



Advisory Circular

AC139-3

Aerodrome Rescue and Fire-fighting

Initial Issue

01 July 2002

GENERAL

Civil Aviation Authority Advisory Circulars (AC) contain information about standards, practices and procedures that the Director has found to be an Acceptable Means of Compliance (AMC) with the associated rule.

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

PURPOSE

This Advisory Circular provides methods, acceptable to the Director, for showing compliance with the rescue and fire-fighting requirements of Part 139 and explanatory material to assist in showing compliance.

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This Advisory Circular also includes Explanatory Material (EM) where it has been shown that further explanation is required. Explanatory Material must not be regarded as an acceptable means of compliance.¶

RELATED CAR

This AC relates specifically to Civil Aviation Rules 139.59, 139.61, 139.63, 139.65, 139.67 and 139.111.

CHANGE NOTICE

There was no previous issue of this AC, consequently no change is in effect.

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## INTRODUCTION

### Background

The principal emergency service at any aerodrome is the aerodrome rescue and firefighting 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.

- The most important factors that affect rescue in a survivable aircraft accident are—
- The training received by the personnel; and
- The effectiveness of the equipment; and
- The speed at which personnel and equipment designated for rescue and firefighting purposes can be put to use.

Papua New Guinea has accepted that its International Aerodromes will comply with the ICAO standards and practises for aircraft rescue and firefighting services. A lesser standard has been developed for domestic aerodromes based on the characteristics of the aircraft using the aerodromes.

### Application

Coverage of the different aspects of rescue and firefighting 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 firefighting in detail and thus not reproduced in this AC. The following is a list of some publications that can be referred to for further guidance material.

ICAO Annex 14, Aerodromes  
Volume 1  
Aerodrome Design and Operations.

- ICAO Doc 9137-AN/898 - Airport Services Manual  
Part 1 Rescue and Firefighting.
- ICAO Doc 7192-AN/857 Training Manual  
Part E-2  
Aerodrome Fire Services, Personnel.
- National Fire Protection Codes – 402, 403, 424M, 1003 & 1500.



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# CHAPTER 1 — PERSONNEL

## 1.1 Personnel fitness

1.1.1 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.

1.1.2 The medical fitness of a prospective firefighter should be determined by a medical examination and assessment conducted by a registered medical practitioner to the following standards —

- (1) Vision - Applicants should have —
  - (i) a distance visual acuity (without correction) of 6/12 in each eye separately. No standard is set for near visual acuity;
  - (ii) 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:
  - psychosis.
  - alcohol or drug dependency.
  - epilepsy.
  - 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.
  - any disturbance of consciousness without an explanation.
  - coronary artery disease (whether successfully treated or not).
  - other cardiac conditions treated by surgical means (for example, valve replacement or insertion of a pacemaker).
  - any active disease (or functional disability) of the lungs.
  - diabetes mellitus controlled by insulin.

Deleted: 1. GENERAL. Civil Aviation Authority advisory circulars (AC) contain information about standards, practices and procedures that the Authority has found to be acceptable for compliance with the associated rule.¶  
Consideration will be given to other methods of compliance which may be presented to the Authority. ¶  
When new standards, practices or procedures are found to be acceptable they will be added to the appropriate advisory circular. ¶  
In addressing a subject the use of the imperative “shall”, a term not normally welcome in an AC, is because it is associated with mandatory provisions of the Rule itself. ¶  
Each reference to a number in this AC, such as 139.15, is a reference to a specific rule within Part 139¶

..... Column Break.....  
2. PURPOSE. This Advisory Circular (AC) provides methods acceptable to the Authority for showing compliance with the aerodrome rescue and firefighting requirements under Part 139 of the Civil Aviation Rules (CAR).¶  
3. FOCUS. This material is intended for operators of certificated aerodromes that are required to provide rescue and fire fighting capability for compliance with Rule 139.111¶  
4. RELATED CAR. This AC relates specifically to CAR Part 139, ... [ 2]

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1.1.3 In determining the complete fitness of a person, consideration should be given to the arduous nature of rescue and firefighting 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 firefighters should be established and included in the aerodrome certification exposition.

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## 1.2 Continued fitness of personnel

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

## 1.3 Personnel training

1.3.1 Entry training. Each prospective firefighter 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:

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- (1) Aerodrome familiarisation.
- (2) Aircraft familiarisation.
- (3) Rescue and firefighting personnel safety.
- (4) The principles of fire extinction.
- (5) Use of fire hoses, nozzles, turrets and any other appliances provided.
- (6) Application of the type of extinguishing agents required under Part 139.
- (7) Use of rescue equipment.
- (8) The checking, maintenance and care of rescue and firefighting equipment.
- (9) Emergency aircraft evacuation assistance.
- (10) Firefighting operations.
- (11) Firefighters role in the aerodrome emergency plan and the interaction with other agencies.
- (12) Medical first aid.

1.3.2 Advanced training. Each firefighting unit should determine its organisational structure to achieve an effective rescue and firefighting 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 firefighting 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.

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1.3.3 For standardisation and commonality the levels should be structured as follows:

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- rescue firefighter
- rescue fire officer
- 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*

1.3.4 There is also a need to provide advanced training for each rescue firefighter to expand their knowledge, skill and proficiency and in particular to cover any developments in techniques, equipment or extinguishing agents.

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1.3.5 Recurrent training. Recurrent training has the aim of maintaining firefighting proficiency consisting of live fire training and participation in emergency plan exercises.

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## 1.4 Protective clothing for personnel

1.4.1 It is essential that all personnel operating at an aircraft fire be provided with protective clothing designed to provide the firefighter with protection from radiated heat, occasional flame contact and injury from abrasive contact.

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1.4.2 Each rescue firefighter should be provided with at least the following items of protective clothing:

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- Protective helmet
- Proximity suit
- Gloves
- Boots

1.4.3 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.

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1.4.4 Each aerodrome should also assess the need for other items such as entry protective suits or chemical suits.

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## 1.5 Personnel levels

(1) Sufficient trained personnel are to be detailed and readily available to discharge the extinguishing agent at the required rate within the time specified in Part 139.

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(2) Other fully trained personnel are to be readily available to provide handline operation if necessary from the major firefighting vehicles, and use ladders and other rescue and firefighting equipment associated with rescue and fire fighting operations.

(3) The number of trained personnel responding and operating the equipment at maximum capacity should not be less than the following.

- Aerodrome category 9 or 10 — one qualified senior rescue fire officer, one rescue fire officer, and five qualified rescue firefighters.
- Aerodrome category 8 — one qualified senior rescue fire officer, one rescue fire officer, and four qualified rescue firefighters.

(4) 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 firefighting vehicle. This will allow an early appraisal of conditions to assess and direct fire fighting operations

(5) At International aerodromes, any control room or communication facility operated by, and serving, the rescue and firefighting service should continue to provide this service until alternative arrangements are made.

(6) 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.

## CHAPTER 2 — TRAINING STRUCTURE AND RESOURCE

### 2.1 Training structure

2.1.1 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 firefighting unit.

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2.1.2 The design of a course for a firefighter at a domestic aerodrome needs to address the fact that the firefighter is not supported by a large organisation and could be the sole duty firefighter. The training of such a person should consider this self-sufficiency with emphasis on proficiency at the aerodrome and on the equipment provided.

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2.1.3 Each aerodrome with a large organisational requirement should establish a training syllabus and experience requirements for each supervisory and management level.

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2.1.4 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.

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2.1.5 The publication, ICAO Doc 9137-AN/898, Airport Services Manual, Part 1, Rescue and firefighting, contains guidance on all aspects of rescue and firefighting training and should be used by each aerodrome operator for the basis of designing and conducting such training.

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### 2.2 Training organisation

2.2.1 Each organisation established for the training of rescue and firefighting personnel should detail its —

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- curriculum and syllabus for each subject and at each level of qualification it intends to train
- methods and criteria to be used for establishing the competence of each trainee
- organisational structure and the training personnel to be used
- facilities and equipment to be provided

2.2.2 There should be a senior instructor responsible for the co-ordination and supervision of rescue and firefighting training, and the maintenance of all records. This senior instructor should be qualified and experienced in the rescue and firefighting role including the training role.

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2.2.3 Personnel used for training should be qualified and experienced in the rescue and firefighting role or specialists in a particular aspect of the training syllabus.

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## CHAPTER 3 — FIREFIGHTING AND RESCUE EQUIPMENT

### 3.1 Firefighting equipment

Each rescue and firefighting vehicle required under Part 139 should be equipped with at least the following firefighting equipment:

- Fire delivery hose
- Firefighting branches hand held
- Standpipe key and bar

### 3.2 Rescue equipment

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

- (1) portable lighting equipment providing flood and spot lighting;
- (2) power operated cutting tools that can be operated from a portable power source;
- (3) hand tools including wire and bolt cutters, screwdrivers of appropriate sizes and designs, crowbars, hammers, axes, metal and wood saws;
- (4) forcing equipment, usually hydraulically operated, for bending or lifting operations;
- (5) four sets of breathing apparatus;
- (6) medical first aid equipment, ideally consisting of pre-packed wound dressings in protective containers, scissors, adhesive dressings and burn dressings, stretchers or spine boards and blankets;
- (7) communications equipment in the form of miniaturised radiotelephone units and a portable loud hailer;
- (8) miscellaneous items including shovels, grab hooks, lines (cordage), harness cutting knives, electrical gloves and ladders of appropriate type and length, related to the likely aircraft types involved; and
- (9) a powered fan unit capable of extracting contaminated air from aircraft.

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Items (a) to (h) inclusive should be carried in the rescue and firefighting vehicles to be available at the accident site within the required response times under Part 139.

3.2.2 Domestic aerodromes should have at least the equipment listed in 3.2 (c), (h) and (f) except for stretchers, spineboards and blankets. The scale should be in relationship to the number of firefighting personnel being used. The items should be carried in the rescue and firefighting vehicles to be available at the accident site within the required response times under Part 139.

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### 3.3 Rescue operations in a difficult environment

3.3.1 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.

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3.3.2 In producing its detailed plan the aerodrome operator should consider the services and facilities already provided by the Search and Rescue Organisation to ensure that their separate responsibilities for an aircraft accident in the vicinity of the aerodrome are clearly delineated.

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3.3.3 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 firefighting capability as the time taken to reach the accident site would preclude an effective firefighting operation.

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## CHAPTER 4 — EXTINGUISHING AGENTS

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### 4.1 Complementary extinguishing agents

The complementary agents required are to be as required by Part 139:

- (1) CO<sub>2</sub>; or
- (2) dry chemical powders; or
- (3) halogenated hydrocarbons (halons); or
- (4) a combination of these agents.

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When selecting dry chemical powders for use with foam, take care to ensure compatibility.

Dry chemical powders and halons are normally considered more efficient than CO<sub>2</sub> for aircraft rescue and firefighting operations.

### 4.2 Foam concentrates

Any foam concentrate to be used in rescue and firefighting vehicles should meet or exceed the specification laid down by the International Standards Organisation (ISO), US Defense Force Military Specification (Mil Spec) or any other recognised organisation that meets the same criteria. Manufacturers that meet these specifications are listed in the Qualified Products List (QPL) promulgated by the US Defense Department.

### 4.3 Foam characteristics

4.3.1 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.

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4.3.2 The amounts of water specified for foam production are calculated on an application rate of 5.5 L/min/m<sup>2</sup> for foam meeting performance level B.

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4.3.3 For agent substitution, the following equivalents should be used;

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1 kg dry chemical powder or 1 kg halon or 2 kg CO<sub>2</sub> = 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 firefighting 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.

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# Advisory Circular

Subject: **Aerodrome Rescue and  
Firefighting**

Date: 21/12/92

**AC139-04**

Initiated by: Mr E Evans

**1. GENERAL.** Civil Aviation Authority advisory circulars (AC) contain information about standards, practices and procedures that the Authority has found to be acceptable for compliance with the associated rule.

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**2. PURPOSE.** This Advisory Circular (AC) provides methods acceptable to the Authority for showing compliance with the aerodrome rescue and firefighting requirements under Part 139 of the Civil Aviation Rules (CAR).

**3. FOCUS.** This material is intended for operators of certificated aerodromes that are required to provide rescue and fire fighting capability for compliance with Rule 139.111

**4. RELATED CAR.** This AC relates specifically to CAR Part 139, Rule 139.61 and 139.65.

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## **Introduction**

### **1 Background**

**1.1 The principal emergency service at any aerodrome is the aircraft rescue and firefighting service. It has the objective of saving human life in the event of an aircraft accident at or near the 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.**

**1.2 The most important factors that affect rescue in a survivable aircraft accident are: the training received, the effectiveness of the equipment and the speed with which personnel and equipment, designated for rescue and fire fighting purposes, can be put to use.**

**1.3 New Zealand has accepted that its international aerodromes will comply with the ICAO standards for this service. A lesser standard has been developed for domestic aerodromes based on the characteristics of the aircraft being served by the aerodrome.**

### **2 Application**

**This AC contains guidance for compliance with the Part 139 requirements for rescue and firefighting. Coverage of the different aspects of rescue and firefighting is not exhaustive in this circular only addressing the essential elements that need further expansion and guidance. There are several publications available which address the elements of rescue fire in detail and thus not reproduced in this AC. Find below a list of some publications which can be referred to for further guidance material.**

**ICAO Annex 14, Aerodromes  
Volume 1  
Aerodrome Design and Operations**

**ICAO Doc 9137-AN/898  
Airport Services Manual  
Part 1 Rescue and fire fighting.**

**ICAO Doc 7192-AN/857  
Training Manual  
Part E-2  
Aerodrome Fire Services  
Personnel.**

**National Fire Protection Codes - 402, 403, 424M, 1003 & 1500**

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