
SUBJECT: AERODROME RESCUE AND FIRE FIGHTING

DATE: 01/08/2009

GENERAL

This Advisory Circular (CT) contains information about standards, practices and procedures that the Authority has found to be an Acceptable Means of Compliance (AMC) with the associated regulation.

An AMC is not intended to be the only means of compliance with a regulation, and consideration will be given to other methods of compliance that may be presented to the Authority. When new standards, practices or procedures are found to be acceptable, they will be added to the appropriate Guidance Document.

PURPOSE

This Advisory Circular (CT) provides methods, acceptable to the Authority, for showing compliance with the rescue and fire-fighting requirements of CV CAR Part 14 and explanatory material to assist in showing compliance.

RELATED CV CAR

This CT relates specifically to CV CAR PART 14, Subpart 14.F.

1. INTRODUCTION

- A. The principal emergency service at any aerodrome is the aerodrome rescue and fire-fighting service. It has the objective of saving human life in the event of an aircraft accident at or near an aerodrome. The requirement is for this service to arrive at the scene of the accident as quickly as possible with appropriate personnel, equipment and fire extinguishing agents.
- B. The most important factors that affect rescue in a survivable aircraft accident are:
 - (1) The training received by the personnel; and
 - (2) The effectiveness of the equipment; and
 - (3) The speed at which personnel and equipment designated for rescue and fire-fighting purposes can be put to use.
- C. Cape Verde has accepted that its International Aerodromes will comply with the ICAO standards and practises for aircraft rescue and fire-fighting services. A lesser standard has been developed for domestic aerodromes based on the characteristics of the aircraft using the aerodromes.

2. APPLICATION

- A. Coverage of the different aspects of rescue and fire-fighting is not exhaustive in this Ac that only addresses the essential elements that need further expansion and guidance. There are several publications available that address the elements of rescue and fire-fighting in detail and thus not reproduced in this GD. The following is a list of some publications that can be referred to for further guidance material.
 - (1) CV CAR 14.F and Manual of Standards, MOS 14,
 - (2) ICAO Doc 9137-AN/898 - Airport Services Manual
 - (3) Part 1 Rescue and Fire-fighting.
 - (4) ICAO Doc 7192-AN/857 Training Manual
 - (5) Part E-2
 - (6) Aerodrome Fire Services, Personnel.

3. CATEGORY DETERMINATION

- A. Subject to paragraph B, each applicant for the grant of an aerodrome operating certificate shall, for an International aerodrome, and any other aerodrome when so required by the Authority in the interest of safety—
 - (1) provide rescue and fire-fighting capability at that aerodrome; and

- (2) determine the rescue and fire fighting category of the aerodrome in accordance with Table 1 based on the largest aeroplane type conducting regular air operations to and from the aerodrome.

Table 1. Aerodrome category for rescue and fire-fighting

Aerodrome Category (1)	Aeroplane over-all length (2)	Maximum fuselage width (3)
1	0 up to but not including 9 m	2 m
2	9 m up to but not including 12 m	2 m
3	12 m up to but not including 18 m	3 m
4	18 m up to but not including 24 m	4 m
5	24 m up to but not including 28 m	4 m
6	28 m up to but not including 39 m	5 m
7	39 m up to but not including 49 m	5 m
8	49 m up to but not including 61 m	7 m
9	61 m up to but not including 76 m	7 m
10	76 m up to but not including 90 m	8 m

Note.1 To categorise the aerodrome according to the largest aeroplane type used on regular air operations using the aerodrome, first evaluate their over-all length and, second, the fuselage width of the aeroplane.

Note.2 If, after selecting the category appropriate to an aeroplane's over-all length that aeroplane's fuselage width is greater than the maximum width in column for that category, and then the aerodrome category for that aeroplane size is actually one category higher.

Note.3 Length and width are shown in metres.

B. An applicant for the grant of an aerodrome operating certificate may—

- (1) when the number of aeroplane movements at the aerodrome of those aeroplanes in the aerodrome category applying under Table 1 is less than 700 in the busiest consecutive 3 months of the year, determine the aerodrome category to be one less than that aerodrome category:
- (2) during periods of reduced activity, reduce the level of protection to that needed for the highest category of aeroplanes using the aerodrome during that time irrespective of the number of movements.

4. EXTINGUISHING AGENTS

Each applicant for the grant of an aerodrome operating certificate shall have the minimum extinguishing agents required for the category determined from Table 1, as provided in Table 2.

Table 2. Minimum usable amounts of extinguishing agents

Aerodrome Category	Foam meeting performance Level B		Complementary agents		
	Water	Discharge rate foam solution/minute	Dry chemical powders	Or Halons	Or Co ₂
	(L)	(L)	(Kg)	(Kg)	(Kg)
1	230	230	45	45	91
2	670	550	90	90	180
3	1200	900	135	135	270
4	2400	1800	135	135	270
5	5400	3000	180	180	360
6	7900	4000	225	225	450
7	12,100	5300	225	225	450
8	18,200	7200	450	450	900
9	24,300	9000	450	450	900
10	32,300	11,200	450	450	900

Volume units are litres and mass units are kilograms

4.1 Complementary extinguishing agents

- A. The complementary agent required as required by CV CAR Part 14 is dry chemical powders.
- B. When selecting dry chemical powders for use with foam, take care to ensure compatibility.

4.2 Foam concentrates

Any foam concentrate to be used in rescue and fire-fighting vehicles should meet or exceed the specification laid down by the International Standards Organisation (ISO), or any other recognised organisation that meets the same criteria.

4.3 Foam characteristics

- A. The quantity of foam concentrate separately provided on vehicles for foam production should be in proportion to the quantity of water provided and the foam concentrate selected. The amount of foam concentrate should be sufficient to supply at least two full loads of water.

- B. The amounts of water specified for foam production are calculated on an application rate of 5.5 L/min/m² for foam meeting performance level B.
- C. For agent substitution, the following equivalents should be used; 1 kg dry chemical powder = 0.66 L water for production of a foam meeting performance level B

4.4 Reserve supply

A 200 percent reserve supply of foam concentrate for the rescue and fire-fighting vehicles should be maintained on the aerodrome for vehicle replenishment purposes. Where a major delay in the replenishment of this supply is anticipated, the amount of reserve supply should be increased.

5. FIRE-FIGHTING AND RESCUE EQUIPMENT

5.1 Rescue and Fire-fighting – vehicles

- A. Each applicant for the grant of an aerodrome operating certificate shall have the minimum rescue and fire-fighting vehicles for the category determined under CV CAR 14, subsection 14.F.210, as provided in Table 3.

Table 3. Minimum rescue & fire fighting vehicles

Aerodrome Category	Rescue & Fire Fighting Vehicles
1	1
2	1
3	1
4	1
5	1
6	2
7	2
8	3
9	3
10	3

- B. Subject to paragraph C, each vehicle required by paragraph A shall be equipped for two-way voice radio communications with at least—
 - (1) each of the other required rescue and fire-fighting vehicles required for the aerodrome; and
 - (2) the aerodrome control service or aerodrome flight information service serving the aerodrome; and
 - (3) other stations as specified in the applicant's aerodrome emergency plan.
- C. Where only one vehicle is required by paragraph (a) and there is no aerodrome control service or aerodrome flight information service serving the aerodrome and the aerodrome emergency plan does not provide for contact with other stations, the vehicle need not be equipped for two-way voice radio communications.

D. Each vehicle required by paragraph (a) shall—

- (1) have a flashing or rotating beacon; and
- (2) be marked in a single conspicuous colour of red or yellowish green.

5.2 Fire-fighting equipment

Each rescue and fire-fighting vehicle required under CV CAR Part 14 should be equipped with at least the following fire-fighting equipment:

- (1) Fire delivery hose
- (2) Fire-fighting branches hand held
- (3) Standpipe key and bar

5.3 Rescue equipment

Aerodromes should have at least the following equipment available for rescue at the scene of any aircraft accident:

Table 3. Minimum equipment for rescue operations

<i>Equipment for rescue operations</i>	<i>Airport category</i>			
	<i>1-2</i>	<i>3 -5</i>	<i>6-7</i>	<i>8-10</i>
Adjustable wrench	1	1	1	1
Axe, rescue, large non-wedge type	-	1	1	1
Axe, rescue, small non-wedge or aircraft type	1	2	4	4
Cutter bolt, 61 cm	1	1	1	1
Crowbar, 95 cm	1	1	1	1
Crowbar, 1.65 m	-	-	1	1
Chisel, cold 2.5 cm	-	1	1	1
Flashlight/hand lamps	2	3	4	8
Hammer, 1.8 kg	-	1	1	1
Hook, grab or salving	1	1	2	3
Saw, metal cutting or hacksaw, heavy duty, complete with spare blades	1	1	1	1
Blanket, fire resisting	1	1	2	3
Ladder, extending (of over-all length appropriate to the aircraft types in use)	1	1	2	3
Rope line, 15 m length	1	1	2	3
Rope line, 30 m length	-	-	2	3
Pliers, 17.8 cm, side cutting	1	1	1	1
Pliers, slip joint 25 cm	1	1	1	1
Screwdrivers, assorted (set)	1	1	1	1
Snippers, tin	1	1	1	1
Chocks, 15 cm high	-	-	1	1
Chocks, 10 cm high	1	1	-	-
Powered rescue saw complete with two blades; or - pneumatic rescue chisel complete - plus spare cylinder, chisel, and retaining spring	1	1	1	2
Seat beltharness cutting tool	1	2	3	4
Gloves, flame resistant pairs (unless	2	3	4	8

issued to individual crew members)				
Breathing apparatus and spare cylinder	One set per fire fighter on duty			
Oxygen inhaler	-	1	1	1
Hydraulic or pneumatic forcing tool	-	1	1	1
Medical first aid kit	1	1	2	3
Tarpaulin	1	1	2	3
Protective Clothing	-	1	2	3
Protective Clothing	One set per fire fighter on duty			
Stretcher	1	2	2	2

5.4 Rescue operations in a difficult environment

- A. At international aerodromes where a significant proportion of aircraft arrivals and departures take place over water, swampy areas or other forms of difficult terrain that cannot be served by conventional wheeled vehicles, the aerodrome operator should ensure the availability of special procedures and equipment to deal with accidents in these areas. These facilities need not be located with, or provided by, the aerodrome operator if they can be made immediately available by other agencies as part of the aerodrome emergency plan. The aerodrome operator should determine and specify in advance the response area for which it undertakes to provide a rescue service.
- B. In producing its detailed plan the aerodrome operator should consider the services and facilities already provided by other Search and Rescue type organisations to ensure that their separate responsibilities for an aircraft accident in the vicinity of the aerodrome are clearly delineated.
- C. The objective of the rescue operation should be to create conditions in which survival is possible and from which the total rescue operation can succeed. This concept anticipates that the initial rapid response may have to provide a preliminary level of succour while awaiting the arrival of a larger rescue force. The first stage should have as its objective the removal of immediate hazards to survivors, their protection, first aid treatment of injuries, and the use of communication equipment to identify the locations to which additional rescue forces should respond. The emphasis will be on rescue not fire-fighting capability as the time taken to reach the accident site would preclude an effective fire-fighting operation.

6. RESCUE AND FIRE-FIGHTING – RESPONSE CAPABILITY

- A. Each applicant for the grant of an aerodrome operating certificate shall, when required by the Authority, demonstrate the following rescue and fire fighting response capability in optimum conditions of visibility and surface conditions:
 - (1) within 3 minutes of the time of the alarm, the rescue and fire-fighting vehicles and personnel needed to discharge foam at a rate of at least 50 percent of the discharge rate specified in Table 2 for the aerodrome category shall reach the furthest point of the movement area from their assigned posts and be in position at that point to apply that amount of foam:
 - (2) within one minute after the arrival of the first responding vehicle or vehicles and personnel, all other vehicles required for the aerodrome category by Table 3 and all the necessary personnel shall be in position to apply

continuous foam application at the discharge rate specified in Table 2 for the aerodrome category.

7. RESCUE AND FIRE-FIGHTING PERSONNEL

Each applicant for the grant of an aerodrome operating certificate shall establish a procedure to ensure that all rescue and fire-fighting personnel at their aerodrome are—

- (1) equipped with adequate protective clothing and rescue equipment needed to do their duties; and
- (2) trained, medically and physically fit, and competent in the use of the rescue and fire-fighting equipment; and
- (3) receiving recurrent training and regular practice to maintain their competency; and
- (4) sufficient in number and readily available to operate the rescue and fire-fighting vehicle or vehicles and the equipment at maximum capacity; and
- (5) alerted by siren, alarm, or other means to any existing or impending emergency requiring their assistance.

7.1 Personnel fitness

- A. Personnel selected for rescue and fire fighting duties should be free from any physical or mental condition or disability which might limit their performance or which might be aggravated by a sudden level of exertion.
- B. The medical fitness of a prospective fire-fighter should be determined by a medical examination and assessment conducted by a registered medical practitioner to the following standards:
 - (1) Vision - Applicants should have:
 - (a) a distance visual acuity (without correction) of 6/12 in each eye separately. No standard is set for near visual acuity;
 - (b) normal fields of vision.
 - (2) Colour perception - Applicants should have normal colour perception as tested by pseudo-isochromatic plates. If this is failed by more than 2 errors with a 24 plate set, they should demonstrate an ability readily to identify coloured lights of signal red, signal green and white as tested by the normally accepted lantern tests.
 - (3) Hearing - Applicants should understand an average conversational voice in a quiet room, using both ears, at a distance of 2500 mm (8 feet) from the examiner, and with the back turned to the examiner. In cases of doubt, an on-the-job hearing assessment should be used to determine whether there is adequate ability to understand radioed instructions and verbal instructions under the conditions of background noise to be encountered in and around operating fire fighting appliances.

- (4) Medical Fitness - Applicants should be free from any congenital or acquired disability and the effects of medication or of drugs causing such degree of functional incapacity as is likely to interfere with the efficient performance of their duties during the period before the next medical review.
- (5) Applicants should be free from any risk factor, disease, or disability which renders them likely to become suddenly unable to perform their assigned duties safely during the period before the next medical review.
- (6) There should be no history or current diagnosis of the following:
 - (a) psychosis.
 - (b) alcohol or drug dependency.
 - (c) epilepsy.
 - (d) isolated recent convulsion (unless a cause is known and has been eliminated) or brain injury or cranial surgery sufficiently recent to carry a heightened risk of epilepsy.
 - (e) any disturbance of consciousness without an explanation.
 - (f) coronary artery disease (whether successfully treated or not).
 - (g) other cardiac conditions treated by surgical means (for example, valve replacement or insertion of a pacemaker).
 - (h) any active disease (or functional disability) of the lungs.
 - (i) diabetes mellitus controlled by insulin.

C. In determining the complete fitness of a person, consideration should be given to the arduous nature of rescue and fire-fighting duties. Particular care should be taken if personnel are selected to wear respiratory equipment, where psychological factors are significant, in addition to physical suitability. The nature of testing, and procedures for assessing, the suitability of prospective fire-fighters should be established and included in the aerodrome certification exposition.

7.2 Continued fitness of personnel

The continued fitness of personnel is essential if they are to maintain their capability to be effective rescue fire-fighters. Their ongoing medical and physical fitness should be periodically assessed and if necessary a physical fitness programme established.

7.3 Personnel training

- A. Entry training. Each prospective fire-fighter is required to be trained and assessed to be competent before being employed in the role. This training should include at least the following areas:
 - (1) Aerodrome familiarisation.
 - (2) Aircraft familiarisation.
 - (3) Rescue and fire-fighting personnel safety.
 - (4) Emergency communications systems on the aerodrome, including aircraft fire related alarms
 - (5) Use of fire hoses, nozzles, turrets and any other appliances provided.

- (6) Application of the type of extinguishing agents required under CV CAR Part 14.
 - (7) Emergency aircraft evacuation assistance
 - (8) Use of rescue equipment.
 - (9) The checking, maintenance and care of rescue and fire-fighting equipment.
 - (10) Fire-fighting operations.
 - (11) Fire-fighters role in the aerodrome emergency plan and the interaction with other agencies.
 - (12) Dangerous goods
 - (13) Medical first aid.
- B. Advanced training. Each fire-fighting unit should determine its organisational structure to achieve an effective rescue and fire-fighting unit. The larger units will need to have a structure of supervisory and management personnel and identify the training and proficiency requirements for each level in the organisation. The training should be progressive through the grades with minimum levels of aerodrome rescue and fire-fighting experience established for each grade. A successful completion of each preceding training course should be a prerequisite for advancement to higher grade training and appointment.
- C. For standardisation and commonality the levels should be structured as follows:
- (1) rescue fire-fighter
 - (2) rescue fire officer
 - (3) senior rescue fire officer
- Aerodrome operators may use different titles in their organisational structure but they should equate to the preceding in terms of training and qualifications
- D. There is also a need to provide advanced training for each rescue fire-fighter to expand their knowledge, skill and proficiency and in particular to cover any developments in techniques, equipment or extinguishing agents.
- E. Recurrent training. Recurrent training has the aim of maintaining fire-fighting proficiency consisting of live fire training and participation in emergency plan exercises.

7.4 Protective clothing for personnel

- A. It is essential that all personnel operating at an aircraft fire be provided with protective clothing designed to provide the fire-fighter with protection from radiated heat, occasional flame contact and injury from abrasive contact.
- B. Each rescue fire-fighter should be provided with at least the following items of protective clothing:

- (1) Protective helmet
 - (2) Proximity suit
 - (3) Gloves
 - (4) Boots
- C. Self contained respiratory equipment should be provided for those personnel who are required to enter a smoke filled cabin or operate on the presence of smoke or toxic gases.
- D. Each aerodrome should also assess the need for other items such as entry protective suits or chemical suits.

7.5 Personnel levels

- A. Sufficient trained personnel are to be detailed and readily available to discharge the extinguishing agent at the required rate within the time specified in CV CAR Part 14.
- B. Other fully trained personnel are to be readily available to provide handline operation if necessary from the major fire-fighting vehicles, and use ladders and other rescue and fire-fighting equipment associated with rescue and fire fighting operations.
- C. The number of trained personnel responding and operating the equipment at maximum capacity should not be less than the following.
- (1) Aerodrome category 9 or 10 — one qualified senior rescue fire officer, one rescue fire officer, and five qualified rescue fire-fighters.
 - (2) Aerodrome category 8 — one qualified senior rescue fire officer, one rescue fire officer, and four qualified rescue fire-fighters.
- D. At International aerodromes, a fully trained and qualified senior rescue fire officer should arrive at the scene of the incident no later than the first responding rescue and fire-fighting vehicle. This will allow an early appraisal of conditions to assess and direct fire fighting operations.
- E. At International aerodromes, any control room or communication facility operated by, and serving, the rescue and fire-fighting service should continue to provide this service until alternative arrangements are made.
- F. The scale of manning and the minimum number of personnel required for lower aerodrome categories should be assessed regarding the type of aircraft and the use of handlines and rescue equipment.

7.6 Training structure

- A. The previous chapter addressed personnel training in terms of a broad curriculum and identified the need for structured training. The structure of the training required should be determined by each aerodrome considering the size and organisational structure of the required rescue and fire-fighting unit.

- B. The design of a course for a fire-fighter at a domestic aerodrome needs to address the fact that the fire-fighter is not supported by a large organisation and could be the sole duty fire-fighter. The training of such a person should consider this self-sufficiency with emphasis on proficiency at the aerodrome and on the equipment provided.
- C. Each aerodrome with a large organisational requirement should establish a training syllabus and experience requirements for each supervisory and management level.
- D. Each training course should end with an assessment of competence with oral technical, practical and written technical tests. The minimum competence standard for trainees should be established for each course with suitable certificates of competence issued to successful trainees.
- E. The publication, ICAO Doc 9137-AN/898, Airport Services Manual, Part 1, Rescue and fire-fighting, contains guidance on all aspects of rescue and fire-fighting training and should be used by each aerodrome operator for the basis of designing and conducting such training.

7.7 Training organisation

- A. Each organisation established for the training of rescue and fire-fighting personnel should detail its —
 - (1) curriculum and syllabus for each subject and at each level of qualification it intends to train
 - (2) methods and criteria to be used for establishing the competence of each trainee
 - (3) organisational structure and the training personnel to be used
 - (4) facilities and equipment to be provided.
- B. There should be a senior instructor responsible for the co-ordination and supervision of rescue and fire-fighting training, and the maintenance of all records. This senior instructor should be qualified and experienced in the rescue and fire-fighting role including the training role.
- C. Personnel used for training should be qualified and experienced in the rescue and fire-fighting role or specialists in a particular aspect of the training syllabus.



Carlos Monteiro

President of the Board

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