

International Standards  
and Recommended Practices



**Fatigue Management-related excerpts from:**

**Annex 6**  
to the Convention on  
International Civil Aviation

# Operation of Aircraft

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**Part I**  
International Commercial  
Air Transport — Aeroplanes

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International Civil Aviation Organization



# INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

## CHAPTER 1. DEFINITIONS

When the following terms are used in the Standards and Recommended Practices for operation of aircraft in international commercial air transport, they have the following meanings:

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

***Fatigue Risk Management System (FRMS).*** A data-driven means of continuously monitoring and managing fatigue-related safety risks, based upon scientific principles and knowledge as well as operational experience that aims to ensure relevant personnel are performing at adequate levels of alertness.

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## CHAPTER 4. FLIGHT OPERATIONS

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### 4.10 Fatigue management

4.10.1 The State of the Operator shall establish regulations for the purpose of managing fatigue. These regulations shall be based upon scientific principles and knowledge, with the aim of ensuring that flight and cabin crew members are performing at an adequate level of alertness. Accordingly, the State of the Operator shall establish:

- a) regulations for flight time, flight duty period, duty period and rest period limitations; and
- b) where authorizing an operator to use a Fatigue Risk Management System (FRMS) to manage fatigue, FRMS regulations.

*Note.— Guidance for the development of prescriptive regulations to manage fatigue is given in Attachment A and detailed requirements for an FRMS are in Appendix 8.*

4.10.2 The State of the Operator shall require that the operator, in compliance with 4.10.1 and for the purposes of managing its fatigue-related safety risks, establish either:

- a) flight time, flight duty period, duty period and rest period limitations that are within the prescriptive fatigue management regulations established by the State of the Operator; or
- b) a Fatigue Risk Management System (FRMS) in compliance with 4.10.6 for all operations; or
- c) an FRMS in compliance with 4.10.6 for part of its operations and the requirements of 4.10.2 a) for the remainder of its operations.

*Note.*— *Guidance for the implementation and oversight of an FRMS is given in the Fatigue Risk Management Systems Manual for Regulators (Doc 9966).*

4.10.3 Where the operator adopts prescriptive fatigue management regulations for part or all of its operations, the State of the Operator may approve, in exceptional circumstances, variations to these regulations on the basis of a risk assessment provided by the operator. Approved variations shall provide a level of safety equivalent to, or better than, that achieved through the prescriptive fatigue management regulations.

4.10.4 The State of the Operator shall approve an operator's FRMS before it may take the place of any or all of the prescriptive fatigue management regulations. An approved FRMS shall provide a level of safety equivalent to, or better than, the prescriptive fatigue management regulations.

4.10.5 States that approve an operator's FRMS shall establish a process to ensure that an FRMS provides a level of safety equivalent to, or better than, the prescriptive fatigue management regulations. As part of this process, the State of the Operator shall:

- a) require that the operator establish maximum values for flight times and/or flight duty periods(s) and duty period(s), and minimum values for rest periods. These values shall be based upon scientific principles and knowledge, subject to safety assurance processes, and acceptable to the State of the Operator;
- b) mandate a decrease in maximum values and an increase in minimum values in the event that the operator's data indicates these values are too high or too low, respectively; and
- c) approve any increase in maximum values or decrease in minimum values only after evaluating the operator's justification for such changes, based on accumulated FRMS experience and fatigue-related data.

*Note.*— *Safety assurance processes are described in Appendix 8.*

4.10.6 Where an operator implements an FRMS to manage fatigue-related safety risks, the operator shall, as a minimum:

- a) incorporate scientific principles and knowledge within the FRMS;
- b) identify fatigue-related safety hazards and the resulting risks on an ongoing basis;
- c) ensure that remedial actions, necessary to effectively mitigate the risks associated with the hazards, are implemented promptly;
- d) provide for continuous monitoring and regular assessment of the mitigation of fatigue risks achieved by such actions; and
- e) provide for continuous improvement to the overall performance of the FRMS.

*Note.*— *Detailed requirements for an FRMS are in Appendix 8.*

4.10.7 **Recommendation.**— *States should require that, where an operator has an FRMS, it is integrated with the operator's SMS.*

*Note.*— *The integration of FRMS and SMS is described in the Fatigue Risk Management Systems Manual for Regulators (Doc 9966).*

4.10.8 An operator shall maintain records for all its flight and cabin crew members of flight time, flight duty periods, duty periods, and rest periods for a period of time specified by the State of the Operator.

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## APPENDIX 2. ORGANIZATION AND CONTENTS OF AN OPERATIONS MANUAL

(See Chapter 4, 4.2.3.1)

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### 2. Contents

The operations manual referred to in 1.1 and 1.2 shall contain at the least the following:

#### 2.1 General

- 2.1.1 Instructions outlining the responsibilities of operations personnel pertaining to the conduct of flight operations.
- 2.1.2 Information and policy relating to fatigue management including:
- rules pertaining to flight time, flight duty period, duty period limitations and rest requirements for flight and cabin crew members in accordance with Chapter 4, 4.10.2 a); and
  - policy and documentation pertaining to the operator's FRMS in accordance with Appendix 8.
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## APPENDIX 8. FATIGUE RISK MANAGEMENT SYSTEM REQUIREMENTS

*Note.— Guidance on the development, implementation, approval and monitoring of an FRMS is contained in the Fatigue Risk Management Systems Manual for Regulators (Doc 9966).*

A Fatigue Risk Management System (FRMS) established in accordance with Chapter 4, 4.10.6, shall contain, at a minimum:

### 1. FRMS POLICY AND DOCUMENTATION

#### 1.1 FRMS policy

- 1.1.1 The operator shall define its FRMS policy, with all elements of the FRMS clearly identified.
- 1.1.2 The policy shall require that the scope of FRMS operations be clearly defined in the operations manual.
- 1.1.3 The policy shall:
- reflect the shared responsibility of management, flight and cabin crews, and other involved personnel;
  - clearly state the safety objectives of the FRMS;

- c) be signed by the accountable executive of the organization;
- d) be communicated, with visible endorsement, to all the relevant areas and levels of the organization;
- e) declare management commitment to effective safety reporting;
- f) declare management commitment to the provision of adequate resources for the FRMS;
- g) declare management commitment to continuous improvement of the FRMS;
- h) require that clear lines of accountability for management, flight and cabin crews, and all other involved personnel are identified; and
- i) require periodic reviews to ensure it remains relevant and appropriate.

*Note.*— *Effective safety reporting is described in the Safety Management Manual (SMM) (Doc 9859).*

## 1.2 FRMS documentation

An operator shall develop and keep current FRMS documentation that describes and records:

- a) FRMS policy and objectives;
- b) FRMS processes and procedures;
- c) accountabilities, responsibilities and authorities for these processes and procedures;
- d) mechanisms for ongoing involvement of management, flight and cabin crew members, and all other involved personnel;
- e) FRMS training programmes, training requirements and attendance records;
- f) scheduled and actual flight times, duty periods and rest periods with significant deviations and reasons for deviations noted; and

*Note.*— *Significant deviations are described in the Fatigue Risk Management Systems Manual for Regulators (Doc 9966).*

- g) FRMS outputs including findings from collected data, recommendations, and actions taken.

## 2. FATIGUE RISK MANAGEMENT PROCESSES

### 2.1 Identification of hazards

*Note.*— *Legal guidance for the protection of information from safety data collection and processing systems is contained in Annex 13, Attachment E.*

An operator shall develop and maintain three fundamental and documented processes for fatigue hazard identification:

#### 2.1.1 Predictive

The predictive process shall identify fatigue hazards by examining crew scheduling and taking into account factors known to affect sleep and fatigue and their effects on performance. Methods of examination may include but are not limited to:

- a) operator or industry operational experience and data collected on similar types of operations;
- b) evidence-based scheduling practices; and
- c) bio-mathematical models.

### 2.1.2 Proactive

The proactive process shall identify fatigue hazards within current flight operations. Methods of examination may include but are not limited to:

- a) self-reporting of fatigue risks;
- b) crew fatigue surveys;
- c) relevant flight and cabin crew performance data;
- d) available safety databases and scientific studies; and
- e) analysis of planned versus actual time worked.

### 2.1.3 Reactive

The reactive process shall identify the contribution of fatigue hazards to reports and events associated with potential negative safety consequences in order to determine how the impact of fatigue could have been minimized. At a minimum, the process may be triggered by any of the following:

- a) fatigue reports;
- b) confidential reports;
- c) audit reports;
- d) incidents; and
- e) flight data analysis events.

## 2.2 Risk assessment

2.2.1 An operator shall develop and implement risk assessment procedures that determine the probability and potential severity of fatigue-related events and identify when the associated risks require mitigation.

2.2.2 The risk assessment procedures shall review identified hazards and link them to:

- a) operational processes;
- b) their probability;
- c) possible consequences; and

- d) the effectiveness of existing safety barriers and controls.

### 2.3 Risk mitigation

An operator shall develop and implement risk mitigation procedures that:

- a) select the appropriate mitigation strategies;
- b) implement the mitigation strategies; and
- c) monitor the strategies' implementation and effectiveness.

## 3. FRMS SAFETY ASSURANCE PROCESSES

The operator shall develop and maintain FRMS safety assurance processes to:

- a) provide for continuous FRMS performance monitoring, analysis of trends, and measurement to validate the effectiveness of the fatigue safety risk controls. The sources of data may include, but are not limited to:
  - 1) hazard reporting and investigations;
  - 2) audits and surveys; and
  - 3) reviews and fatigue studies;
- b) provide a formal process for the management of change which shall include but is not limited to:
  - 1) identification of changes in the operational environment that may affect FRMS;
  - 2) identification of changes within the organization that may affect FRMS; and
  - 3) consideration of available tools which could be used to maintain or improve FRMS performance prior to implementing changes; and
- c) provide for the continuous improvement of the FRMS. This shall include but is not limited to:
  - 1) the elimination and/or modification of risk controls that have had unintended consequences or that are no longer needed due to changes in the operational or organizational environment;
  - 2) routine evaluations of facilities, equipment, documentation and procedures; and
  - 3) the determination of the need to introduce new processes and procedures to mitigate emerging fatigue-related risks.

## 4. FRMS PROMOTION PROCESSES

FRMS promotion processes support the ongoing development of the FRMS, the continuous improvement of its overall performance, and attainment of optimum safety levels. The following shall be established and implemented by the operator as



part of its FRMS:

- a) training programmes to ensure competency commensurate with the roles and responsibilities of management, flight and cabin crew, and all other involved personnel under the planned FRMS; and
- b) an effective FRMS communication plan that:
  - 1) explains FRMS policies, procedures and responsibilities to all relevant stakeholders; and
  - 2) describes communication channels used to gather and disseminate FRMS-related information.

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