

**Democratic Socialist Republic of Sri Lanka**

Civil Aviation Authority of Sri Lanka

**Implementing Standards**

(Issued under Sec. 120, Civil Aviation Act No. 14 of 2010)

**Title: Limitations on Flight Time, Flight Duty Periods, Duty Periods and Rest Periods of Flight Crewmembers and Cabin Crewmembers for Fatigue Management.****Reference No. :** IS-6-(I)-4.10**SLCAIS:** 054**Date:** 28<sup>th</sup> November 2022

Pursuant to Section 120 of the Civil Aviation Act No.14 of 2010 which is hereinafter referred to as the CA Act, Director General of Civil Aviation shall have the power to issue, whenever he considers it necessary or appropriate to do so, such Implementing Standards for the purpose of giving effect to any of the provisions in the Civil Aviation Act, any Regulations or Rules made thereunder including the Articles of the Convention on International Civil Aviation which are specified in the Schedule to the Civil Aviation Act.

Accordingly, I, being the Director General of Civil Aviation do hereby issue SLCAIS: 054 as mentioned in the Attachment hereto (**Ref: IS-54-Att ;**), for the purpose of giving effect to the provisions under section 67 in the aforementioned Act. Standards and Procedures described under section 4.10 of chapter 4 of the Annex 6 “ Operation of Aircraft”, issued under article 37 of the Convention.

This Implementing Standard shall be applicable to every person holding an Air Operator Certificate issued by Director General of Civil Aviation and his employees engaged in flight operations and shall come in to force with immediate effect and remain in force unless revoked.

Attention is also drawn to Section 103 of the Civil Aviation Act, which states inter alia that failure to comply with Implementing Standards is an offence.

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Chief Executive Officer

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Enclosure: Attachment No. IS- 54-Att;

## **Implementing Standards**

### **Title: Limitations on Flight Time, Flight Duty Periods, Duty Periods and Rest Periods of Flight Crewmembers and Cabin Crewmembers for Fatigue Management.**

#### **GENERAL:**

Requirements contained in this Implementing Standard are based on the Amendment 42, Edition 12 of ICAO Annex 6 – Part 1- 4.10 "Operation of Aircraft".

- i. The requirements contained in this document are applicable to persons/organizations holding an Air Operator Certificate issued by Director General of Civil Aviation, Sri Lanka for commercial air transportation and prospective applicants for Air Operator Certificate for commercial air transportation.
- ii. Holders of Air Operator Certificate issued by the DGCA for commercial air transportation shall comply with the requirements published in this document and are hereby instructed to forward to the DGCA a "Declaration of Conformance" which indicates the degree of compliance with each item detailed in the document.
- iii. This document is a replacement to IS 054, 10<sup>th</sup> January 2018, issued by the DGCA.
- iv. This document may be amended from time to time and the amendments will be reflected with the vertical line on the right side of the text.
- v. All operators shall be guided by SLCAP 4210 as amended, for the prescriptive regulations on Limitation on Flight Time, Duty Periods and Rest Periods of Flight Crewmembers and Cabin Crewmembers conducting commercial operations for the preparation of the roster.
- vi. The operators shall submit an Operator's Scheme for the approval of the DGCA based on the prescriptive Flight Time Limitations or Fatigue Risk Management Systems as specified in SLCAP 4210 as amended.

#### **Reference Documents**

- Annex 6 Part 1 Chapter 4.10
- CAASL IS 13 – Compliance to Annex 6 - Part 1 – Chapter 4 – Flight Operations
- Fatigue Risks Management Systems- Published by IATA, IFALPA & IATA.
- Doc 9859 Safety Management Manual
- Doc 9966 Manual for the Oversight of Fatigue Management Approaches

## **1. Purpose and Scope**

- 1.1** The provisions in this Implementing Standard set limits on the allowable duty hours and minimum periods of rest for flight and cabin crewmembers employed by holders of a Sri Lankan Air Operator Certificate for regular public transport for the purpose of fatigue management.
- 1.2** Flight time, flight duty period, duty period limitations and rest requirements are established for the sole purpose of ensuring that the flight crew and the cabin crew members are performing at an adequate level of alertness for safe flight operations.
- 1.3** The prescriptive limitations are based on scientific principles (circadian system) knowledge on human behavior and operational experience of flight and cabin crew member's working habits.
- 1.4** For the purpose of this document flight crew and cabin crew are as defined by Implementing Standards 011 – Definitions.
- 1.5** In order to accomplish this, two types of fatigue should be taken into account, namely, transient fatigue and cumulative fatigue. Transient fatigue may be described as fatigue that is dispelled by a single sufficient period of rest or sleep. Cumulative fatigue occurs after incomplete recovery from transient fatigue over a period of time.
- 1.6** Limiting the maximum number of hours worked in any duty period allows provision of an adequate opportunity for sleep recovery to address transient fatigue. As the effects of sleep restriction are cumulative, schedules must be designed to allow periodic extended opportunities for sleep recovery.
- 1.7** The usual recommendation for a recovery opportunity is a minimum of two consecutive nights of unrestricted sleep. This is not necessarily 48 hours off duty. A 48-hour break starting at midnight will not allow most people two consecutive nights of unrestricted sleep (most people go to sleep before midnight). Conversely, a 40-hour break starting at 2000 hours will allow most people two consecutive nights of unrestricted sleep.
- 1.8** Circadian low (WOCL typically between 0200 hrs. and 0559 hrs.) fatigue refers to the reduced performance during night time hours, particularly when an individual feels more sleepy and are least able to perform mental and physical tasks.
- 1.9** Limitations based upon the provisions will provide safeguards against both kinds of fatigue because they will recognize:
  - a) The necessity to limit flight duty periods with the aim of preventing both kinds of fatigue;
  - b) The necessity to limit the duty period where additional tasks are performed immediately prior to a flight or at intermediate points during a series of flights in such a way as to prevent transient fatigue;
  - c) The necessity to limit total flight time and duty periods over specified time spans, in order to prevent cumulative fatigue;

- d) The necessity to provide crew members with adequate rest opportunity to recover from fatigue before commencement of the next flight duty period; and
- e) The necessity of taking into account other related tasks the crew member may be required to perform in order to guard particularly against cumulative fatigue.

## **2. Operational Concepts**

### **2.1 Flight Time**

The definition of flight time, in the context of flight time limitations, applies to flight and cabin crew members.

### **2.2 Duty Periods**

All time spent on duty can induce fatigue in, flight and cabin crew members and should therefore be taken into account when arranging rest periods for recovery. Standby may be included as duty if it is likely to induce fatigue.

### **2.3 Flight Duty Periods**

2.3.1 The definition of flight duty period is intended to cover a continuous period of duty that always includes a flight or series of flights for a flight or cabin crew member. It is meant to include all duties a crew member may be required to carry out from the moment he or she reports for duty until he or she completes the flight or series of flights and the aeroplane finally comes to rest and the engines are shut down. It is considered necessary that a flight duty period should be subject to limitations because a crew member's activities over extended periods would eventually induce fatigue — transient or cumulative — which could adversely affect the safety of a flight.

2.3.2 A flight duty period does not include the period of travelling time from home to the point of reporting for duty. It is the responsibility of the flight or cabin crew member to report for duty in an adequately rested condition.

2.3.3 Time spent positioning at the behest of the operator is part of a flight duty period when this time immediately precedes (i.e., without an intervening rest period) a flight duty period in which that person participates as a flight or cabin crew member.

2.3.4 An important safeguard is for Director General of Civil Aviation & Operators to recognize the responsibility of a crew member to refuse further flight duty, when suffering from fatigue of such a nature, as to adversely affect the safety of flight.

### **2.4 Rest Periods**

The definition of rest period requires that flight or cabin crew members be relieved of all duties for the purpose of recovering from fatigue. The way in which this recovery is achieved is the responsibility of the flight or cabin crew member. Extended rest periods should be given on a regular basis. Rest

periods should not include standby if the conditions of the standby would not enable flight and cabin crew members to recover from fatigue. Suitable accommodation on the ground is required at places where rest periods are taken in order to allow effective recovery.

## **2.5 Fit for Duty**

Fit for duty means physiologically and mentally prepared and capable of performing assigned duties at the highest degree of safety.

## **2.6 Fitness for Duty**

- 2.6.1 Each flight/cabin crew member must report for any flight duty period, rested and prepared to perform his or her assigned duties.
- 2.6.2 An Operator may assign, and no flight/cabin crew member may accept assignment to a flight duty period if the flight/cabin crew member has reported for a flight duty period too fatigued to safely perform his or her assigned duties.
- 2.6.3 An operator may permit a flight/ cabin crew member to continue a flight duty period if the flight/ cabin crew member has reported him or herself too fatigued to continue the assigned flight duty period.
- 2.6.4 As part of the dispatch or flight release, as applicable, each flight/ cabin crew member must affirmatively state he or she is fit for duty prior to commencing flight.

## **2.7 Fatigue**

A physiological state of reduced alertness or capability to perform mental or physical tasks, which:

- a. may impair the ability of the Flight Crew member to safely operate an aircraft
- b. is caused by one or more of the following:
  - i. the Flight Crew member's lack of sleep
  - ii. the Flight Crew member's extended wakefulness
  - iii. the Flight Crew member's circadian phase at any relevant time
  - iv. The Flight Crew member's workload of mental activities, or physical activities at any relevant time.

## **2.8 Fatigue Risk Management System. (FRMS)**

A data-driven means of continuously monitoring and managing fatigue related safety risks, based upon scientific principles, knowledge and operational experience that aims to ensure relevant personnel are performing at adequate levels of alertness.

- 2.8.1 No Operator may exceed any of the provisions of this document unless the DGCA has approved a Fatigue Risk Management System that provides at

least an equivalent level of safety against fatigue-related accidents or incidents.

2.8.2 The Fatigue Risk Management System must include:

- (1) A fatigue risk management policy.
- (2) An education and awareness training program.
- (3) A fatigue reporting system.
- (4) A system for monitoring flight/ cabin crew fatigue.
- (5) An incident reporting process.
- (6) A performance evaluation.

**2.9 Fatigue education and awareness training program.**

2.9.1 An operator must develop and implement an education and awareness training program, approved by the DGCA. This program must provide annual education and awareness training to all employees of the operator responsible for administering the provisions of this rule including flight/ cabin crew members, dispatchers, persons directly involved in the scheduling of flight/ cabin crew members, persons directly involved in operational control, and any employee providing direct management oversight of those areas.

2.9.2 The fatigue education and awareness training program must be designed to increase awareness of:

- (1) Fatigue;
- (2) The effects of fatigue on pilots; and
- (3) Fatigue countermeasures

2.9.3 An operator must update its fatigue education and awareness training program every two years as a minimum.

**3. Types of Limitations**

3.1 Limitations are broadly divided by time. It must be understood, however, that these limitations will vary considerably taking into account a variety of situations.

3.2 To take account of unexpected delays once a flight duty period that has been planned within the allowable limitations has commenced, provisions are made for minimizing the extent to which exceeding the limits may be permitted. Similarly, provisions are made for controlling the extent to which any reduction of rest below that ordinarily required may be allowed in cases where flexibility to recover a delayed schedule is sought. The authority, to extend a flight duty period or reduce a rest period within the limitations established is vested, in the pilot-in-command.

3.3 In formulating regulations or rules governing flight time limitations, the crew complement and the extent to which the various tasks to be performed can be divided among the flight or cabin crew members, should be taken into account. In the case where additional flight or cabin crew members are carried and facilities in the aeroplane, are such that a flight or cabin crew

member can obtain recuperative rest in a comfortable reclining seat, or in a bunk, separated and screened from the flight deck and passengers, and reasonably free from disturbance, planned flight duty periods could be extended.

- 3.4** Director General of Civil Aviation has taken to consideration all relevant factors, which include: the number and direction of time zones crossed; the time at which a flight duty period is scheduled to begin; the number of planned and/or actual sectors within the flight duty period; the pattern of working and sleeping relative to the circadian rhythm or 24-hour physiological cycle of the flight or cabin crew; the scheduling of days off; the sequence of early reporting times and late releases from duty; mixing early/late/night duties; and flight operation characteristics.
- 3.5** The number and composition of flight crew members shall be according to the applicable Flight Manual. The number and composition of cabin crew members shall be in compliance to IS 021 – Cabin Crew Members.
- 3.6** Variations to Meet Unexpected Operational Circumstances / Exceptional Circumstances and risks.
- 3.6.1** While regulation through variation is undesirable, DGCA may offer some limited flexibility (**not more than 60 minutes**) to operators complying with the prescribed limits by way of variations. Variations may be necessary to meet operational needs and risks in:
1. Expected but exceptional circumstances; and
  2. Unexpected circumstances beyond the control of the Operator;
- 3.6.2** The operator is permitted to use variation from the Prescriptive limitations, provided it is in the Operator's scheme and approved by the DGCA, taking to consideration the circumstances that leads to such variations and the Risk Assessment provided by the operator.

*Note: Guidance for use of variations from Prescriptive Limitations are detailed in SLCAP 4210*

- 3.7** The following material comprises a set of parameters which has been considered in the development of prescriptive limitations for fatigue management.

## **4. Definitions**

### **4.1 Operators and Crew Members**

**Acclimatized;** it means a state in which a crewmember's circadian biological clock is synchronized to the time zone where the crewmember is.

- A crew member is considered to be acclimatized to a 2 hour wide time zone surrounding the local time at the time of departure.
- Is acclimatized when a crew member has spent 3 consecutive local nights on the ground within a time zone which is 2 hours wide, and is able to take uninterrupted night's sleep.

- The crew member will remain acclimatized thereafter until a duty period finishes at a place where local time differs by more than 2 hours from that at the point of departure

**Augmented Flight Crew.** A flight crew that comprises more than the minimum number required to operate the aeroplane and in which each flight crew member can leave his or her assigned post and be replaced by another appropriately qualified flight crew member for the purpose of in-flight rest.

**Cabin Crew Member.** A crew member who performs, in the interest of the 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.

**Contactable;** A short period of time during the day, other than on a 'day off', during which the company requires a crew member to be at an agreed location for the purpose of giving notification of a duty period which will commence not less than ten hours ahead. The contactable period will be between 0600 and 0830 local time and shall not exceed 2½ hours. If required, the 2½ hours can be split into 2 separate periods. Such arrangements must be agreed by the DGCA

**Crew Member.** A person assigned by an operator to duty on an aircraft during a flight duty period.

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

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

#### 4.2 Flight or Block Time;

**Flight Time — aeroplanes.** The total time from the moment an aeroplane first moves for the purpose of taking off until the moment it finally comes to rest at the end of the flight.

*Note.*—“Flight time” as here defined is synonymous with the term “block to block” time or “chock to chock” time in general usage which is measured from the time an aeroplane first moves for the purpose of taking off until it finally stops at the end of the flight.

#### 4.3 Duty and Flight Duty

**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.

**Early Start Duty** A duty which commences in the period between 0500 to 0659 hours local time.



***Flight Duty Period.*** A period which commences when a flight or a 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.

***Late Finish Duty*** A duty is a Late Finish when the duty finishes in the period 0100 to 0159 hours local time.

***Local Night*** A period of 8 hours falling between 2200 hours and 0800 hours local time.

***Night Duty*** A duty is a Night Duty if any part of that duty falls within the period 0200 to 0459 hours local time.

***Scheduled Duty*** The allocation of a specific flight or flights or other duties to a crew member within the pre-notified rostered/planned series of duty periods.

#### **4.4 Rest Period and Standby**

***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.

***Standby.*** A defined period of time during which a flight or cabin crew member is required by the operator to be available to receive an assignment for a specific duty without an intervening rest period.

***Standby Duty.*** A period during which the company places restraints on a crew member who would otherwise be off duty. It is a pre notified and defined period of time during which a crewmember is required by the operator to be available to receive an assignment for a flight, positioning or other duty. However, it shall not include any time during which the crew member is contactable for the purpose of giving notification of a duty which is due to start 10 hours or more ahead.

#### **4.5 General**

***Home Base.*** The location nominated by the operator to the crew member from where the crew member normally starts and ends a duty period or a series of duty periods.

***Exceptional Circumstances.*** Has a same meaning as Unforeseen Operational Circumstance in (32)

***Positioning.*** The transferring of a non-operating crew member from place to place as a passenger at the behest of the operator.

***Note.— “Positioning” as here defined is synonymous with the term “Deadheading”.***

***Rest Facility*** A bunk or seat with leg and foot support suitable for crew member’s sleeping on board an aircraft

**Regular.** *when applied to duties that are Late Finishes, Night or Early Starts, means a run of 4 or 5 consecutive duties, not broken by a period of 34 hours free from such duties, contained in a single 7 consecutive day period*

**Reporting Time.** The time at which flight and cabin crew members are required by an operator to report for duty.

**Roster.** A list provided by an operator of the times when a crew member is required to undertake duties.

**Note.**— “Roster” as here defined is synonymous with “Schedule”, “Line of Time”, “Pattern”, and “Rotation”.

**Rostered/Planned Duty** *A duty period, or series of duty periods, with stipulated start and finish times, notified by the company to crew in advance.*

**Sector** *The segment of an FDP between an aircraft first moving under its own power for the purpose of taking-off until it next comes to rest after landing, on the designated parking position.*

**Split Duty** *A flying duty period which consists of two or more sectors, separated by less than a minimum rest period.*

**Suitable Accommodation.** *A well-furnished bedroom which is subject to minimum noise, is well ventilated, and has the facility to control the levels of light and temperature.*

**Travelling** *All time spent by a crew member transiting between the place of rest, and the place of reporting for duty.*

**Unforeseen Operational Circumstance.** An unplanned event, such as un forecast weather, equipment malfunction, or air traffic delay that is beyond the control of the operator.

**Window of Circadian Low (WOCL)** *The period between 0200 hrs and 0559 hrs in the time zone to which, a crewmember is acclimatized.*

## **5 CAASL Responsibilities**

- 5.1 The objective of any prescriptive limitations for fatigue management regulations is to ensure that flight and cabin crew members remain sufficiently alert so that they can operate to a satisfactory level of performance and safety under all circumstances.
- 5.2 The variation will not exceed 60 minutes from the prescriptive limitations.

## **6 The Operator's Responsibilities**

- 6.1 Operators should reflect in their operations manuals those elements of this example that are appropriate to the operations they undertake. If operations are planned that cannot be managed within the limitations published in the example, a variation may be requested. In this case, and before a variation is approved, an operator should demonstrate to the DGCA that the variation, provides an equivalent level of safety and that objections on grounds of safety are taken into account.
- 6.2 Duty rosters should be prepared and published sufficiently in advance to provide flight and cabin crew members the opportunity to plan adequate rest. Consideration should be given to the cumulative effects of undertaking long duty hours interspersed with minimum rest, and of avoiding rosters that result in the serious disruption of an established pattern of working and sleeping. Rosters should cover a period of at least 28 days.
- 6.3 Flights should be planned to be completed within the allowable flight duty period taking into account the time necessary for pre-flight duties, the flight and turn-around times, and the nature of the operation. Minimum rest periods needed to provide adequate rest should be based upon the actual operation. The operator shall ensure that flight duty periods are planned in a way that enables crew members to remain sufficiently free from fatigue so that they can operate to a satisfactory level of safety under all circumstances;
- 6.4 An operator specify reporting times that allow sufficient time for ground duties;
- 6.5 An operator shall take into account the relationship between the frequency and pattern of flight duty periods and rest periods and give consideration to the cumulative effects of undertaking long duty hours combined with minimum rest periods.
- 6.6 The operator shall allocate duty patterns which avoid practices that cause a serious disruption of an established sleep/work pattern, such as alternating day/night duties;
- 6.7 In order to avoid any detriment to a flight or cabin crew member's performance, opportunities to consume a meal must be arranged when the flight duty period exceeds 1 hour.
- 6.8 An operator shall change a schedule and/or crew arrangements if the actual operation exceeds the maximum flight duty period on more than 33% of the flight duties in that schedule during a scheduled seasonal period.
- 6.9 An operator should nominate a home base for each flight and cabin crew member, from where the flight and cabin crew member will normally start and end a duty period or a series of duty periods. The home base should be assigned with a degree of permanence.
- 6.10 An operator should not require a flight crew member to operate an aeroplane if it is known or suspected that the flight crew member is fatigued to the extent that the safety of flight may be adversely affected.

- 6.11 To provide evidence of compliance with prescriptive limits, records shall be kept for 15 months of the duties performed and rest periods achieved so as to facilitate inspection by the operator's authorized personnel and audit by the CAASL.
- 6.12 The operator should ensure that these records include for each flight and cabin crew member, at least:
- a. the start, duration and end of each flight duty period;
  - b. the start, duration and end of each duty period;
  - c. rest periods; and
  - d. flight time

## **7 Flight Crew Members' Responsibilities**

- 7.1 A flight crew member should not operate an aeroplane when he or she knows that he or she is fatigued or feels unfit to the extent that the safety of flight may be adversely affected.
- 7.2 Flight crew members should make best use of the facilities and opportunities that are provided for rest and for the consumption of meals, and should plan and use rest periods to ensure that they are fully rested.

## **8 Flight and Cabin Crew Members**

The text that follows specifies limitations that apply to operations by flight and cabin crew members.

## **9 Limitations for Flight Times and Duty Periods (Flight Crew)**

The operators shall be guided by SLCAP 4210 - Limitation for Flight Time, Flight Duty Periods, Duty Periods and Rest Periods for Fatigue Management of Flight Crewmembers and Cabin Crewmembers employed in aircraft/airlines registered in Sri Lanka for public air transport, for the preparation of the roster ensuring Fatigue Risks Management of crew.

### **9.1 Maximum duty hours for flight crew**

#### **9.1.1 Duty hours may not exceed:**

- a) 55 hours in any 7 consecutive days or in a week; and
- b) 190 hours in any 28 consecutive days or in a calendar month.

*Note; Duty includes all tasks carried out at the behest of the operator. These include, but are not limited to: pre-flight preparation; conduct of the flight (whether or not this is commercial air transport); post-flight actions; training given or received (classroom, flight simulator or aeroplane); rostered office/management time; and positioning. Standby should be included to the extent that it is likely to induce fatigue*

## 9.2 Limitations for Flight Times and Duty Periods (Cabin Crew )

- a) For cabin crew being assigned to a flight or series of flights, the FDP of the cabin crew may be extended by the difference in reporting time between cabin crew and flight crew, as long as the difference does not exceed **one hour**.
- (b) ***The maximum duty hours for cabin crew shall not exceed:***
- (c) 60 hours in any 7 consecutive days, but may be increased to 65 hours when a rostered duty covering a series of duty periods, once commenced, is subject to unforeseen delays.
- (d) 105 hours in any 14 consecutive days.
- (e) 210 hours in any 28 consecutive days.

*Note: The annual and 28 day limits on flying hours pertaining to flight crew need not be applied.*

## 9.3 Maximum flight duty period for flight and cabin crew

- 9.3.1 The maximum flight duty period shall be 14 hours for flight crew and 01 hour longer for cabin crew.
- 9.3.2 This limitation should allow variation to account for matters known to impact fatigue such as: the number of sectors planned; the local time at which duty begins; the pattern of resting and sleeping relative to the crew member's circadian rhythm; the organization of the working time; and the augmentation of the flight crew.
- 9.3.3 Crew report times should realistically reflect the time required to complete pre-flight duties, both safety- and service-related (if appropriate), and a standard allowance of (30) minutes is to be added at the end of flight time to allow for the completion of checks and records. For record purposes, the pre-flight report time should count both as duty and as flight duty, and the post-flight allowance should count as duty.
- 9.3.4 The maximum flight duty period for cabin crew may be longer than that applicable to the flight crew by the difference in reporting time between flight crew and cabin crew.
- 9.3.5 Flight duty periods may be extended in unforeseen operational circumstances by no more than (3) hour(s) only at the discretion of the pilot-in-command. Before exercising this discretion, the pilot-in-command should be satisfied that all members of the crew required to operate the aeroplane consider themselves fit to do so.

## 9.4 Flights Operated by Augmented Crews and the Provision of In-Flight Relief

- 9.4.1 The composition and number of flight crew members carried to provide in-flight relief, and the quality of rest facilities provided, should determine the amount by which the basic flight duty period limitations may be extended. A sensible balance should be kept between the division of in-flight duty and rest. The number of the cabin crew should be determined taking into account

the rest facilities provided and other parameters linked to the operation of the flight.

- 9.4.2 The operator should ensure that flight and cabin crew members are notified prior to commencement of the rest period preceding the flight of the role they are required to undertake (i.e., main or relief crew), so that they can plan their pre-flight rest accordingly.

## **9.5 Minimum Rest Periods**

- 9.5.1 The minimum rest period immediately before commencing a flight duty period may not be less than 12 hours.
- 9.5.2 Rest provisions should be introduced to take into account the impact of time zone crossings and night operations.
- 9.5.3 Longer rest periods should be granted on a regular basis to preclude cumulative fatigue.
- 9.5.4 Minimum rest periods may be reduced in unforeseen operational circumstances by no more than 01 hour only at the discretion of the pilot-in-command.
- 9.5.5 Travelling time spent by a flight or cabin crew member in transit between the place of rest and the place of reporting for duty is not counted as duty, even though it is a factor contributing to fatigue. Excessive travelling time undertaken immediately before commencing a flight duty period could therefore detract from a flight or cabin crew member's ability to counter fatigue arising whilst on duty, and should therefore be taken into account when deciding where pre-flight rest should be taken.

## **9.6 Inflight Rest**

- 9.6.1 Standards for in-flight rest facilities must be adequate to allow sleep;
- a) The operator should establish a protocol for deciding how in-flight rest breaks will be scheduled;
  - b) Where the in-flight rest periods are used to extend the flight duty period, the crew member must utilize the rest period and the sleep facility as intended.

## **10 Discretion that may be exercised by the pilot-in-command for extension of Flight Duty Period;**

- 10.1 The pilot-in-command, at his or her discretion in consideration of special circumstances that could lead to unforeseen levels of fatigue and after discussion with flight or cabin crew members affected, may reduce an actual flight duty period and/or increase a minimum rest period in order to remove any adverse effect on flight safety. (Refer SLCAP 4210).
- 10.2 The pilot-in-command should report to the operator the use of discretion to extend or reduce duty or rest.

### 10.3 Extensions due to unforeseen operational circumstances.

10.3.1 For all operations, and in some circumstances **extensions beyond FDP limits may only be made** in unforeseen operational circumstances, and **should not be made on a regular basis**.

10.3.2 The intention behind the use of the term "unforeseen circumstances" is to prevent operators continually rostering flight and duty times to their maximum limits and regularly relying on extensions to achieve their operational goals.

10.3.3 As well as operational experience, hazard identification and risk assessments can be utilized to foresee potential disruptions or delays, for example :

- Weather
- air traffic control instructions
- peak traffic during departure/landing times
- sickness of crew members during a duty

10.3.4 Extensions should only occur in less than 5 % in any sample of similar FDPs or similar operations. The sample of FDPs should be based on capturing a common root cause for the extension. For example, if an airport turn-around time is programmed for 45 minutes, however, it takes 1 hour and 15 minutes in one third of cases, relying on a 45 minute turnaround when rostering crewmembers for a FDP that is at or close to the maximum is not appropriate.

10.3.5 Where an operator experiences extensions in more than 5% of the sample, the operator should consider revising its rostering practices by creating or amending documented rostering rules both for developing a roster and for day-of-operations management that provide greater assurance that the flight and duty time limits prescribed in the operator's operations manual will reliably not be exceeded.

10.3.6 The Operator must keep records of reports on extensions and should be fed into their hazard identification and continuous monitoring processes as part of the FRMS/ SMS system of the operator.

### 10.4 Maximum daily FDP for acclimatized crew members with the use of extensions without in-flight rest.

10.4.1 The maximum daily FDP may be extended by up to 1 hour not more than twice in any 7 consecutive days. In that case:

- (i) The minimum pre-flight and post-flight rest periods shall be increased by 2 hours; or
- (ii) The post-flight rest period shall be increased by 4 hours.

10.4.2 When extensions are used for consecutive FDPs, the additional pre- and post-flight rest between the two extended FDPs required under subparagraph 1 shall be provided consecutively.

10.4.3 The use of the extension shall be planned in advance, and shall be limited to a maximum of:

- i. 5 sectors when the WOCL is not encroached; or
- ii. 4 sectors, when the WOCL is encroached by 2 hours or less;  
or
- iii. 2 sectors, when the WOCL is encroached by more than 2 hours.

- 10.4.4 Extension of the maximum basic daily FDP without in-flight rest shall not be Combined with extensions due to in-flight rest or split duty in the same duty period.
- 10.4.5 Flight time specification schemes shall specify the limits for extensions of the maximum basic daily FDP in accordance with the certification specifications applicable to the type of operation, taking into account:

### **10.5 Delayed reporting due unforeseen circumstances in flight operations**

The operator shall establish procedures, in the operations manual, for delayed reporting in the event of unforeseen circumstances, in accordance with the certification specifications applicable to the type of operation.

## **11 Miscellaneous provisions**

### **11.1 Standby**

- 11.1.1 The start time and end time of standby should be defined and notified at least 2 hours in advance, and the maximum length of any standby should not exceed 12 hours.
- 11.1.2 Where airport standby is immediately followed by a flight duty period, the relationship between such airport standby and the assigned flight duty should be defined. In such a case, airport standby, if it is likely to induce fatigue, should be considered as part of a duty period and should be taken into account to calculate the minimum rest preceding a subsequent flight duty period.
- 11.1.3 When flight and cabin crew members are required to be on standby at an accommodation arranged by the operator, then adequate rest facilities should be provided.
- 11.1.4 When flight and cabin crew members are required to be available for contact over a brief period of time to receive instructions concerning a possible change of roster, that requirement should not prevent that crew member from having a rest period before reporting for duty. The time spent being available should not be counted as duty

**11.2 Available;** when flight and cabin crew members are required to be available for contact over a brief period of time to receive instructions concerning a possible change of roster, that requirement should not prevent that crew member from having a rest period before reporting for duty. The time spent being available should not be counted as duty.

**11.3 Positioning;** All time spent positioning counts as duty, and positioning followed by operating without an intervening rest period also counts as



flight duty. However, positioning should not count as an operating sector when planning or calculating a flight duty period.

## 12 Records

- 12.1 To enable the operator to ascertain that the fatigue management scheme is functioning as intended and as approved, records should be kept for (15) calendar months of the duties performed and rest periods achieved so as to facilitate inspection by the operator's authorized personnel and audit by the CAASL.
- 12.2 The operator should ensure that these records include for each flight and cabin crew member, at least:
- a) the start, duration and end of each flight duty period;
  - b) the start, duration and end of each duty period;
  - c) rest periods; and
  - d) flight time.
- 12.3 The operator should also keep records of occasions when a pilot-in-command has exercised his or her discretion (as described in 10). If discretion has to be applied for similar reasons on more than (10%) ten per cent of occasions when a particular route or route pattern is flown, it is likely that the intention of this guidance is not being met and undue fatigue may result. Arrangements should be made to change the schedule or the crewing arrangements so as to reduce the frequency at which such events occur. A State may require that, in addition, copies of certain records should be submitted.

*Note: Flight crew members should maintain a personal record of their daily flight time.*

## 13 Glossary of words synonymous with fatigue risk management for managing fatigue due to flight duty

**Actigraph.** A wristwatch-like device containing an accelerometer to detect movement. Activity counts are recorded per unit time, for example every minute. The patterns of movement can be analyzed using purpose-built software to estimate when the wearer of the actiwatch was asleep, and to provide some indication of how restless a sleep period was (i.e., sleep quality). Actigraphs are designed to record continuously for several weeks so they are valuable tools for monitoring sleep patterns, for example before, during, and after a trip or work pattern.

**Actigraphy.** Use of actiwatches to monitor sleep patterns. For actigraphy to be a reliable measure of sleep, the computer algorithm that estimates sleep from activity counts must have been validated against polysomnography, which is the gold-standard technology for measuring sleep duration and quality. The main weakness of actigraphy is that an actigraph cannot differentiate between sleep and still wakefulness (since it measures movement).

**Afternoon Nap Window.** A time of increased sleepiness in the middle of the afternoon. The precise timing varies, but for most people it is usually

around 15:00-17:00. This is a good time to try to nap. On the other hand, it is also a time when it is more difficult to stay awake, so unintentional micro-sleeps are more likely, especially if recent sleep has been restricted.

**Augmented Flight Crew.** A flight crew that comprises more than the minimum number required to operate the aeroplane so that each crew member can leave his or her assigned post to obtain in-flight rest and be replaced by another appropriately qualified crew member.

**Bio-mathematical Model.** A computer programme designed to predict aspects of a schedule that might generate an increased fatigue risk for the average person, based on scientific understanding of the factors contributing to fatigue. Bio-mathematical models are an optional tool (not a requirement) for predictive fatigue hazard identification within an FRMS. All bio-mathematical models have limitations that need to be understood for their appropriate use.

**Circadian Body Clock.** A neural pacemaker in the brain that monitors the day/night cycle (via a special light input pathway from the eyes) and determines our preference for sleeping at night. Shift work is problematic because it requires a shift in the sleep/wake pattern that is resisted by the circadian body clock, which remains 'locked on' to the day/night cycle. Jet lag is problematic because it involves a sudden shift in the day/night cycle to which the circadian body clock will eventually adapt, given enough time in the new time zone.

**Countermeasures.** Personal mitigation strategies that individuals can use to reduce their own fatigue risk. Sometimes divided into strategic countermeasures (for use at home, for example good sleep habits, napping before night duty), and operational countermeasures, for example strategic use of caffeine.

**Crew Member.** A person assigned by an Operator to duty on an aircraft during a flight duty period.

**Cumulative Sleep Debt.** Sleep loss accumulated when sleep is insufficient for multiple nights (or 24-hr days) in a row. As cumulative sleep debt builds up, performance impairment and objective sleepiness increase progressively, and people tend to become less reliable at assessing their own level of impairment.

**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.

**Fatigue Safety Action Group (FSAG).** A group comprised of representatives of all stakeholder groups (management, scheduling, operational personnel) together with any additional specialist experts (i.e. scientists, data analysts, and medical professionals), that is responsible for coordinating all fatigue management activities in the organization.

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

**Internal Alarm Clock.** A time in the circadian body clock cycle when there is a very strong drive for waking and it is difficult to fall asleep or stay asleep. Occurs about 6 hours after the Window of Circadian Low in the late morning to early afternoon and can cause restricted sleep and increased fatigue risk after night duty.

**Jet Lag.** DE synchronization between the circadian body clock and the day/night cycle caused by Trans meridian flight (experienced as a sudden shift in the day/night cycle). Also results in internal resynchronization between rhythms in different body functions. Resolves when sufficient time is spent in the new time zone for the circadian body clock to become fully adapted to local time.

**Micro-Sleep.** A short period of time (seconds) when the brain disengages from the environment (it stops processing visual information and sounds) and slips uncontrollably into light non-REM sleep. Micro-sleeps are a sign of extreme physiological sleepiness.

**Mitigations.** Interventions designed to reduce a specific identified fatigue risk.

**Non-Rapid Eye Movement Sleep (Non-REM sleep).** A type of sleep associated with gradual slowing of electrical activity in the brain (seen as brain waves measured by electrodes stuck to the scalp, known as EEG). As the brain waves slowdown in non-REM sleep, they also increase in amplitude, with the activity of large groups of brain cells (neurons) becoming synchronized. Non-REM sleep is usually divided into 4 stages, based on the characteristics of the brainwaves. Stages 1 and 2 represent lighter sleep. Stages 3 and 4 represent deeper sleep and are also known as slow-wave sleep.

**Non-REM/REM Cycle.** Regular alternation of non-REM sleep and REM sleep across a sleep period, in a cycle lasting approximately 90 minutes.

**On-call.** A defined period of time, during which an individual is required by the service provider to be available to receive an assignment for a specific duty. Synonymous with standby. \*Operational personnel. Personnel involved in aviation activities who are in a position to report safety information. (For the purposes of this manual, the relevant operational personnel are those for whom ICAO Fatigue Management Standards and Recommended Practices apply.)

**Pairing.** A scheduling expression describing the time from when a flight crew member initially reports for duty until he/she returns home from the sequence of flights and is released from duty. (See Trip)

**Rapid Eye Movement Sleep (REM sleep).** A type of sleep during which electrical activity of the brain resembles that during waking. However, from time to time the eyes move around under the closed eyelids – the ‘rapid eye movements’ – and this is often accompanied by muscle twitches and

irregular heart rate and breathing. People awakened from REM sleep can typically recall vivid dreaming. At the same time, the body cannot move in response to signals from the brain, so dreams cannot be ‘acted out’. The state of paralysis during REM sleep is sometimes known as the ‘REM block’.

**Recovery Sleep.** Sleep required for recovery from the effects of acute sleep loss (in one 24-hour period) or cumulative sleep debt (over multiple consecutive 24-hour periods).

**Roster.** (Noun) a list of planned shifts or work periods within a defined period of time. Synonymous with Schedule;

**Roster.** (Verb) to assign individuals to a schedule or pattern of work. Synonymous with Schedule.

**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, accountability, responsibilities, policies and procedures.

**Safety Oversight.** A function performed by a State to fulfil its responsibility for the effective implementation of safety related Standards and Recommended Practices (SARPs), guidance material and associated procedures, as well as national regulations, including SMS where required.

**Safety Performance.** A State or a Service Provider’s safety achievement as defined by its safety performance targets and safety performance indicators.

**Safety Performance Indicator.** A data-based parameter used for monitoring and assessing safety performance.

**Safety Performance Target.** The planned or intended objective for safety performance indicator(s) over a given period.

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

**Schedule.** (Noun) a list of planned shifts or work periods within a defined period of time. Synonymous with Roster. (Verb) to assign individuals to a roster or pattern of work. Synonymous with Roster.

**Shift Work.** Any work pattern that requires an individual to be awake at a time in the circadian body clock cycle that they would normally be asleep.

**Sleep.** A reversible state in which conscious control of the brain is absent and processing of sensory information from the environment is minimal. The brain goes “off-line” to sort and store the day’s experiences and replenish essential systems depleted by waking activities.

**Sleep Debt.** See Cumulative sleep debt.

**Sleep Disorders.** A range of problems that make it impossible to obtain restorative sleep, even when enough time is spent trying to sleep. Examples include obstructive sleep apnea, the insomnias, narcolepsy, and periodic limb movements during sleep.

**Sleep Homeostatic Process.** The body's need for slow-wave sleep (non-REM stages 3 and 4), that builds up across waking and discharges exponentially across sleep.

**Sleep Inertia.** Transient disorientation, grogginess and performance impairment that can occur after waking. The length and intensity of sleep inertia is greatest when the individual has not had enough sleep, is woken from slow-wave sleep (non-REM stages 3 and 4) or woken during the WOCL.

**Sleep Need.** The amount of sleep that is required on a regular basis to maintain optimal levels of waking alertness and performance. Sleep need is very difficult to measure in practice because of individual differences. In addition, because many people live with chronic sleep restriction, when they have the opportunity for unrestricted sleep, their sleep may be longer than their theoretical 'sleep need' due to recovery sleep.

**Sleep Quality.** Capacity of sleep to restore waking function. Good quality sleep has minimal disruption to the non-REM/REM cycle. Fragmentation of the non-REM/REM cycle by waking up, or by brief arousals that move the brain to a lighter stage of sleep without actually waking up, decreases the restorative value of sleep.

**Sleep Restriction.** Obtaining less sleep than needed. The effects of sleep restriction accumulate, with performance impairment and objective sleepiness increasing progressively. The need for sleep will eventually build to the point where people fall asleep uncontrollably (see micro-sleep).

**Slow-Wave Sleep.** The two deepest stages of non-REM sleep (stages 3 and 4), characterized by high amplitude slow brainwaves.

**State Safety Programme (SSP).** An integrated set of regulations and activities aimed at improving safety.

**Transient Fatigue.** Impairment accumulated across a single duty period, from which complete recovery is possible during the next rest period.

**Trip.** A scheduling expression describing the time from when a flight crew member initially reports for duty until he/she returns home from the sequence of flights and is released from duty. A trip may include multiple flights and many days of travel. (See Pairing)

**Unforeseen Operational Circumstance.** Unexpected conditions that could not reasonably have been predicted and accommodated, such as bad weather or equipment malfunction, which may result in necessary on-the-day operational adjustments.

**Unrestricted Sleep.** Sleep which is not restricted by any demands. Sleep can begin when an individual feels sleepy, and does not have to be delayed for any reason. In addition, the individual can wake up spontaneously and does not have to set the alarm.