Trinidad and Tobago
Civil Aviation Authority

TTCAA Advisory Circular

Subject: REQUIREMENTS FOR AERODORME RESCUE AND FIREFIGHTING
TTCAA Advisory Circular TAC-AD002
Date: 07/01/04

PURPOSE

1. (1) The purpose of this TTCAA Advisory Circular (TAC) is to provide guidance on the requirements for aerodrome rescue and firefighting as prescribed in TTCAR No.12 and the Manual of Aerodrome Standards.

(2) This amendment arises because of a change in the numbering system for TACs in which the numbering of aerodrome TACs now have the identifier "AD" before the TAC number. This TAC replaces and supercedes TAC-AGA041 which is cancelled and should be destroyed.

RELATED REFERENCES

2. This TAC relates to the following:

(a) TTCAR No.12;

(b) ICAO Annex 14;

(c) ICAO Doc 9137 - Airport Services Manual, Part 1

GENERAL

Background

3. (1) The principal objective of a rescue and fire fighting service is to save lives. For this reason, the provision of means of dealing with an aircraft accident or incident occurring at, or in the immediate vicinity of, an aerodrome assumes primary importance because it is within this area that there are the greatest opportunities of saving lives. This must assume at all times the possibility of, and need for, extinguishing a fire which may occur either immediately following an aircraft accident or incident, or at any time during rescue operations.

(2) The most important factors bearing on effective 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 into use.

(3) Requirements to combat building and fuel farm fires, or to deal with foaming of runways, are not taken into account.

(4) Under TTCAR No.12:44 an aerodrome operator must ensure that rescue and fire fighting equipment and services are provided at his aerodrome. Public and private organizations suitably equipped may be designated to provide the rescue and fire fighting service. It is intended that the fire station housing these organizations would normally be located on the aerodrome, although an off-aerodrome location is not precluded provided the response time can be met.

PROTECTIVE CLOTHING AND EQUIPMENT FOR PERSONNEL

Protective clothing for personnel

4. It is essential that all responding rescue and fire fighting personnel be provided with protective clothing and respiratory equipment to enable them to perform their duties in an effective manner. As a general guide, the protective clothing would include protective helmet, protective suit, protective fire fighting boots and protective fire fighting gloves and when correctly worn, should protect the wearer from -

(a) Occasional flame contact;

(b) Radiant heat of 3 W/cm^2 for two minutes;

(c) Radiant heat of 8 W/cm^2 for one minute;

(d) Impact resistance from sharp objects;

(e) Water; and

(f) Electric shock.

Respiratory Equipment

5. (1) Fire fighters will need respiratory equipment of an approved design for the anticipated environment, for example if required to enter a smoke filled cabin or operate in the presence of smoke or toxic gases. Such equipment should be self-contained and may necessitate the use of a special hood or helmet if the standard helmet in use does not accommodate a face mask.

(2) Each aerodrome operator should also assess the need for other items such as entry protective suits or chemical suits.

PERSONNEL LEVELS

6. (1) Determination of the personnel level for rescue and fire fighting at an aerodrome would require the assurance that –

(a) Sufficient fully trained personnel are to be detailed and readily available to discharge the extinguishing agent at the required rate within the time specified in the Manual of Aerodrome Standards; and.

(b) Other fully trained personnel are readily available to ensure the rescue and firefighting unit can meet its obligations under the aerodrome emergency plan.

(2) The total number of trained personnel required to deploy and operate the rescue and fire fighting service should therefore be determined based on the following criteria:

(a) The rescue and fire fighting vehicles should be manned to ensure their ability to discharge at their maximum designed capability, principal and complementary distinguishing agents effectively and simultaneously at an aircraft accident or incident;

(b) Any control room or communications facility operated by and serving the rescue and fire fighting service should be able to continue to provide this service until alternative arrangements are initiated by the airport emergency plan to undertake this function.

(3) The personnel level would also be dependent on the types of aircraft using the airport. During flight operations, sufficient trained personnel should be detailed and be readily available to ride the rescue and fire fighting vehicles and to operate the equipment at maximum capacity. These trained personnel should be deployed in such a way that ensures that minimum response times can be achieved and that continuous agent application at the appropriate rate can be fully maintained.

(4) All personnel provided for aircraft rescue and fire fighting duties, should be fully trained in the performance of their duties and under the direction of a designated chief of emergency crew. Selected personnel should receive special driving instruction in cross-country and soft-ground techniques. Where the response area of the rescue and fire fighting service includes water, swamps or other difficult terrain and suitable rescue equipment and procedures are provided for these locations, the personnel designated to respond should be adequately trained and exercised to provide a prompt and effective service .

SELECTION OF PERSONNEL FOR RESCUE AND FIRE FIGHTING DUTIES

7. (1) Personnel recruited for rescue and fire fighting services should be resolute, possess initiative, competent to form an intelligent assessment of a fire situation and, above all, must be well trained and fully qualified. Ideally, every individual should be capable of sizing up changing circumstances at an aircraft accident and taking the necessary action without detailed supervision. Where the available staff displays limited capacity to use initiative, the deficiency must be made good by the provision of additional supervisory staff of a superior grade who will be responsible for exercising control of their crews.

(2) The officer responsible for the organization and training of the rescue and fire fighting service should be an experienced, qualified and competent leader. The capabilities of this officer should have been proved wherever practicable by training at a recognized rescue and fire fighting service training establishment and measures should be taken to ensure the officer's continuing proficiency.

(3) Due regard should be given to the arduous nature of rescue and fire fighting duties and personnel selected for this work should be free from any physical disability which might limit their performance or which might be aggravated by a high level of exertion. Particular care should be taken in selecting personnel as wearers of respiratory protection equipment, where psychological factors are significant, in addition to physical suitability.

TRAINING STRUCTURE AND RESOURCE

Elements of Training

8. (1) TTCAR No.12:26 requires that an aerodrome operator shall ensure that all persons performing duties or providing services at his aerodrome are trained in accordance with the standards for training aerodrome personnel set out in his Aerodrome Manual for the aerodrome.

(2) All rescue and fire fighting personnel must be properly trained to perform their duties in an efficient manner and are required to participate in live fire drills commensurate with the types of aircraft and type of rescue and fire fighting equipment in use at the aerodrome, including pressure fed fuel fires.

(3) Each firefighting unit should determine its organizational 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 organization. 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.

(4) For standardization and commonality the levels should be structured as follows—

(a) Rescue fire-fighter;

(b) Rescue fire officer; and

(c) Senior rescue fire officer.

Note: *An aerodrome operator may use different titles in its organizational structure but they should equate to the preceding in terms of training and qualifications.*

Training Curriculum

9. (1) The training curriculum should include initial and recurrent training in at least the following areas:

(a) Aerodrome familiarization,

(b) Aircraft familiarization,

(c) Rescue and firefighting personnel safety,

(d) The principles of fire extinction;

(e) Emergency communications systems on the aerodrome including aircraft fire related alarms;

(f) Use of fire hoses, nozzles, turrets and other appliances required for compliance with the Manual of Aerodrome Standards;

(g) Application of the type of extinguishing agents required under the Manual of Aerodrome Standards;

(h) Emergency aircraft evacuation assistance;

(i) Adaptation and use of structural rescue and fire fighting equipment for aircraft rescue and fire fighting; use of rescue equipment,

(j) The checking, maintenance and care of rescue and firefighting equipment,

(k) Dangerous goods;

(l) Fire-fighters role in the aerodrome emergency plan and the interaction with other agencies;

(m) Protective clothing and respiratory protection.

(n) Emergency aircraft evacuation assistance;

(o) Firefighting operations, and

(p) Medical first aid.

(2) 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.

Recurrent Training

10. The aim of recurrent training is to maintain firefighting proficiency and in addition to instruction in the curriculum, should include live fire training and participation in emergency plan exercises.

Advanced Training

11. There is also a need to provide advanced training for each rescue fire-fighter to expand his knowledge, skill and proficiency and in particular to cover any developments in techniques, equipment or extinguishing agents.

Training Personnel

12. (1) The training organization should include 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.

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

Training Guidance Documents

13. (1) Guidance to assist the aerodrome operator in providing proper training is given in ICAO Doc 9137 –Airport Services Manual, Part 1 and ICAO Doc ICAO Doc 7192- Training Manual, Part E-2 and these should be used by aerodrome operators as the basis for designing and conducting the required training.

(2) Rescue and fire fighting personnel training programme must include training in human performance, including team coordination. Guidance on the design of training programmes on human performance and team coordination can be found I ICAO Doc 9683 – Human Factors Training Manual

FIREFIGHTING AND RESCUE EQUIPMENT

Information on Level of Protection

14. (1) Information concerning the level of protection provided at an aerodrome for aircraft rescue and fire fighting purposes must always be made available to intended aerodrome users. Where there are significant changes in the level of protection normally available at an aerodrome for rescue and fire fighting, these must be notified to the appropriate air traffic service units and aeronautical information units to provide the necessary information to arriving and departing aircraft.

(2) In this respect, a significant change in the level of protection is considered to be a change in the category of the rescue and fire fighting service from the category normally available at the aerodrome, resulting from a change in availability of extinguishing agents, equipment to deliver the agents or personnel to operate the equipment.

(3) To categorize the aeroplanes using the aerodrome, their overall length should first be evaluated and second, their fuselage width. Guidance on categorizing aerodromes for rescue and fire fighting purposes and on providing rescue and fire fighting equipment and services is given in the Airport Services Manual, Part 1.

***Note**.— Either a take-off or a landing constitutes a movement.*

Minimum Fire Fighting Equipment

15. Each rescue and firefighting vehicle required under TTCAR No.12 should be equipped with at least the following firefighting equipment—

(a) Fire delivery hose;

(b) Firefighting branches; and

(c) Standpipe, key and bar.

Rescue equipment

16. Rescue equipment commensurate with the level of aircraft operations expected should be provided on the rescue and firefighting vehicles. International aerodromes should have at least the following equipment available for rescue at the scene of any aircraft accident—

(a) Portable lighting equipment providing flood and spot lighting;

(b) Power operated cutting tools that can be operated from a portable power source;

(c) Hand tools including wire and bolt cutters, screwdrivers of appropriate sizes and designs, crowbars, hammers, axes, metal and wood saws;

(d) Forcing equipment, usually hydraulically operated, for bending or lifting operations;

(e) Four sets of breathing apparatus;

(f) 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;

(g) Communications equipment in the form of radiotelephone units and a portable loud hailer;

(h) 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

(i) A powered fan unit capable of extracting contaminated air from aircraft. 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 TTCAR No.12.

Rescue operations in a difficult environment

17. (1) Under TTCAR No.12:44(3) , an aerodrome operator shall ensure that special rescue and fire fighting equipment appropriate to the associated hazards and risks are available –

(a) Where an aerodrome is located close to water or swampy areas or difficult terrain; or

(b) Where a significant portion of approach or departure operations take place over areas close to water, swampy areas or difficult terrain.

(2) In situations referred to in sub-paragraph (1), 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.

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

(4) 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 containment 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.

EXTINGUISHING AGENTS

Extinguishing agents

18. Descriptions of the agents may be found in the Airport Services Manual, Part 1.

Complementary extinguishing agents

19. (1) The complementary agents required are—

(a) CO2;

(b) Dry chemical powders;

(c) Halogenated hydrocarbons (halons); or

(c) A combination of these agents.

(2) When any other complementary agent is used, the substitution ratios need to be checked.

(3) Alternate complementary agents having equivalent fire fighting capability may be utilized. Additional information on extinguishing agents is given in the Airport Services Manual, Part 1.

(4) 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 CO2 for aircraft rescue and firefighting operations.

(5) On the grounds that halons are the major ozone depleting substances and carbon dioxide is the major contributor to atmospheric change, halon and carbon dioxide may continue to be used but other forms of extinguishing agents should be investigated to replace these extinguishing systems.

Foam concentrates

20. (1) Any foam concentrate used in rescue and firefighting vehicles must meet or exceed the ICAO performance level B specification. There is no direct relationship between this specification and

specifications of other organizations such as the International Standards Organization (ISO) or US Defence Force Military Specifications (Mil Spec). If such foam concentrates are used, users need to be able to show that they will produce foam meeting the ICAO performance level B requirements.

Foam characteristics

21. (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.

(2) 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.

(3) For agent substitution, 1 kg dry chemical powder or 1 kg halon or 2 kg CO2 = 0.66 L water for production of a foam meeting performance level B should be used.

(4) Information on the required physical properties and fire extinguishing performance criteria needed for a foam to achieve an acceptable performance level A or B rating is given in the Airport Services Manual, Part 1.

Reserve supply

22. (1) A 200 percent reserve supply of foam concentrate for the runway category 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.

(2) If the 200 percent reserve supply of foam concentrate is temporarily not available on the aerodrome the runway rescue and firefighting category need only be reduced when the quantity of foam concentrate available falls below 100 percent of that for the normal category.

(3) The quantity of foam concentrate provided on a vehicle should be sufficient to produce at least two loads of foam solution.

RESPONSE CAPABILITY

Frequency of rescue and fire fighting response verification

23. (1) Response time is considered to be the time between the initial call to the rescue and fire fighting service, and the time when the first responding vehicle is in position to apply foam at a rate of at least 50 per cent of the discharge rate specified in Table 9-2 of the Manual of Aerodrome Standards.

(2) The holder of an aerodrome licence should regularly complete a rescue and fire fighting response time verification. Response time verifications should normally be held with a periodicity of between one and three months.

(3) The verification should require a fire vehicle to produce water through the vehicle's monitor at the correct operating pressure, immediately upon arrival at a nominated location.

(4) The response time verification should be initiated using the normal emergency response activation procedures detailed in the aerodrome emergency plan, and the time required from the activation to the production of water at the nominated location should be recorded.

Response considerations

24. (1) The response verification should be carried out during periods of minimal or no traffic so that the fire vehicles are not disrupted during the verification, and the vehicles can be serviced before the next scheduled aircraft movement.

(2) The verification should be carried out during daylight hours and with dry surface conditions.

REFERENCES FOR ADDITIONAL GUIDANCE

25. (1) This TAC contains guidance for compliance with requirements of TTCAR No.12 and the Manual of Aerodrome Standards for rescue and firefighting. Coverage of the different aspects of rescue and firefighting is not exhaustive in this TAC which addresses elements that need further expansion and guidance. There are several publications available which address the elements of rescue and firefighting in detail and below is a list of some publications which should be referred to for further guidance material.

(a) ICAO Annex 14, Aerodromes
Volume 1
Aerodrome Design and Operations

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

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

(2) Information on the ICAO Documentation is obtainable from the ICAO web site at http://www.icao.int/icao/en/sales.htm

_____
Ramesh Lutchmedial
Director General, Civil Aviation