PROGRAMS FOR TRAINING OF AIRCRAFT RESCUE AND FIRE FIGHTING PERSONNEL

1. PURPOSE. This Advisory Circular (AC) provides information on courses and reference materials for training of Aircraft Rescue and Firefighting (ARFF) personnel.

2. APPLICATION. The material contained in this AC is applicable for use on all categories of civil aerodromes except where otherwise specified. The guidance contained in this AC are recommended to be used for aircraft Rescue and Firefighting Training Programs.

3. REFERENCES:

3.1 Civil Aviation (Aerodrome) Regulations, as amended.

3.2 ICAO Airport Services Manual Doc 9137:
   - Part 7: Airport Emergency Planning
   - Part 1: Rescue and Fire Fighting
   - Part 5: Removal of Disabled Aircraft

3.3 Human Factors Training Manual. ICAO Doc 9683

3.4 ICAO Doc 9284 Technical Instruction for safe Carriage of Dangerous Goods by Air

4. REQUIREMENTS FOR CERTIFICATED AERODROMES

The Civil Aviation (Aerodromes) Regulations, as amended require that:

“All rescue and fire fighting personnel shall be properly trained, including training in human performance and team coordination and shall participate in live fire drills commensurate with the type of aircraft and fire fighting equipment in use at the aerodrome, including pressure-fed fuel fires”

The recommendations in this AC comprise a method for meeting this provision. The minimum requirements for a training program are listed below. These recommendations are not intended as proficiency standards for airport fire fighters, but are provided to assist the airport operators in
establishing an adequate training program. However, proficiency is the key to a successful ARFF training program. The number of hours of training will vary from individual to individual. We recommend that, as a minimum, no less than 40 hours of annual recurrent training be accomplished for each ARFF personnel.

4.1 Training Curriculum

The training curriculum must include initial and recurrent instruction in at least the areas listed in (1) through (12) below.

Initial training is defined as that training provided to a new employee to enable him/her to identify and interpret advanced theories, facts, concepts, principles, requirements, procedures, equipments, and components of ARFF as applied to the aircraft serving the airport and to demonstrate all required tasks safely and accurately and in accordance with established procedures while functioning independently.

Recurrent training is defined as that training provided to an employee as often as necessary but not less than 12 consecutive calendar months to enable him/her to maintain a satisfactory level of proficiency. Appropriate frequencies for recurrent training will vary widely from airport to airport and from one employee to another. Training in several areas will require coordination with airlines and other organizations on the local airport.

4.1.1 Airport familiarization

The program shall train personnel such that they are able to do the following:

(a) Describe the runway and taxiway identification system;
(b) Describe the airfield lighting color code/markings system;
(c) Describe the airfield pavement marking and signing system;
(d) Identify the various on-field aircraft navigation aids;
(e) Cite airport rules and regulations concerning vehicle movement and access;
(f) Cite rules and regulations governing airport security;
(g) Locate a given point on a grid map or other standard map used at the airport;
(h) Identify terrain features using map symbols;
(i) Identify installations and features in the critical response areas that present a hazard to vehicle response;
(j) Identify installations and terrain features in the critical response areas that limit vehicle response capability;
(k) Identify the probable direction of travel of fuel in a simulated leak in the fuel distribution system;
(l) Demonstrate the operation of fuel system valves and pumps to control the flow of fuel within the system; and
(m) Identify hazardous materials that are frequently stored or used on the airport property.
4.1.2 Aircraft familiarization

For scheduled flight operations, the program should train personnel such that they are able to do the following:

(a) Identify the types of aircraft operating at the airport;
(b) Identify the categories of aircraft propulsion systems;
(c) Locate normal entry doors, emergency exit openings, and evacuation slides for a given aircraft;
(d) Demonstrate the opening of all doors and compartments for a given aircraft;
(e) Identify aircrew and passenger capacities and locations for a given aircraft;
(f) Indicate the type of fuel used, location of fuel tanks, and capacity of fuel tanks for a given aircraft;
(g) Identify and locate components of the fuel, oxygen, hydraulic, electrical, fire protection, anti-icing, APU, brake, wheel, and egress systems for a given aircraft; and
(h) Identify and locate the flight data recorder and cockpit voice recorder.

4.1.3 Rescue and firefighting personnel safety

The program shall train personnel such that they are able to do the following:

(a) Identify the hazards associated with aircraft firefighting/rescue;
(b) Identify the hazards to personnel associated with aircraft and aircraft systems;
(c) Identify the potential stress effects on emergency services personnel involved in a mass casualty situation;
(d) Identify the purpose and limitations of approved protective clothing used locally;
(e) Demonstrate donning protective approved clothing within 1 minute;
(f) Identify the purpose of self-contained breathing apparatus. self – contained breathing apparatus;
(g) Identify the components and operation of self-contained breathing apparatus.;
(h) Identify the limitations of self-contained breathing apparatus.;
(i) Demonstrate the donning within 1 minute and use of an approved self-contained breathing apparatus.;
(j) Demonstrate changing the air supply cylinder of a team member with an exhausted air supply cylinder;

(k) While wearing a self-contained breathing apparatus, demonstrate the actions to be taken when the following emergency situations occur: low air alarm activates, air supply is exhausted, regulator malfunctions, face piece is damaged, low pressure hose is damaged, and high pressure hose is damaged;

(l) While wearing a self-contained breathing apparatus, demonstrate the actions to be taken to assist a team member experiencing the following emergency situations: low air alarm activates, air supply is exhausted, regulator malfunctions, face piece is damaged, low pressure hose is damaged, and high pressure hose is damaged; and

(m) Identify techniques for protection from communicable disease hazards.

4.1.4 Emergency communications systems on the airport, including fire alarms

The program shall train personnel such that they are able to do the following:

(a) Identify the procedures for receiving an emergency alarm;

(b) Identify radio frequencies and channels used by his/her organization and mutual aid organizations;

(c) Identify procedures concerning multiple alarms and mutual aid;

(d) Demonstrate knowledge of the phonetic alphabet;

(e) Demonstrate the use of all communication equipment used by his/her organization;

(f) Cite the procedure for obtaining clearance from the control tower or other responsible authority for apparatus movement;

(g) Give an initial status report for a simulated aircraft accident;

(h) Demonstrate the use of standard aircraft fire rescue hand signals; and

(i) Identify standard hand signals to be used to communicate with aircrew personnel.

4.1.5 Use of fire hoses, nozzles, turrets, and other appliances

The program shall train personnel such that they are able to do the following:

(a) Identify the purpose of each tool and item of equipment used locally;

(b) Identify the location of each tool and item of equipment used locally;
(c) Identify the hazards associated with each tool and item of equipment used locally;
(d) Identify the proper procedures for use and maintenance of each tool and item of equipment used locally;
(e) Identify the purpose of each hose, nozzle, and adapter used locally;
(g) Identify the size and amount of each hose carried on each local vehicle;
(h) Identify the proper procedures for use and maintenance of each hose, nozzle, and adapter used locally;
(i) Identify the proper procedure to be used when advancing hose for fire attack;
(j) Identify the proper procedure to be used when laying hose to establish a resupply of water;
(k) Identify the primary purpose, agent capacity, water capacity, type of agent carried, agent discharge rate/range, personnel requirements, and response limitations for each vehicle used locally;
(l) Demonstrate the proper methods of operation of all handlines and vehicle-mounted discharge devices;
(m) Identify the procedures for maintenance of each vehicle used locally; and
(n) Identify the procedures for resupply, using a hydrant, structural vehicles, tank trucks and other vehicles, for each vehicle used locally.

4.1.6 Applications of Fire extinguishing agents

The program shall train personnel such that they are able to:

(a) identify the extinguishing properties of each agent, including advantages and disadvantages;
(b) identify which agents used by the local organization are compatible and which are not;
(c) identify the locations and quantities of each agent that is kept in inventory for vehicle resupply;
(d) identify the quantity of each type of agent that is carried on each vehicle used at the local airport;
(e) identify the preferred agent to be used in suppression and extinguishment for various fire scenarios;
(f) demonstrate agent application techniques;
(g) identify each type of portable fire extinguisher by classification and rating;
(h) identify the limitations and operating characteristics of each type of portable fire extinguisher;

(i) Identify the location of each portable fire extinguisher provided on local vehicles; and

(j) Identify the general location of portable fire extinguishers provided on aircraft.

### 4.1.7 Emergency aircraft evacuation assistance

For scheduled flight operations, the program shall train personnel such that they are able to do the following:

(a) identify the priorities of openings to be used to gain entry to aircraft;
(b) identify which opening should be used to gain entry for a given aircraft and situation;
(c) select the necessary tools and equipment to gain entry for a given aircraft and situation;
(d) while wearing full protective clothing, demonstrate, from inside and outside the aircraft, opening normal entry doors and emergency exit points for a given aircraft;
(e) identify potential locations for cut-in entry, using reference materials, aircraft markings, or general guidelines for a given aircraft;
(f) identify the hazards associated with cut-in entry;
(g) identify procedures followed during an emergency situation by crews of scheduled aircraft operating at the local airport; and
(b) identify the procedures to be used to protect evacuation points.

### 4.1.8 Firefighting operations

The program shall train personnel such that they are able to do the following:

(a) Describe the standard operating procedure plans for various emergency scenarios;
(b) Select a strategy and tactics for incident control and termination;
(c) Identify the procedures for securing and maintaining a rescue path;
(d) Identify the proper procedure to use when protecting an aircraft fuselage from fire exposure;
(e) Identify the procedures to be used when providing protective streams for personnel;
(f) Identify procedures for controlling runoff from fire control operations and fuel spills; and
(g) Identify the procedures to be used to stabilize aircraft wreckage.
4.1.9 Adapting and using structural rescue and firefighting equipment for aircraft rescue and firefighting

For any structural rescue and firefighting equipment available and intended for use in aircraft firefighting, the program shall train personnel such that they are able to identify the procedures used to adapt the equipment for aircraft rescue and firefighting based on manufacturer specifications.

4.1.10 Aircraft cargo hazards

The program shall train personnel such that they are able to do the following:

a. identify the hazards indicated by each International Civil Aviation Organization (ICAO) label;
b. identify the limitation of the ICAO classifications and labeling system;
c. use Emergency Response Guidebook to obtain information on hazardous materials for a given situation;
d. using the information obtained from the Emergency Response Guidebook to identify the appropriate response, including risk assessment and rescue or evacuation requirements, to a given situation involving hazardous materials.

4.1.11 Familiarization with fire fighters’ duties under the airport emergency plan

The program shall train personnel such that they are able to do the following:

a. Identify airport pre-fire plans;
b. Identify the various types of aircraft-related emergencies;
c. Identify and understand the incident command system to be utilized in an emergency;
d. Identify the procedures to be used to size-up a given aircraft accident; and
e. Identify the other duties of his/her organization under the airport emergency plan.

4.2 Additional training

a. If the airport emergency plan calls for fire fighters to respond to special situations, such as water or treetop rescue, training specific to such situations should be provided.
b. If a Surface Movement Guidance and Control System (SMGCS) plan is in place at the airport, training specific to operations in low visibility should be provided.
c. Fire fighters should also receive training in recognition of aircraft ballistic parachute systems during emergency operations.

4.2.1. Live-Fire Drills

All rescue and firefighting personnel must participate in at least one live-fire drill every 12 months. This drill must include a pit fire with an aircraft mock-up or similar device, using enough fuel to provide a fire intensity that simulates realistic firefighting conditions. The conditions would simulate the type of fire that could be encountered on a scheduled aircraft at the airport. It is intended that the drill provide an opportunity for the firefighting team to become familiar with the use of all fire extinguishment equipment they will use in the event of an accident. If possible, a simulated rescue of aircraft occupants will help in creating a realistic simulation. During the drill, each fire fighter must demonstrate the following:

(a) the control and extinguishment of a simulated aircraft fire using handlines and turrets, given an airport-type foam firefighting vehicle. The decision to train on handlines or turret should be based on whether the trainee is assigned a handlines or whether the trainee is a driver/operator who would normally operate the turrets. Many training programs may have all the participants working the handlines, and it would be acceptable for the driver/operator to meet the annual requirement in this fashion. However, it would not be acceptable for a handlines firefighter to use training on the turrets to meet the annual requirement;

(b) the control and extinguishment of a simulated aircraft fire using handlines and turrets, given each type, other than foam-type, firefighting vehicle [see (1) above for guidance on acceptability of handlines and turret operation]; and

(c) using fire streams to protect fire fighters and aircraft occupants, given an airport firefighting vehicle.

4.2.2 First Aid

At least one person trained and current in basic emergency medical care must be on duty during air carrier operations. In this context, “on duty” does not mean that the emergency medical person be one of the regular ARFF personnel, but that there must be some assured means of having the individual available within a reasonable response time. This training must include 40 hours covering at least the following areas:

(1) Bleeding;
(2) Cardiopulmonary resuscitation;
(3) Shock;
(4) Primary patient survey;
(5) Injuries to the skull, spine, chest, and extremities;
(6) Internal injuries;
(7) Moving patients;
(8) Burns; and
(9) Triage.

4.2.3. Hands-On Training

It is highly recommended that fire fighters receive hands-on training on the aircraft that regularly serve their airport. Such a feat is very difficult unless there are aircraft that remain overnight or there is an aircraft maintenance facility on the airport. Where such hands-on training is not feasible, it is recommended that ARFF crews be given access to aircraft schematics and to computer-based training that are available in the commercial market.

5. FIRE FIGHTER CERTIFICATION

In future Aircraft Rescue and Fire Fighting Certification Program will be developed to recognize ARFF personnel who have demonstrated more than normal devotion to their profession by exceeding regular job requirements and to standardize ARFF training. The levels for the ARFF Certification Program will be as follows:

1. The Basic Level—designed to recognize personnel who have recently entered the ARFF profession.
2. The Senior Level—designed to recognize more experienced ARFF personnel.
3. The Master Level—designed to recognize personnel involved in ARFF on a management level.

6. HUMAN PERFORMANCE AND TEAM COORDINATION

1. Leadership
   • Definition of leadership
   • Differences between leadership and authority
   • A skilled leader

2. Personality and attitudes
   • Personality traits and attitudes
   • Characteristics of attitudes
   • Desirable and undesirable personality characteristics
   • Differences between personality and attitudes

3. Communication
   • Effective communication
4. Co-ordination
   - Advantages of teamwork
   - Variables that determine co-ordination
   - Risks associated with breakdown in communication

5. Human Performance Limitations
   - Information processing
   - Perception
   - Stress and workload
   - Situation awareness
   - Work environmental factors

Civil Aviation Authority
1. FIRE FIGHTER TRAINING

2. COMPETENCE OF RFFS TRAINERS

3. REVIEW RFFS TRAINING PROGRAM

Every year the aerodrome operators RFFS trainers review the training material that is submitted to Authority for approval and renewal of the certificate. The instructors meet at the end of the year and work on the material which is then sent for approval.

4. RFFS TRAINING SCHEDULE

The RFFS training schedule is always posted on the company web side for interested parties that need this training.

5. ISSUING OF CERTIFICATE

Successful students (firemen cadets) and their names are recorded in the aerodromes certified RFFS register. This is through the training report submitted to the human resources department at the end of each training.

6. EXPIRED RFFS CERTIFICATE

Refresher training is organized for staff whose certificate has either expired or has lasted for a period of 24 calendar months. This is done every two years.

7. SCHEDULE OF RFFS COURSES OFFERED

I. Course 111 – AERODROME FIREFIGHTER COURSE

Implementation:

The syllabi are prepared by teams of specialists and reviewed by a group of senior instructors from a number of EAC partner states Training centers. The comments and recommendations of these instructors are reelected in the syllabus of the first edition of each Technical Guidance.
8. COURSE ELIGIBILITY:

A trainee must meet the following prerequisites before being considered as suitable for a career as a firefighter;

a. Trainees must have a good command of his national language (reading, writing, and speaking).

b. Trainee should be capable of reading, writing and speaking the language used by the instructional staff or the Fire Service Training School (where applicable).

c. Trainee’s educational background should be of a suitable standard that this intellectual capability will enable him to comprehend the instructional lessons during the course.

d. The trainee shall be medically and physically examined prior to the course by recognized medical physician to ensure he will be suitable for the arduous physical tasks proposed for the course.

e. The trainee shall be able to speak, see, hear and execute the physical duties of a firefighter with clarity but without assistance or aids.

f. Trainees shall have successfully completed the established selection process by interview; completely aware of his personal entitlements and compiled all necessary application forms.

g. Trainees shall have been issued with all necessary personal items of clothing or uniform

9. COURSE LENGTH: 14 WEEKS.

The course is predominantly a practical experience of the trainee. Apart from the hours where the trainee will be engaged in physical education and the maintenance of equipment and fire vehicles, the course includes:
Practical:  265 hours  
Class Activity:  155 hours  

Number of students:  
Minimum 12  
Maximum 15  

Curriculum:  
The lessons developed for this course are intended as guides only and 
are designed for an average classroom period of 50 minutes to one hour. 
Each instructor is expected to develop his own individual lesson plans 
based upon the subject material contained in each lesson guide. An 
example of a lesson guide developed into a lesson plan is included. There 
is also guidance on how to set up a practical aircraft firefighting exercise 
Local procedures must be included where applicable.

10. GRADING:  
The number appearing in the column entitled “grading” is an indicator of 
the required level of knowledge. As a general indication, it may be taken 
that the required level of knowledge. As a general indication, it may be 
taken that the required level of grading indicates an increasing level of 
proficiency form 1 to 5.

1. Denotes an understanding of a principle  
2. Denotes a basic knowledge of a subject  
3. Denotes knowledge of the subject and the ability, where 
   applicable, to apply it practically.  
4. Denotes a thorough knowledge of the subject and the ability to 
   apply it with speed and accuracy.  
5. Denotes extensive knowledge of the subject and the ability to 
   apply procedures derived from it with judgment in the light of 
   the circumstances.

11. COURSE 111 – AERODROME FIREFIGHTER  

Course Administration
Lessons

- Firemanship
- Fireground Skills
- Aircraft Firefighting
- Aircraft
- Communications
- Water Supplies
- Fire Vehicles
- Topography
- Examinations
- Course Review

12. SUBJECT - Firemanship

OBJECTIVES

To provide the trainee with:

1. The practical skills required to use firefighting ancillary equipment.
2. The practical knowledge required to use firefighting ancillary equipment.
3. An indication of the physical requirement of an aerodrome firefighter
4. A basis outline as to the duties of an aerodrome firefighters

TOPICS:

- Structure of the RFF
- Use of protective clothing
- Discipline and team work
- Turn out processes
- Mounting of fire vehicles
- Description of fire vehicles
- Ancillary equipment
- Locke drills
- Use of ancillary equipment
- Maintenance of ancillary equipment
- Maintenance of ancillary equipment
- Hose and hose fittings
- Hose storage
- Dry hose running
- Branch holding
- Words of command
- Signals
- Hose running Hose maintenance
- Principles of combustion
- Temperature and heat
- Classes of fire
- Firefighting agents
- Hand held fire extinguishers
- Application of firefighting agents
- Maintenance of fire extinguishers
- Ladders
- Ladder skills
- Ropes and lines Practical use of lines
- Progress tests

13. **SUBJECT – Fire ground Skills**

**OBJECTIVES**

To provide the trainee with:

I. The practical skills require to use the more complex item
II. The practical skills to use any combination of equipment
III. Knowledge of the dangers associated with some industrial practices on an airport
IV. Knowledge and practical skills in the handling of disabled persons

**TOPICS:**

- Working in smoke
- Breathing apparatus
- Breathing apparatus maintenance
- First Aid
- Casualty handling
- Stretchers
- Rescue and evacuation
- Structural firefighting
- Fire prevention
- Power operated tools
- Power operated tools maintenance
- Combination drills
- Aircraft fueling
- Visit to fuelling depot
- Tanker fire
- Liquefied petroleum gas

14. **SUBJECT - Aircraft Firefighting**

**OBJECTIVES**

To provide the trainee with:

1. The practical skills required of an aerodrome firefighter.
2. The practical knowledge to enable the implementation of an aerodrome firefighter’s skills
3. Knowledge of the assisting emergency services and the overall strategy of aerodrome firefighting.

**TOPICS:**
- Strategy and tactics
- Aerodrome emergency organization
- Wheel fires
- Freight and cargo fires
- Engine fires
- Fire on one side
- Cross wind attach
- Combined attach
- Fully involved survivable crash
- Aircraft crash at remote location
- Smoke logged fuselage
- Scattered debris

15. **Subject - Aircraft**
OBJECTIVE

To provide the trainee with:

I. Sufficient knowledge of aircraft that he can execute his firefighter skills with assurance and effectiveness
II. The practical skills required to enter a crashed aircraft.
III. Knowledge of the contents of aircraft, the complexity of these cargos, and how it affects aerodrome firefighter.

TOPICS

- Aircraft construction
- Aircraft familiarization
- Aircraft cargo
- Military aircraft
- Aircraft familiarization visit