IFE Level 4 Certificate in Fire Science and Fire Safety (HL)

Unit 2: Fire Safety

Unit Reference Number: D/505/5932

Introduction

This unit focuses on the prevention and detection of fire in premises and environments, including complex ones. Complex premises and environments include premises with a large number of occupants, premises with longer distances to escape routes and premises used for storage/processes involving high risk materials. It covers building and building materials, protection equipment and fire safety principles.

Learning Outcomes

Candidates who achieve this unit should be able to:

- evaluate risks in complex buildings and environments, taking into account construction, occupancy and layouts
- identify and evaluate options to reduce risks, drawing on extensive knowledge of precautions and protection options
- determine appropriate solutions and summarise fire safety information and advice for diverse audiences

Unit Status

This is a mandatory unit for candidates who wish to achieve the Level 4 Certificate in Fire Science and Fire Safety.

Content

1. Fire Safety Principles

Assessment Objective	Knowledge, Understanding and Skills
1.1 Identify and apply the principal requirements for the prevention of fire in complex premises and environments	Premises and environments including: • Multi-storey car parks • Shopping precincts and malls • High rise tower blocks • Hospitals • Residential care establishments for the elderly, young or disabled

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	• Schools and universities
	• Sports stadia
	• Petroleum installations and chemical plants
	• Residences of multiple occupation
	• Flats or maisonettes (apartments)
	• Historic buildings
	• High bay storage warehouses and other warehousing with large storage areas
	• Farm buildings
	• Tank farms
	• Temporary buildings and structures
	• Buildings being built, altered or demolished
	• Complex and fire engineered buildings
	• Commercial office premises
	• Retail premises
	• Factories and other places of manual work
	• Places of public entertainment, including cinemas, theatres, dance halls and premises used only occasionally for these purposes
	• Premises where alcoholic liquor is consumed
	• Hotels and other relevant premises
	• Forests, heaths, bush and crops (wildland fires)
	• Transportation - road, rail, aviation, maritime

1.2 Explain the purpose and implementation of fire precautions in the protection of people, property and the environment and assess the effectiveness of different approaches in different contexts	• Pre-planned arrangements for ensuring the safety of people
	• Principles of evacuation procedures that should be adopted in case of fire
	• How the behaviour of people in a fire can adversely affect evacuation and means of escape
	• Purpose of training and testing of fire precautions
	• Use, siting and contents of fire notices
	• Use and siting of different types of system including fire extinguishers
	• Use of passive and active systems including different types of equipment:
	    o Alarms
	    o Fixed installations

2. Human Behaviour and Principles of Means of Escape from Fire

Assessment Objective	Knowledge, Understanding and Skills
2.1 Explain the principles of means of escape (egress) from fires and apply them to specific places	Principles of means of escape and effects of: • Construction • Time of evacuation • Occupancy • Exits • Travel distance

	• Management control
2.2 Explain the special arrangements that may be needed for means of escape for individuals with particular requirements and assess implications in different contexts	• Emergency procedures for the safe evacuation of people from a fire situation • Individuals with particular requirements to include the young, the old, the disabled, those with poor health, obese individuals • Behavioural aspects of people in fire and implications when planning/reviewing means of escape and evacuation procedures
2.3 Assess the impact of human behaviour in different situations	• The physiological, behavioural and psychological effects on people presented with a fire situation • How behaviour of people in a fire can adversely affect evacuation and means of escape

3. Fire Protection Equipment

Assessment Objective	Knowledge, Understanding and Skills
3.1 Describe the design features, installation, use, maintenance and operations of extinguishing media and assess which types of extinguishing media would be appropriate in different situations	• Sprinkler systems • Drenchers • Water spray projectors and water mist systems • Rising mains • Foam systems • Gas/vapour systems • Dry powder systems
3.2 Describe the design features, installation, maintenance and operation of fire detection systems and assess which different types of fire detection systems would be most appropriate in different situations	• Heat detectors • Smoke and combustion product detectors • Flame detectors • Flammable vapour and other vapour detection systems
3.3 Describe and explain the design features, installation, maintenance and operation of explosion detection and control systems	• Explosion detection systems • Explosion venting systems • Explosion suppression systems • Control of flammable atmospheres
3.4 Describe the design features, installation, maintenance and operation of Automatic Fire Detection Systems and assess which systems would be appropriate in different situations	• Types of system • Definitions of a detector • Classifications of detectors • Success or failure of operation • Automatic Fire Detectors - Radio Systems • Automatic Fire Detection - Detector Circuits • Control and indicating equipment • Detector positions • Manually Operated Fire Alarms

4. Building Construction

Assessment Objective	Knowledge, Understanding and Skills
4.1 Interpret plans of buildings and recognise graphical symbols used for fire protection drawings	- How to apply graphical symbols to fire protection drawings - How to evaluate plans to identify risk and/or impact on fire safety measures
4.2 Explain the way in which building materials are used, comment on their behaviour in fire and assess the implications for fire safety	Building materials to include: - Timber - Stone - Brick - Cement - Concrete (reinforced and pre-stressed) - Metals - Glass - Building boards and building slabs - Insulating materials - Paint - Plastics - Sandwich panels - Photovoltaic panels
4.3 Define elements of structure, stating their function and assessing their impact on fire resistance	Elements to include: - Columns - Beams - Walls - Floors - Roofs - Non load bearing walls and partitions - Stairways - Doors - Windows - Roof lights - Ceilings - Atrium
4.4 Describe the various types of heating, ventilation and air conditioning systems that are used in buildings, assess the effects they may have on a fire and explain the fire suppression methods used in these systems	- Heating systems - Ventilation - Air conditioning systems - Stairwell pressurisation systems - Ventilation and smoke handling systems
4.5 Describe the methods of servicing buildings and assess the implications for fire safety	- Electricity - Gas - Water - Lifts - Escalators
4.6 Describe the requirements and principles of elements of buildings	- Separating walls - Compartment walls and floors

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and explain their role in fire resistance	• Junctions formed by elements of structure • Protected shafts and protecting structures • Fire resisting doors and other enclosures • Space separation
4.7 Evaluate risks associated with construction design and development	• Interaction and compatibility between different materials • Impact of inappropriate selection, use, location, orientation and interaction of materials • Impact of quality of construction • Impact of modern methods of construction

5. Fire Safety Review and Advice

Assessment Objective	Knowledge, Understanding and Skills
5.1 Explain how to assess fire risks within complex premises and environments	• Principles and methods of risk assessment in complex premises and environments • Impact of structure, materials and access
5.2 Assess and explain fire hazards and risks in and around different premises and environments	• Identification of people who may be at risk • Identification of risks to property and the environment • How to explain risks to members of the public and property owners/managers • Common causes of fire in different occupancies
5.3 Analyse control measures in current and planned situations	• How to review effectiveness of current measures • How to provide feedback on effectiveness of current measures • Impact of organisational constraints
5.4 Identify and apply relevant legislation, codes of practice, rules, regulations and recommendations	• Principal requirements of fire safety, fire precaution and fire prevention legislation, together with their attendant Codes of Practice, rules, regulations and recommendations (which operate in candidates' own countries) • Roles and responsibilities • Identification of general professional liability issues in respect of advice offered
5.5 Identify and evaluate methods of improving fire safety in the community and increasing public awareness and perception of general fire safety matters	• Risks in the community and prioritising safety programmes • Objectives of safety education in the community • Contents of safety programmes and their purpose • Methods to engage diverse community members and stakeholders • Methods to evaluate success
5.6 Assess the need for training and advise on training requirements	• Engaging and training employees in different premises/workplaces and in different roles • Identification of training requirements for people with fire safety responsibility • Importance of testing precautions in place and how to do this