

# IFE Level 3 Diploma in Fire Science and Fire Safety

## Unit 4: Aviation Fire Operations

Unit Reference Number: R/505/6009

### Introduction

This unit focuses on the strategies and activities required to resolve fire and rescue incidents in aviation (civil and military) contexts. It covers pre-planning for incidents, resolving incidents and post-incident activities.

### Learning Outcomes

Candidates who achieve this unit should be able to:

- assess fire and rescue incidents and identify appropriate action to resolve the incident safely and with regard to environmental issues
- assess the scale of an evolving incident and know when and how to escalate/handover to appropriate colleagues
- explain the operation of firefighting equipment, knowing when to use equipment and how to manage risks associated with the use of different equipment
- explain emergency planning procedures

### Unit Status

Optional

### Content

#### 1. Emergency Planning and Procedures

Assessment Objective	Knowledge, Understanding and Skills
1.1 Explain the purpose of pre-planning for any specified emergency and assess the issues for inclusion in different contexts	<ul style="list-style-type: none"> <li>• Prepare for appropriate response</li> <li>• Protect responders, the public and the environment</li> <li>• Mitigate impact of incident</li> </ul>
1.2 Identify the key components of plans and explain the importance of each	<ul style="list-style-type: none"> <li>• Components to include:               <ul style="list-style-type: none"> <li>○ Airport location and topography</li> <li>○ Access</li> <li>○ Rendezvous points and marshalling areas</li> <li>○ Water supplies and drainage systems</li> <li>○ Rescue and firefighting response and capability</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ Communications</li> <li>○ Air traffic control</li> <li>○ Aircraft hazards</li> <li>● Features that are useful for planning procedures:             <ul style="list-style-type: none"> <li>○ Determining the best position for standby for emergency vehicles</li> <li>○ Observation and watching duties</li> </ul> </li> </ul>
1.3 Explain the involvement of relevant external bodies in pre-planning	<ul style="list-style-type: none"> <li>● Stakeholders and local partners</li> <li>● Joint working in planning and incident review</li> </ul>
1.4 Detail the categorisation of emergencies at airports	<ul style="list-style-type: none"> <li>● Aircraft Accident</li> <li>● Aircraft Accident Imminent</li> <li>● Aircraft Crash – Off-airfield</li> <li>● Full Emergency</li> <li>● Local Standby</li> <li>● Aircraft Ground Incident</li> <li>● Bomb Alert/Bomb Suspected</li> <li>● Weather Standby</li> <li>● Domestic Fire</li> </ul>
1.5 Outline the areas of an airport and assess safety implications	<p>Areas to include:</p> <ul style="list-style-type: none"> <li>● Runway</li> <li>● Aircraft stand</li> <li>● Air bridge</li> <li>● Apron</li> <li>● Airside/landside security</li> <li>● Taxiway</li> <li>● Airport terminal buildings</li> <li>● Airport cargo buildings</li> <li>● Baggage areas</li> <li>● Maintenance facilities</li> <li>● Fuel storage</li> </ul>
1.6 Outline the range of aircraft and assess the implications in relation to different types of incidents	<ul style="list-style-type: none"> <li>● Types of aircraft:             <ul style="list-style-type: none"> <li>○ Fixed wing</li> <li>○ Rotary wing (helicopters, autogyro, etc)</li> <li>○ Gliders</li> <li>○ Microlights</li> </ul> </li> <li>● Civilian and military contexts</li> <li>● Incidents on and off airport to include:             <ul style="list-style-type: none"> <li>○ Scheduled/chartered flights</li> <li>○ Military</li> <li>○ Private flights</li> <li>○ Air shows and other events</li> </ul> </li> </ul>
1.7 Explain the importance of maintaining operational readiness and outline how this can be managed	<ul style="list-style-type: none"> <li>● Training requirements of rescue and firefighting personnel</li> <li>● Methods of training available to test contingency and pre-determined emergency plans and how they can be improved</li> <li>● Training needs analysis</li> <li>● Maintaining availability of resources</li> </ul>

## 2. Incident Command and Management

Assessment Objective	Knowledge, Understanding and Skills
2.1 Understand the key principles of Incident Command as they apply to aviation contexts both on airport and off airport	<ul style="list-style-type: none"> <li>• Functional areas of Incident Command Systems</li> <li>• Levels of management applied at operational incidents</li> <li>• Role of other agencies</li> </ul>
2.2 Understand the roles and responsibilities of personnel within the incident command structure	<ul style="list-style-type: none"> <li>• Role and responsibilities of the Incident Commander at Operational level</li> <li>• Role and responsibilities of the Sector Commander at incidents</li> <li>• Relationship between the Incident Commander, the Sector Commander and the Incident Command System</li> <li>• Role and responsibilities of Command Support</li> <li>• Progression at an incident from first pump attending to the arrival of a dedicated vehicle</li> <li>• Responsibility for determining the cause of an incident</li> <li>• Range and the types of evidence available at an operational incident</li> </ul>
2.3 Understand the requirements for the successful management of risk at operational incidents	<ul style="list-style-type: none"> <li>• Definition of hazard, risk and control measure</li> <li>• Management of risk at operational incidents</li> <li>• Dynamic Risk Assessment flowchart</li> <li>• Tactical mode options available at incidents</li> <li>• Hierarchy of control measures in relation to risks</li> <li>• Importance of evidence preservation</li> </ul>
2.4 Understand the need for effective lines and methods of communication at incidents	<ul style="list-style-type: none"> <li>• Lines of communication available at incidents in relation to an Incident Commander’s span of control</li> <li>• Impact of poor or inappropriate communication</li> <li>• Methods of briefing of crews at operational incidents</li> <li>• Model for sectorisation at operational incidents</li> </ul>
2.5 Understand principles for general control, tactics and strategy in resolving emergency incidents and explain how and when these principles should be applied in different contexts	<ul style="list-style-type: none"> <li>• Need for evacuation at fires</li> <li>• Strategy and tactics involved in rescue work</li> <li>• Objectives of ventilation at fires</li> <li>• Aims and principles of salvage/damage control</li> <li>• Procedures for ensuring the safety of both personnel and public</li> <li>• How to identify signs and symptoms of stress in relation to trauma and/or work based activity</li> <li>• Actions to reduce the exposure to and impact on operational personnel and casualties</li> <li>• Issues to take into consideration in establishing inner and outer cordon distances</li> <li>• Environmental considerations and actions to minimise environmental impact</li> </ul>

### 3. Provision for Firefighting and Rescue Facilities at Airports and Airfields

Assessment Objective	Knowledge, Understanding and Skills
3.1 Explain the categorisation of airports in relation to the firefighting protection to be provided and assess implications	<ul style="list-style-type: none"> <li>• Relevance of size and type of airport (and the types of aircraft using the airport) when determining the fire protection required including vehicles, equipment and personnel for firefighting</li> <li>• Categorisation determined by aircraft overall length and maximum fuselage</li> <li>• UK 10 point scale as identified by Civil Aviation Authority OR other relevant categorisation (national/international method)</li> </ul>
3.2 Understand how to deploy firefighting equipment and other resources to deal with on airport and off airport scenarios	<ul style="list-style-type: none"> <li>• Detail the provision of principal and complementary extinguishing media and describe their characteristics</li> <li>• Outline the discharge rates for extinguishing agents</li> <li>• Provisions of rescue and firefighting vehicles and detail their response times and specifications</li> <li>• Explain in detail the meaning of the term “critical area concept”</li> </ul>
3.3 Assess the provision of water supplies at airports and airfields and determine strategies to resolve issues	<ul style="list-style-type: none"> <li>• Provision of supplies of water for firefighting purposes</li> <li>• Operational use of water from its supply for firefighting purposes</li> </ul>

### 4. Aircraft Construction

Assessment Objective	Knowledge, Understanding and Skills
4.1 Understand the principles of aircraft construction, the implications for fire and rescue situations and the hazards associated with different materials	<ul style="list-style-type: none"> <li>• Materials normally used in aircraft construction</li> <li>• Features of aircraft construction</li> <li>• Features of power systems and services</li> <li>• Features of internal fixtures and fittings</li> <li>• Aircraft access and evacuation systems</li> <li>• Fixed fire protection systems in aircraft</li> <li>• Classify passenger emergency exits in terms of type, size and location and be able to determine the number and type of exits to be provided for each side of an aircraft according to passenger carrying capacity</li> </ul>
4.2 Describe the various engines used in aircraft and assess the hazards associated with them	<ul style="list-style-type: none"> <li>• Piston engines</li> <li>• Gas turbine engines</li> </ul>
4.3 Describe the types of aviation fuels that are used and assess the hazards associated with them	<ul style="list-style-type: none"> <li>• Provision of fuel tanks in aircraft (including military aircraft)</li> <li>• Types of fuel used in aircraft (including military aircraft)</li> </ul>
4.4 Understand the principles of rotary wing aircraft construction and the implications for fire and rescue situations	<ul style="list-style-type: none"> <li>• Describe the construction details of rotary wing aircraft</li> <li>• Categorise the different types of helicopter</li> <li>• Discuss access and escape routes provided in rotary</li> </ul>

	wing aircraft <ul style="list-style-type: none"> <li>• Position of engines and the general features of rotor blades</li> </ul>
4.5 Understand the principles of military aircraft construction and the implications for fire and rescue situations	<ul style="list-style-type: none"> <li>• Access to and exits from military aircraft including cockpit canopies, break-in points and emergency hatches</li> <li>• Types of power systems and services that may be found in military systems</li> <li>• Types of storage of armaments and pyrotechnics found on board military aircraft</li> </ul>

## 5. Aircraft Firefighting and Rescue Procedures, Equipment and Techniques

Assessment Objective	Knowledge, Understanding and Skills
5.1 Understand the types and causes of aircraft ground incidents and fires that can be encountered and the methods of dealing with them	<ul style="list-style-type: none"> <li>• Fuselage and passenger cabin fires</li> <li>• Wheel fires and hot brakes</li> <li>• Engine fires</li> <li>• Running fuel fires</li> <li>• Metal fires</li> <li>• Freight-related hazards and incidents</li> <li>• Aircraft fuel spillage with and without a fire occurring</li> <li>• Actions of fire and rescue service at “high speed accidents” and “low speed accidents”</li> </ul>
5.2 Understand the fire tactics and techniques that need to be adopted for attending incidents at airports and assess the implications for different situations	<ul style="list-style-type: none"> <li>• Approaching the incident</li> <li>• Appliance positioning</li> <li>• Application of extinguishing agents including foam</li> <li>• Use of additional water supplies and extinguishing agents</li> <li>• Locating the incident</li> <li>• Casualty handling</li> <li>• Working with other organisations</li> </ul>
5.3 Understand and apply the principles of rescue procedures for rescue from civil aircraft including rotary wing	<ul style="list-style-type: none"> <li>• Methods used to evacuate an aircraft by the fire service and rescue personnel</li> <li>• Methods of entry that can be used to gain access to an aircraft</li> <li>• Methods of release and rescue of aircrew</li> <li>• Methods used by the flight crew to evacuate an aircraft</li> </ul>
5.4 Understand and apply the principles of rescue procedures for rescue from military aircraft	<ul style="list-style-type: none"> <li>• Methods of entry used to gain access to military aircraft including access via cockpit canopies</li> <li>• Dangers presented by ejection seats and the principles of making them safe</li> <li>• Methods of release and rescue of aircrew</li> </ul>

## 6. Post-Incident Procedures and Considerations

Assessment Objective	Knowledge, Understanding and Skills
6.1 Understand how to close down the operation phase of an incident	<ul style="list-style-type: none"> <li>Measures to hand over control of an incident to an appropriate person, agency or authority</li> <li>Actions to identify and minimise any unresolved hazards and associated risks within operational constraints</li> <li>How to gather and review all relevant information from internal and external sources for debriefing purposes</li> </ul>
6.2 Explain the process to remove wreckage and other equipment following the incident and assess the safety and environmental issues	<ul style="list-style-type: none"> <li>Movement of wreckage and the practice of de-fuelling</li> <li>Methods of dealing with ignition sources and the evacuation of the surrounding area</li> <li>Need to decontaminate personnel and equipment</li> <li>Environmental considerations</li> </ul>
6.3 Explain the process to manage the removal of bodies and personal belongings	<ul style="list-style-type: none"> <li>Removal and moving of bodies including the recording of positions and locations</li> <li>Removal and collation of personal belongings</li> </ul>
6.4 Determine the requirements for preservation of evidence at a scene by applying basic fire investigation principles	<ul style="list-style-type: none"> <li>How to identify and preserve potential evidence identified at the incident</li> </ul>
6.5 Understand the principles of, and value of, debriefs and apply these principles to different incident contexts	<ul style="list-style-type: none"> <li>How to contribute to a post-incident debrief appropriate to the type and scale of incident</li> <li>How to gather and review all relevant information from internal and external sources</li> <li>How to engage crew in debriefing and to review crew welfare and learning issues</li> <li>How to implement remedial measures to improve future practice and performance</li> </ul>

## 7. Heliports

Assessment Objective	Knowledge, Understanding and Skills
7.1 Outline the points that need to be considered when determining the size of a heliport including the final approach and take-off areas	<ul style="list-style-type: none"> <li>Factors that need to be considered in choosing a heliport site</li> </ul>
7.2 Understand the operation of fire protection measures in relation to heliports	<ul style="list-style-type: none"> <li>Levels of fire protection required for heliports</li> <li>Categorisation of heliports in relation to the provisions of fire protection facilities to be provided</li> <li>Response times for fire and rescue personnel at both surface and elevated heliports</li> </ul>