



ICAO

Doc 10072

# Manual on the Establishment of Minimum Cabin Crew Requirements

First edition, 2017



Approved by and published under the authority of the Secretary General

INTERNATIONAL CIVIL AVIATION ORGANIZATION





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## FOREWORD

Cabin crew members play a key role with regard to passenger and operational safety. The number of cabin crew on board, and their performance, are significant factors in the successful evacuation of aircraft. Therefore, a minimum number of cabin crew members are required to effectively conduct a timely evacuation and increase the survivability of passengers during an accident.

ICAO developed the *Manual on the Establishment of Minimum Cabin Crew Requirements* (Doc 10072) in order to provide guidance on provisions in Annex 6 — *Operation of Aircraft, Part I — International Commercial Air Transport — Aeroplanes* related to the assignment of emergency duties and the minimum number of cabin crew required on board commercial passenger flights.

This manual contains guidance for States to develop the operating rules and approval processes regarding the number of cabin crew members required on board. It also provides guidance on other aspects related to the assignment of cabin crew members on board, including additional cabin crew requirements for specific situations, and considerations related to the use of personnel assigned to non-safety and non-emergency duties in the cabin by operators, if permitted by the State.

The content of this manual was developed with input from experts from civil aviation authorities, operators, aircraft manufacturers, training organizations and international organizations, and thereafter submitted for extensive peer review to take into account comments from the expert community.

ICAO gratefully acknowledges the contributions of the ICAO Cabin Safety Group and individual experts who provided support, advice and input for this manual.

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# GLOSSARY

## ABBREVIATIONS

AOC	Air operator certificate
ABPs	Able-bodied passengers
I/C	In-charge cabin crew member
OPSPECS	Operating provisions/operations specifications
Pax	Passenger
PBE	Portable breathing equipment
SARPs	Standards and Recommended Practices
SMS	Safety management system
TC	Type Certificate

## DEFINITIONS

When the following terms are used in this manual, they have the following meanings:

***Able-bodied passengers.*** Passengers who are clearly physically able and are willing to help cabin crew maintain good order and discipline on-board the aircraft.

***Aircraft.*** Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.

***Air operator certificate (AOC).*** A certificate authorizing an operator to carry out specified commercial air transport operations.

***Approved.*** Accepted by a Contracting State as suitable for a particular purpose.

***Cabin crew member.*** A crew member who performs, in the interest of safety of passengers, duties assigned by the operator or the pilot-in-command of the aircraft, but who shall not act as a flight crew member.

***Direct access.*** A direct route or passage from a seat to an exit from which a passenger can proceed without entering an aisle or passing around an obstruction.

***Disembarkation.*** The leaving of an aircraft after a landing, except by crew or passengers continuing on the next stage

of the same through-flight.

**Duty.** Any task that flight or cabin crew members are required by the operator to perform, including, for example, flight duty, administrative work, training, positioning and standby when it is likely to induce fatigue.

**Duty period.** A period which starts when a flight or cabin crew member is required by an operator to report for or to commence a duty and ends when that person is free from all duties.

**Emergency exit.** Door, window exit, or any other type of exit (e.g. hatch in the flight deck, tail cone exit) used as an egress point to allow maximum opportunity for cabin evacuation within an appropriate time period.

**Emergency exit row seating.** Each seat in a row of seats located at an emergency exit, having direct access to the exit.

**Fatigue.** A physiological state of reduced mental or physical performance capability resulting from sleep loss, extended wakefulness, circadian phase, and/or workload (mental and/or physical activity) that can impair a person's alertness and ability to perform safety-related operational duties.

**Flight crew member.** A licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period.

**Flight duty period.** A period which commences when a flight or cabin crew member is required to report for duty that includes a flight or a series of flights and which finishes when the aeroplane finally comes to rest and the engines are shut down at the end of the last flight on which he/she is a crew member.

**Hazard.** A condition or an object with the potential to cause or contribute to an aircraft incident or accident.

**In-charge cabin crew member.** Cabin crew leader who has overall responsibility for the conduct and coordination of cabin procedures applicable during normal operations and during abnormal and emergency situations for flights operated with more than one cabin crew member.

**In-flight.** The period from the moment all external aircraft doors are closed following boarding through the moment when one external door is opened to allow passengers to leave the aircraft or until, if a forced landing, competent authorities take over responsibility for the aircraft and individuals and property on the aircraft. For the purpose of the Tokyo Convention an aircraft is considered to be in flight from the moment when power is applied for the purpose of take-off until the moment when the landing run ends.

**Mock-up.** A training device that is a partial, functional replica of an actual aircraft, without motion.

**Operations manual.** A manual containing procedures, instructions and guidance for use by operational personnel in the execution of their duties.

**Operator.** The person, organization or enterprise engaged in or offering to engage in an aircraft operation.

**Person with disabilities.** Any person whose mobility is reduced due to a physical incapacity (sensory or locomotor), an intellectual deficiency, age, illness or any other cause of disability when using transport and whose situation needs special attention and the adaptation to the person's needs of the services made available to all passengers.

**Pilot-in-command.** The pilot designated by the operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight.

**Rest period.** A continuous and defined period of time, subsequent to and/or prior to duty, during which flight or cabin crew members are free of all duties.

**Safety.** The state in which risks associated with aviation activities, related to or in direct support of the operation of aircraft, are reduced and controlled to an acceptable level.

**Safety management system (SMS).** A systematic approach to managing safety, including the necessary organizational structures, accountabilities, policies and procedures.

**Safety risk.** The predicted probability and severity of the consequences or outcomes of a hazard.

**Special categories of passengers.** Persons who need special conditions, assistance, or equipment when travelling by air. These may include but are not limited to:

- a) infants;
- b) unaccompanied children;
- c) persons with disabilities;
- d) persons with mobility impairments;
- e) persons on stretchers; and
- f) inadmissible passengers, deportees or persons in custody.

**State of Design.** The State having jurisdiction over the organization responsible for the type design.

**State of the Operator.** The State in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

**Type Certificate.** A document issued by a Contracting State to define the design of an aircraft, engine or propeller type and to certify that this design meets the appropriate airworthiness requirements of that State.

*Note.— In some Contracting States a document equivalent to a Type Certificate may be issued for an engine or propeller type.*

**Unstaffed exit.** Emergency exit for which no cabin crew member has been positioned for the flight.

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# Chapter 1

## INTRODUCTION

### 1.1 BACKGROUND

1.1.1 Past accident investigations have stated that the performance of cabin crew members was a significant factor in the successful evacuation of aircraft, especially when time is a critical factor in the survivability of occupants. The number of cabin crew members on board can impact the outcome of an evacuation. Their performance significantly influences the speed at which passengers are able to evacuate.

1.1.2 In addition to their role in an emergency evacuation, cabin crew members play an important proactive role in managing safety during normal operations, which can also contribute to the prevention of incidents or accidents. This role has become increasingly challenging and includes, but is not limited to:

- a) applying safety procedures, including continuous surveillance of the cabin;
- b) managing and assisting passengers, for example during in-flight medical emergencies;
- c) preventing and managing incidents from escalating in the cabin, such as smoke or fire;
- d) informing the flight crew of abnormal situations observed in the cabin or relating to the aircraft, such as pressurization problems, engine anomalies, and contamination of critical surfaces; and
- e) preventing unlawful interference and managing events that can compromise safety and security of the flight, such as hijackings or unruly passengers.

1.1.3 A minimum number of cabin crew members is needed to manage all such scenarios, mitigate the risk of injury to passengers and manage operational safety.

1.1.4 The assignment of cabin crew members for emergency duties on board commercial passenger aircraft is a requirement of Annex 6 — *Operation of Aircraft, Part I — International Commercial Air Transport — Aeroplanes*, which states that an operator must establish, to the satisfaction of the State of the Operator, the minimum number of cabin crew members required for each aircraft type in its fleet, based on seating capacity or the number of passengers carried. This requirement is based on the need for cabin crew members to be present on board in order to conduct safe and expeditious evacuation of an aircraft, and perform the necessary functions in an emergency or in a situation requiring an evacuation.

1.1.5 The establishment of minimum cabin crew requirements (also referred to as minimum crew complement) should take into account two aspects:

- a) the minimum number of cabin crew members for a specific aircraft type as established at type certification between the aircraft manufacturer and the certification authorities of the State of Design (i.e. certification requirements); and
- b) the ratio of cabin crew members per number of passengers carried or installed passenger seats, as specified in the State of the Operator's operating rules (i.e. operational requirements).

1.1.6 The State should take both of these aspects into consideration when approving the minimum number of cabin crew required for each aircraft type in an operator's fleet. It should conduct an approval of the minimum cabin crew requirements in the following circumstances:

- a) as part of the process to issue a new air operator certificate (AOC);
- b) when an operator introduces a new aircraft type into its fleet; or
- c) in special circumstances (e.g. certain changes in the cabin configuration).

1.1.7 As stated in the *Manual of Procedures for Operations Inspection, Certification and Continued Surveillance* (Doc 8335), Part III — *The AOC Application, Evaluation and Certification*, an AOC applicant may be required, as part of the certification inspection, to conduct a demonstration of the adequacy of aircraft emergency procedures, crew member emergency evacuation training and emergency equipment (commonly referred to as an evacuation demonstration). The State may also require an applicant to conduct a simulated ditching demonstration for each aircraft type which will be operated on extended flights over water. Two aspects should be considered:

- a) if the State requires the operator to conduct an evacuation demonstration, the number of cabin crew members used by the operator to successfully complete the demonstration should be used to establish the minimum cabin crew required on that aircraft type for that operator; and
- b) where an evacuation demonstration was successfully completed by the aircraft manufacturer as part of the type certificate process with one cabin crew member per floor-level exit, that number should not be reduced by the operator (refer to Chapter 6 for further explanations). If the demonstration conducted by the manufacturer did not include one cabin crew member per floor-level exit, it is not expected that the operator would be required to add additional cabin crew to staff each floor-level exit when operating the same aircraft type unless the State determines that an acceptable level of safety is not maintained.

1.1.8 Additional considerations which should be addressed when establishing the minimum cabin crew complement are presented in Chapter 3.

## 1.2 PURPOSE

1.2.1 The *Manual on the Establishment of Minimum Cabin Crew Requirements* (Doc 10072) provides guidance related to ICAO requirements on the establishment and approval of the minimum cabin crew complement, found in Annex 6, Part I. It addresses the different aspects that should be taken into account by a State when developing or modifying its operating rules on the number of cabin crew members required on board commercial passenger flights, as well as when approving an operator's minimum cabin crew requirements. The manual provides detailed guidance for the planning, conduct and evaluation of operators' evacuation and simulated ditching demonstrations. It also provides an overview of minimum cabin crew requirements related to the certification of aircraft.

1.2.2 In addition, the manual provides guidance on other aspects related to the assignment of cabin crew on board aircraft, including specific considerations when establishing minimum cabin crew numbers (e.g. refuelling with passengers on board), and those related to the use of personnel assigned to non-safety and non-emergency duties in the cabin by an operator, if permitted by the State. For the purpose of this manual, "State" refers to State of the Operator, unless specified otherwise. The term "aircraft type" refers to a particular aircraft make, model and series, as well as a specific cabin configuration (if applicable). An example of an aircraft make, model and series is as follows: A330-200 – A-Airbus (make), 330 (model), 200 (series).



### 1.3 SCOPE

The content of this manual is presented as guidance material. The approach outlined was developed as an acceptable means, but not the sole means, to establish and approve minimum cabin crew requirements. States may also use guidance material issued by other States to assist with the approval process. Operators should consult specific requirements for the establishment of minimum crew complements with their State and comply with national regulations and operating rules, where applicable.

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## Chapter 2

# CERTIFICATION REQUIREMENTS

### 2.1 GENERAL

2.1.1 Certification requirements related to design and construction, as well as crashworthiness and cabin safety are contained in Annex 8 — *Airworthiness of Aircraft* and Annex 6 — *Operation of Aircraft*. The relevant Standards and Recommended Practices (SARPs) can be found in the appendix to Chapter 2. Certification requirements address, but are not limited to, the following aspects:

- a) emergency exits;
- b) cabin crew seats; and
- c) emergency evacuation.

2.1.2 This chapter provides an overview of certification requirements related to cabin safety, focusing primarily on those linked to the establishment of the minimum number of cabin crew members required on board transport category aircraft. Most States' airworthiness standards related to design and construction of transport category aircraft are harmonized at the international level. Therefore, the content of this chapter should be applicable to a large audience. However, since differences between States may exist, the content should not be considered as the sole means of compliance with such standards.

### 2.2 EMERGENCY EXITS

2.2.1 Annex 8 requires that aircraft be equipped with sufficient emergency exits to allow maximum opportunity for cabin evacuation within an appropriate time (typically a timeframe of 90 seconds). Items to be considered include the number of seats, seating configuration, as well as number, location and size of exits.

2.2.2 When an aircraft is designed, the number of passenger seats fitted on board by a manufacturer is restricted by the types and number of exits in the aircraft's fuselage. States' airworthiness standards related to design and construction of transport category aircraft specify the maximum number of passenger seats permitted for each exit of a specific type installed in each side of the fuselage (i.e. per pair of exit type). Table 2-1 presents a maximum number of passenger seats permitted for each type of exit pairs.

**Table 2-1. Maximum number of passenger seats permitted per each type of exit pairs**

<i>Pair of exit type</i>	<i>Maximum number of passenger seats</i>
Type A	110
Type B	75
Type C	55
Type I	45
Type II	40
Type III	35
Type IV	9

2.2.3 The maximum passenger seating capacity on an aircraft is based predominantly on the numbers presented in Table 2-1. However, certification requirements also include other considerations that further restrict the maximum number of passenger seats permitted for each exit of a specific type installed in each side of the aircraft fuselage. Restrictions are linked to the number of passenger seats in the seating configuration and/or the combination of exit types installed on a given aircraft.

### 2.3 CABIN CREW SEATS

ICAO SARPs related to the equipment and location of cabin crew seats are found in Annex 6, Part I — *International Commercial Air Transport — Aeroplanes*. States' airworthiness standards also define the required layout of cabin crew seats in relation to the specific type of exits installed. Based on these requirements, aircraft manufacturers define standard locations of cabin crew seats for their aircraft. Criteria for the location of cabin crew seats include distance from emergency exits (adjacent to or near the exit) as well as visibility of the cabin from the cabin crew seats when occupied by crew members (direct view of passengers, main aisles, etc., in the cabin area). States' airworthiness standards typically specify that cabin crew seats must be near required floor-level exits. They also specify that a cabin crew seat must be located adjacent to each Type A and B exit.

### 2.4 EMERGENCY EVACUATION

ICAO Annex 8 requires that facilities be provided, related to the passenger and crew capacity, for the rapid evacuation of an aircraft in conditions likely to occur following an emergency landing. The interior layout of the cabin and the position and number of emergency exits, including the means of locating and illuminating the escape paths and exits, must facilitate rapid evacuation of the aircraft in conditions likely to occur following an emergency landing. In addition, the design of aircraft certificated for ditching conditions must give maximum practicable assurance that safe evacuation of the occupants can be executed in case of ditching. Whether or not ditching certification is requested by the manufacturer, ditching emergency exits must be provided as per States' airworthiness standards.

## 2.5 NUMBER OF CABIN CREW

As part of the Type Certificate (TC) process, the minimum number of cabin crew members is established by the aircraft manufacturer, in accordance with the specific requirements found in the State of Design's relevant standards. These standards take into consideration the optimum location and distribution of cabin crew members, to support an evacuation (refer to section 2.6.1). In addition, special interior features (e.g. bar, suite installation) may affect the number and distribution of cabin crew members and should be taken into account.

## 2.6 EMERGENCY EVACUATION DEMONSTRATION BY THE MANUFACTURER

2.6.1 As part of the TC process, and in accordance with the specific requirements found in the State of Design's relevant standards, a manufacturer must demonstrate that the maximum seating capacity of the aircraft for which certification is requested, including the number of crew members required under the operating rules, can be evacuated in a given layout within an appropriate time (typically a timeframe of 90 seconds). The goal of the actual demonstration or analysis is to satisfy the certification authority of an acceptable evacuation capability of the aircraft. Emergency evacuation demonstrations are typically conducted with the number of cabin crew members required by the operating rules. Based on these demonstrations, or analysis based on data, aircraft are certified with a minimum number of cabin crew members in relation to a number of passenger seats intended to be occupied for taxi, take-off, and landing. The requirement for a manufacturer to conduct an evacuation demonstration, as part of the TC process, is only applicable to aircraft having a seating capacity of more than forty-four passengers. The State of Design's regulations should cite when a demonstration must be performed, how it is to be conducted, and the specific criteria that must be met by the manufacturer.

2.6.2 The evacuation demonstration evaluates the following aspects:

- a) the basic design and efficiency with which passengers and crew can be safely evacuated in specific degraded conditions (i.e. half of the exits available);
- b) the aircraft's emergency evacuation systems; and
- c) the manufacturer's recommended emergency evacuation procedures.

2.6.3 The operating rules normally establish the minimum cabin crew requirements. If a manufacturer conducts an emergency evacuation with more than this minimum crew, the crew complement used in the successful demonstration would become the minimum for that TC. Furthermore, if one fewer cabin crew member than required by the operating rules is used in the successful demonstration by the manufacturer, the minimum cabin crew requirements are established by the operating rules, not by the manufacturer's demonstration.

2.6.4 The manufacturer's procedures applied in the evacuation demonstration become the baseline for the aircraft operator's procedures.

## 2.7 CRITERIA FOR A FULL-SCALE EVACUATION DEMONSTRATION

2.7.1 A full-scale (land) evacuation demonstration involves any scenario where the aircraft remains in the normal ground attitude, landing gear extended, and one of each pair of emergency exits in the sides of the fuselage remains usable. The applicant (manufacturer or operator) must prove that all of the aircraft's occupants (passengers and crew

members) can evacuate to the ground within an appropriate time (typically a timeframe of 90 seconds), when at full passenger seating capacity. The State<sup>1</sup> should define specific conditions that the applicant must meet as part of the demonstration. These conditions fall under the following categories:

- a) environmental conditions;
- b) aircraft conditions;
- c) crew and passenger conditions;
- d) confidentiality of information; and
- e) scenario conditions.

### **2.7.2 Environmental conditions**

The demonstration should be conducted with exterior ambient light levels of no greater than 0.3 foot-candles prior to the activation of the aircraft emergency lighting system. However, the State may allow the demonstration to be carried out during daylight with simulated darkness so as to recreate night-time conditions. If the demonstration takes place indoors, during daylight hours, all windows of the aircraft should be covered and all exits should be closed to minimize the effect of daylight in the cabin. This lower level of illumination is needed to properly evaluate the aircraft's emergency lighting system and passenger and crew member performance in darkened conditions. Levels of illumination significantly darker may interfere with a proper evaluation of the demonstration, adversely affect safety, and/or test logistics. Therefore, this approximate level of illumination should be maintained by natural or artificial means. The most effective way of controlling the level of illumination is to conduct the demonstration in a darkened hangar. Although the State may allow the use of lighting on the ground, it should not shine against the aircraft exits or windows.

### **2.7.3 Aircraft conditions**

The State should specify conditions related to the aircraft involved in the exercise. Aircraft conditions typically involve the following:

- a) the aircraft should be of the type (i.e. make, model, series and cabin configuration) for which approval is sought. However, the manufacturer may have to combine features of more than one configuration to provide the critical configuration for the demonstration, thus it may not reflect the configuration for which approval is sought;
- b) the aircraft should be at normal ground attitude with its landing gear extended;
- c) during the steps leading to the commencement of the timing of the evacuation, the aircraft's electrical systems should be fully powered (either by an external power unit or by the auxiliary power unit);
- d) the seating capacity and cabin configuration should be representative of the highest passenger version of that aircraft type that will be put into service;
- e) all exits and any internal doors and curtains should be in the take-off position;

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<sup>1</sup> State of Design if the exercise is part of the TC process; State of the Operator if it is an operational requirement.

- f) all the safety and emergency equipment required for the planned operation of the aircraft should be installed;
- g) unless the aircraft is equipped with an off-wing descent means (i.e. slide), stands or ramps may be used by occupants to evacuate via the wings to the ground. Items like safety mats and barriers may be used to ensure safety of the participants provided they do not affect the test results. However, other equipment that is not part of the aircraft's emergency evacuation equipment should not be used;
- h) the aircraft's wing flaps should be fully extended, if required by the emergency evacuation procedures. Stands or ramps (if used) should be positioned accordingly. Wing flaps should not be repositioned until after the demonstration;
- i) not more than 50 per cent of the emergency exits in the sides of the fuselage of the aircraft may be used for the demonstration. If an aircraft has an odd number of emergency exits, one exit should be subtracted and; 50 per cent of the remaining number of exits should be used in the demonstration. Flight crew exits, and exits that are not part of a pair (such as ventral exits, tail-cone exits, and exits on only one side of the fuselage) should not be used for the demonstration<sup>2</sup>. Exits that are not to be used in the exercise should have the exit handle deactivated. Red lights, red tape, or other means placed outside the exits may be used to indicate fire or other reasons that render the exits unusable during the exercise. The exits to be used during the demonstration should be representative of all exits on the aircraft and should be designated by the State. At least one floor-level exit should be used; and
- j) before the start of the demonstration, approximately one-half of the total average amount of carry-on baggage, blankets, pillows, and other similar articles should be distributed at several locations in aisles and emergency exit access ways to create minor obstructions.

#### 2.7.4 Crew and passenger conditions

2.7.4.1 The State should specify conditions related to the participants that will act as crew members and passengers during the exercise. Conditions related to passengers are meant to recreate a representative passenger load, similar to what would be encountered on a routine flight. Persons involved should be in normal health. The term "normal health" means that participants should be free of medical conditions or physical limitations that could affect the demonstration results or increase the chance of injury to themselves or others. Passenger load ratios typically involve the following:

- a) 40 per cent of passengers should be female;
- b) at least 35 per cent of passengers should be over 50 years of age;
- c) at least 15 per cent of passengers should be female and over 50 years of age; and
- d) three life-size dolls not included as part the total passenger load should be on board the aircraft (to simulate infants).

2.7.4.2 The State should prohibit crew members, aircraft maintenance technicians and training personnel, who maintain or operate that specific aircraft type in the normal course of their duties to take part in the demonstration in the role of passengers. Passenger seating for the demonstration should be random. In addition, passengers should not receive any specific instructions except the pre-flight safety briefing prior to the exercise unless it is allowed by the State

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<sup>2</sup> These restrictions on exits to be used are typically required if the exercise is part of the TC process.

(refer to section 2.7.5).

2.7.4.3 Cabin crew members involved in the demonstration should be qualified, regularly scheduled line cabin crew members, i.e. persons that have been trained by the operator in accordance with the standards detailed in the approved training syllabus. No additional training in evacuation procedures or techniques should be provided to those assigned responsibility for the exit operation. Since crew members may have additional knowledge from past experience with demonstrations, which can influence how they perform in the evacuation, every effort should be made to ensure that they have not participated in a demonstration in the past. Cabin crew to be used in the demonstration should not be instructors, supervisory personnel, safety representatives from worker organizations, or anyone else who may be expected to have knowledge of evacuation demonstrations beyond that of an average cabin crew member. When the demonstration is conducted for the purpose of a TC issuance, the cabin crew should be trained to the standards in the manufacturer's certification test requirement document. When the demonstration is conducted as part of the process to issue an AOC, or other operational requirements, the cabin crew should be trained to the standards in the operator's approved training programme.

2.7.4.4 The State may allow flight crew members who are not regularly scheduled line crew members to participate in the exercise (as flight crew), provided they are knowledgeable on the aircraft type.

2.7.4.5 A new (start-up) operator may not have regularly scheduled line cabin crew members. In such instances, the operator would need to utilize the first trained group of cabin crew members. It is possible that this initial group of cabin crew members will include instructors. Nevertheless, this group should not be given any additional instruction or experience that will not be given to other cabin crew members expected to operate the aircraft type on the line. For example, instructors should only receive "train the trainer" training after their participation in the evacuation demonstration. Persons who are responsible for the operator's overall cabin crew programmes should not be used as cabin crew members during demonstrations, unless no other cabin crew have been hired.

2.7.4.6 Smaller operators may also lack sufficient personnel to meet some of the restrictions noted in this section. In those instances, the State may need to work with the operator to address restrictions and establish necessary criteria, such as a specified time period within which cabin crew are prohibited from participating in the exercise.

### **2.7.5 Confidentiality of information**

The State should define criteria regarding confidential information, which should not be disclosed to participants, to ensure unbiased results. The following points should be covered:

- a) no crew member or passenger should be given knowledge of the exits available for the demonstration (i.e. exits that have been chosen as usable);
- b) passengers may be told to follow crew member instructions, as part of the pre-flight safety briefing, but should not be instructed on the procedures to be followed in the demonstration;
- c) the operator should be prohibited from practising, rehearsing, or describing in detail the demonstration for the participants; and
- d) persons having recently participated in this type of demonstration should be prohibited from participating in the exercise.

### **2.7.6 Scenario conditions**

2.7.6.1 The State should define the scenario, which describes how the exercise will be carried out. Conditions



regarding the scenario should include the following:

- a) the minimum number of crew members required (flight and cabin crew) should be on board;
- b) the complete number of passengers, which represents the full passenger seating capacity of the aircraft, should be on board;
- c) cabin crew members should conduct pre-flight safety checks, door arming procedures, cabin compliance checks, the passenger pre-flight safety briefing, and take their assigned jump seats as part of the normal departure preparations process;
- d) cabin crew members should be seated in their assigned jump seats for take-off with safety harness fastened, confirm “cabin readiness” for take-off and pass on the notification to the flight crew, as per established procedures;
- e) flight crew members should be seated in their normal positions with restraints fastened;
- f) once the flight crew advise the State team leader that the cabin is prepared, the State team leader decides when to initiate the evacuation;
- g) cabin crew members should remain seated with safety harnesses fastened until the initiation signal for the commencement of the evacuation is given;
- h) with the exception of the cabin crew members involved in the demonstration, the State should prohibit any employee of the operator to be seated at an emergency exit;
- i) the aircraft’s normal electrical power sources should be interrupted. This action provides a clear initiation signal in the following ways:
  - 1) outside, the aircraft’s external lights (e.g. taxi lights, anti-collision lights) should extinguish; and
  - 2) inside, normal cabin lighting should extinguish and the emergency lighting system should illuminate;
- j) for demonstrations conducted by the operator, other options of signalling the commencement of the evacuation may be available, as approved by the State (e.g. command from the flight deck or other established operator signals). If alternative initiation signals are used, the emergency lighting system must still be activated;
- k) upon receiving the initiation signal, cabin crew members should follow the approved emergency procedures and initiate the evacuation as follows:
  - 1) shouting of commands;
  - 2) unfastening of safety harnesses;
  - 3) leaving the assigned jump seats;
  - 4) assessing exits for usability (before opening);
  - 5) opening usable exits; and

- 6) deploying the slides, if fitted;
- l) all of the safety and emergency equipment that is normally available on that aircraft (slides, ropes, emergency lights, flashlights, megaphones, etc.) should be fully utilized, as applicable, during the demonstration;
- m) the flight crew should delay evacuating the flight deck by a time equivalent to that required to accomplish appropriate emergency procedures and take no active role in assisting others inside the cabin during the demonstration; and
- n) all occupants should escape the aircraft by a means provided as part of the aircraft's systems and equipment (e.g. via slides, stairs).

2.7.6.2 The evacuation time period is completed when the last occupant (including crew members) has evacuated the aircraft and is on the ground. If stands or ramps are used for over-wing egress, occupants are considered to be on the ground when they are on the stand or ramp, provided that the acceptance rate of the stand or ramp is no greater than the acceptance rate of the means available on the aircraft for descent from the wing during an actual accident scenario. In order for the demonstration to be considered successful, the total time which elapses between the interruption of electrical power (or other initiation signal used to indicate that the demonstration has commenced) until the last occupant has evacuated the aircraft and is on the ground should not exceed an appropriate time (typically a timeframe of 90 seconds).

## 2.8 DITCHING PROVISIONS

A ditching demonstration is not part of the TC process. Evacuation demonstration data may be used, but for aircraft design and construction, a ditching evaluation is typically done by analysis. Small-scale testing may be conducted by the manufacturer on one exit type or slide/raft configuration. Typically, egress rates for ditching are much lower than land evacuation demonstrations.

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## Appendix to Chapter 2

### ICAO STANDARDS AND RECOMMENDED PRACTICES (SARPs) RELATED TO CERTIFICATION

Certification requirements related to design and construction, as well as crashworthiness and cabin safety are contained in Annex 8 — *Airworthiness of Aircraft* to the Convention on International Civil Aviation.

Paragraph 4.1.7 *Emergency landing provisions*, of Annex 8 — *Airworthiness of Aircraft*, Part III. *Large Aeroplanes*, Part IIIA. *Aeroplanes over 5 700 kg for which application for certification was submitted on or after 13 June 1960 but before 2 March 2004*, states that:

4.1.7.1 Provisions shall be made in the design of the aeroplane to protect the occupants, in the event of an emergency landing, from fire and from the direct effects of deceleration forces as well as from injuries arising from the effect of deceleration forces on the aeroplane's interior equipment.

4.1.7.2 Facilities shall be provided for the rapid evacuation of the aeroplane in conditions likely to occur following an emergency landing. Such facilities shall be related to the passenger and crew capacity of the aeroplane.

4.1.7.3 The interior layout of the cabin and the position and number of emergency exits, including the means of locating and illuminating the escape paths and exits, shall be such as to facilitate rapid evacuation of the aeroplane in conditions likely to occur following an emergency landing.

4.1.7.4 On aeroplanes certificated for ditching conditions, provisions shall be made in the design to give maximum practicable assurance that safe evacuation from the aeroplane of passengers and crew can be executed in case of ditching.

Paragraph 8.4 *Evacuation*, of Annex 8 — *Airworthiness of aircraft*, Part III. *Large Aeroplanes*, Part IIIB. *Aeroplanes over 5 700 kg for which application for certification was submitted on or after 2 March 2004*, states that:

The aeroplane shall be equipped with sufficient emergency exits to allow maximum opportunity for cabin evacuation within an appropriate time period. Items to be considered shall include:

- a) number of seats and seating configuration;
- b) number, location and size of exits;
- c) marking of exits and provision of instructions for use;
- d) likely blockages of exits;
- e) operation of exits; and

- f) positioning and weight of evacuation equipment at exits, e.g. slides and rafts.

The requirements for equipment and location of cabin crew seats are in Annex 6 — *Operation of Aircraft*. Paragraph 6.16 *Aeroplanes carrying passengers — cabin crew seats* of Annex 6, Part I, states that:

6.16.1 Aeroplanes for which the individual certificate of airworthiness is first issued on or after 1 January 1981

All aeroplanes shall be equipped with a forward or rearward facing (within 15 degrees of the longitudinal axis of the aeroplane) seat, fitted with a safety harness for the use of each cabin crew member required to satisfy the intent of 12.1<sup>1</sup> in respect of emergency evacuation.

6.16.2 Aeroplanes for which the individual certificate of airworthiness was first issued before 1 January 1981

**Recommendation.**— *All aeroplanes should be equipped with a forward or rearward facing (within 15 degrees of the longitudinal axis of the aeroplane) seat, fitted with a safety harness for the use of each cabin crew member required to satisfy the intent of 12.1 in respect of emergency evacuation.*

*Note.*— *Safety harness includes shoulder straps and a seat belt which may be used independently.*

6.16.3 Cabin crew seats provided in accordance with 6.16.1 and 6.16.2 shall be located near floor level and other emergency exits as required by the State of Registry for emergency evacuation.

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<sup>1</sup> Refer to Appendix A to Chapter 3.

## Chapter 3

# OPERATIONAL REQUIREMENTS

### 3.1 NUMBER OF CABIN CREW

3.1.1 Annex 6 requires that an operator establish the minimum number of cabin crew required for each aircraft type in its fleet. The goal of this requirement is to allow for a safe and expeditious evacuation of the aircraft, and to enable cabin crew to carry out the necessary functions to be performed in an emergency or a situation requiring emergency evacuation. The detailed ICAO SARPs can be found in Appendix A to Chapter 3. As per these SARPs, the number of cabin crew required on board is based on:

- a) seating capacity; or
- b) the number of passengers carried.

3.1.2 In addition to the requirements cited above, the ratio of cabin crew members to floor-level exits<sup>1</sup>, should also be considered when establishing minimum crew requirements (refer to Appendix B to Chapter 3).

3.1.3 The role of the cabin crew member involves much more than being prepared to respond in an evacuation. First aid, safety, security-related duties, customer service and other commercial responsibilities, as outlined in the *Cabin Crew Safety Training Manual* (Doc 10002), have increased significantly over the years adding extra workload for cabin crew members. Workload should be taken into consideration when establishing minimum crew requirements, in addition to the considerations presented in ICAO SARPs.

3.1.4 ICAO SARPs do not provide a numeric value (e.g. exact number of cabin crew) needed for the operator to comply with Annex 6 requirements. The minimum number of cabin crew members required for each aircraft type in the operator's fleet must be approved by the State, considering those factors noted above.

3.1.5 The State's operating rules should specify when cabin crew members are required and how the minimum cabin crew complement is determined (i.e. based on seating capacity or number of passengers carried). They should address the following:

- a) *Presence of cabin crew on board.* The requirement for the presence of cabin crew on board commercial passenger aircraft is typically based on the number of installed passenger seats (e.g. cabin crew are generally required for aircraft fitted with more than 19 seats).
- b) *Minimum cabin crew requirement.* This requirement is not internationally harmonized. Some States use seating capacity to determine minimum crew, while others use number of passengers carried. Some States have additional requirements related to evacuation aspects (e.g. direct view).

3.1.6 Most States use the 1:50 model (i.e. a ratio of 1 cabin crew member to 50 passenger seats installed). This includes the United States and States in the European Union. This method is based on the aircraft manufacturers' certificated evacuation capability, as part of the TC process. As an aircraft manufacturer intends to determine the

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<sup>1</sup> Floor-level exits are defined in accordance with FAR 25.807.

maximum passenger capacity with the certification demonstration, the number of passengers carried is equal to the number of passenger seats.

3.1.7 Examples of States using different models include Canada and Australia. Canada uses a 1 cabin crew member to 40 passengers on board ratio as a basis. However, Transport Canada Civil Aviation (TCCA) permits operations with the use on the 1:50 model, if the operator meets a series of criteria to the satisfaction of the competent authority. Australia requires 1 cabin crew member to 36 passengers on board. However, the Civil Aviation Safety Authority (CASA) may grant permission to large aircraft operators to transition to a 1:50 model, if the competent authority is satisfied that an acceptable level of safety can be maintained as a result of implementing this model.

3.1.8 If an operator wants to modify the established minimum number of cabin crew required on a specific aircraft type, it should follow the applicable process established by the State (refer to Chapter 6).

### **3.2 EMERGENCY EVACUATION DEMONSTRATION BY THE OPERATOR**

3.2.1 In order to establish the minimum cabin crew complement, the State may require an applicant of an AOC to conduct an evacuation demonstration, as part of the certification inspection. This exercise is carried out in addition to the demonstration conducted by the manufacturer as part of the TC process. An evacuation demonstration is usually required for each aircraft type with a seating capacity of more than 44 seats. A current AOC holder (i.e. an existing operator) may be required to conduct an evacuation demonstration under specific circumstances, such as the introduction of a new aircraft type into its fleet or other changes listed in section 3.5. An applicant may also be required to conduct a simulated ditching demonstration as part of the operational phase of the certification process for each aircraft type which will be operated on flights over water<sup>2</sup>. A current AOC holder may be required to conduct a simulated ditching demonstration under specific circumstances (refer to section 3.5.9). The State's national regulation should cite when demonstrations must be performed, how they are to be conducted, and the specific criteria that must be met by the operator.

3.2.2 The goal of the demonstration is to satisfy the State that, in any of the circumstances described in section 3.2.1, an operator's cabin crew members are able to achieve an evacuation and ditching capability equivalent to that achieved for the same aircraft type by the manufacturer during the TC process.

3.2.3 For an operator, the evacuation demonstration evaluates the following aspects:

- a) cabin crew training programme and crew member competency in a new or modified design;
- b) the operator's emergency evacuation and ditching procedures; and
- c) the reliability and capabilities of the safety and emergency equipment on board the aircraft.

3.2.4 If the State requires an operator to conduct an evacuation demonstration, the number of cabin crew members used by the operator to successfully complete the demonstration should be used to establish the minimum cabin crew required on that aircraft type for that particular operator. If the number of cabin crew members used by the operator in the demonstration is higher to that used by the manufacturer to achieve the TC requirements, this higher number should become the operator's minimum cabin crew required for that aircraft type. Special considerations related to type certification are presented in Appendix B to Chapter 3.

3.2.5 Emergency evacuation demonstrations conducted by the operator are divided into the following categories:

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<sup>2</sup> When flying over water and at a distance of more than 93 km (50 NM) away from the shore.

- a) full-scale (land) evacuation demonstration (refer to section 2.7, as the same criteria typically apply for operators as for manufacturers);
- b) partial (land) evacuation demonstration; and
- c) simulated ditching demonstration.

### 3.3 CRITERIA FOR A PARTIAL EVACUATION DEMONSTRATION

3.3.1 A partial (land) evacuation demonstration involves any scenario where the aircraft remains in the normal ground attitude, landing gear extended, and 50 per cent of the emergency exits in the sides of the fuselage remain usable. Cabin crew members must demonstrate, to the State, that the aircraft's emergency evacuation equipment is ready for use within an appropriate time (typically a timeframe of 15 seconds). Fifty per cent of exits (and slides, if fitted) should be used.

3.3.2 Passengers are generally not required for a partial demonstration, only flight crew and cabin crew. However, in some situations passengers are required to perform duties in an evacuation (e.g. open over-wing exits). In those instances, passengers should be included in the demonstration to carry out these duties during the exercise. All efforts should be made to minimize injury to passenger participants.

3.3.3 The State should define specific conditions that the operator must meet as part of the exercise. These conditions fall under the following categories:

- a) environmental conditions (same as presented in section 2.7.2);
- b) aircraft conditions;
- c) crew conditions (same as presented in section 2.7.4);
- d) confidentiality of information (same as presented in section 2.7.5); and
- e) scenario conditions.

#### 3.3.4 Aircraft conditions

The State should specify conditions related to the aircraft involved in the exercise. Aircraft conditions typically involve the following:

- a) the aircraft should be of the type (i.e. make, model, series and cabin configuration) for which approval is sought;
- b) the aircraft should be at normal ground attitude with its landing gear extended;
- c) during the steps leading to the commencement of the timing of the evacuation, the aircraft's electrical systems should be fully powered (either by an external power unit or by the auxiliary power unit);
- d) all exits and any internal doors and curtains should be in the take-off position;

- e) all the safety and emergency equipment required should be installed in accordance with the operator's manual; and
- f) Fifty per cent of the exits should be used. Exits that are not to be used in the exercise should have the exit handle deactivated. Red lights, red tape, or other means placed outside the exits may be used to indicate fire or other reasons that render the exits unusable during the exercise. The exits to be used during the demonstration should be representative of all exits on the aircraft and should be designated by the State. At least one floor-level exit should be used.

### 3.3.5 Scenario conditions

3.3.5.1 The State should define the scenario, which describes how the exercise will be carried out. Conditions regarding the scenario should include the following:

- a) the minimum number of crew members required (flight and cabin crew) should be on board;
- b) if the operator's procedures require the use of passengers to perform duties in an evacuation (e.g. open over-wing exits), the needed number of passengers should be on board;
- c) cabin crew members should conduct pre-flight safety checks, door arming procedures, cabin compliance checks, the passenger pre-flight safety briefing (if passengers are part of the exercise), and take their assigned jump seats as part of the normal departure preparations process;
- d) cabin crew members should be seated in their assigned jump seats for take-off with safety harness fastened, confirm "cabin readiness" for take-off and pass on the notification to the flight crew, as per operator procedures;
- e) flight crew members should be seated in their normal positions with restraints fastened;
- f) once the flight crew advise the State team leader that the cabin is prepared, the State team leader decides when to initiate the evacuation;
- g) cabin crew members should remain seated with safety harnesses fastened until the initiation signal for the commencement of the evacuation is given;
- h) with the exception of the cabin crew members involved in the demonstration, the State should prohibit any employee of the operator to be seated at an emergency exit;
- i) the aircraft's normal electrical power sources should be interrupted. This action provides a clear initiation signal in the following ways:
  - 1) outside, the aircraft's external lights (e.g. taxi lights, anti-collision lights) should extinguish; and
  - 2) inside, normal cabin lighting should extinguish and the emergency lighting system should illuminate;
- j) other options of signalling the commencement of the evacuation may be available to the operator, as approved by the State (e.g. command from the flight deck or other established operator signals). If alternative initiation signals are used, the emergency lighting system must still be activated;
- k) upon receiving the initiation signal, cabin crew members should follow the approved emergency



procedures and initiate the evacuation as follows:

- 1) shouting of commands;
  - 2) unfastening of safety harnesses;
  - 3) leaving the assigned jump seats;
  - 4) assessing exits for usability (before opening);
  - 5) opening useable floor-level exits,
  - 6) opening useable non-floor level exits whose opening is assigned as an emergency evacuation duty to cabin crew members, as per operator procedures (if applicable); and
  - 7) deploying the slides, if fitted;
- l) upon receiving the signal from the cabin crew, passengers assigned to exits (if present) should open them as commanded;
- m) flight crew members should be prohibited from taking an active role in assisting the cabin crew members or others inside the cabin during the demonstration; and
- n) flight and cabin crew members (and passengers, if present) should not be required to descend the slides.

*Note.— If cabin crew members are required to open and manage more than one exit, as per the operator's procedures, this aspect should be included and assessed as part of the demonstration (refer to the appendix to Chapter 6).*

3.3.5.2 The evacuation time period is completed when the last slide has fully deployed and is ready for use. A slide is considered "ready for use" when it is fully inflated and can be used by an occupant without causing injury. For aircraft not equipped with slides, the evacuation time period is completed when usable exits are opened. In order for the demonstration to be considered successful, the total time which elapses between the interruption of electrical power (or other initiation signal used to indicate that the demonstration has commenced) until full deployment of all activated slides should not exceed an appropriate time (typically a timeframe of 15 seconds).

### 3.4 CRITERIA FOR A SIMULATED DITCHING DEMONSTRATION

3.4.1 A simulated ditching demonstration involves a scenario where cabin crew should demonstrate, to the State, their ability to efficiently carry out the operator's ditching procedures specific to the aircraft type. Flight crew and cabin crew must take part in the exercise. If the operator's procedures require the use of passengers to assist in launching of life-rafts, the needed passengers must be on board and participate in the demonstration.

3.4.2 The State should define specific conditions that the operator must meet as part of the demonstration. These conditions fall under the following categories:

- a) environmental conditions;
- b) aircraft conditions;

- c) crew and passenger conditions (same as presented in section 2.7.4);
- d) confidentiality of information (same as presented in section 2.7.5);
- e) scenario conditions; and
- f) State-specified timing.

### **3.4.3 Environmental conditions**

The demonstration should assume that daylight hours exist outside the aircraft. It should be conducted during daylight hours, or in a lighted hangar. The State should determine any other appropriate conditions so as to validate the ditching procedures.

### **3.4.4 Aircraft conditions**

3.4.4.1 A simulated ditching demonstration may be carried out using an aircraft or cabin training device. If an actual aircraft is used, it should be the type for which approval is sought.

3.4.4.2 If the State allows the use of a cabin training device, the following points should be considered:

- a) the cabin training device should be a representative of the aircraft type currently used by or proposed to be used by the operator;
- b) the cabin training device should contain adequate seats for use by the participants;
- c) the operation of the emergency exits should simulate those on the aircraft;
- d) slide-rafts should be deployable and detachable;
- e) sufficient wing area should be installed outside the over-wing exits to demonstrate the evacuation, if applicable to the aircraft type; and
- f) the cabin training device should be equipped with all the required safety and emergency equipment, in accordance with the operator's manual.

### **3.4.5 Scenario conditions**

The State should define the scenario, which describes how the exercise should be carried out. Conditions regarding the scenario should include the following:

- a) the minimum number crew members required (flight and cabin crew) should be on board;
- b) if the operator's procedures require the use of passengers to assist in the launching of life-rafts, the needed number of passengers should be on board;
- c) cabin crew members should conduct pre-flight safety checks, door arming procedures, cabin compliance checks, the passenger pre-flight safety briefing (if passengers are part of the exercise),

and take their assigned jump seats as part of the normal departure preparations process;

- d) a stand should be placed at each emergency exit and wing, with the top of the platform at a height simulating the water level of the aircraft following a ditching;
- e) flight crew members should be seated in their normal positions with restraints fastened;
- f) cabin crew members should be seated in their assigned jump seats for take-off with safety harness fastened, confirm “cabin readiness” for take-off and pass on the notification to the flight crew, as per operator procedures;
- g) once the flight crew advise the State team leader that the cabin is prepared, the State team leader decides when to initiate the ditching;
- h) cabin crew members should remain seated with safety harnesses fastened until the initiation signal for the commencement of the ditching preparation is given;
- i) flight crew members should inform cabin crew of an emergency situation that will end in a ditching; the “prepare-for-ditching” order is the clear signal to all involved that the demonstration has commenced;
- j) once the ditching order has been given by the captain, with or without passengers, cabin crew members should carry out all procedures as per the operations manual (e.g. make passenger announcements, don life jackets, brief able-bodied passengers (ABPs), take brace position, shout brace commands, etc.);
- k) upon receiving the order to initiate the evacuation:
  - 1) for one life-raft, selected by the State, cabin crew members should remove the raft from its stowage location, transport it to an exit, secure it to the aircraft, manipulate it out of the aircraft (via stands or ramps), and position it on the ground before inflation; and
  - 2) for one slide-raft, selected by the State, a cabin crew member should inflate the slide-raft in a normal manner (i.e. opening exit in armed mode), demonstrate releasing it from the aircraft, and then lower it to the ground;
- l) if a cabin configuration and/or operator procedure specifies that one exit would be utilized to launch two types of devices (slide-raft and life-raft), the sequence of the launching should be demonstrated at the same time through the applicable exit and conducted during one test and not as separate tests;
- m) if a cabin configuration and/or operator procedure specifies that an over-wing exit would be utilized to launch a life-raft, that action should be demonstrated;
- n) cabin crew should retrieve all other required safety and emergency equipment and place them in the slide-raft or life-raft; and
- o) each occupant should enter the slide-raft/life-raft and the cabin crew members assigned to each slide-raft/life-raft should indicate the location of emergency equipment on board the raft and describe its use.

### 3.4.6 State-specified timing

In addition to the items noted in section 3.4.5, the State may establish the maximum time acceptable for crew members to prepare for ditching, calculated from the moment the flight crew gives the “prepare-for-ditching” order to the cabin crew, up to the simulated water landing (e.g. 15 minutes). The intent of a time limit is to assess cabin crew members’ efficiency and ability to perform in the time period between the decision to ditch and the actual water landing. The State should establish a reasonable timeframe for the completion of the following ditching preparation activities based on an earlier review of the operator procedures. Cabin crew members should accomplish the following within the specified timeframe:

- a) correctly don life jackets;
- b) brief passengers;
- c) secure the cabin;
- d) complete all required checklists;
- e) advise the flight crew that the cabin is prepared for ditching;
- f) be prepared to evacuate; and
- g) react to flight crew signal by adopting the brace position.

*Note.— In those instances of new (start-up) operators, the State may need to work with the operator to establish a “reasonable” timeframe.*

## 3.5 DETERMINING WHICH CATEGORY OF DEMONSTRATION IS REQUIRED

3.5.1 The State should decide if an operator will be required to conduct a full-scale emergency evacuation for each aircraft type operated or if it will allow a partial demonstration or analysis based on data to be used in lieu of a full-scale demonstration. This determination should be made based on specific circumstances, as outlined in this section.

3.5.2 If the operator proposes to operate an aircraft configured with less than 44 seats, even though the aircraft may have been previously type certificated with more than 44 seats, a demonstration should not be required.

3.5.3 A full-scale evacuation demonstration should be conducted by the operator in the following circumstances:

- a) no previous full-scale evacuation demonstration has been conducted by any manufacturer or any operator (aircraft has been previously certified by data analysis);
- b) new aircraft type to the State of the Operator with a proposed maximum passenger seating capacity which has not been previously demonstrated by another AOC holder or by a manufacturer, in accordance with airworthiness standards;
- c) an aircraft has undergone a change in its exit configuration and/or design (as determined by the State of the Operator); or
- d) whenever significant changes have been made to the cabin configuration layout which may alter the

evacuation capabilities as initially demonstrated in the successful evacuation demonstration conducted by the aircraft manufacturer as part of the TC process.

3.5.4 A full-scale evacuation demonstration is a complex undertaking with an inherent risk of injury to the participants. In the event that a full-scale evacuation demonstration is required of an operator, the State may wish to obtain assistance from another State which is highly experienced in conducting such exercises.

3.5.5 The State should determine whether a partial evacuation demonstration is required of the operator. A partial evacuation demonstration should be required in the following circumstances:

- a) a new operator as part of the certification process;
- b) the operator introduces a new aircraft type into its fleet, which has previously had a full-scale demonstration conducted by an AOC holder or by a manufacturer, for the maximum passenger seating capacity to be used by the operator acquiring the aircraft. This would apply even if the aircraft type is already being operated by other national operators within the State;
- c) a significant change has occurred, determined by the State of the Operator, such as:
  - 1) aircraft conversion (e.g. passenger to combi);
  - 2) change in number or type of exits;
  - 3) changes in the type of opening mechanism of emergency exits;
  - 4) reduction in the number of cabin crew required on board;
  - 5) change in cabin configuration (as described in section 3.5.6);
  - 6) change in cabin crew evacuation duties or procedures; and/or
  - 7) increased capacity.

3.5.6 Not all cabin configuration changes will drive the need for an evacuation demonstration. However, if the changes could alter/impede the evacuation capability, the State should require the operator to prove that an acceptable level of safety can be maintained. Examples of cabin configuration changes that may require an evacuation demonstration include:

- a) moving cabin crew jump seat location/crew stations;
- b) changes which would cause de-rating an exit;
- c) seating changes in the over-wing exit layout;
- d) cabin layout between configuration classes where the aisle is no longer straight due to seats;
- e) monument relocation which may impede the evacuation pathway;
- f) seating pitch which may impede access to the aisle; and/or
- g) seating layout which uses new types of seats (oblique-facing seats, side-facing seats, etc.).

3.5.7 The State may allow the use of analysis, based on data, in lieu of an actual evacuation demonstration, if it finds that a combination of analysis and testing will provide data equivalent to that which would be obtained by an actual demonstration. When determining if this option is acceptable, the following aspects should be considered:

- a) existing manufacturer data that is available and recent; and
- b) special circumstances (aircraft conversion, passenger combination, changing emergency exits, significant changes to the aircraft, etc.).

3.5.8 A simulated ditching demonstration should be required when the operator intends to operate aircraft on flights over water, or is otherwise required to have certain equipment on board as part of the regulatory requirements.

3.5.9 A simulated ditching demonstration should be conducted by the operator in the following circumstances:

- a) new operator (as part of the certification process to issue an AOC), even if the aircraft type(s) that makes up the new operator's fleet is already being operated by other operators in the State;
- b) new aircraft type for the operator; or
- c) operator is planning to initiate flights over water areas for the first time with an aircraft type which it has previously operated only over land areas.

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## Appendix A to Chapter 3

### ICAO STANDARDS AND RECOMMENDED PRACTICES (SARPs) RELATED TO MINIMUM CABIN CREW REQUIREMENTS

The assignment of cabin crew members for safety duties on board commercial passenger aircraft is a requirement of Annex 6 — *Operation of Aircraft*.

Paragraph 12.1 *Assignment of emergency duties*, of Annex 6, Part I — *International Commercial Air Transport — Aeroplanes*, states that:

“The operator shall establish, to the satisfaction of the State of the Operator, the minimum number of cabin crew required for each type of aeroplane, based on seating capacity or the number of passengers carried, in order to effect a safe and expeditious evacuation of the aeroplane, and the necessary functions to be performed in an emergency or a situation requiring emergency evacuation. The operator shall assign these functions for each type of aeroplane.”

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## Appendix B to Chapter 3

### CONSIDERATIONS FOR CABIN CREW PER FLOOR-LEVEL EXITS

#### 1. ACCIDENT INVESTIGATIONS ON EVACUATIONS

1.1 This section presents findings from investigations which relate to evacuations, focusing on: the number of cabin crew members on board, staffing of emergency exits and impacts on the evacuations and their outcomes. The list of occurrences presented in this appendix supports the recommendations presented in this manual, regarding minimum cabin crew requirements. This list is non-exhaustive of accident investigations and serves as a series of examples. Accident reports for each of the occurrences referenced in this appendix, as well as other documentation cited, may be obtained from the ICAO website in the Cabin Safety Library, at: [www.icao.int/cabinsafety](http://www.icao.int/cabinsafety).

#### 1.2 Occurrence 1: Collision with ground vehicle during taxi

1.2.1 In May 1991, a MD-88 on a scheduled passenger flight from Savannah to Atlanta, with 96 passengers and six crew members on board (two flight crew members and four cabin crew members), collided with a ground vehicle while taxiing to a gate at Atlanta International Airport.

1.2.2 A fire erupted outside the aircraft and the cabin crew immediately initiated an evacuation. While the in-charge cabin crew member (I/C) attempted to contact the flight crew on the interphone, “panicked” passengers rushed towards her and slammed her against the L-1 exit (main boarding door). A non-revenue passenger, who had been seated in the first class cabin, pulled passengers away from the exit. The I/C was then able to open the exit door and deploy the evacuation slide. One passenger was seriously injured during the evacuation; four passengers suffered minor injuries. The aircraft was substantially damaged in the collision.

1.2.3 In the National Transportation Safety Board (NTSB) Survival Factors Group Chairman’s Factual Report into the occurrence, the I/C is quoted as saying that “she believed it was only with the assistance of the passenger that she was able to get passengers away far enough so that she could open the exit door”. When she moved away from the open exit, passengers pinned her against the flight deck bulkhead, and she could not reach the R-1 galley service door. The R-1 exit was opened by the same non-revenue passenger who had initially assisted the I/C at the L-1 exit. The NTSB found that although some cabin crew members were responsible for opening two exits, they had not practiced opening two exits during their emergency procedures training.

#### 1.3 Occurrence 2: Rejected take-off and evacuation

1.3.1 In July 1992, a Lockheed L-1011 TriStar 1 on a scheduled passenger flight from New York to San Francisco, with 280 passengers and 12 crew members on board (three flight crew members and nine cabin crew members), departed the runway after a rejected take-off at John F. Kennedy International Airport, following a false stall warning. One passenger was seriously injured during the ensuing evacuation and nine others suffered minor injuries. None of the crew members were injured; the aircraft was destroyed by fire.

1.3.2 Included in the 280 passengers were two off-duty pilots and five off-duty cabin crew members, all employed by the operator. The off-duty pilots were seated in the flight deck jump seats. Three of the off-duty cabin crew members were seated in extra cabin jump seats. Two were seated in passenger seats. Every available seat on the



aircraft was occupied.

1.3.3 Exits L-1, L-2, and R-1 were used for the evacuation. All of the cabin crew members who were seated near the exit doors held passengers back while they assessed the conditions outside their exits. The duty cabin crew member at the L-2 exit reported that it was “difficult to get a clear picture out the window.” She then went to a passenger seat to see if it was clear outside the exit. While doing so, one of the off-duty cabin crew members, who occupied the inboard jump seat position at L-2, took her place at the L-2 exit. She waited until the other cabin crew member told her to open the exit door. Passengers were jammed at the L-2 exit because of the delay in opening. Some of them went forward and used L-1 at the urging of the duty cabin crew member.

1.3.4 The R-3 and R-4 exits were not opened during the evacuation because of the fire that developed during the crash sequence. The R-4 cabin crew member blocked the exit and instructed passengers to go forward. The R-3 cabin crew member looked down at the exit during the landing roll and saw flames. The L-3, L-4 and R-2 exits were opened but blocked from use by cabin crew because of fire and smoke.

1.3.5 Without any instruction, the five off-duty cabin crew members remained at their positions and assisted in the evacuation by yelling commands to passengers to move forward. They also assisted the other cabin crew members at their exits. One of the extra (off-duty) crew members yelled commands for passengers to move forward to the L-1 exit, in order to relieve congestion at the L-2 exit. In the accident report, the NTSB stated that it “believes that if there had not been an extra flight attendant [cabin crew member] near the L-2 exit, that exit might not have been opened and the evacuation might have been delayed.” In addition, the timeliness of the evacuation was augmented by the fact that the extra cabin crew members were in areas of the cabin other than at exits, where they assisted in keeping passengers moving to and through available exits.

1.3.6 The evacuation of the aircraft occurred within two minutes. The accident report, issued by the NTSB, stated that the speed in evacuating 292 passengers and crew from the aircraft was complemented by the following: the operator’s requirement (in accordance with its normal operating procedures) for nine cabin crew members, which was three more than the minimum cabin crew complement required by applicable regulations from the State of the Operator; and the fact that the nine cabin crew members were assisted by five off-duty cabin crew members and two off-duty captains who were occupying the flight deck jump seats.

1.3.7 The report concluded that the emergency evacuation of the aircraft was accomplished in an exemplary manner, resulting in only one serious injury and several minor injuries, despite the rapidly spreading fire that quickly destroyed the aircraft. It stated that the performance of the cabin crew and the pilots in leading the emergency evacuation prevented significant loss of life.

#### **1.4 Occurrence 3: Runway overrun and fire**

1.4.1 In August 2005, an A340-300, on a scheduled passenger flight from Paris to Toronto with 297 passengers and 12 crew members on board, overran the runway after landing at Toronto International Airport. The aircraft was not able to stop on the runway and departed the far end. It stopped in a ravine and caught fire.

1.4.2 The accident report, issued by the Transportation Safety Board of Canada (TSB), stated that applicable regulations (from the State of this Operator) call for one cabin crew member for every 50 passenger seats, and the minimum cabin crew requirement for this flight was six crew members. However, there were ten crew members in the cabin; nine cabin crew plus one additional crew member (service crew), not yet qualified. In accordance with the State of the Operator’s regulatory requirements, all of the cabin crew were certified and qualified for their assigned duties. Cabin crew designated as members of the minimum crew were assigned to cabin crew stations L-1 (chief I/C), L-2 (forward I/C), L-3, L-4 (aft I/C), R-3 and R-4, in accordance with operator procedures. There were three supplemental cabin crew members on the occurrence flight. They were assigned to cabin crew stations R-1, R-2, and cabin crew seat 10, located in the aft cabin between galleys 6 and 7. According to the report, supplemental cabin crew may perform duties related to

passenger safety during normal operations and during emergency situations, if directed to do so by a member of the minimum crew. The additional crew member was on board for passenger service purposes only. The additional (service) crew member was assigned cabin crew seat 9, located adjacent to cabin crew seat 10. Under normal operating conditions, additional crew members cannot be assigned passenger safety-related duties. However, in an emergency situation, they may perform such duties if directed to do so by a member of the minimum crew (as may any other ABP). Refer to Table 1-1 for cabin crew information.

**Table 1-1. Cabin crew information on the accident flight (source: TSB)**

<i>Cabin crew position</i>	<i>Crew information</i>
L-1	Minimum crew (chief I/C)
L-2	Minimum crew (forward I/C)
L-3	Minimum crew
L-4	Minimum crew (aft I/C)
R-1	Supplemental crew
R-2	Supplemental crew
R-3	Minimum crew
R-4	Minimum crew
Cabin Crew Seat 9	Additional (service) crew
Cabin Crew Seat 10	Supplemental crew

1.4.3 At the onset of the evacuation, R-1 and R-2 exits were assessed by cabin crew as unusable because a creek was immediately outside the exits. Both crew members followed the operator procedure for unusable exits. As the evacuation progressed, the cabin crew members reassessed their original decision regarding the usability of R-1 and R-2 exits, and concluded that they would have to be used to expedite the evacuation in light of the ever increasing amount of smoke in the cabin.

1.4.4 The forward I/C knew that opened the L-2 exit (which opened inadvertently during the crash sequence for unknown reasons) was unusable because of the fire outside and because the slide had not deployed. However, when the aircraft came to a stop, he realized that the chief I/C was not aware that the aircraft was already on fire. He rushed over to him and advised him that an evacuation was required. This action likely enabled the evacuation to begin sooner. In doing so, he did not have time to close the exit door and left the open exit unattended for an undetermined period of time. In his absence, at least 16 passengers egressed via the L-2 exit. Two of the passengers incurred serious injuries: one when he jumped from the exit, at a height of 10 to 12 feet, and the other when pushed out of the exit by other passengers. The forward I/C subsequently returned to the L-2 exit and redirected passengers to the L-1 exit.

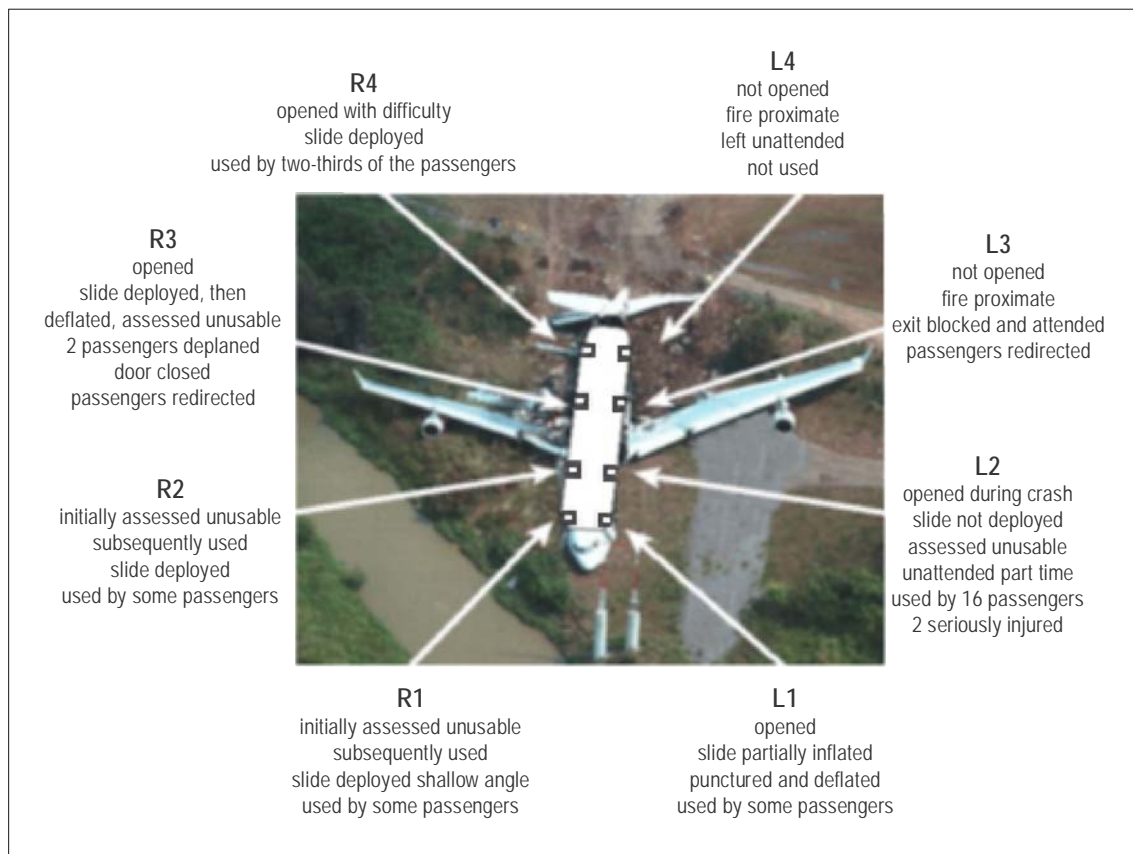
1.4.5 When the R-3 exit was opened, the slide deployed but immediately deflated when it contacted debris, making it unsafe for use. As the responsible cabin crew member proceeded to close the exit door, two passengers forced their way by and jumped from the exit. It is not known what, if any, injuries they incurred. When the R-3 cabin crew member saw that passengers were not following his emergency instructions to not use that exit, he quickly assumed a much more assertive manner, resulting in passengers responding quickly and appropriately to his commands. The cabin crew member subsequently closed the R-3 exit and redirected passengers to another exit.

1.4.6 Fire outside the aircraft rendered the L-3 and L-4 exits unusable. The L-3 cabin crew member blocked the

unusable exit and redirected passengers to the nearest available exit as per the operator's procedures. The aft I/C, stationed at the L-4 emergency exit, did not block the unusable exit nor assign an ABP or supplemental cabin crew member to block it; it was deemed evident that the exit could not be used because of the fire on that side.

1.4.7 The R-4 exit was difficult to open, requiring two cabin crew members to lift the door control handle to the fully up position and push the door out. A deformation of the fuselage resulting from the crash forces was very likely transmitted to the door frame and would explain the difficulty experienced by crew members when opening the R-4 exit door.

1.4.8 Fire rendered two of the eight exits (L-3 and L-4) unusable for evacuation (refer to Figure 3B-1). The L-2 and R-3 exits, although the slides had either not deployed or had deflated, were used by a few passengers, some of whom incurred injuries. The L-1, R-1, R-2, and R-4 exits were used. Two cabin crew members blocked access to unusable exits and redirected passengers to the nearest available emergency exit. Four of the eight exits were therefore unsafe for use, or unusable: L-2, L-3, L-4, and R-3. However, the investigation noted that the L-2 and R-3 exits could have been used had other options not been available. The L-3 and R-3 cabin crew members remained at their exits, as per operator procedures, directing passengers to alternate available exits. Approximately two-thirds of the passengers evacuated via the R-4 exit. The remainder evacuated via the L-1, R-1, and R-2 exits and a few evacuated at the L-2 and R-3 exits. It is estimated that the aircraft was evacuated in a little more than two minutes. A total of ten passengers and two crew members were seriously injured during the crash and ensuing evacuation, and the aircraft was destroyed by fire.



**Figure 3B-1. Emergency exits (source: TSB)**

1.4.9 The TSB report noted that the evacuation was successful due to the training and actions of the whole cabin crew. With few exceptions, the performance of the cabin crew was exemplary and professional, and was a significant factor in the successful evacuation from the accident. Furthermore, the TSB stated that “the availability of three supplemental cabin crew members on [the accident flight] undoubtedly contributed to the success of the evacuation, as evidenced by the roles they played during the evacuation. Two were in command of passenger evacuations at emergency exits and the third played a pivotal role in opening an emergency exit and subsequently assisted passengers at the foot of the R-4 slide.”

### 1.5 Occurrence 4: Smoke in the cabin and evacuation

1.5.1 In November 2013, a B767-300 on scheduled passenger flight from Casablanca to Montreal, with 243 passengers and eight crew members (two flight crew members and six cabin crew members) on board, experienced smoke in the cabin after a fire broke out under a belt loader that a ground crew member was positioning under the left aft cargo door.

1.5.2 The investigation report, issued by the TSB, stated that the flight had been uneventful. The aircraft came to a stop at the gate and the engines were shut down; the doors were disarmed by the cabin crew. The passengers began disembarking through the boarding bridge via the left forward exit (1L exit, refer to Figure 3B-2). As per the operator’s procedures, one cabin crew member was staffed for the pair of floor-level exits number 2 (2L and 2R), another one for the pair of floor-level exits number 3 (3L and 3R), and each of the aft floor-level exits (4L and 4R) were staffed by an individual cabin crew member.

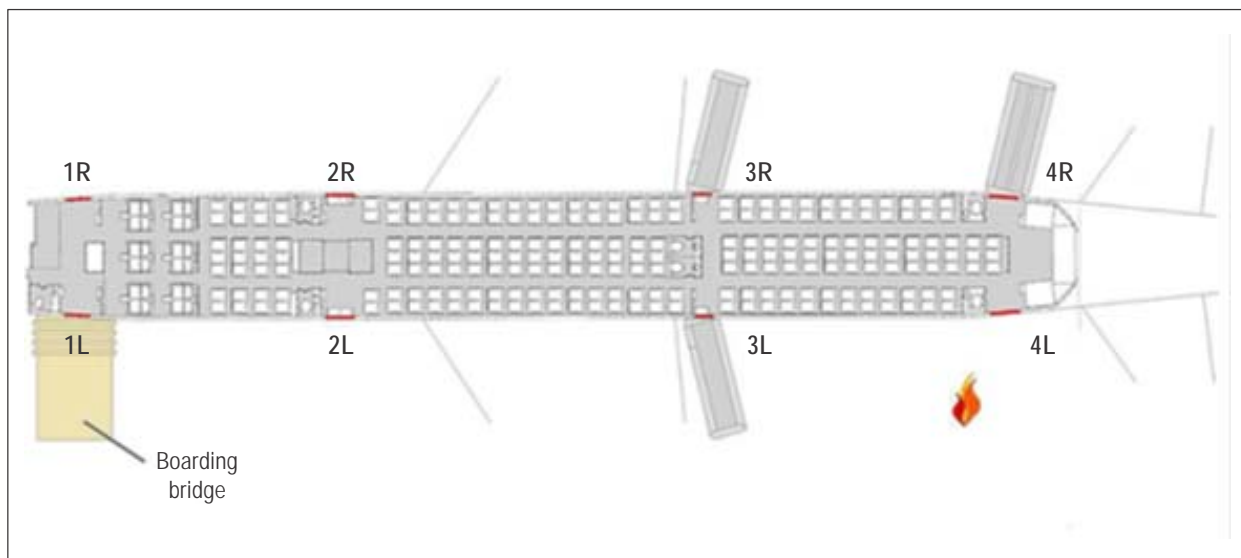


Figure 3B-2. Diagram of cabin showing deployed slides and fire (source: TSB)

1.5.3 Due to a fuel leak from the belt loader’s engine compartment, a fire broke out under the aft cargo door, under the rear left side of the aircraft. Meanwhile, passengers at the front of the cabin had started disembarking in the usual way via the 1L exit, the only open door at this point. Several passengers in the aft cabin were standing in the aisles, gathering their personal belongings and carry-on baggage or waiting for the aisle to clear to move towards the front. The cabin crew members at the 1L exit noticed a burning smell in the cabin. At the same time, a ground crew member was banging on the boarding bridge door and shouting to warn the cabin crew about the fire. The I/C observed the fire close to the 4L exit through the boarding bridge window. He immediately informed the captain who ordered the passengers to evacuate the aircraft as quickly as possible via the front exit and to leave their baggage behind.

1.5.4 Cabin crew members helped passengers who were having trouble exiting the aircraft quickly. Some passengers tried to take their carry-on baggage with them, hampering the evacuation. The main aft cargo door was open, which caused smoke to enter the cabin through the air recirculation fans. When the smoke began to enter the cabin, there were about 106 passengers between exits 2 and 3 and ninety between exits 3 and 4. Passengers in the aft cabin became agitated and panicked when they saw their access to the exit delayed and the smoke intensifying. Passengers began pushing and shoving, causing some passengers to fall down in the aisle. The cabin crew tried to help them while having to deal with panicking passengers attempting to step over the fallen passengers. At this point, some passengers took the initiative to open the 3L and 3R exits just behind the wings, triggering the deployment of the evacuation slides (which, as per the operator's procedures, are always armed). Seeing these newly created exits, several passengers chose to evacuate by sliding down the evacuation slides to the apron. During this time, panicked passengers in the aft cabin were insisting that the cabin crew members open the 4L and 4R exits. A cabin crew member blocked access to the 4L exit because it was directly above the fire while another cabin crew member re-armed the 4R exit which had been disarmed on arrival, in accordance with operator procedures. Given the clear and present danger, the cabin crew member opened the 4R exit which then deployed the slide.

1.5.5 The investigation report stated that applicable regulations (from the State of the Operator) call for one cabin crew member for every 50 passengers, and the flight was in compliance with this ratio. However, it should be noted that these regulations did not include specific considerations for cabin crew per floor-level exit. There were eight floor-level exits on the aircraft but six cabin crew members. There was a single cabin crew member staffed at the 3L and 3R exits where passengers opened exits uncommanded. Exits 4 were staffed with one cabin crew member per floor-level exit, where one crew member blocked the unusable exit (due to fire) and the other commanded the evacuation at the usable exit.

## **2. RESEARCH ON THE INFLUENCE OF CABIN CREW IN EVACUATIONS**

### **2.1 Cranfield University study**

2.1.1 In 1994, Cranfield University conducted a study, commissioned by the Civil Aviation Authority of the United Kingdom (UK CAA) and the United States Federal Aviation Administration (FAA), on the influence of cabin crew members on passenger evacuations during an emergency situation<sup>1</sup>.

2.1.2 The programme was composed of two parts. In the first series of tests, an investigation was conducted into the influence of the number of cabin crew and their behaviour on participant performance when evacuating from the forward exits of a narrow-body cabin training device. The scenarios tested included:

- a) evacuations with either one or two assertive cabin crew;
- b) evacuations with two non-assertive cabin crew; and
- c) evacuations with no cabin crew available to assist participants.

2.1.3 In the second series of tests, the participants exited from the rear (aft) exits of the cabin training device with either two assertive cabin crew or no cabin crew to assist their evacuation.

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<sup>1</sup> CAA Paper 95006: Part A (FAA No. DOT/FAA/AR-95/52) Influence of Cabin Crew During Emergency Evacuations at Floor Level Exits.

2.1.4 Participants were recruited from the public in groups of approximately 60 people. They were tasked with performing four emergency evacuations. Incentive payments were used to motivate the participants and assist in reproducing the urgency which can occur in an emergency situation.

2.1.5 The two protocols which were used involved competitive and cooperative evacuations:

- a) *Competitive protocol*. This involved evacuations where an incentive payment of £5 was made to the first 75 per cent of participants to evacuate the aircraft.
- b) *Cooperative protocol*. This involved evacuations where all of the participants received an incentive payment of £5 if everybody on board evacuated within a target time.

2.1.6 Each group of participants performed two evacuations involving the competitive protocol and two involving the cooperative protocol. A total of 1 307 participants took part in the evacuations tests conducted at the Cranfield University facilities. The evacuations were captured using video cameras equipped with internal time bases. The video provided information on the time taken for each participant to evacuate and the order in which they exited the cabin training device.

2.1.7 The report prepared by the Cranfield University Department of Applied Psychology and published by the UK CAA stated that “the results showed that the performance and number of cabin crew significantly influenced participant behaviour and evacuation rates.” The results also indicated that when two assertive cabin crew members were present, participants were able to evacuate the aircraft faster than when assisted by one assertive cabin crew member. The evacuations involving a non-assertive cabin crew member or no cabin crew present were significantly slower.

## 2.2 UK CAA report

2.2.1 In 2008, the UK CAA published a report prepared by the Fire Safety Engineering Group of the University of Greenwich entitled “*A Database to Record Human Experience of Evacuation in Aviation Accidents*”<sup>2</sup>. The report presented the development of a database, which housed accident investigation reports and data supplied by the United Kingdom’s Air Accident Investigation Branch, the United States NTSB and the Australian Transport Safety Bureau.

2.2.2 The database was used to analyse survival factors and addressed areas such as: survival and reply rates, age distribution, seat belt difficulty, seat climbing reasons, direction and distance travelled, exit usage, exit availability and group behaviour. The analysis also focused on data relating to cabin crew, including cabin crew staffing levels and evacuation efficiency.

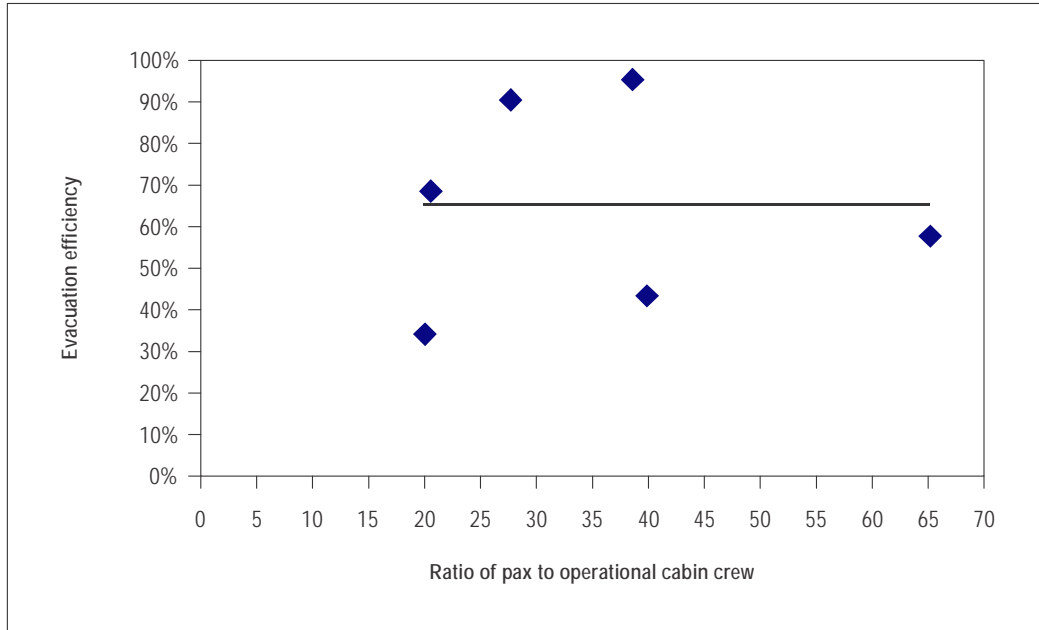
2.2.3 As defined in the report, an evacuation efficiency of 100 per cent indicates that all the passengers made use of their nearest viable exits whereas values less than 100 per cent indicate that not all of the passengers made use of their optimal exits. It is assumed in the analysis that the cabin crew play a vital role in managing the evacuation of passengers.

2.2.4 In order to filter out unrepresentative data, aircraft with less than 50 per cent loading were excluded from the analysis. Accidents with less than 50 per cent passenger reply rate were also discarded. The analysis also excluded small commuter aircraft (i.e. less than 30 passenger seats) and accidents where aircraft fuselage ruptured, providing alternative means of egress. The number of operational cabin crew was determined based on the number of cabin crew members involved in the evacuation and not the number of cabin crew on board the aircraft (to account for cabin crew who were incapacitated or seriously or fatally injured during the accident and did not take part in the evacuation).

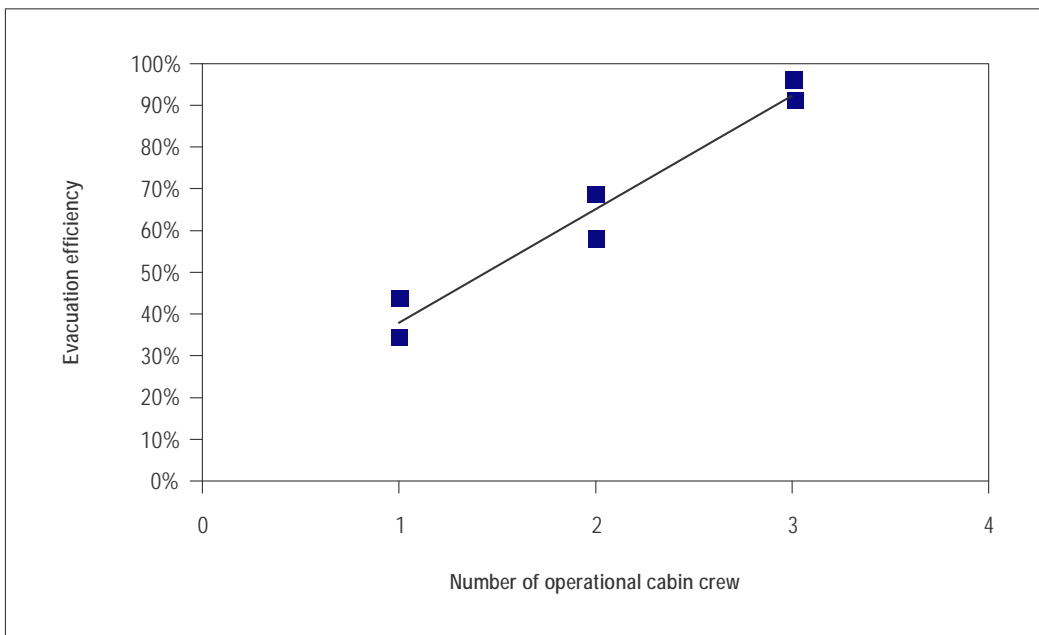
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<sup>2</sup> CAA Paper 2006/01.

2.2.5 The analysis concluded that there was no apparent correlation between the evacuation efficiency and the actual passenger (pax) to operational cabin crew ratio (refer to Figure 3B-3). However, a strong relationship was reported between the number of operational cabin crew and the evacuation efficiency (refer to Figure 3B-4).



**Figure 3B-3. Relationship between evacuation efficiency and passenger to operational cabin crew ratio (source: UK CAA)**



**Figure 3B-4. Relationship between evacuation efficiency and the number of operational cabin crew (source: UK CAA)**

### 3. MANUFACTURER RECOMMENDATIONS

3.1 In 2006, Airbus published a Flight Operations Briefing Note (FOBN) on unplanned ground evacuation<sup>3</sup>. According to the manufacturer, FOBNs provide an overview of the applicable standards, flying techniques and best practices, operational and human factors, suggested company prevention strategies and personal lines of defence related to major threats and hazards to flight operations safety.

3.2 A section in this FOBN addresses exit flow management commands. The document notes that cabin crew members must monitor an evacuation, and maintain an even flow of passengers from each exit so as to avoid congestion at the bottom of the slides. In this context, the document states that “the cabin crew must continually monitor the slide to ensure that it remains safe for use.”

3.3 Another section of the FOBN provides guidance regarding unusable exits. The document notes that the cabin crew member who is responsible for the unusable exit must inform the passengers that the exit is unusable, and redirect them to the nearest usable exit. It states that “the cabin crew member must guard the exit to prevent the exit from being used.”

### 4. RATIO OF CABIN CREW MEMBERS TO FLOOR-LEVEL EXITS

4.1 As demonstrated by accident investigations and research studies presented in this appendix, as well as manufacturer recommendations, floor-level exits should be assigned to cabin crew members so that they are attended in the event of an emergency evacuation. The presence of cabin crew members at exits is needed in order to effectively operate them and provide passenger management during an evacuation. In addition, one cabin crew member should be assigned per floor-level exit as a means to mitigate the risk associated with unsupervised exits during emergency evacuations.

4.2 The operator may propose establishing the minimum cabin crew requirement for an aircraft type which results in a pair of floor-level exits being assigned to a single cabin crew member. A pair of exits should not be assigned to a single cabin crew member unless the operator can demonstrate to the satisfaction of the State that an acceptable level of safety is maintained when comparing operations where a single cabin crew member is assigned a pair of floor-level exits and those where a single cabin crew member is assigned to each floor-level exit. The State should pay special consideration to the issue of ratio of cabin crew members to floor-level exits when approving minimum cabin crew requirements. It may wish to consult with the aircraft manufacturer to investigate this issue for the specific aircraft type being assessed. If the operator proposes to operate aircraft with less than one cabin crew member per floor-level exit, the State should consider the issues noted in sections 5 to 8 of this appendix as part of its approval process.

### 5. PHYSICAL PROXIMITY OF THE OPPOSITE FLOOR-LEVEL EXIT

5.1 The physical proximity of the opposite floor-level exit is a key criterion in assessing the appropriate management of exits by crew members. Therefore, when approving the minimum cabin crew requirement on an aircraft type, the State should require the operator to demonstrate the evacuation capabilities using the operator's procedures.

5.2 On some narrow-body aircraft types, the distance between the left and right floor-level exits (of a pair) is such that a single cabin crew member may have direct view of the opposite exit. On board such aircraft types, the cabin crew member may have reasonable capability to manage the evacuation flow at both exits and stop the passenger flow

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<sup>3</sup> Airbus FOBN Reference : FLT\_OPS – CAB\_OPS – SEQ 12 – REV 01 – NOV. 2006.



at an exit, if required. The State should require the operator to demonstrate a cabin crew member's ability to continually assess outside conditions and manage the evacuation at a pair of floor-level exits using new/different testing procedures (refer to the appendix of Chapter 6).

5.3 On some narrow-body aircraft types and all wide-body aircraft types, the distance between a pair of floor-level exits is such that a single cabin crew member may not be able to operate or have direct view of the opposite exit. Visibility can also be affected by evacuating passengers and the angle of the deployed slide. In such aircraft, the distance between a pair of exits can also hinder the evacuation management. The distance as well as the multiple flow paths available to escaping passengers (particularly on wide-body aircraft) make it difficult for a single cabin crew member to stop the flow of passengers to the unsupervised exit (i.e. that opposite to the one where the cabin crew member stands if only one crew member is assigned to an exit pair). Under such circumstances, there is an increased risk that the opposite exit will be operated by passengers when it should not be (i.e. in unusable exit conditions) or that the exit will not be operated by a cabin crew member when it should be.

## **6. CHALLENGES RELATED TO DUAL EXIT ASSIGNMENT**

6.1 On aircraft types where the distance between a pair of floor-level exits is such that a single cabin crew member may not be able to operate or have direct view of the opposite exit, it is highly unlikely that a single cabin crew member would be capable of:

- a) simultaneously giving commands for the two emergency exits including possibly preventing passengers from opening an unusable exit;
- b) reaching and operating the opposite exit (taking into consideration fuselage width and requirements for direct view compliance); and
- c) managing the evacuation and the passenger flows to both emergency exits of a pair.

6.2 If an operator wishes to assign a single cabin crew member to a pair of floor-level exits, procedures in the operations manual and the approved training programme should address the management of an evacuation at more than one exit. The validity of such procedures and training should be evaluated by the State in order to verify that they provide an acceptable level of safety (refer to Chapter 6 for further explanations).

## **7. VALIDATION OF CABIN CREW PERFORMANCE**

If an operator wishes to assign a single cabin crew member to a pair of floor-level exits, it should successfully demonstrate as part of its training and by any other means requested by the State, that cabin crew are proficient in methods used to operate a pair of floor-level exits. Evidence presented by the operator should satisfy the State that an acceptable level of safety can be maintained by proving that cabin crew members can perform duties including but not be limited to:

- a) managing the flow of passengers at both exits;
- b) managing carry-on baggage at both exits;
- c) monitoring continued exit serviceability at both exits;
- d) shouting appropriate/audible commands at both exits;

- e) managing incapacitated crew member duties;
- f) redirecting passengers to other usable exits; and
- g) preventing passengers from opening an unusable exit.

## **8. SPECIAL CONSIDERATIONS RELATED TO TYPE CERTIFICATION**

8.1 Where a full-scale evacuation demonstration, successfully completed by the manufacturer as part of the TC process for an aircraft type, was conducted with one cabin crew member per floor-level exit, that number should not be reduced by the operator (refer to Chapter 6 for further explanations).

8.2 If the full-scale evacuation demonstration conducted by the manufacturer did not include one cabin crew member per floor-level exit, it is not expected that the operator would be required to add additional cabin crew to staff each floor-level exit when operating the same aircraft type unless the State determines that an acceptable level of safety is not maintained.

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## Chapter 4

# PLANNING AND CONDUCT OF EMERGENCY EVACUATION AND DITCHING DEMONSTRATIONS BY OPERATORS

### 4.1 GENERAL

4.1.1 If an operator is required to conduct an emergency evacuation or simulated ditching demonstration, the State should carry out the following tasks:

- a) determine the category of demonstration that must be conducted by the operator (refer to section 3.5);
- b) develop instructions for the planning and conduct of the demonstration;
- c) review and approve the operator's plan for the demonstration as well as all other relevant manuals and documents; and
- d) observe, evaluate and document the demonstration including how to address an operator's failure to successfully complete it.

4.1.2 Evacuation demonstrations carried out by the aircraft manufacturer and/or another operator for the same aircraft type may be taken into account by the State when a decision is made on the category of demonstration required. The State should ensure its inspectors are familiar with the aircraft type for which the demonstration is being conducted. If an operator wishes to introduce a new aircraft type, it should provide training/familiarization on the aircraft type to the relevant State inspectors.

*Note.— Guidance on State safety oversight may be found in the Manual of Procedures for Operations Inspection, Certification and Continued Surveillance (Doc 8335).*

### 4.2 INSTRUCTIONS FOR THE PLANNING AND CONDUCT OF A DEMONSTRATION

4.2.1 The State should develop instructions that require the operator to submit an application and obtain approval from the State to conduct the demonstration prior to carrying out the exercise. The instructions should also define the procedures which must be followed during the planning and conduct of an evacuation demonstration or simulated ditching demonstration, and guidelines related to the application submission and approval process, as well as obligations of the applicant.

4.2.2 A planning meeting should be held between the State and the operator well in advance of the demonstration in order to discuss the exact procedures to be followed and the criteria for the successful completion of the exercise. The operator should designate an evacuation demonstration coordinator who will serve as the primary contact with State representatives on all matters related to the exercise.

### 4.2.3 Content of the operator's plan for an evacuation/ditching demonstration

4.2.3.1 The State should require the operator to develop and submit a plan for demonstrating the aircraft evacuation. The State should specify the content of the evacuation demonstration (or simulated ditching) plan as well as the timelines for submission of the documentation, as per its established process. Subsequently, the State should review and approve the operator's plan for the evacuation demonstration as well as all relevant manuals documents and procedures prior to authorizing the conduct of the exercise. The State should meet with the operator as often as necessary to ensure the operator clearly understands which documents and information are required for the demonstration plan to be accepted for evaluation.

4.2.3.2 The operator's plan should outline the manner in which the demonstration is to be conducted. It should include the following:

- a) letter of request;
- b) diagram of the aircraft to be demonstrated;
- c) appropriate portions of the operations manual describing emergency evacuation procedures;
- d) content of the training programme provided to cabin crew members as part of the aircraft type qualification;
- e) passenger safety briefing card specific to the aircraft to be demonstrated as well as content of the safety announcements;
- f) a description and location of the safety and emergency equipment installed on the aircraft including at least the type and model of each piece of equipment, as applicable;
- g) a description of how the operator will ensure conditions required for the selection of flight and cabin crew will be met (refer to section 2.7.4); and
- h) a description of how the operator will ensure all other conditions required for the demonstration will be met during the exercise.

4.2.3.3 The letter of request should state the following:

- a) the reason for the application (e.g. entry into service of a new aircraft type);
- b) the aircraft type and full seating capacity (including crew seats) to be demonstrated;
- c) the number of crew members and their duty assignment positions to be used during the demonstration;
- d) the proposed date, time and location of the evacuation demonstration; and
- e) the name and contact information of the operator's evacuation demonstration coordinator.

4.2.3.4 The diagram, representative of the aircraft to be demonstrated, should include the following:

- a) the location and designation of all exits by type and the designated exit pairs;

- b) the assigned seating location of each required crew member during take-off;
- c) the interior cabin configuration showing the location of each passenger seat, the galleys, aisles, lavatories, and passenger compartment partitions and bulkheads; and
- d) the location and type of safety and emergency equipment on the aircraft including but not limited to:
  - 1) portable fire extinguishers;
  - 2) portable breathing equipment (PBE);
  - 3) portable oxygen bottles/masks;
  - 4) megaphones;
  - 5) crash axes, pry bar, gloves;
  - 6) emergency flashlights;
  - 7) emergency ropes/tapes;
  - 8) first aid and medical kits;
  - 9) life-rafts (for ditching only);
  - 10) survival kits (for ditching only);
  - 11) individual flotation devices or life jackets for passengers and crew members (for ditching only);
  - 12) portable emergency signalling equipment; and
  - 13) equipment for making the pyrotechnical distress signals.

4.2.3.5 The plan should include a clear description of how the operator proposes to initiate the demonstration, the initiation signal to be used for the purpose of timing, and the method the operator intends to use to indicate to the crew which exits are blocked. The operator should understand that the initiation signal has to be given to the flight deck, cabin and ground personnel simultaneously to initiate the demonstration. It should be emphasized that the operator is responsible for developing the initiation procedure and the method for indicating that exits are blocked. The State team leader should review this procedure for adequacy. The plan should also include a description of how the operator will ensure the demonstration is conducted in accordance with the environmental conditions (refer to sections 2.7.2 and 3.4.3). It should include a description of how the operator plans to ensure that the aircraft is positioned in a location, either indoors or outdoors which will allow the unobstructed deployment of all slides or slide-rafts, as applicable.

4.2.3.6 Where over-water flights are included in the operation, the State should require the operator to develop and submit a plan to demonstrate ditching equipment and the ability of cabin crew members to carry out ditching procedures (refer to section 3.4). The demonstration plan should include information applicable to the ditching demonstration such as the following, in addition to the items listed in section 4.2.3.2:

- a) appropriate portions of the operations manual, describing crew members ditching duties and responsibilities; and

- b) a description of applicable safety and emergency equipment used for ditching (such as life-rafts, life jackets, etc.) including the location, manufacturer type and model of the equipment.

### 4.3 REVIEW AND APPROVAL OF THE OPERATOR'S PLAN

4.3.1 When the operator's emergency evacuation demonstration plan is submitted, the State should make an initial review of the submission to ensure that all the required information and documents are included. The State should respond to the operator's plan within a pre-determined timeframe, as per its established process. Minor omissions or deficiencies may be resolved by contacting the operator's evacuation demonstration coordinator. If discrepancies can be resolved quickly, the process may move to the next phase. If the operator's plan has a significant number of required items or documents missing, or is incomplete, the entire submission should be returned to the operator with a written explanation as to why it is unacceptable. In such cases, the State should advise the operator that no further action will be taken until an acceptable plan is submitted.

4.3.2 Following the initial review, the State should conduct a thorough analysis and evaluation of the operator's plan to ensure that the information in or attached to the operator's letter of request is acceptable and consistent with the proposed category of demonstration. During this in-depth review, the State should verify that:

- a) the operator's cabin crew safety training programmes (current and proposed) have been reviewed;
- b) the evacuation procedures (and/or ditching procedures, if applicable) in the operator's manual(s), including individual crew member assignments are realistic and appropriate;
- c) the passenger safety briefing card is understandable and consistent with the State's regulations and aircraft type to be demonstrated;
- d) the safety and emergency equipment is acceptable for the type of operation proposed; and
- e) the operator has an acceptable plan to ensure conditions for the demonstration will be met.

4.3.3 Certain items in the proposal may require on-site evaluations. For example, the hangar or ramp area the operator intends to use for the demonstration should be inspected for its adequacy. The State should determine that the operator has or is making provisions for participant safety during the demonstration including the use of stands, padding, mats, and any other appropriate safety measures. Safety observers should be provided by the operator and positioned at strategic locations during the demonstration. They may not assist crew members nor should they take an active role in the demonstration. Their role is limited to assisting in the prevention of injuries during the exercise as well as identifying any discrepancies or successes as a means for further improvement through lessons learnt.

4.3.4 Deficiencies noted during the in-depth review should be resolved with the operator's evacuation demonstration coordinator. If major discrepancies surface during the review or if the State and the operator are unable to resolve significant issues, the operator's plan should be returned. The operator should be informed in writing, within a pre-determined timeframe as per the State's established process, that the discrepancies must be corrected and a plan resubmitted before the State takes further action. If, after a detailed review, the submission is found acceptable, the State should notify the operator that the plan has been accepted as per the established process. Once the plan is accepted, the State should move to the next phase: planning the demonstration.

#### **4.4 PLANNING THE DEMONSTRATION**

4.4.1 The planning phase requires thorough coordination and clear instruction and guidance for both the State and operator participants to ensure that the demonstration is conducted and evaluated objectively. The State should coordinate with the operator to ensure the availability of the aircraft type for which approval is sought; as well as flight and cabin crew members who meet the crew conditions for the exercise (as defined in section 2.7.4). The operator should have at least two crew complements on hand for the demonstration. Specific guidance for conducting demonstrations is presented in Chapters 2 and 3.

##### **4.4.2 State demonstration team**

The State should appoint a team leader (preferably a cabin safety inspector) who will act as the head of its team responsible for evaluating the demonstration. If a cabin safety inspector is not appointed as State team leader, at least one cabin safety inspector should be part of the State's team. The State team leader should be assigned as early as possible in the process and no later than the beginning of the review of the operator's demonstration plan. The State team leader should be responsible for planning, overseeing the conduct of, and evaluating the demonstration. The State team leader serves as the primary contact and central spokesperson for the State on all matters pertaining to the demonstration. Other members of the State's team should be assigned as needed and typically consist of operations, maintenance and avionics inspectors familiar with commercial air transport operations and applicable regulatory requirements.

##### **4.4.3 Pre-demonstration meeting with the operator**

After reviewing and thoroughly evaluating the operator's plan, the State team leader should meet with the operator's evacuation demonstration coordinator. During this meeting, the State team leader should accomplish the following:

- a) review the operator's plan and ensure that the operator is thoroughly familiar with the applicable criteria to be used during the demonstration;
- b) review the list provided by the operator of at least two crew complements, and verify that they meet the established conditions (refer to section 2.7.4);
- c) verify that the operator is aware of its responsibilities regarding participant safety including provisions for safety observers, stands, ramps, padding, and ambulance coordination, as applicable;
- d) review the method and signals for initiating the demonstration and timing criteria;
- e) review the method for the simulation of blocked exits;
- f) in coordination with the operator, determine the signal to be used to terminate (stop) the demonstration such as an air horn, or some other clear, distinguishable audible signal (experience has demonstrated that a whistle blast may not be adequate). A suitable device should be agreed upon as early as possible in the planning stage and tested to assure its adequacy. This termination signal could also be used in the event of an emergency situation if the exercise has to be stopped midway; and
- g) resolve any unanswered questions or issues the operator may have before conducting the demonstration.

#### 4.4.4 State team planning

The State team leader should conduct a meeting with the other team members to assure each team member is aware of why the demonstration is being conducted. He/she should establish specific assignments for team members during the demonstration. This includes timekeeping, positioning (inside or outside the aircraft), and inspecting the aircraft, safety and emergency equipment as well as any applicable documents. The State team leader should distribute an aircraft diagram to each inspector showing his or her assigned locations for the demonstration. The State's team should determine which emergency exits must be opened. He/she should make certain each team member is aware of the signal to be used to initiate the demonstration and the signal to be used to terminate the demonstration. During the meeting, regulatory requirements and demonstration criteria should be reviewed to assure common understandings.

#### 4.4.5 Selecting and blocking exits

4.4.5.1 Fifty per cent of exits (and slides, if fitted) should be used during a full-scale or a partial evacuation demonstration. The remaining exits should be blocked. Any emergency exit(s) designated as primary and assigned to a cabin crew member as part of his/her evacuation duties may be selected for use during the demonstration. A primary exit is an exit assigned to a cabin crew member for which he/she has emergency exit duties. A primary exit would be the first exit that a cabin crew member would be assigned to open upon commencement of the evacuation. A secondary exit may be utilized by a cabin crew member if time and conditions permit during the evacuation. Ventral (stairs) and tail cone exits should not be used during the exercise unless they are paired with another exit. If there is any doubt as to which exits are paired, the State of the Operator should consult the State of Design responsible for the TC of the aircraft type.

4.4.5.2 One exit from each exit pair should be selected. Exit pairs should be identified by the operator in the aircraft diagram. If a cabin crew member is assigned to more than one exit, this exit assignment should be tested in the demonstration to ensure it is realistic and practicably accomplished. The State may require that a pair of exits be opened or blocked in order to test the ability of the cabin crew member to manage both exits (refer to the appendix in Chapter 6). After determining which exits will be used, the team should not divulge that information to the operator until the signal to initiate the evacuation is to be given.

4.4.5.3 The operator should propose the method for blocking exits. The demonstration team should review the proposal to determine its acceptability. Acceptable methods of blocking exits during an emergency evacuation demonstration include but are not limited to the following:

- a) *Tape a swatch of red cloth covering each exit.* A line long enough to reach the ramp or hangar floor should be secured to the covering. At the initiation signal, designated inspectors should pull the lines to remove the coverings from the exits that are to be used and leave the coverings on the exits that are not to be used.
- b) *Position inspectors inside the aircraft at each exit before starting the demonstration.* When the evacuation is initiated, the inspectors positioned in front of exits to be opened should move from that position as quickly as possible. While the cabin crew members are conducting their procedures to assess exit usability, inspectors positioned in front of exits should move so as not to impede the process. Inspectors should indicate that the exit is blocked by raising their hands and stating, "this exit is blocked."
- c) *Red lights.* To simulate a fire at the blocked exits, red lights should be rigged in front of the appropriate exits (which when illuminated simulate fire). The lights at the blocked exits should be illuminated simultaneously with the initiation signal.



4.4.5.4 When a method of blocking exits has been determined, the State team leader should notify the operator's evacuation demonstration coordinator of agreement with the method and ensure the operator will provide the required maintenance and logistical support to prepare the exit blocking method.

#### **4.4.6 Initiation signal**

4.4.6.1 It is essential that State's team members be aware of the initiation signal. The operator should propose a method that provides the same initiation signal for participants inside the aircraft and State team members outside the aircraft. The preferred method is for the operator to interrupt the aircraft's normal source of power by one of the following actions:

- a) disconnecting or turning off an external source of power or a ground power unit;
- b) disconnecting or turning off the auxiliary power unit; or
- c) interrupting power from the flight deck.

4.4.6.2 This method of initiating the demonstration provides a clear initiation signal in the following ways:

- a) inside the aircraft, the cabin crew and State team members will observe the normal cabin lighting extinguish followed by the illumination of the emergency lighting system. This is their signal to commence the evacuation demonstration. It should be noted that these are not simultaneous events and there could be a second or two delay between the cabin lights extinguishing and the illumination of the emergency lighting system. For timing purposes, the demonstration commences when the cabin lights are extinguished; and
- b) outside the aircraft, State observers (stationed at each exit) and the team leader will observe the external lights (e.g. taxi lights, anti-collision lights, position lights, and logo lights) extinguish. This is the signal to initiate the timing and other necessary observation actions of the State team.

#### **4.4.7 Participants**

4.4.7.1 Due to the complexity involved in conducting an emergency evacuation demonstration, only those individuals who have a genuine need or concern should be present during the demonstration. Interested but unessential personnel may present hazards, interfere, or in other ways affect the outcome of the demonstration. The operator should be responsible for all non-State personnel who observe the demonstration. Those not directly involved in the demonstration should be kept at a safe distance from the aircraft by some means such as ropes or lines. The State team leader is responsible for State personnel who observe the demonstration. State observers should be limited to those who are required to evaluate the conduct of the demonstration or need to be involved for specific reasons such as the following:

- a) State inspectors from other offices whose operators will be acquiring the same or similar aircraft type as the one being demonstrated;
- b) government officials or designees; and
- c) State personnel from any other State offices concerned with technical or engineering components of the aircraft.

4.4.7.2 Key personnel from the operator, such as directors of operations and maintenance, quality assurance and

cabin safety should be available at the site for the demonstration. These individuals should have authority to direct modifications to the demonstration plan at the time of the demonstration. Additionally, they should be able to respond to State requirements for specific corrective actions due to deficiencies that may occur during the demonstration. Other operator personnel present at the demonstration site should have a direct role in conducting the demonstration. It is the operator's responsibility to ensure that its personnel does not pose a distraction or affect the demonstration's outcome.

4.4.7.3 Non-operator personnel, who are not State personnel, should have specific reasons to observe the demonstration. Typically, these individuals include: representatives of the aircraft manufacturer, manufacturers of other pieces of equipment used during the demonstration, safety representatives from worker organizations, or other organizations that have a direct interest in aviation safety.

## **4.5 OBSERVING THE DEMONSTRATION**

4.5.1 During this phase, the State team should conduct a pre-demonstration inspection, conduct the necessary briefings to all participants and observers and observe the exercise with the goal of evaluating it.

### **4.5.2 Pre-demonstration inspection**

Before the demonstration, the State team should inspect the aircraft and the safety and emergency equipment. The aircraft should be prepared and equipped for normal flight in accordance with the operator's manuals and procedures. The team should inspect all fixed and portable safety and emergency equipment and systems including but not limited to the following:

- a) portable fire extinguishers;
- b) PBE;
- c) first aid kits and medical kits;
- d) crash axe, pry bar and gloves;
- e) megaphones;
- f) interior emergency exit markings;
- g) lighting for interior emergency exit markings;
- h) emergency lighting operation;
- i) emergency exit operating handles;
- j) emergency exit access;
- k) exterior exit markings;
- l) exterior emergency lighting and escape route;
- m) floor-level exits;

- n) additional emergency exits;
- o) ventral or tail cone exits;
- p) emergency flashlights;
- q) seats, seat belts, and safety harnesses;
- r) emergency equipment required for extended overwater operations;
- s) public address system and interphone;
- t) passenger information signs/placards;
- u) aircraft fire detection and protection system (operational test);
- v) passenger safety briefing cards;
- w) flight deck escape system;
- x) individual flotation devices or life jackets for passengers and crew members;
- y) life-rafts; and
- z) slides and slide-rafts.

#### **4.5.3 Pre-demonstration briefings**

4.5.3.1 Before the actual demonstration, four separate briefings should be conducted for the following participants:

- a) crew members involved in the demonstration;
- b) passenger participants (if applicable);
- c) State team; and
- d) observers.

4.5.3.2 The operator's evacuation demonstration coordinator should provide crew members with certain information regarding the demonstration. The State team leader should be in attendance at this briefing to resolve any questions and verify that the following information is covered:

- a) state the purpose of the demonstration;
- b) clearly specify the initiation signal, which begins the demonstration;
- c) explain the method used to identify a blocked exit;
- d) discuss the significance of the appropriate time limit (typically a timeframe of 90 seconds for full-scale evacuation demonstrations and 15 seconds for partial evacuation demonstrations);

- e) describe the signal to be used by the State team leader for terminating the demonstration such as an air horn, or some other clear audible means. Participants should be instructed that any evacuation activity in progress must immediately cease with a termination signal; and
- f) emphasize the importance of safety during the demonstration including crew member responsibilities, safety observer duties and limitations.

4.5.3.3 As stated in section 4.4.1, the operator should have at least two crew complements available for the exercise. Each crew complement should be isolated to prevent communication regarding the demonstration, in case a second demonstration is required on the day.

4.5.3.4 The operator's evacuation demonstration coordinator should provide passengers with certain information regarding the demonstration. The State team leader should be in attendance at this briefing to resolve any questions and verify that the following information is covered:

- a) state the purpose of the demonstration;
- b) state that passengers must pay attention to cabin crew member instructions; and
- c) emphasize that individual safety is not to be compromised at any time during the demonstration.

4.5.3.5 The State team leader should brief his/her team as follows:

- a) state the objectives of the demonstration;
- b) review the initiation signal;
- c) review observer assignments with regard to exits to be used or blocked;
- d) review procedures/responsibilities for timing the demonstration and recording observations;
- e) review the termination signal that stops the demonstration; and
- f) remind the team members not to discuss the results of their observations with persons other than the State team leader.

4.5.3.6 The State team leader should brief all observers not to interfere with the demonstration, whether inside or outside the aircraft.

#### **4.5.4 Conducting the demonstration**

4.5.4.1 Detailed guidance on the conditions for conducting a full-scale evacuation demonstration or a partial demonstration are presented in Chapters 2 and 3, respectively. Detailed guidance on the conditions for conducting a simulated ditching demonstration is presented in Chapter 3. Once the State team leader has been informed that the crew is ready, he/she should make certain all the State's team members and the operator's safety observers (if used) are ready and in position. The State team leader may then issue a warning signal (e.g. air horn) which should precede the initiation signal. Depending upon the method approved by the State (in the operator's plan), the State team leader should inform the operator's evacuation demonstration coordinator to initiate the demonstration. In a simulated ditching demonstration, the State team leader should instruct the captain to commence the demonstration. The captain will initiate the demonstration by ordering the cabin crew members to prepare for ditching.

4.5.4.2 For an evacuation demonstration, the State team leader should begin timing with two stopwatches (a primary and a backup) when the external aircraft lights extinguish. At the end of the appropriate time (typically a timeframe of 90 or 15 seconds, as appropriate) the State team leader should issue a clear, audible signal terminating the demonstration. For a full-scale demonstration, each State observer assigned to an exit which is to be used should be responsible for counting passengers as they evacuate at his/her assigned exit before the State team leader's termination signal. Any passenger or crew member that would remain on board or use an exit after the termination signal would constitute an unsatisfactory demonstration. For a partial demonstration, each State observer assigned to an exit which is to be used should be responsible for determining that his/her assigned exit was opened and each slide or slide-raft (as applicable) was ready for use before the State team leader's termination signal. Any exit, slide, or slide-raft that was not ready for use before the termination signal would constitute an unsatisfactory demonstration. The State team members assigned to the cabin should ensure that all required equipment and systems worked properly (e.g. emergency lighting system) and that all procedures were properly applied.

4.5.4.3 For a simulated ditching demonstration, if the State established the maximum time acceptable for crew members to prepare for ditching, the State team leader should begin timing when the captain issues the "prepare-for-ditching" order. During the ditching demonstration, emphasis should be placed on crew member ability to successfully carry out assigned duties in the time period between the decision to ditch and the simulated ditching. The cabin crew should not be given excessive time to prepare for the ditching as this will not provide a realistic picture of the crew's ability to coordinate tasks and effectively manage time. At the end of the maximum time for the planned ditching demonstration, the crew must be prepared for a simulated water landing. After the maximum time has elapsed, the State team leader should instruct the captain to order the initiation of the evacuation on water. Upon receiving the evacuation order, the cabin crew should launch and board the selected slide-raft and/or life-raft(s), as per the operator's procedures. Each occupant should also enter the slide-raft/life-raft. For the purpose of this demonstration "launching" a life-raft means to remove it from its stowage location, transport the raft to an exit, secure the raft to the aircraft, manipulate it out of the aircraft (via stands or ramps), and position it on the ground before inflation. "Launching" a slide-raft means to inflate it in a normal manner (i.e. opening exit in armed mode), demonstrate releasing it from the aircraft, and then lower it to the ground. Cabin crew members assigned to any inflated raft should be questioned by one of the State team members about actual launch procedures, then enter the raft and locate and describe the use of each piece of safety and emergency equipment within the raft.

4.5.4.4 State team members should not discuss the results of their observations with operator personnel or passenger participants. After the demonstration is finished, the State team should confer immediately on the observation of each team member and the overall conduct of the demonstration before advising the operator of the demonstration results.

## 4.6 EVALUATING THE DEMONSTRATION

### 4.6.1 Evaluation of an evacuation demonstration

4.6.1.1 The State should establish a process to evaluate the demonstration, including how to address an operator's failure to successfully complete the exercise. Specific points to be noted and evaluated during an evacuation demonstration include:

- a) the adherence by cabin crew members to the execution of assigned duties and responsibilities both on board the aircraft and on the ground;
- b) the location of each crew member during the evacuation;
- c) the effectiveness of the pilot-in-command in the exercise of command responsibilities;

- d) the effectiveness of cabin crew members in performing their assigned evacuation duties; and
- e) any shortcomings, deficiencies or delays encountered.

4.6.1.2 In the observation of the exercise, to assist in the evaluation of the evacuation demonstration, the State should record the following:

- a) time from start of the demonstration until each exit to be utilized was opened;
- b) time necessary to inflate each slide, if required by the State;
- c) time before each slide received its first evacuee;
- d) time before the first evacuee leaves the over-wing exits (if applicable);
- e) total number of persons that evacuated via each exit;
- f) any difficulties, deficiencies or shortcomings encountered; and
- g) any additional comments from the evaluators.

*Note.— The demonstration should be recorded with a video device that includes time lapse capability.*

#### **4.6.2 Evaluation of a simulated ditching demonstration**

4.6.2.1 Specific points to be noted and evaluated during a simulated ditching demonstration include:

- a) the adequacy of the preparation of passengers and the cabin for the anticipated ditching;
- b) the location and quantity of safety and emergency equipment available on board (i.e. life-rafts, slide-rafts, life jackets, medical kits, first aid kits and emergency locator transmitter);
- c) proper stowage and accessibility of safety and emergency equipment (could it be readily removed or ejected from the aircraft in the time specified?);
- d) the availability, adequacy and use of means to prevent equipment from drifting away from survivors;
- e) full inflation of life-raft(s), slide-raft, and life jackets within acceptable time limits;
- f) serviceability of other relevant safety and emergency equipment; and
- g) the adherence to procedure and effectiveness of the cabin crew members in performing their assigned evacuation duties.

4.6.2.2 To assist in the evaluation of the ditching demonstration, the State may establish the maximum time acceptable for crew members to prepare for ditching (refer to section 3.4.6).

### 4.6.3 Evaluation of operator procedures and crew performance

When evaluating operator procedures and cabin crew member performance, the following aspects should be assessed:

- a) Were the emergency exits to be utilized selected and could such exits be opened readily by the crew?
- b) Were emergency procedures and related checklists adequate and were they properly used by the crew members?
- c) Could any performance deficiency result from lack of, or inadequate, training? Were crew members familiar with and did they adhere to the timely execution of their assigned duties and responsibilities?
- d) Could crew members, using available safety and emergency equipment and following the procedures outlined in the operations manual, facilitate the evacuation of the aircraft under critical conditions and in the specified timeframe?
- e) Were there any other deficiencies that may have hindered the performance of the crew?

### 4.6.4 Determination of results

Failing to meet a specified time limit is automatic grounds for an unsatisfactory demonstration. Deficiencies in other areas such as crew member effectiveness, or equipment malfunctions that occur even when timing criteria is met, may be grounds for determining the demonstration unsatisfactory. The severity of the deficiency and the root cause should be considered. If the cause of a major deficiency was due to improper operator training, procedures, or maintenance, the demonstration should be judged as unsatisfactory. For example, if all emergency lighting failed to illuminate due to a maintenance problem, there is sufficient grounds for determining the demonstration unsatisfactory. Minor deficiencies can usually be resolved with responsible operator personnel without having to declare the demonstration unsatisfactory. The State should establish procedures to address demonstration failures, including how, when and how many times the operator may repeat the exercise.

### 4.6.5 Correction of deficiencies

If the operator cannot satisfactorily complete the demonstration, the State should require the operator to correct deficiencies which may have contributed to the failure. These may include, but are not limited to:

- a) revising evacuation procedures;
- b) improving crew training;
- c) modifying or changing the safety and emergency equipment used;
- d) changing the passenger compartment arrangement;
- e) reducing total passenger seating capacity; and/or
- f) increasing the number of cabin crew members.

#### 4.6.6 Demonstration report

Upon completion of the exercise, the operator should be notified on site of the demonstration's outcome (satisfactory or unsatisfactory). The results of the demonstration should be reported, as specified in the State's instructions. The State should issue a letter of approval or rejection to the operator or applicant, including a detailed report of the outcome. If the demonstration has been judged as satisfactory, the aircraft type and the maximum demonstrated passenger seating capacity should be listed and approved in the relevant part of the specific operating provisions/operations specifications (OPSPECS). If the demonstration has been judged as unsatisfactory, the State should include in the report the reasons why the demonstration was deemed unsuccessful and corrective measures that need to be taken. The operator should be required to repeat the demonstration exercise after it has addressed the items requiring corrective measures to the satisfaction of the State.

#### 4.6.7 Records

For each demonstration (evacuation and/or ditching) conducted by an operator, the following records should be retained indefinitely by the State, including for analytical purposes:

- a) record of the demonstration (a record of completion of the emergency evacuation is required for each demonstration attempt made by the operator);
- b) the passenger safety briefing card specific to the aircraft type;
- c) a diagram of the aircraft, including:
  - 1) safety and emergency equipment;
  - 2) exits;
  - 3) exits used; and
  - 4) the number of approved passenger seats;
- d) the location of seats used by crew members;
- e) the name and speciality of each member of the State's team involved in the demonstration;
- f) any deficiencies and corrective actions taken to resolve them;
- g) the completed emergency evacuation and ditching demonstration form (refer to the appendix to Chapter 4); and
- h) the letter of approval/rejection and any associated reports.

*Note.— The form presented in the appendix to this chapter is only an example. This form may need to be modified for each event.*

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## Appendix to Chapter 4

### SAMPLE EMERGENCY EVACUATION/DITCHING DEMONSTRATION FORM

<b>EMERGENCY EVACUATION/DITCHING DEMONSTRATION</b>		
<b>Instructions:</b> Attach passenger safety briefing card required by [State regulation] and diagram of aircraft showing location of cabin crew seats, safety and emergency equipment, and exits used for the demonstration.		
1. Date and Time of Demonstration	2. Result A. <input type="checkbox"/> Satisfactory B. <input type="checkbox"/> Unsatisfactory	
3. Name of Operator and Designator		
4. Aircraft Make, Model, Series, and Registration Number		
5. Name and Title of [State] Team Members:		
6. Category of Demonstration A. <input type="checkbox"/> Full-scale B. <input type="checkbox"/> Partial C. <input type="checkbox"/> Simulated Ditching	7. Reason for Demonstration A. <input type="checkbox"/> Initial Type Certification B. <input type="checkbox"/> New Aircraft Model C. <input type="checkbox"/> Increase in Seating Capacity D. <input type="checkbox"/> Change in Cabin Configuration E. <input type="checkbox"/> Change in Cabin Crew Number, Duties, Location, or Procedures	F. <input type="checkbox"/> Change in Exit Number Location, or Opening Mechanism G. <input type="checkbox"/> Other (Specify) _____ _____ _____
8. Number of Persons on Board A. Flight Crew _____ B. Cabin Crew _____ C. Passengers _____ D. Total _____	9. Applicable Regulations A. <input type="checkbox"/> [State Regulation Number] B. <input type="checkbox"/> [State Technical Standards]	
10. Exits Used* Fill in the exits used	11. Type of Evacuation Devices used A. <input type="checkbox"/> Inflatable B. <input type="checkbox"/> Non-inflatable C. <input type="checkbox"/> Slide-raft	12. Time Record A. <input type="checkbox"/> Full-scale Demonstration _____(sec) B. <input type="checkbox"/> Partial Demonstration _____(sec) C. <input type="checkbox"/> Simulated Ditching _____(min)
Comment Record		
13. Aircraft Location A. <input type="checkbox"/> Hangar B. <input type="checkbox"/> Ramp	14. Crew Knowledge A. <input type="checkbox"/> Satisfactory B. <input type="checkbox"/> Unsatisfactory	

15. Operator Safety Precautions A. <input type="checkbox"/> Satisfactory    B. <input type="checkbox"/> Unsatisfactory	16. Equipment Reliability A. <input type="checkbox"/> Satisfactory    B. <input type="checkbox"/> Unsatisfactory
17. Safety and Emergency Equipment Inspections A. <input type="checkbox"/> Satisfactory    B. <input type="checkbox"/> Unsatisfactory	18. Operator Procedures A. <input type="checkbox"/> Satisfactory    B. <input type="checkbox"/> Unsatisfactory
19. Other (Record on block 22) A. <input type="checkbox"/> Satisfactory    B. <input type="checkbox"/> Unsatisfactory	
*Exit Code: L = Left; R = Right; W = Window; F = Floor-Level; VS = Ventral Stairs; T = Tail, C = Cockpit, U = Upper Deck; B = Below Main Cabin Floor. Number the Exits from Flight Deck to Tail.	
<b>EMERGENCY EVACUATION/DITCHING DEMONSTRATION REPORT</b>	
20. How Non-designated Exits Were Blocked:	
21. Initiation Signal	
22. Discrepancies/Recommendations: (Make Reference to Appropriate Blocks)	
Block	Remarks
23. Action by [State] Office (e.g. "Approved")	Initials of Responsible Person in [State] Office:
State Team Leader's Name	Signature
	Date
24. Director, Civil Aviation Review:	
Specialist's Name	Signature
	Date

## Chapter 5

# CONSIDERATIONS WHEN ESTABLISHING MINIMUM CABIN CREW NUMBERS

### 5.1 GENERAL

5.1.1 In addition to the minimum cabin crew complement, the State's operating rules and operator's procedures should address cabin crew staffing requirements for the following specific situations:

- a) ground operations;
- b) cabin management during designated in-flight crew rest;
- c) aircraft/cabin configuration and distribution of passengers;
- d) flights operated with special categories of passengers on board; and
- e) cabin crew incapacitation.

5.1.2 Sections 5.2 to 5.6 provide additional guidance on each of these situations. Section 5.7 provides guidance related to non-commercial operations.

### 5.2 GROUND OPERATIONS

5.2.1 The State should define the minimum number of cabin crew required to be present on board during ground operations and ready to act if needed. If more than one cabin crew member is on board, they should be evenly distributed throughout the cabin, in the vicinity of exits except when conducting other safety-related duties (e.g. safety demonstration, safety briefings and cabin checks prior to take-off), to provide the most effective response in the event of an emergency situation. The operator's procedures should include the minimum number of cabin crew required during ground operations in accordance with operating rules, where applicable. Ground operations cover the following:

- a) passenger boarding;
- b) disembarkation;
- c) transit stops; and
- d) refuelling with passengers on board.

5.2.2 When establishing the minimum number of cabin crew members required, the State should require the operator to have procedures for cabin crew to manage the following potential situations while carrying out their duties and responsibilities:

- a) monitor conditions inside and outside of the aircraft (maintain situational awareness);

- b) respond to an emergency situation (e.g. fire or smoke);
- c) manage an evacuation;
- d) manage a medical situation on board;
- e) manage an unruly passenger event;
- f) attend to special categories of passengers on board;
- g) verify that passengers comply with “no-smoking” regulations and portable electronic devices (PED) usage requirements;
- h) apply communication protocols with flight and ground crew;
- i) conduct lavatory and/or stowaway checks; and
- j) perform security-related duties.

5.2.3 In addition to the above, the operator should have procedures for cabin crew members to manage the following situations while carrying out their duties and responsibilities:

- a) passenger boarding:
  - 1) monitor carry-on baggage and stowage; and
  - 2) verify that exits, aisles and cross aisles are clear of obstructions;
- b) disembarkation:
  - 1) verify that all passengers have disembarked; and
  - 2) perform security checks;
- c) transit stops:
  - 1) control access to stairs and aerobridge, as applicable;
  - 2) perform security checks; and
  - 3) manage disembarkation and boarding processes.

5.2.4 The State should also require the operator to have procedures for cabin crew members to manage the following potential situations during aircraft refuelling with passengers on board:

- a) monitor conditions inside and outside of the aircraft (maintain situational awareness);
- b) conduct safety announcements;
- c) verify that passengers:

- 1) are seated with their seat belts unfastened;
- 2) do not smoke;
- 3) leave aisles and exits clear; and
- 4) do not use PEDs, if applicable;
- d) maintain clear area adjacent to designated emergency exit;
- e) report the smell of fuel vapour; and
- f) manage an evacuation in the event of fire or significant fuel spillage.

### 5.3 IN-FLIGHT CREW REST

As per Annex 6, Part I, the State must require the operator to establish means to manage cabin crew fatigue-related safety risks. These should include procedures to address the management of in-flight crew rest. The intent is to ensure that cabin crew members that are on duty while others are on in-flight rest are staffed appropriately to adequately monitor the cabin and respond to any situation that may occur during flight (e.g. conduct cabin checks in the event of a turbulence encounter). In-flight rest scheduling practices should consider the following aspects, so that safety of flight is not negatively affected during rest periods:

- a) number of cabin crew on rest at the same time;
- b) flight and duty times;
- c) continuous monitoring of the cabin;
- d) crew required to respond to in-flight safety and security-related occurrences (i.e. fire, decompression, crew member incapacitation, unruly passenger, etc.);
- e) aircraft/cabin configuration and distribution of passengers; and
- f) rest facilities available on board.

*Note.— Guidance on fatigue management is contained in the Manual for the Oversight of Fatigue Management Approaches (Doc 9966) and the ICAO-IATA-IFALPA Fatigue Management Guide for Airline Operators. A copy of these guidelines may be obtained from the ICAO website in the Cabin Safety Library, at: [www.icao.int/cabinsafety](http://www.icao.int/cabinsafety).*

### 5.4 AIRCRAFT/CABIN CONFIGURATION

When establishing the number of cabin crew required, the State should require the operator to have procedures to address the specific aspects of an aircraft or its cabin configuration. Consideration should be given to the following:

- a) aircraft with multiple decks;

- b) configurations that result in separate passenger compartments; and
- c) seating density in each aircraft zone.

## **5.5 SPECIAL CATEGORIES OF PASSENGERS ON BOARD**

When establishing the number of cabin crew on board, the State should require the operator to have procedures to address the management of special categories of passengers. Consideration should be given to the following:

- a) seating;
- b) attendant requirements, if applicable;
- c) specific safety briefings for all phases of flight;
- d) movement assistance to/from on board facilities;
- e) any specialized in-flight monitoring needs; and
- f) specific procedures related to an evacuation and the mitigation of any influences the special category of passenger may have on the evacuation.

## **5.6 CABIN CREW INCAPACITATION**

5.6.1 When establishing the number of cabin crew required, the State should require the operator to have procedures to address the management of cabin crew incapacitation event(s) after reporting for duty or during a tour of duty/pairing (i.e. during a flight duty period and at a stopover/layover). Incapacitation may prevent the I/C or another cabin crew member from performing his/her duties and may also impact the minimum cabin crew complement.

### **5.6.2 Incapacitation prior to dispatch from base**

Incapacitation may occur at a base of the operator (where that operator has cabin crew members stationed) prior to dispatch of the aircraft. The operator should have cabin crew members on standby to efficiently respond to such circumstances. As the operator has the means to replace an incapacitated cabin crew member (whatever their designation), a flight should not depart unless another cabin crew member of the same designation (if applicable) has been assigned. The State should not permit a reduction of the cabin crew complement below the minimum required from a base of the operator.

### **5.6.3 Incapacitation during a stopover or layover**

5.6.3.1 Incapacitation may occur during a stopover or layover. The operator should take appropriate measures to replace the incapacitated cabin crew member and/or I/C (if applicable) at the stopover (layover) point. If there is no possibility of finding a replacement crew member, the operator should have documented procedures that enable the aircraft to return to base while maintaining an acceptable level of safety. In such extenuating circumstances, relief from the applicable minimum cabin crew requirements for the aircraft type may require approval by the State.

5.6.3.2 The appropriate measures include, but are not limited to the following:

- a) where a cabin crew member or I/C is available or can be made available, the operator should:
  - 1) appoint a cabin crew member or I/C originally assigned to another flight and who is available at the concerned base or stopover (layover); or
  - 2) reposition another cabin crew member or I/C to the destination where the cabin crew member or I/C has become incapacitated or unavailable to operate; and
- b) where a cabin crew member or I/C is not available, the operator should have procedures to address the reduction in the minimum number of cabin crew.

5.6.3.3 When applying either of the options cited above, rest and duty time limitations should be adhered to. Procedures may include, but are not limited to:

- a) notifying the captain;
- b) repositioning of cabin crew and reallocating duties;
- c) assessing the safety impact (the crew may need to use an ABP);
- d) assessing the commercial impact (the crew may need to stop cabin service or provide limited service only);
- e) considering a decrease in the number of passengers carried if operating with less than the minimum cabin crew;
- f) selecting the next most suitably qualified cabin crew member for the conduct of I/C duties if the incapacitated cabin crew member is the I/C (refer to section 5.6.5);
- g) applying the required procedures for incapacitation during transit away from a base of the operator or on a layover; and
- h) applying the required procedures for incapacitation in case of single cabin crew member operation.

#### **5.6.4 INCAPACITATION DURING FLIGHT**

Incapacitation may occur in flight. The State should require the operator to have procedures to address the management of cabin crew member incapacitation during the flight. The operator should address the situation by taking into account the elements listed in section 5.6.3.

#### **5.6.5 IN-CHARGE CABIN CREW MEMBER INCAPACITATION**

When an I/C is required by the State, the operator should have procedures to address the management of the I/C duties if incapacitation of the I/C occurs. Consideration should be given to the following:

- a) there may be another I/C on the same flight who can take over the duties and responsibilities of the incapacitated I/C;

- b) if there is no other I/C on the same flight, the next most suitably qualified cabin crew member should take over in order to reach a base of the operator;
- c) if, during the series of flights, the aircraft transits via a base of the operator, another I/C should join the flight and replace the cabin crew member acting as I/C; and
- d) the operator should consider including the identification of the next most suitably qualified cabin crew member, in the event of I/C incapacitation, in the pre-flight briefing.

*Note.— When selecting the next most suitably qualified crew member, consider the competencies included in I/C training stated in the Cabin Crew Safety Training Manual (Doc 10002).*

## 5.7 NON-COMMERCIAL OPERATIONS

5.7.1 The State should require the operator, authorized to conduct international commercial air transport operations as per the provisions found in Annex 6, Part I, to have procedures to address non-commercial operations (i.e. non-revenue flights), including the specifics of the kind of persons who may be carried on such flights. Non-commercial operations include the following:

- a) flight crew training/instructional flights;
- b) test flights (design/approval tests, acceptance checks, post maintenance functional checks);
- c) relocation flights (ferry, delivery, positioning, recovery);
- d) flying displays; and
- e) demonstration flights.

5.7.2 In addition to the flight crew members required to operate a non-revenue flight, other operator's personnel may be on board (e.g. aircraft maintenance technicians). The State may allow non-commercial operations to be conducted without cabin crew members on board aircraft where they are otherwise required for commercial passenger flights on the same aircraft type. The State should only provide relief from minimum cabin crew requirements if the operator meets specific conditions.

5.7.3 In order for the operator to operate an aircraft with persons such as those referred to in section 5.7.2 but without cabin crew, it should address the following:

- a) establish procedures for the transport of persons on board non-revenue flights;
- b) ensure persons carried have unobstructed access to the flight deck or to an emergency exit from their seats;
- c) provide a means of two-way communication between persons carried in the cabin and the flight crew members;
- d) verify that the pilot-in-command has a means of notifying persons in the cabin when seat belts must be fastened;
- e) ensure that a crew member provides a safety briefing to all persons travelling in the cabin before every



take-off, and in accordance with national regulations; and

f) establish who will be responsible for:

1) the arming/disarming of doors;

2) safety checks (safety and emergency equipment);

3) securing the cabin and galley; and

4) opening exits during normal operations and in the event of an emergency.

5.7.4 The State may issue a special flight permit under certain circumstances. This type of document may limit and specify the types of persons that may be carried. It will not include cabin crew as no fare-paying passengers would be permitted and the flight crew members would be responsible for the safety of the other persons carried.

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## CHAPTER 6

# MODIFYING THE MINIMUM CABIN CREW REQUIREMENTS

### 6.1 GENERAL

6.1.1 As described in Chapter 3, a State's operating rules should specify how the minimum number of cabin crew members required on board aircraft is determined. As part of an application for an AOC, some States require operators to conduct an evacuation demonstration in order to confirm that the minimum cabin crew complement remains compatible with the normal and emergency procedures of the operator. In such cases, the number of cabin crew members used in the demonstration by the applicant of an AOC (or an existing operator if a new aircraft type is introduced into the fleet) should become the minimum cabin crew complement required on that aircraft type for that operator.

6.1.2 For example, if the number of cabin crew members used during the aircraft certification process, in accordance with the applicable regulations, was eight crew members, but the operator successfully completes the evacuation demonstration with ten cabin crew members, ten becomes the approved minimum cabin crew complement for that aircraft type for that operator. If, in the future, the operator wishes to reduce the minimum cabin crew complement for that same aircraft type (e.g. from ten down to nine crew members), this modification should not be carried out without prior approval by the State.

6.1.3 Some States allow an operator to modify the approved minimum number of cabin crew required on a specific aircraft type by granting the operator an exemption or permission issued by the competent authority. Although operators may need flexibility, changes must be implemented safely. Therefore, the operator proposing to modify the minimum crew requirement should demonstrate to the State that there are no significant safety differences between the current cabin safety procedures and the ones for the crew complement being proposed.

6.1.4 Some States do not allow modifications to the minimum number of required cabin crew members established by the TC process. Special considerations related to type certification should also be addressed; they are presented in Appendix B to Chapter 3.

### 6.2 APPROVAL PROCESS

6.2.1 The State should require any operator who wishes to modify the minimum cabin crew requirements to follow an approval process which includes conducting a safety risk assessment using its established safety risk management process, revising emergency procedures and training, and conducting an evacuation demonstration, if applicable for that approval. The risk assessment should demonstrate to the State that operations involving a revised minimum cabin crew complement can be safely conducted.

*Note.— Detailed guidance on conducting safety risk assessments is contained in the Safety Management Manual (Doc 9859).*

6.2.2 The State should outline the scope of the safety risk assessment to be used in the planning, transition and implementation of modified minimum cabin crew requirements. The operator seeking to modify the minimum crew requirements should submit for approval all the required documentation that supports the modification and provides

assurance to the State that operations can be conducted with an acceptable level of safety. Once the State approves the proposed changes, the minimum crew requirements may be modified and documented in the operations manual. The operator's documentation should include activities to be conducted in the post-implementation phase, to identify and address any safety concerns. The State may wish to monitor the changes made by the operator in its routine or ad hoc surveillance activities.

6.2.3 Approvals (e.g. exemptions or permissions) for modifying the minimum cabin crew requirements should be issued on a case-by-case basis. For each operator wishing to modify its minimum cabin crew requirements, the State should examine key parameters which include but are not limited to:

- a) the manufacturer/TC minimum crew complement;
- b) the number of seats installed on each aircraft;
- c) the number of floor-level exits on aircraft types in the operator's fleet;
- d) the distance (width) between two doors of a pair; and
- e) the projected load factor.

### **6.3 SAFETY RISK ASSESSMENT**

6.3.1 When the operator reviews its policy and procedures to determine a modified minimum cabin crew complement, its safety risk assessment should address the following areas:

- a) cabin crew workload (normal, abnormal and emergency situations);
- b) aircraft manufacturer recommended procedures;
- c) location of cabin crew seats;
- d) supervision of exits;
- e) emergency landing/ditching and evacuation procedures;
- f) type and duration of flights to be operated;
- g) unique interior cabin designs that may require additional duties (e.g. first class suites); and
- h) training.

6.3.2 Sections 6.3.3 to 6.3.10 provide additional information on each of these areas.

#### **6.3.3 Cabin crew workload**

6.3.3.1 The operator should consider the impact of a reduction in the number of cabin crew members on the accomplishment of duties and responsibilities in normal, abnormal and emergency situations. A reduction in the number of cabin crew members may result in several consequences which should be assessed, such as:

- a) unstaffed exits;
- b) limited opportunity for crew rest and increased crew fatigue;
- c) increased cabin crew workload during normal operations;
- d) increased cabin crew workload during abnormal or emergency situations (e.g. in-flight medical event, fire/smoke, or security threat);
- e) reduced situational awareness/reduced awareness of the cabin environment; and
- f) increased time needed during an evacuation.

6.3.3.2 Procedures and training may need to be modified as part of the formal change management process to reduce or control risks related to increased crew workload to an acceptable level.

#### **6.3.4 Aircraft manufacturer recommended procedures**

When proposing to modify the minimum number of cabin crew members required on board, consideration should be given to the aircraft manufacturer's recommended evacuation procedures and the operator's capability in meeting or exceeding the evacuation performance, taking into consideration the following:

- a) number of exits;
- b) type of exits and their assisting evacuation means (slide, slide-raft, stairs, etc.);
- c) location of exits in relation to cabin crew seats and the cabin layout;
- d) operation and management of unstaffed exits; and
- e) specific required evacuation positions (e.g. A380 stair monitor).

#### **6.3.5 Location of cabin crew seats**

Consideration should be given to the location of cabin crew seats and cabin crew duties in an emergency evacuation. These include, but are not limited to:

- a) opening floor-level exits and initiating stair or slide deployment;
- b) directing passengers to and through exits;
- c) directing passengers away from unusable exits;
- d) crowd control (e.g. stair monitor, etc.);
- e) cabin direct view requirements; and
- f) passenger flow management.

### 6.3.6 Supervision of exits

6.3.6.1 The supervision of exits during emergency evacuations may be impacted by modified minimum cabin crew requirements. Consequences of unstaffed exits, or exit pairs supervised by a single cabin crew member, may include:

- a) slower evacuations;
- b) usable, unopened exits;
- c) unusable exit not blocked appropriately and inadvertently opened;
- d) inaudible directions or commands; and
- e) ineffective flow management and crowd control.

6.3.6.2 Any modification in the minimum cabin crew requirements should take into account additional actions that cabin crew members may be required to perform when responsible for a pair of exits in support of aircraft manufacturer's recommended procedures. Despite any modification in minimum crew, one cabin crew member should be required per floor-level exit unless an acceptable level of safety can be maintained with a reduced number of crew members.

6.3.6.3 ABPs may play a role during an evacuation. This role should not be considered a replacement for the role of a cabin crew member. The operator looking to modify crew requirements should consider the following aspects when amending its procedures:

- a) designation of emergency exit rows;
- b) ABPs, able to undertake emergency tasks;
- c) self-help emergency exit rows to be occupied by a minimum number of passengers;
- d) delivery of emergency exit row safety briefings; and
- e) passenger acknowledgement and understanding of safety responsibilities associated with occupying an emergency exit row.

### 6.3.7 Emergency landing/ditching and evacuation procedures

Any modification in the minimum cabin crew requirements should take into account actions that cabin crew members may be required to perform in an emergency landing or ditching and subsequent evacuation, including the cabin preparations, opening of exits and crowd control. For operators involved in extended over-water operations, consideration should be given to actions that cabin crew members may be required to perform in a ditching, including the cabin preparations and the launching of slide-rafts/life-rafts. Post-evacuation procedures to increase survivability should also be considered (e.g. raft management, aquatic survival techniques).

### 6.3.8 Type and duration of flights to be operated

The type and duration of the flight(s) to be operated should be taken into consideration, looking at all duty factors which may impact safety in normal, abnormal and emergency situations. Such factors may include, but are not limited to:

- a) cabin crew scheduling, planned and actual duty periods and the management of disruptions, including

- the recognition and mitigation of fatigue inducing factors;
- b) in-flight workload, responsibilities, distribution and management of safety and service duties; and
- c) the effect of modified minimum cabin crew requirements on:
  - 1) pre-flight duties;
  - 2) in-flight duties; and
  - 3) post-flight duties.

### **6.3.9 Unique interior cabin designs**

The cabin interior of aircraft should be taken into consideration when a design might impact safety in normal, abnormal and emergency situations. An example is an interior that has a unique design, such as a first class suite with dividers or monuments that may inhibit passenger observation. These unique designs may require additional cabin crew responsibilities related to passenger management in a normal, abnormal or emergency situation.

### **6.3.10 Training**

Training is necessary to prepare cabin crew members to conduct their safety-related duties and responsibilities during normal day-to-day flights and essential to enable them to recognize and act on any abnormal or emergency situation. The operator's safety risk assessment should look at how a modification in minimum crew requirements may impact the training programme. A job and task analysis should be conducted to evaluate cabin crew members' duties and responsibilities under a modified crew complement. This may lead to a redesign of certain parts of the training curriculum. When proposing to modify minimum crew requirements, the operator should pay particular attention to how the change may impact the following aspects:

- a) initial and recurrent training:
  - 1) duties and responsibilities;
  - 2) normal, abnormal and emergency procedures;
  - 3) cabin health and first aid; and
  - 4) duties and responsibilities relating to aviation security;
- b) aircraft type and differences training:
  - 1) exits (type, number, location and operation);
  - 2) assisting evacuation means (slide, slide-raft, life-raft, rope, etc.);
  - 3) safety and emergency equipment;
  - 4) aircraft systems relevant to cabin crew duties;
  - 5) normal procedures;

- 6) abnormal and emergency procedures, including:
    - i) firefighting;
    - ii) smoke removal procedures;
    - iii) anticipated and unanticipated emergency landing/ditching;
    - iv) evacuation (land/water), including operation and management of a pair of floor-level exits;
    - v) flight and cabin crew member incapacitation; and
    - vi) rapid disembarkation;
  - 7) security-related procedures;
  - 8) design-related elements that may impact on normal and/or emergency procedures; and
- c) human performance training:
- 1) cabin crew skills; and
  - 2) crew resource management.

*Note.— Guidance on the development of cabin crew training is contained in the Cabin Crew Safety Training Manual (Doc 10002).*

#### **6.4 AMENDMENTS BY THE OPERATOR**

Once the State is satisfied that the operator's safety risk assessment addresses the necessary areas (as per section 6.3), the operator should amend the operations manual and training programme to include all the mitigation measures derived from the assessment. The State should approve the amendments prior to allowing the operator to conduct operations with the modified minimum crew complement.

#### **6.5 EMERGENCY EVACUATION DEMONSTRATION**

In addition to the amendments discussed in section 6.4, the State should require the operator to conduct a demonstration of the proposed changes as part of an established process to collect evidence and assess if an acceptable level of safety is maintained. Recognizing that the current testing protocol used to determine minimum cabin crew requirements by operators (partial evacuation demonstrations) may not effectively test certain new cabin crew procedures, the State should consider designing new processes or test protocols to evaluate changes to cabin crew procedures (e.g. a cabin crew member who is assigned a pair of floor-level exits). An example of a new process to evaluate a modification of the minimum cabin crew requirement is presented in the appendix to this chapter.



## 6.6 POST-IMPLEMENTATION ACTIVITIES

6.6.1 Following the implementation of the modified minimum cabin crew requirements, the State should require the operator to monitor hazards associated with the modified minimum crew complement through the established safety assurance processes of its safety management system (SMS).

6.6.2 As a follow-up to the approval, the State should include aspects related to the modified minimum crew requirements as part of its continued surveillance activities of the operator (e.g. inspections). It should gather data and reports to verify that the operator follows up on:

- a) any safety risks associated to the change in the minimum crew complement;
- b) any occurrences (e.g. evacuation); and
- c) any findings resulting from surveillance activities.

6.6.3 The State should have an established process for enforcement of compliance with applicable rules and regulations. If the operator violates regulations regarding minimum crew requirements or conditions outlined in the exemption/permission granted by the competent authority, or it fails to accomplish the necessary corrective action(s) within a reasonable time, the established process for enforcement action should be followed, as with any other issue.

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## Appendix to Chapter 6

# EXAMPLE OF PROCESS TO EVALUATE THE MODIFICATION OF MINIMUM CABIN CREW REQUIREMENTS

### 1. GENERAL

1.1 The minimum number of cabin crew members required on board an aircraft type is determined by a State's operating rules. Section 4 of Appendix B to Chapter 3 presents recommendations regarding the ratio of cabin crew members to floor-level exits, which should be taken into consideration when determining the minimum crew complement. Some States allow an operator to modify the approved minimum number of cabin crew required on a specific aircraft type by granting the operator an exemption or permission issued by the competent authority. Any changes to the approved cabin crew complement must take into account the safety of occupants. Therefore, the State should require the operator proposing to modify the minimum crew complement to demonstrate that an acceptable level of safety is maintained with the cabin crew complement being proposed. Prior to granting an exemption or permission related to the minimum crew requirement, the competent authority should collect evidence through a formal established process. Evidence should consist of a safety risk assessment, operator documentation and a demonstration of the proposed changes. Recognizing that the current testing protocol used to determine minimum cabin crew requirements by operators (partial evacuation demonstrations) may not effectively test certain new cabin crew procedures, the State should consider designing new processes or test protocols to evaluate changes to cabin crew procedures (e.g. a cabin crew member who is assigned a pair of floor-level exits). Ultimately, the State takes the final decision regarding if, and to which extent, the minimum number of cabin crew members required on board an operator's specific aircraft type will be modified. The process developed by the State should enable it to make an evidence-based decision and provide assurance that an acceptable level of safety is maintained as a result of the proposed change.

1.2 This appendix presents an example of an approval process which the State can use to evaluate a proposed modification in a previously approved minimum cabin crew complement for an individual operator's specific aircraft type. This process is presented solely as an example, and does not represent the only means to assess crew complement modifications. Part of the process involves a demonstration by the operator. As with any demonstration, the State should consider the advantages and disadvantages of conducting a realistic exercise. Such considerations are presented in section 4.7 of this appendix.

1.3 As per ICAO requirements, each operator must establish, to the satisfaction of the State, the minimum number of cabin crew required for each aircraft type in its fleet. As this approval process is specific to an individual operator, the successful completion of the process to modify the minimum cabin crew by one operator should not be transferable to another operator with the same aircraft type. Each operator proposing to modify the minimum cabin crew complement should complete the process to the satisfaction of the State prior to implementing the modification.

### 2. SAFETY RISK ASSESSMENT

2.1 As a first step in the process, the operator should submit a safety risk assessment using its established safety risk management process to demonstrate to the State that operations involving a revised minimum cabin crew complement can be safely conducted (refer to Chapter 6, section 6.3). The operator should review the proposed changes to its operations in relation to the minimum crew modification and carry out the following tasks:



### **3. OPERATOR DOCUMENTATION**

#### **3.1 General**

As with the conduct of emergency evacuation and ditching demonstrations, the State should require the operator to develop and submit a plan for demonstrating the aircraft evacuation with the modified minimum cabin crew complement. This is the second step in the process. The State should specify the content of the demonstration plan as well as the timelines for submission of the documentation in accordance with the State's established process (refer to Chapter 4). The operator's submission should address at a minimum:

- a) the revised operations manual including modified SOPs;
- b) training programme requirements/amendments; and
- c) a demonstration plan for the conduct of the exercise.

#### **3.2 Standard operating procedures**

As part of the modification to the minimum cabin crew complement, the operator may wish to assign a pair of floor-level exits to a single cabin crew member. Management of dual exit assignment to a single cabin crew member requires an evaluation and potential changes to the operator's SOPs. Consideration should be given to normal, abnormal and emergency situations when reviewing SOPs. The following points should be addressed as part of the review:

- a) cabin crew assignment and positioning;
- b) boarding and other related cabin crew duties and responsibilities while the aircraft is on the ground, including refuelling (e.g. cabin crew remaining in the vicinity of exits);
- c) briefing of ABPs at unstaffed exit;
- d) arming/disarming procedures (including cross-check of door arming status);
- e) shouted commands;
- f) operation of emergency lighting and evacuation alarm system (if applicable);
- g) assessment of exit conditions inside and outside the aircraft (on land or water);
- h) opening of exits;
- i) assessment of slide inflation;
- j) movement of passengers from one exit to another;
- k) protective position while commanding the evacuation;
- l) passenger management (e.g. egress flow, crowd control, compliance with crew instructions);

- m) management of carry-on baggage;
- n) responsibility for safety and emergency equipment and
- o) conduct of post-evacuation duties.

### **3.3 Training programme**

If the proposed modification to the minimum cabin crew includes dual exit assignment to a single cabin crew member, initial and recurrent training programmes should include a review of SOPs for dual exit assignment to a single cabin crew member (refer to Chapter 6, section 6.3.10). The training programme should include scenario-based training, to be carried out in a representative cabin training device (i.e. mock-up or cabin simulator), to assess the cabin crew's performance in conducting their duties and responsibilities during an evacuation. Assessment of cabin crew members should focus on the points covered in section 3.2 of this appendix and include workload management, crew resource management (CRM) and the ability of crew members to move to another exit within the applicable distance of movement during the evacuation drill.

### **3.4 Demonstration plan**

The operator should submit a demonstration plan in advance of the demonstration based on the timeframe determined by the State for review by the competent authority. The demonstration plan's content should be the same as the content of the operator's plan for an evacuation/ditching demonstration (refer to Chapter 4, section 4.2.3). The same guidelines presented in Chapter 4 should be followed for planning and conduct of any demonstrations by operators.

## **4. CONDUCT OF THE DEMONSTRATION**

### **4.1 Scenario for the demonstration**

Once the State has completed the review of all documentation submitted by the operator and is satisfied with the proposed changes (e.g. content of safety risk assessment, revision of SOPs, amendment of training programme content), it should require the operator to demonstrate that the revised procedures can be executed by cabin crew members in a realistic situation. This is the third step in the process. A demonstration should take the form of a practical drill where cabin crew carry out a simulated evacuation scenario applying the modified SOPs. The number of cabin crew taking part in the exercise should reflect the modified minimum cabin crew complement for which the operator is seeking approval. If the modification in the cabin crew complement leads to a single cabin crew member being assigned a pair of floor-level exits, this should be the focus of the demonstration (i.e. the operator must prove to the State that a single cabin crew member can manage a pair of floor-level exits during an evacuation). In order to gather such evidence, the State may require the operator to carry out one of the scenarios presented in Table 1-2. For each scenario presented in this table, assessment criteria is listed which should be used to evaluate the performance of the cabin crew member(s) participating in the exercise. The scenario chosen by the operator should be submitted to the State in advance for approval.

**Table 1-2. Sample scenarios for assessing a single cabin crew member assigned to a pair of floor-level exits**

<i>Scenario</i>	<i>Assessment Criteria</i>
Cabin crew member responsible for two usable exits	<p>Ability of the cabin crew member to demonstrate:</p> <ul style="list-style-type: none"> <li>• use of assertive evacuation commands</li> <li>• assess inside and outside conditions for the assigned primary exit</li> <li>• open assigned primary exit</li> <li>• ensure slide is ready for use</li> <li>• take protective position</li> <li>• start the flow of passengers at that exit</li> <li>• cross over to unstaffed exit</li> <li>• assess inside and outside conditions</li> <li>• open unstaffed exit</li> <li>• ensure slide is ready for use</li> <li>• take protective position</li> <li>• start the flow of passengers at that exit</li> <li>• monitor the flow at both exits</li> <li>• manage crowd control at both exits</li> <li>• manage cabin baggage at both exits</li> <li>• monitor continuing serviceability at both exits</li> <li>• conduct cabin check</li> <li>• remove safety and emergency equipment from aircraft, as per established responsibilities</li> </ul>
Cabin crew member responsible for two exits – with one unusable exit	<p>Ability of the cabin crew member to demonstrate:</p> <ul style="list-style-type: none"> <li>• use of assertive evacuation commands</li> <li>• assess inside and outside conditions</li> <li>• open usable exit</li> <li>• ensure slide is ready for use</li> <li>• take protective position</li> <li>• start the flow of passengers at that exit</li> <li>• block unusable exit</li> <li>• prevent passengers from opening unusable exit</li> <li>• redirect passengers to usable exits</li> <li>• monitor the flow of passengers at usable exit</li> <li>• manage cabin baggage</li> <li>• monitor continuing serviceability at both exits</li> </ul>
Cabin crew member responsible for two usable exits – with the use of an ABP <sup>1</sup>	<p>Ability of the cabin crew member to demonstrate:</p> <ul style="list-style-type: none"> <li>• ABP exit briefings</li> <li>• use of assertive evacuation commands</li> <li>• assess inside and outside conditions</li> <li>• open usable exits</li> <li>• ensure slides are ready for use</li> <li>• assign briefed ABP to usable exit to monitor passenger flow and slide usability</li> <li>• monitor the flow of passengers at usable exits</li> </ul>

<sup>1</sup> Based on the procedures, the operator may elect to complete the demonstration with or without ABPs.

	<ul style="list-style-type: none"> <li>• manage cabin baggage</li> <li>• monitor continuing serviceability at both exits</li> </ul>
Cabin crew member responsible for two exits with one unusable exit blocked – with the use of an ABP	<p>Ability of the cabin crew member to demonstrate:</p> <ul style="list-style-type: none"> <li>• ABP exit briefings</li> <li>• use of assertive evacuation commands</li> <li>• assess inside and outside conditions</li> <li>• open usable exit</li> <li>• ensure slide is ready for use</li> <li>• assign briefed ABP to block unusable exit</li> <li>• prevent passengers from opening unusable exit</li> <li>• redirect passengers to usable exit</li> <li>• monitor the flow of passengers at usable exit</li> <li>• manage cabin baggage</li> <li>• monitor continuing serviceability at both exits</li> </ul>

*Note.— If the State determines a simulated ditching demonstration is required, it may establish different assessment criteria.*

## 4.2 The demonstration

4.2.1 The demonstration allows the State to evaluate the management of a pair of exits by one cabin crew member and the following aspects:

- a) the operator's training programme;
- b) cabin crew member competency;
- c) the operator's emergency evacuation and ditching procedures; and
- d) the reliability and capability of the safety and emergency equipment on the aircraft.

4.2.2 The operator should be responsible for the logistics and coordination of the demonstration. The following points should be considered:

- a) the operator should conduct a briefing of participants, including representation from the State's personnel, prior to the commencement of the exercise. The briefing should cover the requirements of the exercise together with the safety, occupational health and safety and non-normal aspects of the demonstration;
- b) the operator should be responsible for the scheduling and conduct of briefings and de-briefings of participants and crew and should advise the details of such briefings to the State prior to the exercise. The State should attend all such briefings. In order to ensure an appropriate representation, briefings to the crew should not be completed in advance of the demonstration; and
- c) the operator should provide all equipment required for the exercise and be responsible for making safe



any aircraft equipment to be used in this exercise. The State personnel should provide their own equipment to record timings during the exercise. The State should also advise the operator of the names of the State's personnel to be in attendance during the exercise.

### **4.3 Aircraft environment**

4.3.1 The demonstration should be conducted on board the same aircraft type for which the operator is requesting the crew modification, or in a representative cabin training device. The aircraft seating and relevant cabin fixtures (inclusive of safety and emergency equipment, documented as installed at the cabin crew station) should be configured as described in the operations manual. The State should conduct a cabin inspection prior to the commencement of the exercise to ensure the equipment is installed, as documented in the operations manual. The operator should be responsible for making safe any automatic devices at exits.

4.3.2 If the exercise is to be conducted in a hangar, the hangar lighting should be adjusted to ensure a reduced light environment in the cabin. If the exercise is to be conducted in an area other than a hangar, the operator should take adequate steps such as the closure of aircraft window shades to ensure a reduced light environment is reproducible in the cabin. Ground power should be provided to the aircraft to enable the activation of the emergency lighting. Steps (where applicable) should be in position at all floor-level exits.

### **4.4 Use of representative training devices**

The State may grant the use of a cabin training device where it is representative of the aircraft being tested. The following points should be considered, as a minimum:

- a) the cabin training device seating as configured is representative to that of the aircraft inclusive of cabin crew seats (jump seats);
- b) relevant cabin fixtures, inclusive of safety and emergency equipment, are installed at the cabin crew stations, as documented in the operations manual;
- c) monuments are installed identical to that of the aircraft (monuments do not need to be identical in composition as long as they are identical in dimensions and represent the same type of visual obstruction);
- d) evacuation slides are present (deployable or attached to the cabin training device), if used in the exercise;
- e) exits and associated features are identical to that of the aircraft, including distance between pair of exits;
- f) lighted signs and emergency lighting are identical to that of the aircraft; and
- g) safety information cards are present.

### **4.5 Passengers**

The number of participants taking part in the exercise as passengers should be sufficient in numbers to demonstrate that the revised procedures can be executed by cabin crew members in a realistic situation. Participants should be appropriately naïve: they must have no extra familiarity with the aircraft beyond that of an average passenger.

Passengers should not be advised of the details of the exercise in advance. They can be informed they are to take part in an exercise to demonstrate the efficacy of the operators procedures and training and that some activity may take place which may require their active involvement, however, they should not be specifically informed they are to take place in an evacuation demonstration. The operator should not be allowed to provide any further briefing and/or rehearsal other than the standard exit briefing detailed in the operations manual to any participating passengers unless the operator incorporates such briefing and/or rehearsal into the operations manual as the ongoing SOP.

#### **4.6 Cabin crew**

Cabin crew members taking part in the demonstration should meet the criteria presented in Chapter 2, section 2.7.4. The cabin crew may not be provided with additional training or become familiarized with the exercise prior to the demonstration. A cabin crew briefing should take place prior to the start of the demonstration to review the exercise, expectations and desired outcome. This demonstration should not be delivered in advance of the demonstration day. The operator may brief cabin crew members on the non-normal aspects of the exercise including the indication for exit usability. Cabin crew should be briefed that they are to take part in an exercise to demonstrate the efficacy of procedures and training. It should be emphasized to cabin crew that while the exercise is a simulation, they are to treat the exercise as a live test of procedures and training. Upon approval by the State, the operator may request additional personnel (e.g. training personnel) to be present as observers provided they take no part in the demonstration.

#### **4.7 Considerations regarding safety and financial implications**

4.7.1 A demonstration which involves an actual evacuation of passengers from an aircraft provides the most realistic recreation of the crew's performance in a real occurrence. The scenarios presented in Table 1-2 describe a sequence of events which involve the deployment of slides (if the demonstration is carried out on an actual aircraft) and the egress of passengers via those slides. However, descending slides may result in injuries to participants. Likewise, egress from an aircraft through evacuation assisting means also increases the probability that persons may fall from a high door sill and suffer injuries. Therefore, the State should pay close consideration to the use of passengers during the demonstration. It needs to balance the safety benefits derived from a realistic simulation versus the risk of bodily harm to individuals involved in the exercise. Options, such as having passengers egress onto ramps or platforms may reduce the risk of injuries. If a representative training device is considered an acceptable option to the use of an actual aircraft, it may be lowered close to the ground or placed near platforms that will eliminate the need for occupants to exit via slides. Likewise, the State may limit the participation of passengers or prohibit them from evacuating the aircraft. However, this will limit its ability to assess passenger management in an evacuation scenario. In such instances, additional exercises (e.g. during training) should be included to gather the necessary evidence on crew performance.

4.7.2 Emergency evacuation demonstrations are costly exercises for an operator. Aside from the cost associated with removing an aircraft from service, the deployment of one or multiple slides can be costly for the operator. The State should consider the financial implications of the demonstration and balance them against the safety benefits of using an actual aircraft and deploying slides. The exercise may be limited to opening disarmed doors while factoring in the typical time required for a slide to fully deploy. As noted in section 4.4 of this appendix, the State may consider allowing the use of a representative training device, in lieu of an actual aircraft, to alleviate the financial burden on the operator if certain conditions are met.

4.7.3 The State has the final decision regarding the conditions of the demonstration (e.g. whether or not to use passengers; deploy slides, etc.). It should strive to obtain the optimal safety benefit while minimizing the risk of injuries for participants and being mindful of the costs to the operator.

## 4.8 Pass/fail criteria

4.8.1 During the demonstration, the State should observe the exercise in order to validate the adequacy of the operator's procedures and training. A satisfactory exercise (pass) will be achieved when exits designated as useable are operated effectively and opened within the designated time period and all criteria previously mentioned in the scenarios have been met. A satisfactory exercise marks the final step in the process. Upon successful completion of the process, the State may allow an operator to modify the approved minimum number of cabin crew required on a specific aircraft type by granting the operator an exemption or permission issued by the competent authority.

4.8.2 If the modified minimum cabin crew complement results in a cabin crew member being assigned a pair of floor-level exits, the exemption or permission should only allow the operator to assign a single cabin crew member to the exit pair which was successfully demonstrated. For example, if L-1 and R-1 were the floor-level exits utilized during the satisfactory exercise, then L-1 and R-1 should always be the exit pair assigned to a single cabin crew member on the specific aircraft type tested. In that case, the operator should not be allowed to assign any other exit pair on board that aircraft type to a single cabin crew member (e.g. L-2 and R-2), if that exit pair is currently staffed with a ratio of one cabin crew member per floor-level exit. This restriction is based on the notion that the passenger evacuation dynamics at the alternate exit pair may be different from the exit pair demonstrated (e.g. installed monuments presenting an obstruction; exits located at the front of the cabin versus in the center).

4.8.3 The exercise should be assessed as unsatisfactory (fail) if any of the following occurs:

- a) a cabin crew member or a passenger opens an exit designated as unusable (a cabin crew member must not move the exit handle away from the closed position of an exit designated as unusable);
- b) a cabin crew member fails to manage the passengers at both exits (e.g. passenger opens a usable exit without a crew member's instruction);
- c) a cabin crew member fails to effectively monitor the passenger flow at both exits;
- d) a cabin crew member fails to open an exit designated as usable;
- e) a cabin crew member fails to reassess the usability of an exit (e.g. exit initially blocked becomes usable); and/or
- f) the time from the initiation signal to a cabin crew member's primary exit being deemed ready for use exceeds the agreed upon timeframe.

4.8.4 The State may declare the exercise invalid should any of the following occur:

- a) it has reason to believe that the operator did not take all reasonable steps with regard to cabin crew taking part in the demonstration (refer to section 4.6 of this appendix); or
- b) the State personnel inadvertently or otherwise provides information to an operating cabin crew member about the usability of an exit prior to the initial "evacuate" command.

4.8.5 If the operator does not succeed in the first attempt at the exercise, depending on the reason for the failure, the State may permit a second attempt. Should a second attempt be undertaken, a different set of cabin crew members and passengers will be required. Should the operator not succeed in the second attempt, it should be required to investigate the circumstances and plan a further exercise at a later date. In such circumstances, the proposed modification to the minimum crew complement should be rejected by the State until further notice.

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## Chapter 7

# ADDITIONAL CONSIDERATIONS FOR CABIN CREW

### 7.1 GENERAL

In addition to the minimum number of cabin crew members required on board, other factors should be taken into account when assigning cabin crew members to operate different aircraft types in order to effect a safe and expeditious evacuation and to perform the necessary functions in an emergency or a situation requiring emergency evacuation. These factors are: mixed fleet operations and the location of cabin crew members on board the aircraft. In 1992, the NTSB identified risks associated with cabin crew members being qualified on numerous aircraft types and the lack of equipment standardization in a Special Investigation Report<sup>1</sup> relating to cabin crew training and performance during emergency situations. The NTSB noted that some cabin crew members may be given so much information, such as multiple stowage locations of safety and emergency equipment on several aircraft types, that these locations may not be readily recalled during an emergency situation.

### 7.2 MIXED FLEET OPERATIONS

7.2.1 An operator's fleet may comprise several aircraft types, with different configurations, systems, exits, equipment and procedures. Consideration should be given to the amount and complexity of differences between the aircraft in the fleet before determining the number of aircraft types for which qualifications will be issued to a single cabin crew member (refer to section 7.2.4).

7.2.2 States may choose to limit the maximum number of aircraft types that cabin crew members can be qualified to operate. In the event that the State chooses to limit the maximum number of aircraft types qualifications that can be issued to a single cabin crew member, it should require the operator to maintain an updated record of all aircraft types on which each cabin crew member is certified.

7.2.3 Some States issue cabin crew licences, certificates or attestations. In such cases, limitations on aircraft types that cabin crew members can be qualified to operate should be recorded in such documents as required by the State.

7.2.4 The following elements should be assessed for the purpose of determining the number of aircraft types that cabin crew can be qualified to operate:

- a) aircraft configuration:
  - 1) cabin layout;
  - 2) number of aisles (narrow/wide-body); and
  - 3) number of passenger decks;

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<sup>1</sup> NTSB/SIR-92/02 - Special Investigation Report: Flight Attendant Training and Performance During Emergency Situations.

- b) exits:
  - 1) number, type and location;
  - 2) exit operation and differences; and
  - 3) assisting evacuation means;
- c) aircraft systems - differences in:
  - 1) communication systems;
  - 2) warning indications and resets; and
  - 3) control panel operation;
- d) differences in procedures; and
- e) the type, location and operation of the safety and emergency equipment across the operator's fleet.

*Note.— The State should pay attention to cabin crew members who elect to work for more than one operator at the same time (particularly as it relates to elements cited in sections 7.2.4 d) and e)).*

7.2.5 Cabin crew members qualified on multiple aircraft types and varying cabin configurations would benefit from standardized equipment location within these aircraft. The operator should strive for the standardization of safety and emergency equipment stowage locations across its fleet to the extent possible.

### **7.3 LOCATION OF CABIN CREW ON BOARD**

In order to provide the most effective evacuation, the following requirements should be considered. The minimum number of cabin crew required by the State should be evenly distributed throughout the cabin at all times when the aircraft is on ground and passengers are on board including refuelling. During taxi, take-off and landing, all cabin crew members should be seated with their safety harnesses fastened except when required to perform safety-related duties (e.g. safety demonstration, conducting safety briefings and cabin checks prior to take-off).

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## Chapter 8

# PERSONNEL ASSIGNED NON-SAFETY AND NON-EMERGENCY DUTIES IN THE CABIN

### 8.1 GENERAL

8.1.1 ICAO defines a cabin crew member as “a crew member who performs, in the interest of safety of passengers, duties assigned by the operator or the pilot-in-command of the aircraft, but who shall not act as a flight crew member”. A cabin crew member must receive safety training, as addressed in Annex 6, Part I, 12.4 — *Training*, which states that: “the operator shall establish and maintain a training programme, approved by the State of the Operator, to be completed by all persons before being assigned as a cabin crew member.”

8.1.2 An operator may choose to employ personnel in the cabins of its aircraft for the sole purpose of conducting certain passenger service activities such as: food/beverage preparation and service, beauticians, musicians, sale of on board merchandise, etc. These persons are not assigned to flights to perform safety nor emergency duties and are referred to as “personnel assigned non-safety and non-emergency duties in the cabin”. They should not act in the capacity of a cabin crew member, nor are they trained or qualified to act as a cabin crew member or qualified on any aircraft type in the operator’s fleet. These personnel should be considered passengers and comply with all applicable national regulations, operator policies and procedures and should not be listed on the load manifest as a crew member/cabin crew member. In certain States, national regulations prohibit the use of such personnel by operators. If the State allows operators to employ personnel assigned non-safety and non-emergency duties in the cabin, it should require them to have procedures to address the management of such personnel on board.

### 8.2 GUIDELINES FOR PERSONNEL ASSIGNED NON-SAFETY AND NON-EMERGENCY DUTIES IN THE CABIN

8.2.1 If a State’s regulations allow the use of personnel assigned non-safety and non-emergency duties in the cabin, the State and the operator should consider that their presence could interfere with the duties of cabin crew if these persons are not properly trained. An operator employing such personnel should consider the following aspects:

- a) applicable national regulations, operator policies and procedures;
- b) personnel’s role;
- c) delineation between cabin crew and other personnel;
- d) assignment of activities; and
- e) training relevant to their activities on board.

8.2.2 Sections 8.2.3 to 8.2.7 provide additional guidance on each of these aspects.

### **8.2.3 Applicable national regulations, operator policies and procedures**

Personnel assigned non-safety and non-emergency duties in the cabin should be subject to the provisions of the State's regulations governing commercial passenger flights. They should:

- a) receive a passenger safety briefing containing at least the information required by national regulations;
- b) be seated and secured whenever the seat belt sign is illuminated (they should not conduct any activities during taxiing);
- c) stow their carry-on baggage in approved stowage locations on board aircraft; and
- d) comply with all applicable regulatory requirements, operator policies and procedures.

### **8.2.4 Personnel's role**

The operator should define the role and activities of personnel assigned non-safety and non-emergency duties in the cabin, if permitted on board aircraft. These personnel may be utilized by the operator to perform activities limited to passenger service and should be defined as persons not qualified as cabin crew members.

### **8.2.5 Delineation between cabin crew and other personnel**

Personnel assigned non-safety and non-emergency duties in the cabin should be distinguishable from the cabin crew. They should not be confused by passengers as cabin crew members and should therefore not wear the same uniform as the operator's cabin crew. Passengers should be made aware that such personnel are on board, in addition to the cabin crew.

### **8.2.6 Assignment of activities**

The activities allocated to personnel assigned non-safety and non-emergency duties in the cabin should be distinguishable from the duties assigned to cabin crew members. They should not be permitted to operate any equipment or systems unless specific training is provided by the operator. Unless instructed to do so by the cabin crew, these personnel should only operate equipment and systems required to conduct assigned activities.

### **8.2.7 Training**

8.2.7.1 Personnel assigned non-safety and non-emergency duties in the cabin should receive training relevant to their activities on board so that they know what tasks they may perform and equipment they may operate so as not to interfere with the duties and functions of cabin crew members. Training should address how such personnel may assist the cabin crew under their direction and enable these persons to act as ABP, if needed. The training should include the following:

- a) applicable national regulations, operator policies and procedures;
- b) personnel's role;
- c) delineation between cabin crew and other personnel;



- d) assignment of activities;
- e) training relevant to their activities on board; and
- f) seat assignment in the cabin.

8.2.7.2 Additionally, the operator may choose to include education or awareness for such personnel to cover the following:

- a) aircraft familiarization;
- b) aircraft systems (e.g. interphones, oral and visual indications); and
- c) safety and emergency procedures and how to support the cabin crew, including but not limited to the following:
  - 1) phases of flight;
  - 2) coordination and communication with the cabin crew;
  - 3) ABP duties;
  - 4) operation of exits;
  - 5) turbulence;
  - 6) anticipated and unanticipated emergency landing/ditching;
  - 7) types of evacuations;
  - 8) decompression;
  - 9) hypoxia;
  - 10) first aid;
  - 11) fire and smoke; and
  - 12) aviation security principles; and
- d) human factors.

### 8.3 OCCUPANCY OF CABIN CREW SEATS

8.3.1 Cabin crew seats (i.e. jump seats) are located adjacent to or near emergency exits and provide crew members with a direct view of the cabin area. They are designed and located to facilitate the rapid operation of emergency exits and provide access to aircraft systems and safety and emergency equipment used by cabin crew members. Depending on the cabin configuration, multiple cabin crew seats may be installed at crew stations. Additional cabin crew seats may be installed at locations other than exits, for example, in or near galleys. All operating cabin crew members should be assigned a cabin crew seat during a flight.

8.3.2 The State may define who is authorized to occupy a cabin crew seat on board commercial passenger aircraft, for example: operating cabin crew members, or certain individuals such as cabin safety inspectors. If the State does not define or restrict persons authorized to occupy a cabin crew seat, other individuals that typically use this type of seat include: personnel assigned non-safety and non-emergency duties in the cabin, deadheading crew members, other operator personnel, or non-revenue passengers.

8.3.3 There are safety concerns associated with allowing the use of cabin crew seats by persons other than the operator's cabin crew members qualified on for the specific aircraft type. These include, but are not limited to, the following:

- a) the person occupying the cabin crew seat at an exit area may not know what to do during an evacuation – this may result in obstruction of an exit, hindrance of an evacuation, a slowed response, or inappropriate reaction including that person operating an exit when it should not be opened (e.g. fire outside);
- b) the person occupying the cabin crew seat at an unstaffed exit may be unaware of the operator's evacuation procedures – this may lead to a slowed response or inappropriate reaction including that person operating an exit when it should not be opened;
- c) the person may be unable to rapidly get out of the cabin crew seat due to unfamiliarity with the operation of the safety harness or stowage of the crew seat – this may lead to a delay in operating the exit or to an obstruction during an evacuation;
- d) the person occupying the cabin crew seat may suffer injury – this may occur if the crew seat is located in a galley or close to stairways; and
- e) other passengers may confuse the person occupying the cabin crew seat with an operating cabin crew member – they may expect that person to carry out specific functions such as opening an exit in an evacuation.

8.3.4 If the State authorizes persons other than the operator's cabin crew members qualified on the specific aircraft type to occupy cabin crew seats, the operator should establish procedures (e.g. briefings) to mitigate the safety risks identified in section 8.3.3. These procedures should address the following:

- a) verify that persons occupying cabin crew seats located at an emergency exit meet the operator's criteria for passengers seated at emergency exits;
- b) provide an unstaffed exit briefing to persons occupying cabin crew seats located at emergency exits;
- c) provide a briefing on the correct operation and use of the cabin crew seat, including the safety harness, seat stowage and the appropriate brace position for that seat (e.g. aft-facing seats); and
- d) provide an additional briefing to persons occupying cabin crew seats located at an area other than the passenger cabin, such as in a galley, covering hazards and injury prevention.



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