interaction. 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.
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Application of the Unit

Application of the unit	This unit of competency supports the work of fire systems' designers and certifiers who need to: • understand the characteristics, operation and interaction of fire system technologies and components • select and assess fire system technologies and components. Fire systems are limited to those within the deemed-to-satisfy provisions of the Building Code of Australia or alternative solutions designed by fire engineers. This unit does not apply to fire systems for special hazard locations.
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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. Research and evaluate fire suppression systems.	1.1. The range of <i>technologies and components for fire suppression systems</i> is researched and identified. 1.2. The suitability of fire suppression systems to different types of buildings and situations is assessed with reference to <i>relevant legislation, codes and standards</i>. 1.3. The <i>performance characteristics and limitations of fire suppression systems</i> are determined. 1.4. Fire suppression system failures are analysed and appropriate design solutions are proposed. 1.5. Suitable and cost-effective fire suppression system technologies and components are selected for a range of buildings and situations.
2. Research and evaluate fire detection and occupant warning systems.	2.1. The range of <i>technologies and components available for fire detection and occupant warning systems</i> is researched and identified. 2.2. The suitability of fire detection and occupant warning systems to different types of buildings and situations is assessed with reference to relevant legislation, codes and standards. 2.3. The <i>performance characteristics and limitations of fire detection and occupant warning systems</i> are determined. 2.4. Fire detection and occupant warning system failures are analysed and appropriate design solutions are proposed. 2.5. Suitable and cost-effective fire detection and occupant warning system technologies and components are selected for a range of buildings and situations.
3. Analyse and specify the interaction of fire systems.	3.1. The required interactions for effective operation of fire systems in different types of buildings and situations are analysed and specified. 3.2. The interfaces that affect interactions between fire systems in different types of buildings and situations are identified and examined. 3.3. Suitable fire detection and suppression systems are selected for a range of buildings and situations and the interactions and interfaces required for effective performance are specified.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

- analytical skills to assess performance features and suitability of system technologies and components
- operating computer software packages and systems, including:
 - word processing
 - spreadsheet
 - email
 - internet
 - proprietary hydraulic calculation software
 - proprietary estimating software
 - parametric modelling of services coordination using proprietary software, such as Navis-Works or MEP-REVIT
- language and literacy skills for:
 - listening to and communicating clearly with colleagues, installers, suppliers and contractors
 - researching, accessing, reading, interpreting and applying current relevant legislation, codes and standards
 - 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
- numeracy skills to evaluate cost-effectiveness of various systems and components
- developing constructive and cooperative working relationships with project team members, workplace colleagues, suppliers, installers, manufacturers and industry professionals who may supply information relevant to research and evaluation activities
- organising own work, including creating personal systems and checklists for planning, managing and checking work

Required knowledge

- workplace design tools and processes
- fire science, including:

REQUIRED SKILLS AND KNOWLEDGE

- fire behaviour and dynamics
- impact of fire on structures and materials
- products of combustion
- fire control strategies
- fire retardants
- fire detection technologies
- fire suppression technologies
- fire containment
- computer software functions and operation, including:
 - word processing
 - spreadsheet
 - email
 - internet
 - proprietary hydraulic calculation software
 - proprietary estimating software
 - parametric modelling software, such as Navis-Works or MEP-REVIT
- 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
- fire systems' technology and components, including:
 - water-based systems, including:
 - wet pipe sprinkler systems
 - deluge and drencher systems
 - dry pipe sprinkler systems
 - pre-action sprinkler systems
 - early suppression fast response (ESFR)
 - hydrants, hose reels and monitors
 - water supply tanks
 - fire pump sets
 - detection and warning systems, including:
 - emergency warning and intercommunications systems (EWIS)
 - fire detection and alarm systems
 - smoke control systems

REQUIRED SKILLS AND KNOWLEDGE

- emergency lighting systems
- purpose and operation of fire systems, including:
 - layout
 - high hazard products
 - 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
- interconnection of fire systems, including:
 - cause and effect matrix
 - interface with other services
- water supplies, including:
 - common water sources
 - conservation requirements
 - in-ground reticulation
 - booster configurations
- fluid mechanics and hydraulics relating to:
 - water supply
 - pressure
 - pump selection
 - tank selection
 - pressure vessels
 - pipe range
- sustainability requirements and ratings, including:
 - energy conservation
 - water conservation
- principles of organic and inorganic chemistry
- principles of physical sciences, including:
 - Boyle's Law
 - Charles' Law
 - Dalton's Law
 - Henry's Law
- principles of thermodynamics, including:
 - effects of heat
 - stratification of gases
 - smoke and heat dynamics

REQUIRED SKILLS AND KNOWLEDGE

- 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 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

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,

EVIDENCE GUIDE

responsibilities and procedures.
This unit could be assessed as an activity involving research, evaluation and selection of fire detection and suppression systems for a range of types of fire systems design projects. The activity should also include the preparation of specifications for the interactions and interfaces required for the effective operation of the systems in the event of a fire.

EVIDENCE GUIDE	
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 the required skills and knowledge specified within this unit. In particular the person should demonstrate: - the ability to read and interpret a range of documents, including design briefs and specifications for fire systems design projects, and manufacturer specifications and technical performance data for a range of fire detection and suppression technologies and components - the ability to evaluate and compare the performance and cost-effectiveness of different technologies and components with similar applications: - for fire detection and suppression systems - for a range of different fire systems design projects - the ability to assess the suitability of fire detection and suppression systems technology and components for a range of applications in different fire systems design projects, including: - low-rise buildings - medium-rise buildings - high-rise buildings (over 25 metres) - buildings over 45 metres in height - the ability to specify the required interactions and interfaces between fire detection and suppression systems in a range of different fire systems design projects.
Context of and specific resources for assessment	Assessment of essential underpinning knowledge may be conducted in an off-site context. It is to comply with relevant regulatory or Australian standards' requirements. Resource implications for assessment include: - design briefs, drawings, plans and specifications - manufacturer specifications and performance data for a range of fire detection and suppression systems technologies and

EVIDENCE GUIDE

	components • copies of codes, standards, legislation and regulatory requirements • access to information and communications technology - hardware and software.
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EVIDENCE GUIDE	
Method of assessment	Assessment 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.
Guidance information for assessment	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. 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.

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.	
1.1. <i>Technologies and components for fire suppression systems</i> may include:	• wet pipe sprinkler systems and components • dry pipe sprinkler systems and components • pre-action sprinkler systems and components • early suppression fast response (ESFR) sprinkler systems and components

RANGE STATEMENT

- fire control panels
- hydrants
- hose reels
- monitors
- water supply tanks
- fire pump sets
- valves.

RANGE STATEMENT	
<i>Relevant legislation, codes and standards</i> may include:	• building Acts and regulations • the Building Code of Australia (BCA) • Australian standards for fire systems • international standards for fire systems • codes and standards required by building insurers.
<i>Performance characteristics and limitations of fire suppression systems</i> may include:	• system activation and operation • effect of fire, heat and smoke of component materials • interaction with other systems and services.
<i>Technologies and components available for fire detection and occupant warning systems</i> may include:	• emergency warning and intercommunications systems (EWIS) • fire detection and alarm systems • smoke control systems • emergency lighting systems • fire control panels.
<i>1.2. Performance characteristics and limitations of fire detection and occupant warning systems</i> may include:	• system activation and operation • effect of fire, heat and smoke on component materials • interaction with other systems and services.

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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