



Manual of Standards

Air Traffic Management Services: Air Traffic Services

CAAT-ANS-MOSATS

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Date: 18 Sep 2020

Approved By

Chula Sukmanop, PhD

Director General

The Civil Aviation Authority of Thailand

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Foreword

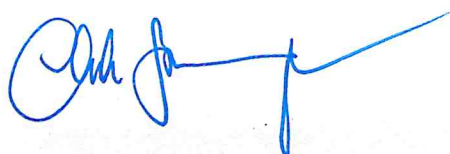
The General Director of Civil Aviation Authority of Thailand is responsible under Section 15/17(2) of the Air Navigation Act B.E.2497 amended by the Air Navigation Act (No. 14) B.E. 2562 for issuing CAAT regulation on Air Navigation Services for Air Traffic Management: Air Traffic Services Standards to stipulate qualifications, rules, procedures, conditions, standards and practical guidance for the following matters to ensure conformity with current and timely International Standards.

The Manual of Standards (hereinafter 'MOS') is the means CAAT uses to meet its responsibilities under Section 15/17 (2) of the Air Navigation Act B.E.2497 amended by the Air Navigation Act (No. 14) B.E. 2562, CAAT regulation No.17 on Air Navigation Services for Air Traffic Management: Air Traffic Services Standards and CAAT rule on Manual of Standards - Air Traffic Management: Air Traffic Services for promulgating standards for Air Traffic Services. The MOS prescribes the detailed technical material (aviation safety standards) that is determined to be necessary for the safety of air navigation.

The MOS is referenced in the particular regulation. You should refer to the applicable provisions of the Air Navigation Act B.E.2497 amended by the Air Navigation Act (No. 14) B.E. 2562 and CAAT Regulation, Requirement and Rules together with this MOS, to ascertain the requirements of, and the obligations imposed by or under the civil aviation legislation.

Readers should forward advice of errors, inconsistencies or suggestions for improvement to this manual to the Manager, Air Navigation Services Standards Department (please see in subsection 1.1.6.3).

The MOS is issued and amended under the authority of the Director General of Civil Aviation Authority of Thailand.



Chula Sukmanop, PhD

Director General

The Civil Aviation Authority of Thailand

Record of Revision

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03	00	18 Sep 2020	ANS (TM)	Revise Effective date in accordance with The Regulation of the Civil Aviation Authority of Thailand No. 17 on Air Navigation Services for Air Traffic Management: Air Traffic Services Standards
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Chapter 1 Introduction

1.1 General

1.1.1 Background

1.1.1.1 This MOS is made under the Air Navigation Act B.E.2497 amended by the Air Navigation Act (No. 14) B.E. 2562. CAAT Regulation, Requirement and Rules refer to the standards and methods to be used in regulating:

- a) the standards for compliance, include:
 - 1) the Operations Manual;
 - 2) aircraft separation;
 - 3) the provider's organization, facilities and equipment, personnel, and check and training system, interface arrangements, safety management system and records;
- b) what is required to accompany an application for an Air Traffic Service Provider's (hereinafter 'ATSP') certificate; and
- c) discontinuance of the service.

1.1.2 Document set

1.1.2.1 The document hierarchy consists of:

- a) The Air Navigation Act B.E. 2497 amended by the Air Navigation Act (No. 14) B.E. 2562 (the Act) and the Civil Aviation Emergency Decree B.E.2558 (the Decree)¹; and
- b) The Civil Aviation Authority of Thailand Regulation, Requirement and Rules ² (The CAAT Regulation, Requirement and Rules); and
- c) Manual of Standards (MOS); and
- d) Advisory Circulars (ACs).

¹

- พระราชบัญญัติการเดินอากาศ พ.ศ. 2497 แก้ไขเพิ่มเติมโดย พระราชบัญญัติการเดินอากาศ (ฉบับที่ 14) พ.ศ.2562

- พระราชกำหนดการบินพลเรือนแห่งประเทศไทย พ.ศ.2558

²

- ข้อกำหนดของสำนักงานการบินพลเรือนแห่งประเทศไทย ฉบับที่ 25 ว่าด้วยการขอและออกใบรับรองบริการการเดินอากาศ

- ข้อบังคับของสำนักงานการบินพลเรือนแห่งประเทศไทย ฉบับที่ 17 ว่าด้วยมาตรฐานการบริการการเดินอากาศ ด้านการจัดการจราจรทางอากาศ ประเภทบริการจราจรทางอากาศ

- ประกาศสำนักงานการบินพลเรือนแห่งประเทศไทย เรื่องกำหนดประเภทนิติบุคคล อายุใบรับรอง และหน้าที่อื่นของผู้ได้รับใบรับรองบริการการเดินอากาศ

- ระเบียบสำนักงานการบินพลเรือนแห่งประเทศไทย ว่าด้วยการจัดทำรายงานของผู้ได้รับใบรับรองบริการการเดินอากาศ

- ระเบียบสำนักงานการบินพลเรือนแห่งประเทศไทย ว่าด้วยคู่มือมาตรฐานการให้บริการจัดการจราจรทางอากาศ ประเภทบริการจราจรทางอากาศ

- ระเบียบสำนักงานการบินพลเรือนแห่งประเทศไทย ว่าด้วยคู่มือการดำเนินงานด้านการจัดการจราจรทางอากาศ ประเภทบริการจราจรทางอากาศ

- 1.1.2.2 The Decree establishes the Civil Aviation Authority of Thailand (CAAT) with functions relating to civil aviation, in particular the safety of civil aviation, and related purposes.
- 1.1.2.3 The CAAT regulation and requirement establish the regulatory framework (Regulations) within which all service providers shall operate.
- 1.1.2.4 The MOS comprises specifications (Standards) prescribed by CAAT, of the detailed technical provisions that contains standards, procedures, instruction which are intended to form the basis of air traffic services within Bangkok FIR. The ATSP in Thailand is required to comply with the provisions contained in this MOS. The ATSP shall document local procedures in their own operations manuals, to ensure the maintenance of and compliance with standards.
- 1.1.2.5 Readers should understand that in the circumstance of any perceived disparity of meaning between MOS and the CAAT regulations/requirements, the primacy of intent rests with the regulations/requirements. Where there is any inconsistency between the regulations/requirements and the MOS, regulations/requirements prevail.
- 1.1.2.6 An ATSP shall ensure that any air traffic service that it provides is provided in accordance with:
- a) the standards set out in the Manual of Standards (MOS); and
 - b) the standards set out or referred to in ICAO Annex 2, ICAO Annex 10 Volume II, ICAO Annex 11, ICAO Doc 4444, ICAO Doc 9426 and ICAO Doc 9432; as varied by Gen 1.7 of Part General and En-route of the AIP-Thailand.
 - c) If a regional supplementary procedure set out in ICAO Doc 7030 relates to an air traffic service that the provider provides, the provider shall also ensure that the service is provided in accordance with that procedure.
- 1.1.2.7 ACs are intended to provide recommendations and guidance to illustrate a means, but not necessarily the only means of complying with the regulation and requirement. ACs may explain certain regulatory requirements by providing interpretive and explanatory materials. It is expected that service providers will document internal actions in their own operational manuals, to put into effect those, or similarly adequate, practices.
- 1.1.2.8 Where the ATSP is unable to comply with any provision in any of this MOS, the ATSP shall inform the CAAT within a reasonable period of time and in writing. The ATSP

shall explain the basis for its non-compliance and propose alternative steps to ensure that an equivalent level of safety is established. The CAAT will review the ATSP's proposal in a timely fashion and approve the proposal, subject to such other conditions it may impose. The ATSP is required to follow-up diligently and thereafter report to CAAT within a reasonable period.

1.1.2.9 Where the CAAT has approved the ATSP's proposal in subsection 1.1.2.8, the ATSP shall record the approved alternative steps to be taken in the ATSP's operations manuals. The operations manuals shall also contain the details of and rationale for the alternative steps, and any result limitations or conditions imposed.

1.1.3 Editorial Practices

1.1.3.1 To avoid any misunderstanding within the MOS, the words 'shall' as used within the requirements indicate the compliance is compulsory' while 'should' means that it is strongly advisable that an instruction is carried out; it is recommended or discretionary.

1.1.4 Differences Between ICAO Standards and those in MOS

1.1.4.1 Notwithstanding the above, where there is a difference between a standard prescribed in ICAO documents and the Manual of Standards (MOS), the MOS standard shall prevail.

1.1.5 Differences Published in AIP

1.1.5.1 Differences from ICAO Standards, Recommended Practices and Procedures are published in AIP GEN 1.7.

1.1.6 MOS Documentation Change Management

1.1.6.1 The Air Navigation Services Standards Department (ANS) has responsibility for the technical content of this MOS.

1.1.6.2 This MOS is issued, and may only be amended, under the authority of the DGCA.

1.1.6.3 Suggested changes to this MOS may be provided to the Manager of Air Navigation Services Standards Department of CAAT by:

Email: ans@caat.or.th

1.1.6.4 Requests for any change to the content of this MOS may come from:

- a) technical areas within CAAT; or
- b) aviation industry service providers or operators; or
- c) individuals or authorisation holders.

1.1.6.5 The need to change standards in this MOS may arise for any of the following reasons:

- a) to ensure safety;
- b) to ensure standardisation;
- c) to respond to changed CAAT standards;
- d) to respond to ICAO prescription;
- e) to accommodate proposed initiatives or new technologies.

1.1.6.6 CAAT may approve trials of new procedures or technologies to develop appropriate standards.

1.1.7 **Related document**

1.1.7.1 These standards should be read in conjunction with:

- a) Civil Aviation Authority of Thailand Regulation and Requirement;
- b) ICAO Annex 2 - Rules of the Air;
- c) ICAO Annex 10 – Aeronautical Telecommunications, Volume II – Communications Procedures;
- d) ICAO Annex 11 – Air Traffic Services;
- e) ICAO Annex 15 – Aeronautical Information Services;
- f) ICAO Annex 19 – Safety Management;
- g) ICAO Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM) (Doc 4444);
- h) ICAO Air Traffic Services Planning Manual (Doc 9426);
- i) ICAO Manual of Radiotelephony (Doc 9432);
- j) ICAO Safety Management Manual (Doc 9859);
- k) ICAO Regional Supplementary Procedures (Doc 7030); and
- l) AIP-Thailand.

1.2 Definitions and Abbreviations

1.2.1 Definitions

For the purpose of these manual of standards, the definition as contained in the ICAO annex and ICAO document, as amended from time to time, shall apply unless as otherwise indicated in AIP or as follow:

Definition	Meaning
Airborne collision avoidance system (ACAS)	An aircraft system based on secondary surveillance radar (SSR) transponder signals which operates independently of ground-based equipment to provide advice to the pilot on potential conflicting aircraft that are equipped with SSR transponders
Air traffic	All aircraft in flight or operating on the manoeuvring area of an aerodrome.
Air traffic control service.	A service provided for the purpose of: <ol style="list-style-type: none"> 1. preventing collisions between aircraft, and 2. preventing collisions on the manoeuvring area between aircraft and obstructions; and 3. expediting and maintaining an orderly flow of air traffic.
Air traffic control unit	A generic term meaning variously, area control centre, approach control unit or aerodrome control tower.
Air traffic service	A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).
Air traffic services unit	A generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office.
Alerting service	A service provided to notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.
Approach control service	The air traffic control service for arriving or departing controlled flights.
Approach control unit	A unit established to provide air traffic control service to controlled flights arriving at, or departing from, one or more aerodromes.
Area control centre	A unit established to provide air traffic control service to controlled flights in control areas under its jurisdiction.

Definition	Meaning
Area control service	The air traffic control service for controlled flights in control areas.
ATS surveillance service	Term used to indicate an air traffic service provided directly by means of an ATS surveillance system.
ATS surveillance system	A generic term meaning variously, ADS-B, PSR, SSR or any comparable ground-based system that enables the identification of aircraft. <i>Note: A comparable ground-based system is one that has been demonstrated, by comparative assessment or other methodology, to have a level of safety and performance equal to, or better than, monopulse SSR.</i>
Automatic dependent surveillance – broadcast	A means by which aircraft, aerodrome vehicles and other objects can automatically transmit or receive data such as identification, position and additional data, as appropriate, in a broadcast mode via a data link.
Automatic terminal information service (ATIS)	The automatic provision of current, routine information to arriving and departing aircraft throughout 24 hours or a specified portion thereof: <ul style="list-style-type: none"> - <i>Data link-automatic terminal information service (D-ATIS). The provision of ATIS via data link.</i> - <i>Voice-automatic terminal information service (Voice-ATIS). The provision of ATIS by means of continuous and repetitive voice broadcasts.</i>
Base turn	A turn executed by the aircraft during the initial approach between the end of the outbound track and the beginning of the intermediate or final approach track. The tracks are not reciprocal. <i>Note: Base turns may be designated as being made either in level flight or while descending, according to the circumstances of each individual procedure.</i>
Break	A period of time within the duty period when an air traffic controller is not required to perform duties, for recuperation purposes;

Definition	Meaning
Control area	A controlled airspace extending upwards from a specified limit above the earth.
Controlled Aerodrome	An aerodrome at which air traffic control service is provided to aerodrome traffic. <i>Note: The term “controlled aerodrome” indicates that air traffic control service is provided to aerodrome traffic but does not necessarily imply that a control zone exists.</i>
Control zone	A controlled airspace extending upwards from the surface of the earth to a specified upper limit.”
Duty	Any task that an air traffic controller is required by an air traffic services provider to perform. These tasks include those performed during time-in-position, administrative work, training and on call duty carried out at the workplace.
Duty period	A period which starts when an air traffic controller is required by an air traffic services provider to report for or to commence a duty and ends when that person is free from all duties.
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 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.
Flight information centre.	A unit established to provide flight information service and alerting service.
Flight information region	An airspace of defined dimensions within which flight information service and alerting service are provided.
Flight information service	A service provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights.

Definition	Meaning
Flight path monitoring	The use of ATS surveillance systems for the purpose of providing aircraft with information and advice relative to significant deviations from nominal flight path, including deviations from the terms of their air traffic control clearances. <i>Note: Some applications may require a specific technology, e.g. radar, to support the function of flight path monitoring.</i>
Identification	The situation which exists when the position indication of a particular aircraft is seen on a situation display and positively identified.
ILS Critical area	An area of defined dimensions about the localizer and glide path antennas where vehicles, including aircraft, are excluded during all ILS operations. The critical area is protected because the presence of vehicles and/or aircraft inside its boundaries will cause unacceptable disturbance to the ILS signal-in-space.
ILS Sensitive area	An area extending beyond the critical area where the parking and/or movement of vehicles, including aircraft, is controlled to prevent the possibility of unacceptable interference to the ILS signal during ILS operations. The sensitive area is protected against interference caused by large moving objects outside the critical area but still normally within the airfield boundary.
Instrument meteorological conditions	Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, less than the minima specified for visual meteorological conditions. <i>Note. — The specified minima for visual meteorological conditions are contained in ICAO Annex2, Chapter 4.</i>
Landing area	That part of a movement area intended for the landing or take-off of aircraft.
Minimum Altitude	A generic expression, used in various cases to denote an altitude below which it is unsafe to fly owing to presence of terrain or obstacles.
Minimum Sector Altitude	The lowest altitude which may be used which will provide a minimum clearance of 300 m (1 000 ft) above all objects located in an area contained within a sector of a circle of 46 km (25 NM) radius centered on a significant point, the aerodrome reference point (ARP) or the heliport reference point (HRP).
Night duty	A duty period wholly or partly within the period of 0130 and 0529 local

Definition	Meaning
NOTAM	A notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations.
On call	A defined period of time, during which an individual is required by ATSP to be available to receive an assignment for a specific duty.
Operational Duty	Any task which an air traffic controller is actually exercising the privileges of the controller's licence at an operational position.
Operations Manual	The procedures, instructions and guidance for use by operational personnel which certificate holder shall provide to ensure compliance with regulations, standards and requirements.
Position indication	The visual indication, in non-symbolic or symbolic form, on a situation display, of the position of an aircraft, aerodrome vehicle or other object.
Position symbol	The visual indication in symbolic form, on a situation display, of the position of an aircraft, aerodrome vehicle or other object obtained after automatic processing of positional data derived from any source.
Procedural control	Term used to indicate that information derived from an ATS surveillance system is not required for the provision of air traffic control service.
Procedural separation	The separation used when providing procedural control.
Psychoactive substances	Alcohol, opioids, cannabinoids, sedatives and hypnotics, cocaine, other psychostimulants, hallucinogens, and volatile solvents, whereas caffeine and tobacco are excluded.
Radar approach	An approach in which the final approach phase is executed under the direction of a controller using radar.
Rest period	A continuous and defined period of time, subsequent to and/or prior to duty, during which personnel are free of all duties.
Risk	The combination of the overall probability or frequency of occurrence of a harmful effect induced by a hazard and the severity of that effect.

Definition	Meaning
Roster	A list of planned shifts or work periods within a defined period of time. Synonymous with Schedule.
Rostering system	The structure of duty and rest periods of air traffic controllers in accordance with legal and operational requirements.
Runway visual range	The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.
Safety management system	A systematic approach to managing safety, including the necessary organizational structures, accountability, responsibilities, policies and procedures.
Situation display	An electronic display depicting the position and movement of aircraft and other information as required.
SSR response	The visual indication, in non-symbolic form, on a situation display, of a response from an SSR transponder in reply to an interrogation.
Stress	The outcomes experienced by an individual when faced with a potential cause ('stressor') of human performance modification. The experience of the stressor may impact the individual's performance negatively (distress), neutrally or positively (eustress), based on the individual's perception of his/her ability to manage the stressor
Terminal control area	A control area normally established at the confluence of ATS routes in the vicinity of one or more major aerodromes.
Time-in-position	The period of time when an air traffic controller is exercising the privileges of the air traffic controller's licence at an operational position.
Vectoring	Provision of navigational guidance to aircraft in the form of specific headings, based on the use of an ATS surveillance system.
Visual meteorological conditions	Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, equal to or better than specified minima. <i>Note: The specified minima are contained in ICAO Annex 2, Chapter 4.</i>

1.2.2 Abbreviations

1.2.2.1 Unless otherwise stated, abbreviations in this MOS have the meanings given as follows:

Abbreviations	Full Name
AC	Advisory circular
ACAS	Airborne collision avoidance system
ACC	Area control centre
ADS-B	Automatic dependent surveillance — broadcast
AIP	Aeronautical information publication
ATC	Air traffic control
ATCO	Air traffic control officer/ air traffic controller
ATIS	Automatic terminal information service
ATS	Air traffic services
ATSP	Air traffic services provider
CAAT	Civil Aviation Authority of Thailand
CTA	Control area
CTAF	Common traffic advisory frequency
CTR	Control zone
DGCA	Director general of Civil Aviation Authority of Thailand
FRMS	Fatigue risk management system
IFR	Instrument flight rules
GPWS	Ground Proximity Warning System
IMC	Instrument meteorological conditions
MSAW	Minimum safe altitude warning
PAL	Pilot activated light
PSR	Primary surveillance radar
RCAB	Regulation of Civil Aviation Board
RTF	Radiotelephone
RVR	Runway visual range
SID	Standard instrument departure
SSR	Secondary surveillance radar
STAR	Standard instrument arrival
STCA	Short-term conflict alert
TAWS	Terrain awareness and warning system
VFR	Visual flight rules
VMC	Visual meteorological conditions

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Chapter 2 Operations Manual

2.1 General

2.1.1 Introduction

2.1.1.1 An Operations Manual shows how and where an ATS provider provides, or proposes to provide, air traffic services. The ANSP shall provide, for compliance by its personnel, an operations manual or system of manuals for the services listed in its operations manual. The operations manual also serves as a reference document for CAAT with respect to the standards, conditions and level of service to be maintained for air traffic services.

2.1.2 Content of the Operations Manual

2.1.2.1 An operations manual shall contain:

- a) a table of contents based on the items in the manual, indicating the page number on which each item begins;
- b) a description of the provider's organisational structure and a statement setting out the functions that the provider performs, or proposes to perform;
- c) a description of the chain of command established, or proposed to be established, by the provider and a statement of the duties and responsibilities of any supervisory positions within the organizational structure;
- d) a statement showing how the provider determines the number of operational staff required including the number of operational supervisory staff;
- e) a list of the air traffic services that the provider provides, or proposes to provide;
- f) a statement for each air traffic service, showing the hours of operation of the service;
- g) a statement, for each air traffic service, that identifies the particular airspace within which the service is provided, or proposed to be provided.;
- h) a statement, for each air traffic service, that identifies the location from where the service is provided, or proposed to be provided;

- i) if the provider provides, or proposes to provide, an air traffic service for a controlled aerodrome:
 - 1) a description of the manoeuvring area of the aerodrome. This may be by reference to a chart of the manoeuvring area of the aerodrome showing all runways, taxiways, parking areas, etc.; and
 - 2) the provider shall have a formal agreement with the aerodrome operator covering the arrangements for controlling aircraft, vehicles, and people on the manoeuvring area of the aerodrome; and
 - 3) copy of the parts of the aerodrome emergency plan; set out in the aerodrome operator's aerodrome manual that are relevant to the provision of the service; and
 - 4) a copy of the procedures set out in the aerodrome operator's aerodrome manual for preventing the unauthorised entry of persons or things onto the manoeuvring area of the aerodrome; and
 - 5) a copy of the procedures set out in the aerodrome operator's aerodrome manual for the control of surface vehicles operating on or in the vicinity of the manoeuvring area;
- j) a statement of the functions, responsibilities and hours of operation, of each operating position;
- k) a description of the arrangements made or proposed to be made by the provider to ensure that it has, and will continue to receive, on a daily basis, the information necessary for providing the service.
 - 1) this requirement includes information that is both internally and externally sourced;
 - 2) the description should nominate the information requirement, its use in service provision, its source, and the means of its transfer, receipt and display;
 - 3) Data Sources.

Note: Examples of data sources normally required are:

- AIS
- NOTAM
- Meteorological information
- Voice communication
- Aerodrome works and administration coordination

- *Local and remote radar data*
 - *AFTN*
 - *Flight notification*
 - *Meteorological warning service*
 - *Information on aerodrome conditions and the operational status of facilities*
 - *Airport emergency service*
 - *Information concerning radioactive material and toxic chemical clouds;*
- l) a description of the arrangements made or proposed to be made by the provider to ensure that it has, and will continue to be able to provide, information in connection with its air traffic services to another person whose functions reasonably require that information (includes SAR alerting);
- m) a description of the provider's document and record keeping system;
- n) a copy of any agreement entered into by the provider in relation to the provision of any of the air traffic services;
- Note: The co-ordination procedures between ATS unit and aviation meteorological service provider shall be defined in letter of agreement, in accordance with CAAT regulations and requirements.³*
- o) a copy of the document that sets out the provider's safety management system;
- p) a description of the provider's quality management system;
- q) a copy of the provider's contingency plan;
- r) a copy of the provider's security program;
- s) a description of the processes and documentation used to present to staff the relevant standards, rules and procedures contained in ICAO Annexes 2, 10 Volume II, 11 and 19, ICAO PANS- ATM, ICAO Regional Supplementary Procedures, Chapter 12 of this MOS, and any of the provider's site specific instructions for the provision of air traffic services;

³ - ระเบียบสำนักงานการบินพลเรือนแห่งประเทศไทย ว่าด้วยการจัดทำข้อตกลงการปฏิบัติงานร่วมกันระหว่างหน่วยงานให้บริการอุตุนิยมวิทยาการบินกับหน่วยงานผู้ใช้อำนาจหน้าที่ในการให้บริการจราจรทางอากาศ พ.ศ. 2559

- t) a description of the processes and documentation used to provide operational instructions to staff;
- u) a description of the procedures to be followed to ensure all operational staff are familiar with any operational changes that have been issued since they last performed operational duties;
- v) a description of the provider's training and checking program and provide assurance that any individual performing any functions in air traffic services is competent to perform that function;
- w) a description of the procedures to be used in commissioning new facilities, equipment and services including decommissioning obsolete facilities, equipment and services;
- x) the procedures to be followed for revising the operations manual.

2.1.2.2 The operations manual is an important document and shall be issued under the authority of the ATSP. The ATSP shall control the distribution of the operations manual and ensure that it is amended whenever necessary to maintain the accuracy of the information in the operations manual and to keep its contents up to date.

Chapter 3 General Provisions for Air Traffic Services

3.1 Establishment of Authority

- 3.1.1 The ATSP shall determine those portions of the airspace and aerodromes where air traffic services will be provided. They shall arrange for such services to be established and provided in accordance with the provisions of this Manual. Where air traffic services are established, information shall be published as necessary to permit the utilization of such services.

3.2 Responsibility for the Provision of Air Traffic Control Service

3.2.1 Area control service

Area control service shall be provided:

- a) by an area control centre (ACC); or
- b) by the unit providing approach control service in a control zone or in a control area of limited extent which is designated primarily for the provision of approach control service, when no ACC is established.

3.2.2 Approach control service

Approach control service shall be provided:

- a) by an aerodrome control tower or an ACC, when it is necessary or desirable to combine under the responsibility of one unit the functions of the approach control service and those of the aerodrome control service or the area control service; or
- b) by an approach control unit, when it is necessary or desirable to establish a separate unit.

Note: Approach control service may be provided by a unit co-located with an ACC, or by a control sector within an ACC.

3.2.3 Aerodrome control service

Aerodrome control service shall be provided by an aerodrome control tower.

Note: Specifications for flight information region, control areas and control zones, including the minimum flight altitudes, shall be effected in accordance with the provisions of ICAO Annex 11. Areas of responsibility for the control of flights on

airways and the units providing this service, as well as control zones dimensions and controlling authorities, shall be specified in AIP Thailand.

3.2.4 Objectives of the air traffic services

The objectives of the air traffic services shall be to:

- a) prevent collisions between aircraft;
- b) prevent collisions between aircraft on the manoeuvring area and obstructions on that area;
- c) expedite and maintain an orderly flow of air traffic;
- d) provide advice and information useful for the safe and efficient conduct of flights;
- e) notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

3.2.5 Classification of airspace

The ATSP shall provide appropriate service according to specified airspace classification. The requirements for flights within each class shall be in accordance with Appendix 4 of ICAO Annex 11.

3.2.6 Establishment and identification of ATS routes

3.2.6.1 When ATS routes are established, a protected airspace along each ATS route and a safe spacing between adjacent ATS routes shall be provided.

3.2.6.2 Designators for ATS routes shall be in accordance with the principles found in ICAO Annex 11, Appendix 1.

3.2.6.3 Standard departure and arrival routes and associated procedures shall be identified in accordance with Annex 11, Appendix 3.

3.2.7 Establishment and identification of significant points

3.2.7.1 Significant points shall be established for the purpose of defining an ATS route and/or in relation to the requirements of air traffic services for information regarding the progress of aircraft in flight. Significant points shall be identified by designators.

3.2.7.2 Significant points shall be established and identified in accordance with the principles set forth in Annex 11, Appendix 2.

3.2.8 Establishment and identification of standard routes for taxiing aircraft

3.2.8.1 Standard routes for taxiing aircraft should be established on an aerodrome between runways, aprons and maintenance areas. Such routes should be direct, simple and where practicable, designed to avoid traffic conflicts. Standard routes for taxiing aircraft should be identified by designators distinctively different from those of the runways and ATS routes.

3.2.9 Aeronautical data

3.2.9.1 The determination and reporting of air traffic services-related aeronautical data with the accuracy and integrity requirements shall be in accordance with the provisions of ICAO Annex 11, Chapter 2.

3.3 Responsibility for the Provision of Flight Information Service and Alerting Service

3.3.1 Flight information service and alerting service shall be provided as follows:

- a) within a flight information region (FIR): by a flight information centre, unless the responsibility for providing such services is assigned to an air traffic control unit having adequate facilities for the exercise of such responsibilities;
- b) within controlled airspace and at controlled aerodromes: by the relevant air traffic control units.

Note: A flight information region shall be delineated to cover the whole of the air route structure and shall include all airspace within its lateral limits.

3.4 Division of Responsibility for Control between Air Traffic Control Units

3.4.1 General

3.4.1.1 The ATSP shall designate the area of responsibility for each air traffic control (ATC) unit and, when applicable, for individual control sectors within an ATC unit. Where there is more than one ATC working position within a unit or sector, the duties and responsibilities of the individual working positions shall be defined.

3.4.2 Between a unit providing aerodrome control service and a unit providing approach control service

3.4.2.1 Except for flights which are provided aerodrome control service only, the control of arriving and departing controlled flights shall be divided between units providing aerodrome control service and units providing approach control service as follows:

3.4.2.1.1 **Arriving aircraft.** Control of an arriving aircraft shall be transferred from the unit providing approach control service to the unit providing aerodrome control service when the aircraft:

- a) is in the vicinity of the aerodrome, and
 - 1) it is considered that approach and landing will be completed in visual reference to the ground, or
 - 2) has reached uninterrupted visual meteorological conditions, or
- b) is at a prescribed point or level, or
- c) has landed,

as specified in ATS unit instructions.

3.4.2.1.2 Transfer of communications to the aerodrome controller should be effected at such a point, level or time that clearance to land or alternative instructions, as well as information on essential local traffic, can be issued in a timely manner.

Note: Even though there is an approach control unit, control of certain flights may be transferred directly from an ACC to an aerodrome control tower and vice versa, by prior arrangement between the units concerned for the relevant part of approach control service to be provided by the ACC or the aerodrome control tower, as applicable.

3.4.2.1.3 **Departing aircraft.** Control of a departing aircraft shall be transferred from the unit providing aerodrome control service to the unit providing approach control service:

- a) when visual meteorological conditions prevail in the vicinity of the aerodrome:
 - 1) prior to the time the aircraft leaves the vicinity of the aerodrome,
 - 2) prior to the aircraft entering instrument meteorological conditions, or

- 3) when the aircraft is at a prescribed point or level, as specified in ATS unit instructions;
- b) when instrument meteorological conditions prevail at the aerodrome:
 - 1) immediately after the aircraft is airborne, or
 - 2) when the aircraft is at a prescribed point or level, as specified in local instructions.

Note: See Note following subsection 3.4.2.1.2.

3.4.3 Between a unit providing approach control service and a unit providing area control service

3.4.3.1 When area control service and approach control service are not provided by the same air traffic control unit, responsibility for controlled flights shall rest with the unit providing area control service except that a unit providing approach control service shall be responsible for the control of:

- a) arriving aircraft that have been released to it by the ACC;
- b) departing aircraft until such aircraft are released to the ACC.

3.4.3.2 A unit providing approach control service shall assume control of arriving aircraft, provided such aircraft have been released to it, upon arrival of the aircraft at the point, level or time agreed for transfer of control, and shall maintain control during approach to the aerodrome.

3.4.4 Between two units providing area control service

3.4.4.1 The responsibility for the control of an aircraft shall be transferred from a unit providing area control service in a control area to the unit providing area control service in an adjacent control area at the time of crossing the common control area boundary as estimated by the ACC having control of the aircraft or at such other point, level or time as has been agreed between the two units.

3.4.5 Between control sectors/positions within the same air traffic control unit

- 3.4.5.1 The responsibility for the control of an aircraft shall be transferred from one control sector/position to another control sector/position within the same ATC unit at a point, level or time, as specified in local instructions.

Chapter 4 Human Resources Management

4.1 Human Resource Management

4.1.1 This chapter sets out the standards for human resources management to ensure that human resources are adequately managed with a view to minimizing their contribution to accident/incident in the provision of ATM services.

4.1.2 Requirements

4.1.2.1 The ATSP shall systematically address human resources management in the following key aspects:

- a) Management responsibilities and accountabilities;
- b) Staff deployment;
- c) Operational watch rostering; and
- d) Operational support arrangements.

4.1.2.2 The ATSP shall document the structure and internal organization with a level of detail according to the size and complexity of the organization. This document shall identify the key personnel responsible for the safe conduct of the ATM services, in particular of the management of personnel in charge of safety, quality, security and human resources-related functions as applicable. Their positions, responsibilities, functions, accountabilities and authorities are to be clearly defined. The ATSP shall also develop job descriptions for ATS staffs and other technical staffs. Organization chart indicating the specific responsibilities and accountabilities should be provided.

4.1.2.3 The ATSP shall document and define the method of determining staffing levels to ensure safe and efficient ATM operations.

4.1.2.4 The ATSP shall plan the level of ATC staffing requirements taking into account the following factors:

- a) Training requirements;
- b) Rest days or rest periods between shifts;
- c) Leave requirements;
- d) Sick leave reserve;
- e) Capacity of the ATS system

- f) Traffic volume, pattern and trend; and
- g) Mid- to long-term projection on the development of ATM system.

Note: Subject to subsection 4.1.2.4 e), ATSP should follow the procedures for assessing capacity value contained in Chapter 20.

- 4.1.2.5 The ATSP shall deploy a sufficient number of air traffic controllers holding valid air traffic controller licenses and rating appropriate to the privileges to be exercised to provide air traffic control services at the air traffic control units.
- 4.1.2.6 The ATSP shall ensure, at all times, enough suitability qualified and trained personnel who are able to supervise the provision of any air traffic service that it provides.
- 4.1.2.7 The ATSP shall ensure that adequate operation and support staffs are trained and maintained to fill established positions of the organization so as to fulfill the necessary functions by providing them with adequate training and that their proficiency should be checked on a recurrent basis.
- 4.1.2.8 The ATSP should develop policies and procedures to enable recruitment and retention of adequate ATS staff.

4.1.3 **Qualifications for certain personnel**

- 4.1.3.1 The ATSP shall not give to a person responsibility for an air traffic control function to be performed in connection with any air traffic service that it provides, unless:
 - a) CAAT has authorized the person to perform the function; or
 - b) the person holds valid air traffic controller licenses and rating appropriate to the privileges to be exercised to provide air traffic control services at the air traffic control units; or
 - c) the person performs the function under the supervision of another person who holds an appropriate On-the-Job Training Instructor certificate and a valid air traffic controller license and rating appropriate to the privileges to be exercised to provide air traffic control services at the air traffic control units.
- 4.1.3.2 The ATSP shall not give to a person responsibility for an air traffic control function to be performed in connection with any air traffic service that it provides if the person is subject to provisional suspension or the licensing is pending examination.

4.2 Fatigue Management

4.2.1 The ATSP shall establish and implement:

- a) principles and procedures to enable fatigue reporting
- b) principles and procedures for occurrence investigation and analysis to consider fatigue as contributing factor
- c) procedures for the identification and management of the effect of fatigue on the safety of operations. The ATSP shall provide air traffic controllers with information programmes on the prevention of fatigue and provide complementing human factors training.

4.2.2 Air Traffic Controllers' rostering system(s)

4.2.2.1 The ATSP shall develop, implement and monitor a rostering system in order to manage the risk of occupational fatigue of air traffic controllers through a safety alternation of duty and rest periods. The duty and rest periods shall be established within the prescriptive fatigue management limit established by CAAT.

4.2.2.2 The details of prescriptive fatigue management limitation in subsection 4.2.2.1 are:

- a) **Maximum duty period.** Except where other limits are defined within this MOS, Duty period shall not exceed 12 hours.
- b) **Maximum monthly duty period.** Within 720 consecutive hours (30 days) the aggregate of duty periods and on call duties shall not exceed 200 hours.
- c) **Consecutive duty period.** The maximum duration of consecutive duty periods may not exceed 72 consecutive hours (6 days).
- d) **Interval between duty period.** There shall be an interval (rest period) of not less than 12 hours between the conclusion of a duty period and the commencement of the next duty period.
- e) **Limit on and interval following consecutive periods of duty.** Upon the conclusion of 6 consecutive duty periods within 144 consecutive hours (6 days), there shall be an interval (Rest period) of a minimum of 60 hours before the commencement of the next duty period.

f) **Time-in-position.**

- 1) Breaks in time-in-position (partial break). Time-in-position shall not exceed a period of 2 hours without there being taken during, or at the end of, that period a partial break or breaks totalling not less than 30 minutes during which period a controller does not exercise the privileges of their license.
- 2) At units where workload for any part of the day is judged to be low and the activity is spasmodic rather than continuous, time-in-position, at these times, may be extended to a maximum of 4 hours, provided that the following break is taken pro-rata (e.g. 45 minutes after 3 hours or 60 minutes after 4 hours).

Note: Judgments on unit workload are to be made by the ATSP. However, the ATSP shall notify CAAT.

- g) **Takeover of air traffic controllers.** To ensure the proper transfer of functions between controllers, the ATSP may extend the maximum duration of the continuous duty period up to a maximum of 15 minutes. The time taken for orderly handover/takeover before a shift starts up to a maximum of 15 minutes, shall be considered as time-in-position for the air traffic controller who finishes his/her activity and therefore shall not be considered to form part of the oncoming controller's duty period.

h) **Night duty.**

- 1) A duty which covers all or part of the period of night duty shall not exceed 10 hours.
- 2) No more than 3 consecutive duties which cover all or part of the period of night duty shall be performed.
- 3) A minimum period of 54 hours shall occur between the end of duties which cover all or part of the period of night duty and the commencement of the next period of duty.

- i) **On call duty.** Limits for on call duty period, where the controller does not attend the place of work, shall be 20 hours. Not more than 3 on-call duties shall be worked in a period of 168 hours (7 days).

- 1) On call duty will not count as duty period if performed outside the workplace.

- 2) On call duty carried out at the workplace will count as a duty period even when the controller does not carry out an operational duty.

4.2.2.3 When necessary to respond to unforeseen, temporary circumstances and of short duration, such as difficulties in the unit or unusual not predictable traffic demands, an air traffic controller may be authorized to exceed the prescriptive fatigue management limitations on duty periods. However, the rest period requirement must be followed.

4.2.2.4 The CAAT may approve in exceptional circumstances, minor variations to the prescriptive fatigue management limitation on the basis of risk assessment provided by the ATSP. Approved variations shall provide a level of safety equivalent to, or better than that achieved through the prescriptive fatigue management limitation.

4.2.2.5 Comprehensive guidance and instructions should be included in the operational manual for the benefit of both air traffic controllers and those members of the operating staff who are concerned with rostering and scheduling. It may be necessary to issue one set of instructions for air traffic controller and a separate, more detailed set for other operating staffs.

4.2.2.6 In order to provide air traffic controllers' opportunity to plan adequate rest, duty rosters shall be published at the unit with at least 10 days in advance. Consideration shall be given the cumulative effects of undertaking long duty hours interspersed with minimum rest, and of avoid rosters that result in the serious disruption of an established pattern of working and sleeping. Rosters should cover a period of at least 4 weeks.

4.2.2.7 An ATSP shall consult those air traffic controllers who will be subject to the rostering system, or, as applicable, their representatives, during its development and its application, to identify and mitigate risks concerning fatigue which could be due to the rostering system itself.

4.2.2.8 The ATSP is required to maintain and provide readily interpreted records of duty periods and rest periods of air traffic controllers. It followed that there must be suitable arrangements for collecting the information necessary to compile the record.

- 4.2.2.9 The ATSP shall not permit an air traffic controller to go on duty if it is known or suspected that the air traffic controller is fatigued to extent that the safety may be adversely affected.
- 4.2.2.10 The ATSP shall not permit an air traffic controller to perform its duties while being under the influence of any psychoactive substance which deteriorates its capacities. Instructions shall be issued to air traffic controllers covering abstention from alcoholic drinks for a suitable period prior the commencement of duty period. The air traffic controller shall also be advised of the precautions to be taken if they are undergoing medication.
- 4.2.2.11 Without prejudice to provision laid down in RCAB 67, the ATSP shall develop and implement an objective, transparent and non-discriminatory procedure for the detection of cases of problematic use of psychoactive substances by air traffic controllers.
- 4.2.2.12 The ATSP shall develop and implement a policy, with related procedures, in order to ensure that the problematic use of psychoactive substances does not affect the provision of air traffic control service.

4.2.3 **Fatigue Risk Management System (FRMS)**

- 4.2.3.1 As appropriate, the ATSP should establish FRMS which has additional requirements to ensure a level of safety that is at least equivalent to that achieved by operating within the prescriptive limitations. FRMS may be an integral part of the management system required in Chapter 8 – Safety Management System.

Note 1: Reference may also be made to CANSO/ICAO/IFATCA Fatigue Management Guide for Air Traffic Service Providers for any additional guidance where appropriate.

Note 2: The ATSP should establish a mechanism to assess fatigue risk as an ongoing continuous process. This may be part of an existing system or a separate one to cater for fatigue assessment. An analysis of the fatigue assessment is to be submitted to the CAAT, if requested.

4.3 Stress Management

4.3.1 ATSP should:

- a) develop and maintain a policy for the management of air traffic controllers' stress including the implementation of a critical incident stress management programme.
- b) provide air traffic controllers with education and information programmes on the prevention of stress, including critical incident stress, complementing human factors training

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Chapter 5 Personnel

5.1 General

- 5.1.1 This Chapter sets out the standards, requirements and procedures pertaining to the air traffic control personnel licensing and rating, training course and training organization.
- 5.1.2 An ATSP shall ensure that it has enough suitably qualified and trained personnel in accordance with CAAT regulations/requirements⁴.

⁴ - กฎกระทรวงว่าด้วยเรื่องใบอนุญาตผู้ประจำหน้าที่ (ฉบับที่ 2) พ.ศ. 2559
- ข้อบังคับของคณะกรรมการการบินพลเรือน ฉบับที่ 67 ว่าด้วยวินัยผู้ประจำหน้าที่
- ข้อบังคับของคณะกรรมการการบินพลเรือน ฉบับที่ 89 ว่าด้วยคุณสมบัติของผู้ขออนุญาตเป็นผู้ประจำหน้าที่
- ข้อบังคับของสำนักงานการบินพลเรือนแห่งประเทศไทย ฉบับที่ 7 ว่าด้วยสิทธิทำการของผู้ถือใบอนุญาตนักบิน พนักงานควบคุมการจราจรทางอากาศ และพนักงานอำนวยความสะดวกการบิน
- ข้อกำหนดของสำนักงานการบินพลเรือนแห่งประเทศไทย ฉบับที่ 15 ว่าด้วยการขอและการออกใบอนุญาตผู้ประจำหน้าที่และการบันทึกภัยในใบอนุญาตผู้ประจำหน้าที่
- ระเบียบสำนักงานการบินพลเรือนว่าด้วยความสามารถทางภาษาที่ใช้ในการติดต่อสื่อสารทางวิทยุของผู้ถือใบอนุญาตผู้ประจำหน้าที่
- ระเบียบสำนักงานการบินพลเรือนแห่งประเทศไทย ว่าด้วยการทดสอบความรู้ภาคทฤษฎีและภาคปฏิบัติด้านการเดินอากาศ
- ระเบียบสำนักงานการบินพลเรือนแห่งประเทศไทยว่าด้วยการรับรองครูฝึกภาคปฏิบัติการควบคุมการจราจรทางอากาศ
- ประกาศสำนักงานการบินพลเรือนแห่งประเทศไทย เรื่อง คุณสมบัติผู้อำนวยความสะดวกและครูผู้สอนในหลักสูตรการควบคุมการจราจรทางอากาศ
- ระเบียบสำนักงานการบินพลเรือนแห่งประเทศไทย ว่าด้วยการแต่งตั้งผู้ทดสอบความรู้ภาคปฏิบัติของพนักงานควบคุมการจราจรทางอากาศ
- ประกาศสำนักงานการบินพลเรือนแห่งประเทศไทย เรื่อง การรับรองหลักสูตรการควบคุมการจราจรทางอากาศ
- ประกาศสำนักงานการบินพลเรือนแห่งประเทศไทย เรื่อง การรับรองสถาบันฝึกอบรมด้านการควบคุมการจราจรทางอากาศ
- ประกาศสำนักงานการบินพลเรือนแห่งประเทศไทย เรื่อง การรับรองเครื่องฝึกปฏิบัติการควบคุมการจราจรทางอากาศจำลอง (Air Traffic Control Simulator)
- กฎหมายอื่นที่เกี่ยวข้อง

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Chapter 6 Training and Checking Program

6.1 General

6.1.1 Introduction

6.1.1.1 This Chapter sets out the standards for a Training and Checking program.

6.1.1.2 The ATSP shall document its policies and procedures on training and checking of its air traffic controller in an appropriate manual.

6.1.1.3 The ATSP should establish and implement a mechanism to monitor the operational performance of its air traffic controllers.

6.1.2 Program

6.1.2.1 A Training and Checking program shall ensure that an individual performing a function in conjunction with any air traffic services is competent to perform that function.

6.1.2.2 Processes which address the integrity of staff training shall be defined, documented and maintained.

6.1.3 Competency

6.1.3.1 In summary, an individual is competent if that individual is:

- a) licensed, where the function can only be performed by the holder of a license;
- b) rated, where the function can only be performed by the holder of an appropriate rating;
- c) endorsed, where the function can only be performed by the holder of an appropriate endorsement;
- d) qualified, where the function can only be performed by the holder of an appropriate qualification;
- e) trained and proven to be proficient in the performance of functions that are not covered by sub-paragraphs a) to d) above; and
- f) recent in the performance of the function and knowledge and skills in emerging matters identified as essential to task performance.

6.1.4 Training Courses

6.1.4.1 The term ‘training course’ has wide application and includes all training for a particular competency required for the provision of an air traffic service and includes training on new equipment.

6.1.4.2 Training courses shall be provided on the basis of CAAT regulations/requirements, or training needs analysis or similar method.

6.1.4.3 The training programs for each course shall be comprehensive and facilitate achievement of training goals through a syllabus which reflects required competencies. The syllabus shall ensure compliance with relevant national and international requirements.

6.1.4.4 Training courses shall use a method of delivery consistent with CAAT requirements for approved training course and/or Approved Training Organization (ATO), using facilities and instructors, or training officers, with current expertise and identified qualifications appropriate to achieving the goals of the course.

6.1.4.5 The method of assessment, both theoretical and practical, shall utilize qualified assessors and appropriate processes and facilities and shall be consistent with CAAT regulations/requirements.

6.1.5 Emergency Training

6.1.5.1 Emergency training to specifically prepare a candidate for unforeseen circumstances shall form part of all training courses.

6.1.6 Competency Based Review Training

6.1.6.1 Competency based review training is part of the Training and Checking program. It involves periodic training and assessment of individuals performing functions in air traffic services in those competencies (knowledge and skills) which are essential, but infrequently or rarely used (e.g. abnormal and emergency operations, degraded equipment modes, contingency plan implementation). The content and periodicity of competency based review training shall be sufficient to ensure competency.

6.1.7 Recurrent/On-going Training

6.1.7.1 The training and checking program shall provide for recurrent/on-going training, as necessary, to ensure that staff are competent in the use of new or emerging standards, procedures, techniques, facilities and equipment identified as essential to task performance.

6.1.7.2 The ANSP shall ensure that its air traffic controllers are appropriately trained prior to the implementation of changes to ATC systems and procedures.

6.1.8 Remedial Training

6.1.8.1 The training and checking program shall have a process which identifies deficiencies in knowledge or application, and shall have a process to ensure these deficiencies are rectified.

6.1.9 Checking

6.1.9.1 The purpose of checking is to ensure that the individual subject to the check meets the competency standards specified in CAAT regulations/requirements, and the ATSP's own standards where these are additional to CAAT regulations/requirements.

6.1.10 Qualifications of Trainers and Assessors

6.1.10.1 Persons carrying out training and/or checking functions shall be appropriately qualified for the functions as required by CAAT regulations/requirements.

6.1.11 Training Record

6.1.11.1 The ATSP shall establish a system for record-keeping of training, qualification and authorization of staff.

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Chapter 7 ATS Facilities and Equipment

7.1 Introduction

- 7.1.1 This chapter sets out the standards for the design, siting, construction, equipping and maintenance of ATS facilities and should be aligned with ICAO Doc 9426 Part 3 Section 2 - Facilities Required by ATS.
- 7.1.2 The ATSP shall establish the following facilities that are appropriate to the ATS listed in ATSP's exposition:
- a) aerodrome control towers
 - b) approach control units
 - c) area control centres
 - d) aerodrome flight information offices
 - e) flight information centres
- 7.1.3 The ATSP shall establish procedures to ensure that any unit listed in ATSP's exposition, is provided.
- 7.1.4 The ATSP shall establish procedures to ensure that any visual display used by an ATS is positioned with due regard to the relative importance of the information displayed and ease of use by staff concerned.
- 7.1.5 The equipment required must have a level of reliability, availability, and redundancy, that minimises the possibility of failure, non-availability, or significant degradation of performance.

7.2 Aerodrome Control Units and Aerodrome Flight Information Service Units

- 7.2.1 **Visibility.** A control tower or aerodrome flight information office first commissioned after December 31, 2018 shall enable the controller to have:
- a) adequate visibility to all the manoeuvring area and airspace which are under the controllers' area of responsibility;
 - b) a view of all runway ends and taxiways, with suitable depth perception;

- c) maximum visibility of airborne traffic patterns with primary consideration given to the view from the aerodrome control position(s);
- d) unobstructed lines of sight from the control tower eye level to:
 - 1) the manoeuvring area of the aerodrome and movement in controlled air traffic related surfaces;
 - 2) take-off area, runway approach path and landing area;
 - 3) any portion of rescue and fire fighting service routes in proximity to the areas mentioned in a) and b) above;
- e) sufficient visual resolution of all aerodrome movement areas for which he/she has a responsibility;
- f) ability to detect movement of aircraft as soon as possible after it has commenced its take-off run or landing;

7.2.2 In addition, procedures or facilities are required to ensure:

- a) protection from glare, reflection and noise;
- b) unobstructed view from an existing control tower cab.

7.2.3 **Communication.** Each control tower or aerodrome flight information offices shall contain:

- a) an appropriate power supply to service the facilities identified in this Chapter;
- b) facilities capable of two-way communications with aircraft, vehicles and persons within its area of responsibility;

Note: Air traffic services requirements for communications shall meet the requirements set forth in ICAO Annex 11, Chapter 6.

- c) facilities capable of providing two-way communications:
 - 1) between operational positions within the control tower;
 - 2) with adjacent ATS units;
 - 3) with aerodrome rescue and fire fighting services;
 - 4) with other units for air traffic services purposes;
- d) a means of alerting emergency services;
- e) a means of recording air/ground and ground/ground communications;

- f) AFTN terminal or other means to provide information normally conveyed by AFTN;
- g) binoculars;
- h) signal lamp (signal light gun), with white, red and green functions.

7.2.4 **Displays.** A control tower or aerodrome flight information offices shall have the following displays:

- a) flight data displays or display system(s) to show the disposition of current and pending aerodrome traffic together with ancillary information for individual aircraft (e.g. flight progress boards);
- b) meteorological displays which meet the accuracy criteria specified in Annex 3 and which provide at least the following information:
 - 1) wind direction and velocity;
 - 2) barometric pressure;
 - 3) temperature;
 - 4) RVR display.

Note: The meteorological displays shall show mean speed and mean direction of the surface wind. Surface wind observations are to be representative of the conditions along the runway and near the touchdown zones. If more than one sensor is used, the displays shall identify the sensor being utilized for the observation.

- c) operational data displays for:
 - 1) other significant weather information;
 - 2) NOTAMS;
 - 3) handover/takeover
 - 4) essential aerodrome information;
 - 5) relevant maps and charts;
- d) a time display at each operational position;

7.2.5 **Switching, monitors and controls for aerodrome equipment.** A control tower or aerodrome flight information offices shall have appropriate switching, monitors, and controls for aerodrome lighting equipment for which the control tower has responsibility, including:

- a) runway lighting;
- b) approach lighting;
- c) high intensity approach and runway lighting;
- d) taxiway lighting;
- e) Visual Approach Slope Indicator System (VASIS: VASI or PAPI)
- f) illuminated wind indicator; and
- g) aerodrome beacon.

7.2.6 A control tower or aerodrome flight information offices shall have a means to readily recognize the failure of any terrestrial radio navigation services and visual aids being used for the control of aircraft.

7.2.7 Where there is ILS, a control tower or aerodrome flight information offices shall have a means of ensuring that the ILS Glide Path is not radiating if the associated Localizer is not operating.

7.3 Area Control Centres, Approach Control Units and Flight Information Centres

7.3.1 Area Control Centres, Approach Control Units and Flight Information Centres shall incorporate the following facilities:

- a) air/ground radiotelephone (RTF) and/or datalink communications equipment on assigned frequencies, in accordance with ICAO Annex 11, Chapter 6;
- b) ground/ground voice and/or datalink equipment to enable communication between adjacent air traffic service units and other units for air traffic services purposes including control towers and the parent area control centre or approach control unit, in accordance with ICAO Annex 11, Chapter 6;
- c) time display at each operational position;
- d) flight data display or display system(s) to show the disposition of current and pending aerodrome traffic together with ancillary information for individual aircraft;
- e) operational data display;
- f) appropriate maps and charts;

- g) external communications;
- h) voice and, where applicable, data recording equipment;
- i) AFTN terminal or other means to provide information normally conveyed by AFTN;
- j) status monitors as appropriate for navigation, approach and landing aids, including establish procedures to ensure that the status monitor required are fitted with an aural signal to indicate a change of status; and a visual indication of the current status;
- k) for an approach control operating position, if applicable, an ILS/MLS status monitor at the approach control position for aerodrome concerned.
- l) For an approach control operating position responsible for aircraft on final approach, or aircraft landing or taking off, a wind direction and wind speed display, and RVR fed from the same source as the corresponding equipment in the aerodrome control tower.

7.3.2 Area Control Centres, Approach Control Units and Flight Information Centres shall have a means to readily recognize the failure of any terrestrial radio navigation services and visual aids being used for the control of aircraft.

7.4 Commissioning of New Facilities and Equipment

7.4.1 Any new facilities shall be commissioned in accordance with procedures stated in the provider's Operations Manual.

7.4.2 The procedures shall describe how the provider has determined that;

- a) the functional and performance requirements for the facility have been met; and
- b) all ATS operating procedures have been validated; and
- c) sufficient trained ATS personnel are available to operate the facility; and
- d) all support arrangements for the facilities, including any necessary agreements, are in place.

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Chapter 8 Management System

8.1 General

8.1.1 Introduction

8.1.1.1 This Chapter sets out the standards for Safety Management System and Quality Management System.

8.2 Safety Management System

8.2.1 The ATSP shall implement the safety management system (SMS) approved by CAAT.

8.2.2 The ATSP shall develop a plan to facilitate SMS implementation.

8.2.3 All activities undertaken in an ATS SMS shall be fully documented. All documentation shall be kept for a minimum of 5 years.

8.2.4 The ATSP shall submit any amendments to the SMS manual to CAAT for approval in a timely manner prior to implementation.

8.2.5 The ATSP shall propose safety performance indicators (SPIs), alert levels and target levels for the CAAT's concurrence.

8.2.6 The ATSP shall submit a report on its achievement of the SPIs to the CAAT on an agreed time interval.

8.2.7 The ATSP shall establish a safety reporting system and maintain safety database. The ATSP shall provide the information to CAAT if requested.

8.2.8 Safety Management System Framework

8.2.8.1 A safety management system shall have the following 4 components and 12 elements:

1) **Safety Policy and Objectives**

a) Management commitment

b) Safety accountability and responsibilities

- c) Appointment of key safety personnel
- d) Coordination of emergency response planning
- e) SMS documentation

2) Safety Risk Management

- a) Hazard identification
- b) Safety risk assessment and mitigation

3) Safety Assurance

- a) Safety performance monitoring and measurement
- b) The management of change
- c) Continuous improvement of the SMS

4) Safety Promotion

- a) Training and education
- b) Safety communication

Note: Reference may also be made to ICAO SMM Doc 9859 for any additional guidance where appropriate.

8.2.9 Safety Reviews

8.2.9.1 General requirements

Safety reviews of ATS units shall be conducted on a regular and systematic basis by personnel qualified through training, experience and expertise and having a full understanding of relevant Standards and Recommended Practices (SARPs) , Procedures for Air Navigation Services (PANS), safe operating practices and Human Factors principles.

8.2.9.2 Scope

The scope of ATS unit safety reviews should include at least the issues published in ICAO PANS-ATM Doc 4444.

8.2.10 Safety Assessment

8.2.10.1 Need for safety assessments

In addition to ATS safety assessment standards contained in ICAO Doc 4444, for any change to ATM system or services that could affect the safety of the ATSP's operation or service, the ATSP shall:

- 1) ensure that a safety assessment is carried out covering the scope of the change, which is:
 - a) the equipment, procedural and human elements being changed;
 - b) interfaces and interactions between the elements being changed and the remainder of the functional system;
 - c) interfaces and interactions between the elements being changed and the context in which it is intended to operate;
 - d) the life cycle of the change from definition to operations including transition into service;
 - e) planned degraded modes of operation of the functional system; and
- 2) provide assurance, with sufficient confidence, via a complete, documented and valid evidence and the arguments supporting the change proposal.

8.2.10.2 Notification of Change

- 1) The ATSP planning a change that could affect the safety of the ATSP's operation or service shall:
 - a) notify CAAT of the proposed change;
 - b) provide CAAT, if requested, with any additional information that allows CAAT to decide whether or not to review the argument for the change;
 - c) inform other service providers and, where feasible, aviation undertakings affected by the planned change.
- 2) If the change is subject to CAAT review, the ATSP shall only allow the parts of the change for which CAAT has approved the argument to enter into operational service.

Note 1: The introduction of new services, and those changes to existing services the effect of which would be that the service would no longer be in accordance with the certificate issued to ATSP are to be notified to CAAT prior to implementation.

Note 2: It is not necessary to submit the safety assessment report to CAAT. However, the ATSP shall provide the safety assessment report and other information to CAAT if requested or for the safety oversight purpose.

8.3 Quality Management System

8.3.1 The ATSP shall implement the quality management system (QMS) according to the following principles.

8.3.2 The quality management system shall:

- a) define the quality policy in such a way as to meet the needs of different users as closely as possible.
- b) set up a quality assurance programme that contains procedures designed to verify that all operations are being conducted in accordance with applicable requirements, standards and procedures.
- c) provide evidence of the functioning of the quality management system by means of manuals and monitoring documents.
- d) appoint management representatives to monitor compliance with, and adequacy of, procedures to ensure safe and efficient operational practices.
- e) perform reviews of the quality management system in place and take remedial actions, as appropriate

8.3.3 An ISO 9001 certificate, issued by an appropriately accredited organization, covering the air navigation services of the provider shall be considered as a sufficient means of compliance. The ATSP shall accept the disclosure of the documentation related to the certification to the competent authority upon the latter's request.

Chapter 9 Contingency Plans

9.1 General

9.1.1 Introduction

9.1.1.1 This Chapter sets out the standards for contingency plans in the provision of air traffic services.

9.1.1.2 A contingency situation is a temporary and unexpected degradation or significant discontinuity of the service provided, which occurs occasionally. In order to minimize the effects of a contingency situation on users, it is required the development of a set of actions (contingency arrangements), perfectly defined in the procedures to be followed, which will be published properly, for general knowledge of users and service providers. Contingency arrangements are therefore temporary in nature and remain in effect only until the services and facilities are reactivated.

9.1.1.3 A contingency plan shall describe in detail the actions that operational staffs are to follow to maintain safety in the event of the failure or non-availability of staffs, facilities or equipment, including natural disasters and public health emergencies which affects the provision of air traffic services. The plan shall also cover procedures for the safe and orderly transition back to full service provision.

9.1.2 Coordination

9.1.2.1 ATSP shall take the necessary measures as soon as possible, to notify of the application of contingency measures to users of the affected services, as well as the rest of the air navigation service providers and other aviation stakeholders that could be affected according to the formal arrangements in place.

9.1.2.2 The ATSP shall notify to the collateral ATS units of the Contingency Plans and from the date of which said plans will take effect.

9.1.2.3 The part of the contingency plan that is necessary for the knowledge of the users of the services must be published in the AIP.

9.1.3 Minimum Contents

9.1.3.1 A contingency plan shall include to the extent of the particular services authorised on the provider's certificate, but is not limited to, arrangements for the following:

- a) airspace management:
 - (1) transfer of responsibility;
 - (2) redesignation;
 - (3) emergency traffic;
- b) air traffic flow management;
- c) air traffic separation;
- d) alternatives for the continuing provision of the services (e.g. alternative operating positions or ATS units);
- e) alternative services (e.g. traffic information);
- f) SAR alerting;
- g) information transfer/coordination;
- h) notifications to affected parties;
- i) letters of agreement with other providers on any of the above matters;
- j) restoration of staff, facility or equipment to normal levels;
- k) measures to test the suitability of the plan;
- l) staff training requirements to ensure the plan can be safely implemented.

Chapter 10 Security Program

10.1 General

10.1.1 Introduction

10.1.1.1 This Chapter sets out the standards for a security program.

10.1.2 Security Measures

10.1.2.1 The ATSP shall establish and implement a ATS security program approved by CAAT and training plan that comply with National Civil Aviation Security Programme (NCASP). The security program shall meet the requirements stated in Section 50/30 and 50/32 of the Air Navigation Act B.E.2497 amended by the Air Navigation Act (No.14) B.E.2562.

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Chapter 11 Documents and Records

11.1 General

11.1.1 Document and Record Control System

11.1.1.1 The ATSP shall establish, and put into effect, a system for controlling documents and records relating to the air traffic services that it provides, including the policies and procedures for elaborating, amending preserving and disposing those documents and records, covering in particular all the elements of the Management System. The system should be organised in a way that ensures document traceability

11.1.1.2 A document control system covers the authorisation, standardisation, publication, distribution and amendment of all documentation issued by the organisation, or required by the organisation for the provision of air traffic services.

11.1.1.3 These processes shall ensure:

- a) authorisation is by a designated authority appropriate to the management and safety accountability structures;
- b) currency can be readily determined;
- c) availability at locations where needed by ATS personnel;
- d) only current versions are available;
- e) a master copy is securely held;
- f) archival where superseded.

11.1.1.4 The manuals and documents to be maintained are the following:

- a) manuals for equipment used by staff in the provision of air traffic services;
- b) the relevant sections of the Aerodrome Emergency Plan (aerodrome services only).

11.1.1.5 The ATSP shall maintain the following reference materials:

- a) Copies of the Air Navigation Act and related regulations and requirements;
- b) Copies of Annex 2 and Annex 10 Volume II, Annex 11;
- c) a Copy of ICAO PANS-ATM Doc. 4444;
- d) if a regional supplementary procedure set out in ICAO Doc. 7030 relates to an air traffic service that the provider provides - a copy of ICAO Doc. 7030;
- e) a Copy of ICAO Doc 9426;

- f) a copy of the parts of the AIP that are relevant to any air traffic services that it provides;
- g) the Manual of Standards – Air Traffic Services (MOS-ATS);
- h) all manuals and documents indicated in the Manual of Standards – Air Traffic Services (MOS-ATS);
- i) a copy of any instruction issued to its personnel in relation to the provision of its air traffic services;
- j) manuals for equipment used by staff in the provision of air traffic services;
- k) the relevant sections of the Aerodrome Emergency Plan (aerodrome services only); and
- l) other necessary documents concerned.

11.1.1.6 The ATSP shall keep the reference materials up to date and in a readily accessible form.

11.1.1.7 The provider's personnel who perform functions in connection with any air traffic service that the provider provides shall have ready access to the reference materials.

11.1.1.8 The ATSP shall, at CAAT's request, elaborate documents, records, copies of them or extracts from them, available for inspection by CAAT.

11.1.2 **Records**

11.1.2.1 A system for records covers identification, collection, indexing, storage, security, maintenance, access and disposal of records necessary for the provision of air traffic services.

11.1.2.2 Records systems shall provide an accurate chronicle of ATS activities for the purpose of reconstruction of events for air safety investigation, and for system safety analysis. These records should be organised in a way that ensures traceability and retrieval throughout the retention period.

11.1.3 **Records to be Kept**

11.1.3.1 Records should be kept in paper form or in electronic format or a combination of both. Records stored on microfilm or optical disc format are also acceptable. The records should remain legible throughout the required retention period. The retention period starts when a record has been created or last amended.

11.1.3.2 Computer systems should have at least one backup system. All computer hardware used to ensure data backup should be stored in a different location from that containing the working data and in an environment that ensures they remain in good condition

11.1.3.3 **Automatic recordings.** The following items used for the provision of air traffic services shall be recorded automatically and retained for the period shown:

- a) direct pilot-controller two-way radiotelephony or datalink communications — 30 days;
- b) direct-speech or data link between air traffic services units — 30 days;
- c) surveillance data from primary and secondary radar equipment or obtained through ADS —30 days;
- d) automated flight data processing including on-screen display of aircraft tracks and label blocks —30 days (consistency with sub-paragraphs c) above).

Note: Where possible, provision of synchronous integration of radar and on-screen data with related voice recordings should be facilitated. (ICAO Air Traffic Services Planning Manual, Chapter 8.4).

11.1.3.4 **Time injection.** Automatic recordings shall have a means of establishing accurately the time, in hours/minutes/seconds, at which any recorded event occurred.

11.1.3.5 **Document records.** The following items shall be kept for a minimum of 90 days (ICAO Air Traffic Services Planning Manual):

- a) ATS messages, including flight plans;
- b) flight progress strips or documents of a similar nature used for the recording of flight data and the issue of clearances, instructions and directions;
- c) transcripts of automated weather broadcasts (e.g. ATIS);
- d) logbooks (Refer to ATS log in ICAO Air Traffic Services Planning Manual- Part IV 2-1-4 1.8);
- e) handover/takeover details, including, if not electronically recorded, the identification of the person taking over.

11.1.3.6 **Additional items.** Unless otherwise specified by CAAT, records of the following additional items shall be kept for a minimum of 5 years:

- a) details of interruptions to services;
- b) details of failures of equipment used for the provision of air traffic services;

- c) details of facility unavailability;
- d) staff duty rosters and position log;
- e) details of actions carried out under the Safety Management System including follow-up corrective and preventative actions;
- f) directions and instructions issued to staff for the provision of air traffic services;
- g) technical manuals used for the provision of air traffic services.

11.1.3.7 **Personnel Licensing Records.** Records of ATS personnel licensing and competency certification under CAAT requirements shall be kept for a minimum of 7 years, including after an employee ceases to be employed by the ATS provider. This includes details of:

- a) training;
- b) renewal and currency of ratings, endorsements and qualifications; and
- c) other proficiencies required by the ATS provider to be demonstrated.

11.1.3.8 **Record retention for investigation.** Where requisitioned, by an appropriate authority, for the purposes of investigation, records shall be isolated and kept in a secure place until their release by that authority.

11.1.4 **Maintaining Records**

11.1.4.1 Records shall not be completed in anticipation of the recorded action being completed.

11.1.4.2 Deletions from communications records are not permitted. All entries shall be written in non-erasable ink, and shall be legible.

11.1.4.3 Non-active forms or strips on which an error is noted may be replaced. Active forms or strips, fault reports, records and Log Books shall be changed, or errors corrected by:

- a) drawing a line through the incorrect data and writing the correct data adjacent thereto; or
- b) cancelling the old and rewriting the record, retaining both the old and the new for later reference purposes.

11.1.4.4 **Methods of recording.** Information transmitted or received by verbal means shall be recorded by electronic means. Voice records shall be supported by one or more of the following methods:

- a) writing on a flight progress strip;
- b) typewritten on authorised forms;
- c) teletyped on page copy machine units;
- d) handwritten in accordance with local requirements;
- e) handwritten on appropriate forms;
- f) entered directly into computer-based equipment.

11.1.4.5 **Flight plans.** Printed flight plans shall be filed within the day of flight. Electronic records shall be archived via a suitable “off-line” media such as tape, disk array or optical disk.

11.1.5 **Maintaining Operational Log Books**

11.1.5.1 The Log Book shall be used to record all significant occurrences and actions relating to operations, facilities, equipment and staff at an ATS unit.

Note: Except when forms such as fault reports or safety related reports shall also be completed, duplication of information should be avoided.

11.1.5.2 A working record or Log Book entry shall not be inserted between earlier entries. In the event of an out of sequence entry being necessary, it shall be entered as soon as possible, and annotated that it is out of sequence with an explanatory note as to why it is out of sequence.

11.1.5.3 All Log Book entries shall be recorded against the times of the occurrence and or time of the Log Book entry.

11.1.5.4 Minimum information to be recorded. The minimum information to be recorded is shown in the following table.

Occasion	Information
At the commencement of each day's operation	<ul style="list-style-type: none"> • UTC date and time; • Where required, identification of the unit and/or the operating Position
On assuming responsibility for a position	<ul style="list-style-type: none"> • The UTC date and time of assuming responsibility for a position and the signature of the officer commencing duty (see also voice recordings); • Results of equipment checks; • Result of time check.
During operation of the unit	<ul style="list-style-type: none"> • Safety related reports, including accidents and breaches of the Regulations such as non-compliance with ATC instructions; <p><i>Note: This is in addition to the completion of incident reporting actions.</i></p> <ul style="list-style-type: none"> • Actions taken in relation to any SAR activity including distress communications; • General notes concerning essential aerodrome information, such as the results of aerodrome inspections, closure of sections of the manoeuvring area caused by works or natural phenomena, etc.; • Times of aerodrome closure and reopening, with reasons for the closure; • Change in status of facilities, service or procedure including communication difficulties and tests; • Short term changes in staffing or hours of coverage, including variations to required staffing levels; • Any dispensation given against the Regulations • Status of navigation aids.

Occasion	Information
Handover/takeover (where a separate form is not provided and kept as a record)	<ul style="list-style-type: none"> • A resume of outstanding action and unusual operations which are current or anticipated, relating to the traffic display and/or SAR activity; • The status of communications and equipment; • The time of handover/takeover
Closure of unit and/or position	<ul style="list-style-type: none"> • Time of closure and conditions and actions relating to the closure, followed by changes to equipment status, and any outstanding action; • The time of intended reopening in case of abnormal occurrence; • The signature of the officer closing the unit/position.

11.1.6 Voice and Data Recording

11.1.6.1 Where appropriate voice recording facilities are available, instead of being recorded as entries in a Log Book, the information mentioned in subsection 11.1.6.2 shall be voice recorded in sufficient detail to readily establish for any safety investigation:

- a) whether and when the position or unit was active or inactive; and
- b) the identity of each person responsible for any active position at any time.

11.1.6.2 The information that should be voice recorded is:

- a) the identification of incoming staff taking over responsibility for a position; and
- b) the information relayed by outgoing staff to incoming staff in accordance with handover and takeover procedures; and
- c) for non-continuous units — details of opening and closing watch, including the identification of incoming staff taking over responsibility for the unit.

11.1.6.3 When an automatic voice recording facility fails, a manual record of communications shall be maintained, to the extent that this is possible.

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Chapter 12 Standards for the Provision of Air Traffic Services

12.1 General

12.1.1 Purpose

12.1.1.1 This Chapter contains the standards, rules and procedures for the provision of air traffic services that are additional to, or expand upon, or specify additional conditions for, the standards, rules and procedures contained in ICAO Annex 2, Annex 10 Volume II, Annex 11, ICAO PANS-OPS Doc 8168 Volume II, ICAO Doc 7030 and ICAO PANS-ATM Doc 4444, ICAO Doc 9432.

12.1.2 Air Traffic Services Commensurate with Airspace Classification

12.1.2.1 Unless otherwise authorised by CAAT, air traffic services shall be provided commensurate with the airspace classifications as notified in the AIP.

12.1.3 Traffic Priorities

12.1.3.1 Aircraft in a state of emergency shall be given priority over all other traffics.

12.1.4 Speed Limitations

12.1.4.1 Speed limitations shall be in accordance with the requirements stipulated in the ICAO Annex 11 Appendix 4.

12.2 ATS Surveillance Systems

12.2.1 Operation of ADS-B transmitters

12.2.1.1 If the situation display shows that the aircraft identification transmitted by an ADS-B-equipped aircraft is different from that expected from the aircraft, ATC shall ask the pilot to confirm aircraft identification.

12.2.1.2 If, after a pilot has been instructed to operate the aircraft's ADS-B transmitter on an assigned aircraft identification or to change call sign, the aircraft identification shown on the situation display is different from that assigned to the aircraft, ATC shall ask the pilot to re-enter the assigned aircraft identification.

12.2.1.3 If the identification of an aircraft as shown on the situation display is different from that assigned to the aircraft, and a request under subsection 12.2.1.2 has not resolved the discrepancy, ATC shall ask the pilot to confirm that the correct aircraft identification has been selected.

12.2.1.4 If the discrepancy continues following confirmation by the pilot that the correct aircraft identification has been set on the ADS-B identification feature, ATC shall:

- a) tell the pilot of the persistent discrepancy; and
- b) if possible, correct the label showing the aircraft identification on the situation display; and
- c) tell the next control position and any other interested unit using ADS-B for identification purposes of the erroneous aircraft identification transmitted by the aircraft.

12.2.2 Verification of level information

12.2.2.1 The tolerance value for pressure altitude-derived level information displayed to the controller is ± 200 ft. Geometric height information shall not be used for separation.

12.2.2.2 ATC shall verify displayed pressure altitude-derived level information:

- a) on initial contact with an aircraft or, if this is not feasible, as soon as possible after initial contact; and
- b) by simultaneous comparison with altimeter-derived level information received from the same aircraft by radiotelephony

12.2.2.3 If aircraft pressure altitude-derived level information is within the approved tolerance value, the pilot need not be advised of the verification. Geometric height information shall not be used to determine if altitude differences exist.

12.2.2.4 If the displayed level information is not within the approved tolerance value or if a discrepancy greater than the approved tolerance value is detected after verification, ATC shall tell the pilot of this and ask the pilot to check the pressure setting and confirm the aircraft's level.

12.2.2.5 If the discrepancy continues to exist after confirmation of the correct pressure setting, ATC shall:

- a) ask the pilot to stop Mode C or ADS-B altitude data transmission, if this does not cause the loss of position and identity information, and tell the next control position or ATC unit for the aircraft of the action taken; or
- b) tell the pilot of the discrepancy and ask that the operation continue in order to prevent loss of position and identity information of the aircraft, if possible, override the label displayed level information with the reported level and tell the next control position or ATC unit for the aircraft of the action taken.

12.2.3 Determination of level occupancy using ATS surveillance system derived level information

12.2.3.1 **Aircraft maintaining a level.** An aircraft is taken to be maintaining its assigned level as long as the pressure altitude-derived level information indicates that it is within ± 200 ft of the assigned level.

12.2.3.2 **Aircraft vacating a level.** An aircraft cleared to leave a level is taken to have commenced its manoeuvre and vacated the previously occupied level when the pressure altitude-derived level information indicates a change of 300 ft or more in the anticipated direction from its previously assigned level.

12.2.3.3 **Aircraft passing a level in climb or descent.** An aircraft in climb or descent is taken to have passed a level when the pressure altitude-derived level information indicates that it has passed this level in the required direction by 300 ft or more.

12.2.3.4 **Aircraft reaching a level.** An aircraft is taken to have reached the level to which it has been cleared when the greater of 3 consecutive renewals of display updates or at least 15 seconds have passed since the pressure altitude-derived level information indicated that it was within ± 200 ft of the assigned level.

12.2.4 Establishment of identification

12.2.4.1 Aircraft shall be identified by at least one of the following procedures:

- a) application of one or more of the identification procedures specified in ICAO PANS-ATM Doc4444.
- b) Correlating a particular position symbol to the position of an aircraft observed visually.

12.2.4.2 If ADS-B is used for identification, aircraft shall be identified by at least one of the following procedures:

- a) direct recognition of the aircraft identification in an ADS-B label;
- b) transfer of ADS-B identification (see subsection 14.1.6);

12.2.5 Position information

12.2.5.1 ATC shall tell the pilot of an aircraft provided with ATS surveillance service of its position in the following circumstances:

- a) on identification, unless the identification is established:
 - 1) based on the pilot's report of the aircraft position, or within 1 NM of the runway on departure, if the observed position on the situation display is consistent with the aircraft's time of departure; or
 - 2) by use of ADS-B aircraft identification, SSR Mode S aircraft identification or assigned discrete SSR codes if the location of the observed position indication is consistent with the current flight plan of the aircraft; or
 - 3) by transfer of identification (see subsection 14.1.6);
- b) when the pilot requests this information;
- c) when the pilot's estimate differs significantly from the controller's estimate based on the observed position;
- d) when the pilot is instructed to resume own navigation after vectoring if the current instructions had diverted the aircraft from a previously assigned route;
- e) immediately before termination of ATS surveillance service, if the aircraft is observed to deviate from its intended route.

12.3 Circuits and Runways

12.3.1 Authorising intersection departures.

12.3.1.1 A controller may authorise a departure from a runway intersection when requested by the pilot or may offer an intersection departure to assist traffic flow. The pilot shall be advised of the remaining runway length if such information is not readily available to the pilot.

12.3.2 Procedures for low visibility operations

12.3.2.1 When meteorological conditions are such that all or part of the manoeuvring area of a controlled aerodrome cannot be visually monitored from the control tower, ATC must co-operate with the aerodrome operator to initiate measures in accordance with the aerodrome's low visibility procedures (LVP).

12.3.2.2 Subject to subsection 12.3.2.3, for a controlled aerodrome, ATC must co-operate with the aerodrome operator to ensure that LVP are fully implemented if either of the following is to take place at the aerodrome:

- a) an instrument approach operation when either:
 - 1) the reported cloud ceiling is less than the value agreed between ATSP and aerodrome operator; or
 - 2) the visibility is less than the value agreed between ATSP and aerodrome operator;
- b) a take-off operation when the reported visibility or RVR on the runway to be used is less than 550 m.

Note 1: When LVP are implemented, the aerodrome operator is required to complete all operator preparations relevant to LVP to commence, and confirm to ATC that these preparations are complete.

Note 2: Guidance on low visibility operations on an aerodrome is contained in the Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476) and Manual of All-Weather Operations (Doc 9365)

12.3.2.3 ATC shall inform pilots that LVP are in force, but only after:

- a) ATC has verified that LVP at the aerodrome are fully implemented; and
- b) for an aerodrome that supports instrument approach operations with minima less than precision approach Category I procedures are in place to safeguard the ILS critical or sensitive areas as required for the classification on the ILS and in accordance with subsection 12.3.3.6.

12.3.3 Protecting ILS critical and sensitive areas

12.3.3.1 ATC shall not permit a vehicle or personnel within the relevant ILS critical areas during ILS operations.

12.3.3.2 Subject to subsection 12.3.3.3, ATC shall not permit an aircraft to be within the relevant ILS critical area if:

- a) the cloud ceiling is at, or below, 600 ft; or
- b) the visibility is 2 000 m or less.

Notes 1: The relevant ILS critical area means either the critical area appropriate to the largest aircraft that uses the aerodrome, or the critical area appropriate to the particular size and shape of the aircraft or vehicle.

Note 2: An aircraft taking off and passing over the relevant localiser is not taken to be penetrating the relevant localiser critical area.

12.3.3.3 Subject to subsection 12.3.3.4, an aircraft may enter an ILS critical area:

- a) without ATC clearance, while landing or vacating a runway after landing; or
- b) under ATC clearance, provided:
 - 1) an approaching aircraft has not passed the ILS outer marker; or
 - 2) if an outer marker is not available — an approaching aircraft is not within 4 nm of the landing runway threshold.

12.3.3.4 If an aircraft penetrates the critical area when the cloud ceiling is at, or below, 600 ft, or the visibility is 2 000 m or less, ATC shall broadcast an appropriate warning to:

- a) any approaching aircraft that have passed the ILS outer marker; or
- b) if an outer marker is not available — any approaching aircraft that are within 4 nm of the landing runway threshold.

12.3.3.5 For subsection 12.3.3.4, “appropriate warning” means a warning that there may be ILS signal disturbance due to aircraft penetration of an ILS critical area.

12.3.3.6 If:

- a) an instrument approach operation with minima less than precision approach Category I is conducted at an aerodrome; and
- b) either:
 - 1) the reported cloud ceiling is less than the value agreed between ATSP and aerodrome operator; or

- 2) the visibility is less than the value agreed between ATSP and aerodrome operator;

then:

- c) for the **ILS critical area** — once an arriving aircraft has passed the ILS outer marker or, if an outer marker is not available, is within 4 nm of the landing runway threshold, ATC shall not permit other aircraft or any vehicle within the relevant ILS localiser or glidepath critical areas; and
- d) for **ILS sensitive areas** — once an arriving aircraft is within 2 nm of the landing runway threshold, ATC shall not permit other aircraft or any vehicle within the relevant ILS sensitive area.

12.3.3.7 ATC shall inform the pilot in command of the aircraft when critical or sensitive area is not being protected.

12.4 Departures and Arrivals

12.4.1 The departure and arrival standards shall meet the requirements set forth in ICAO PANS-ATM Doc 4444.

12.5 Separation Standards — General

12.5.1 Application of Separation Standards

12.5.1.1 The longitudinal, lateral, vertical, time and wake turbulence standards that follow, take precedence over those standards in ICAO PANS-ATM Doc 4444.

12.5.2 Separation of VFR using navigation aids

12.5.2.1 Time separation standards requiring the use of radio aids to determine position shall not be applied to VFR flights. However other separation standards may be applied to VFR flights.

12.5.3 Formation Flights

12.5.3.1 Separation from a formation shall be applied to the outer dimensions applicable to the type of formation.

12.5.3.2 Before applying Vertical Separation with a formation, controllers shall check the levels of the other formation aircraft as necessary to establish the full vertical extent of the formation.

12.5.3.3 A group of civil aircraft conducting the same flight, which require the aircraft to operate at separation distances greater than those specified for formation flights shall be considered to be separate aircraft when applying separation.

12.5.4 **Airspace Boundaries**

12.5.4.1 Where applicable, separation shall be provided from the time an aircraft enters controlled airspace until the time an aircraft leaves controlled airspace. Separation is not required between aircraft within controlled airspace and any aircraft in close proximity but remaining outside controlled airspace. Essential traffic information shall be given to controlled flights concerned whenever they constitute essential traffic to each other.

12.5.4.2 Unless prior coordination has been effected, aircraft shall be separated from adjacent sectors by the appropriate separation standard.

12.5.4.3 Except when the transfer of control is to occur, or when coordination has been performed with an adjoining sector, an appropriate tolerance shall be applied to system map boundaries to ensure the separation of aircraft operating on either side of the boundary.

12.5.4.4 If an airspace boundary in ATS surveillance system coverage divides 2 sectors, aircraft shall not be vectored closer than half the applicable ATS surveillance system horizontal separation minimum from the displayed system map boundary.

12.5.4.5 If different ATS surveillance system separation minima apply on either side of a boundary, aircraft shall not be vectored closer to the boundary than half the larger of the 2 minima.

12.5.4.6 Unless local agreements are in place, a tolerance of not less than the applicable ATS surveillance system separation minimum shall be applied to a system map boundary that divides sectors where one of the sectors is authorised to operate up to the boundary.

12.5.5 Separation minima based on ATS surveillance systems

12.5.5.1 The separation minima based on ATS surveillance system shall meet the requirements set forth in ICAO PANS-ATM Doc 4444.

12.6 Separation Standards–Longitudinal

12.6.1 Application of Longitudinal Time Minima

12.6.1.1 The time interval between aircraft shall be calculated at the speed of the following aircraft.

12.6.2 Cross Check Calculations

12.6.2.1 Separation requirements shall be cross-checked to ensure the integrity of calculations. The cross-check is to validate the initial calculation and to confirm that the calculation is consistent with the traffic disposition.

12.6.2.2 The method used to cross-check calculations need to be sufficiently accurate to confirm that the original calculation has merit. Where a significant discrepancy or inconsistency is found:

- a) the initial calculation shall be performed again and the integrity cross- check reapplied;
- or
- b) further verification using an alternative means shall be performed.

12.6.3 Longitudinal Separation Minima

12.6.3.1 The longitudinal separation standards shall meet the requirements set forth in ICAO PANS-ATM Doc 4444.

12.6.4 Application of Time Departure Minima

12.6.4.1 The longitudinal separation minima based on time standards shall meet the requirements set forth in ICAO PANS-ATM Doc 4444.

12.6.5 Time Departure Separation Minima

12.6.5.1 The departure separation minima standards shall meet the requirements set forth in ICAO PANS-ATM Doc 4444.

12.7 Separation Standards—Vertical

12.7.1 Vertical Buffers between Aircraft Inside and Outside Controlled Airspace.

12.7.1.1 Levels assigned to VFR aircraft shall provide a buffer of at least 500 FT with the base of CTA.

12.7.1.2 If the base of CTA is a VFR level, levels assigned to IFR aircraft shall provide a buffer of at least 500 ft with the base of CTA. If it is known that an IFR aircraft is operating less than 500 ft below the CTA base, levels assigned shall provide a buffer of at least 1 000 ft with the base of CTA.

12.7.1.3 Where the base of CTA is an IFR level, levels assigned to IFR aircraft shall provide a buffer of at least 1 000 FT with the base of CTA, unless it is known that no IFR traffic is operating at the base of CTA. In this instance a buffer of at least 500 FT shall be applied.

12.7.2 Step Climbs and Descents

12.7.2.1 The Step Climb Procedure may be used to simultaneously climb aircraft to vertically separated levels provided that the lower aircraft is progressively assigned levels that provide vertical separation with the higher aircraft.

12.7.2.2 When applying the step climb or step descent procedures, pilots shall be advised that they are subject to a step climb or descent.

12.7.3 Specifying Rates of Climb or Descent

12.7.3.1 A rate of climb or descent shall be described in each level clearance when a specified rate is required to ensure the vertical separation is maintained. The rate shall always be specified in feet per minute.

12.7.3.2 ATC shall endeavour to avoid prescribing rate of climb or descent if it is believed that an aircraft is:

- a) operating in close vertical proximity to the control area lower limit; or
- b) descending VISUAL or VFR to an assigned level and maintaining clearance from terrain or cloud.

12.7.4 Rate in Step Climb/Descent

12.7.4.1 During a Step Climb or Step Descent where a rate of climb or descent has been specified, the rate shall apply to all level clearances issued in the course of the climb or descent. The rate shall be specified in the initial clearance using the phrase: "... STEP CLIMB (or STEP DESCENT) - STANDARD RATE (or at FEET PER MINUTE)".

12.7.5 Assigning Vacated Levels

12.7.5.1 A level vacated by one aircraft may be assigned immediately to a second aircraft provided that:

- a) the required vertical separation has not been increased because of the possibility of turbulence;
- b) the first aircraft has been assigned a level requiring a level change of at least the minimum being applied; and
- c) both aircraft have been instructed to change level at a specified rate which will ensure that the applicable vertical separation standard is not infringed.

12.7.5.2 The lowest holding altitude may be assigned to a second aircraft when the first aircraft has reported, "ON FINAL - LEAVING (final approach altitude)", provided that the following aircraft is instructed to descend at "STANDARD RATE" (or at 500 FT per minute).

12.7.6 Transition Layer, Altitude and Level

12.7.6.1 The system of altimetry used in Thailand makes use of a Transition Layer between the Transition Altitude of 11 000 FT and the Transition Level of FL130.

12.7.6.2 To separate aircraft using QNH from those using 1013.25 Hpa, Cruising in the transition layer shall not be permitted unless specifically cleared by the ATS unit providing control services for that portion of airspace.

12.7.6.3 While operating in the transition layer, vertical position shall be expressed in terms of flight levels or altitudes as advised by ATC to ensure vertical standard separation.

12.7.7 QNH for aircraft operating at or below the transition altitude

12.7.7.1 Pilot who operating an aircraft at or below the transition altitude shall set an altimeter to the currently reported QNH of the nearest station along the route of flight, except as provide in subsection 12.7.7.2 and 12.7.7.3.

12.7.7.2 Pilot who operating an aircraft operating in a terminal control area or a terminal control zone shall set an altimeter to the currently reported QNH of the major aerodrome of that airspace, which will be given by ATC.

12.7.7.3 When there is no appropriate available station, pilot shall set an altimeter to the elevation of the departure aerodrome until the appropriate QNH can be obtained.

Note: Pressure-altitude-derived level information displayed to the controller and level received from a pilot by radio telephony might be vary due to different pressure setting. ATC shall comply with criteria as stated in ICAO doc 4444 paragraph 8.5.5 Level information based on the use of pressure-altitude information.

12.8 Separation Standards—Lateral

12.8.1 The lateral separation standards shall meet the requirements set forth in ICAO PANS-ATM Doc 4444.

12.9 Separation Standards—Visual

12.9.1 Application

12.9.1.1 Visual separation may be achieved:

- a) by the use of visual procedures; or
- b) by assigning visual separation responsibility to a pilot.

12.9.1.2 When applying visual separation, the consideration of controllers shall be given to aircraft performance characteristics, particularly in relation to faster following aircraft. When necessary, corroborative evidence from the pilot of one aircraft on the relative position of another aircraft shall be obtained.

12.9.1.3 ATC may assign to the pilot of one aircraft responsibility to maintain separation with another aircraft only if:

- a) the aircraft to be separated are operating at or below 10 000 ft; and
- b) the pilot has:
 - 1) reported the other aircraft in sight; and
 - 2) accepted responsibility to follow, or maintain his or her own separation with, that aircraft;

- 12.9.1.4 Before altering the clearance of an aircraft with which visual separation has been assigned to another aircraft, the controller shall ensure that visual separation can continue to be maintained.
- 12.9.1.5 Alternative instructions shall be issued to provide separation if there is any doubt of the pilot's ability to keep the other aircraft in sight or maintain separation.
- 12.9.1.6 Positive identification shall be established before visual separation is provided as follows:
- a) by day:
 - 1) identification by type;
 - 2) identification by distinguishing markings if aircraft are of the same type;
 - 3) identification by observing a change of heading or altitude of one of the relevant aircraft.
 - b) by night:
 - 1) momentarily extinguish navigation lights;
 - 2) select flashing navigation lights to steady;
 - 3) extinguish hazard beacon;
 - 4) momentarily switch on landing lights;
 - 5) change heading.
- 12.9.1.7 Visual Separation between an aircraft and a high altitude balloon may be applied provided that:
- a) the confirmed drift of the balloon is away from the aircraft;
 - b) the balloon is ascending; and
 - c) the operations are being conducted during daylight.
- 12.9.1.8 Relevant traffic information shall be passed in sufficient time and detail to enable the pilot to identify and maintain separation from the other aircraft.
- 12.9.1.9 In circumstances where an aircraft has been instructed to maintain separation from, but not follow, an IFR aircraft, traffic information shall be issued to the IFR aircraft, including advice that responsibility for separation has been assigned to the other aircraft.

12.9.1.10 The traffic information provided shall contain as much as is necessary of the following to assist the pilot in identifying the other aircraft:

- a) type, and description if unfamiliar;
- b) level;
- c) position information either by clock reference, bearing and distance, relation to a geographical point, reported position and estimate, or position in the circuit;
- d) intentions, or direction of flight.

12.9.2 Separation Using Visual Observation

12.9.2.1 When weather conditions permit, the aerodrome controller may provide separation based on visual observations as coordinated with Approach Control provided that:

- a) the aerodrome controller is in agreement and accepts responsibility for the provision of such visual control;
- b) where required, the aircraft concerned are on the aerodrome control frequency;
- c) where required, specific airspace is released to the aerodrome controller for the purpose of providing such control.

12.9.2.2 Aerodrome controllers may also separate by the use of visual observation of aircraft position and projected flight paths.

12.9.2.3 When aircraft are operating visually as aerodrome traffic, ATC shall issue one or more of the following:

- a) clearances designed to maintain separation;
- b) sequencing instructions;
- c) relevant traffic information.

12.9.2.4 Pilots shall be advised of their number in the landing sequence to assist in identification of traffic.

12.9.2.5 ATC shall maintain, as far as possible, a continuous visual watch to detect and determine the position, and ensure the safety of, aircraft.

12.9.3 Separating approaching aircraft beyond tower view

12.9.3.1 Two approaching aircraft are deemed to be separated while the second approaching aircraft is on final approach beyond the view of the tower controller if, before commencing such final approach, the first approaching aircraft:

- a) has been sighted by the tower controller, there is reasonable assurance that a landing can be accomplished, and it is clear that no confliction will occur; or
- b) has reported commencing a missed approach, and is proceeding from a point and on a clearance such that separation could readily be maintained should the second approaching aircraft miss its approach.

12.9.3.2 Unless cleared at or before passing 10 NM from the aerodrome, this form of separation is not acceptable and another shall be provided.

12.10 Separation Standards—Miscellaneous

12.10.1 Parachute Jumping Exercise (PJE)

12.10.1.1 Separation between aircraft involved in PJE at the same drop zone is the responsibility of the pilots of the PJE aircraft. Separation between PJE aircraft and the parachutist is the sole responsibility of the pilots of the PJE aircraft.

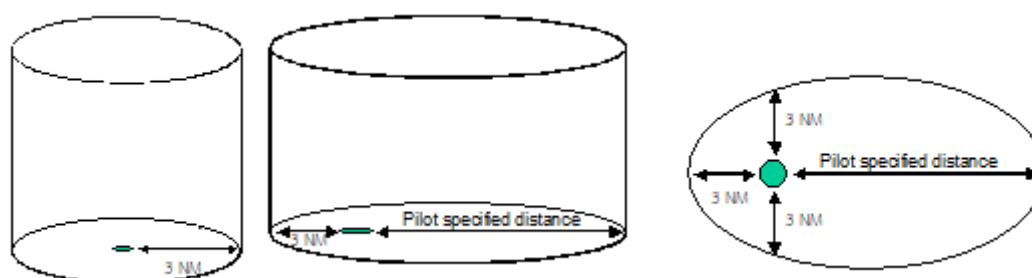
12.10.1.2 ATC shall provide traffic information to PJE aircraft, and apply separation between parachutists and non-PJE aircraft.

12.10.1.3 When applicable, ATC should make a broadcast on the appropriate frequency before the drop as an alert to pilots of flights operating in the airspace.

12.10.1.4 Where two or more PJE Drop Zones are located in close proximity and parachute operators have mutually agreed to accept self-separation, ATC is required to pass only traffic information to the participating operators. A participating pilot may request a separation service, but shall continue to self-separate until ATC is satisfied that a separation standard has been achieved, and can be maintained. Agreements established between parachute operators to self-separate shall be documented in ATS Local Instructions.

12.10.2 Limitations and Extensions – PJE

12.10.2.1 For separation purposes, ATC shall base separation on the fact that the parachutist will be dropped within a 3 NM radius of the target. If an extension of this area is necessary, the pilot shall advise ATS of the distance and direction this extension is required. The navigational tolerance area shall be extended in the advised direction until receipt of advice that the drop is completed. These requirements should be reiterated in any briefing.



12.10.2.2 The instructions described above should be issued by directly briefing the parachutists prior to the exercise. They may also be relayed to the parachutists by the PJE aircraft pilot.

12.10.3 High Altitude Balloons

12.10.3.1 A letter of agreement shall be signed between the relevant Operations Centre and the balloon operator prior to commencement of operations, and shall detail:

- a) notification procedures;
- b) communication requirements;
- c) launch and cutdown procedures; and
- d) restrictions on particular time blocks for launches due to increased RPT traffic on adjacent upper air routes.

12.10.4 Manned Balloon Operations

12.10.4.1 Balloons shall be separated from other airspace users, and issued relevant information at all altitudes according to the classification of airspace in which the balloon is flown.

12.10.4.2 Passing traffic information on other balloons within an authorised formation is not required.

12.10.5 Remotely Piloted Aircraft (RPA)

12.10.5.1 Certified Remotely Piloted Aircraft shall be separated from other aircraft using the separation standards applicable to manned aircraft when:

- a) capable of presenting real time navigational information using approved navigation systems; and
- b) continuous two-way communication is maintained between the operator and the ATC unit.

12.10.6 ACAS/TCAS Resolution Advisory Action

12.10.6.1 ACAS/TCAS Resolution Advisory Action shall meet the requirements set forth in ICAO PANS-ATM Doc 4444.

12.10.7 Unspecified Operations

12.10.7.1 Separation requirements from operations for which standards have not been specified shall be:

- a) determined through direct liaison between CAAT and the affected ATS unit; and
- b) distributed by NOTAM

12.11 Separation Standards—Wake Turbulence

12.11.1 Interpretation

12.11.1.1 In this section, the following applies:

- a) for lateral extent, when applying wake turbulence separation, directly behind means that an aircraft is operating within 760 m of the flight path of the aircraft in front of it.
- b) intermediate part — ICAO PANS-ATM, of a runway, including of a parallel runway separated from the runway by less than 760 m, means a point more than 150 m after the take-off commencement point of the preceding aircraft using the runway or the parallel runway.

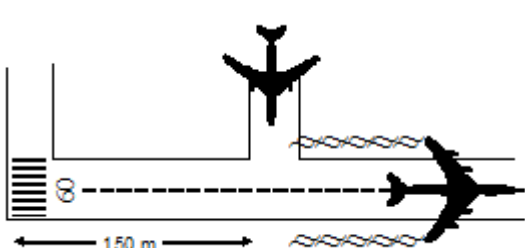
12.11.1.2 In addition to the categories of aircraft specified in PANS-ATM, the Airbus A380 is taken to constitute the SUPER wake turbulence category of aircraft.

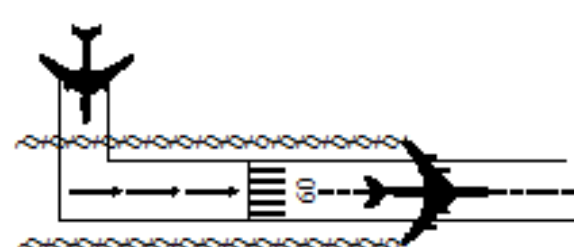
12.11.2 Wake Turbulence Separation Minima

12.11.2.1 The wake turbulence separation standards shall meet the requirements set forth in ICAO PAN-ATM Doc 4444.

12.11.2.2 Wake turbulence separation standards for aircraft under the SUPER category shall be as follows:

Full Length or crossing runway operations, or crossing flight paths			
Aircraft Categories		Separation Minima	
Leading aircraft	Following aircraft	Departure (Minutes)	Arrival (Minutes)
SUPER	HEAVY	2	3
	MEDIUM	3	3
	LIGHT	3	4

Intermediate Departures			
Aircraft Categories		Separation Minima	
Leading aircraft	Following aircraft	(Minutes)	Application
SUPER	HEAVY	4	Intermediate Departures minima shall be applied when a following aircraft will commence take-off from an intermediate part more than 150 m after the take-off commencement point of the preceding aircraft, using the same runway or a parallel runway separated by less than 760 m.
	MEDIUM	4	
	LIGHT	4	
			

Displaced Landing Threshold		
Aircraft Categories		Separation Minima
Arriving aircraft	Departing aircraft	(Minutes)
SUPER	HEAVY	3
	MEDIUM	3
	LIGHT	3
		

Opposite Direction		
Aircraft Categories		Separation Minima
Arriving aircraft	Departing aircraft	(Minutes)
SUPER	HEAVY	3
	MEDIUM	3
	LIGHT	3

12.11.2.3 Distance-based wake turbulence separation

Distance-based wake turbulence separation		
Aircraft Categories		Separation Minima
Arriving aircraft	Departing aircraft	(NM)
SUPER	HEAVY	6
	MEDIUM	7
	LIGHT	8

12.11.3 Application

12.11.3.1 Subject to subsection 12.11.3.3, ATC shall apply an appropriate wake turbulence separation minimum in all controlled airspace when an aircraft is:

- a) operating directly behind another aircraft's flight path; and
- b) at the same level as the other aircraft, or less than 1 000 ft below it.

12.11.3.2 Subject to subsection 12.11.3.3, ATC shall apply appropriate wake turbulence separation minima to aerodrome traffic when:

- a) both aircraft are using the same runway for take-off or for landing; or
- b) an aircraft taking-off behind a landing heavier wake turbulence category aircraft is expected to become airborne before the touchdown point of the landing aircraft; or
- c) an aircraft is taking-off and a preceding departing aircraft on a crossing runway has rotated at or before the runway intersection; or
- d) an aircraft is landing and could still be airborne at the intersection of a crossing runway and a preceding departing aircraft on that crossing runway has rotated at or before the intersection; or
- e) a LIGHT aircraft during its landing run will cross the intersection of a crossing runway behind a departing HEAVY aircraft on that crossing runway which has rotated at or before the intersection; or
- f) using parallel runways for approach and departures when the runways are separated by less than 760 m; or
- g) an aircraft is using the opposite direction runway for take-off or landing to a heavier category aircraft that has taken off or executed a missed approach.

12.11.3.3 ATC is not required to apply wake turbulence separation in the following situations:

- a) when an aircraft is landing behind another aircraft that is taking-off on the same runway;
- b) subject to 12.11.3.4, if a pilot has initiated a waiver of the relevant departure wake turbulence separation minimum;
- c) when a VFR aircraft is in flight and is:
 - 1) operating directly behind a preceding HEAVY or MEDIUM aircraft; or
 - 2) landing on the same runway as a preceding HEAVY or MEDIUM aircraft; or

- 3) landing on a parallel runway separated by less than 760 m from the runway of a preceding HEAVY or MEDIUM aircraft;
- d) when an IFR aircraft is in flight and the pilot has:
 - 1) reported the preceding aircraft in sight; and
 - 2) accepted responsibility to follow, or maintain his or her own separation with, that aircraft.

Note: For sub-paragraphs c) and d), the pilot in command of the aircraft is responsible for ensuring that the spacing from a preceding aircraft of a heavier wake turbulence category is acceptable. If it is determined that additional spacing is required, the flight crew may inform ATC accordingly, stating their requirements.

12.11.3.4 For a LIGHT or MEDIUM aircraft, ATC shall not waive the relevant wake turbulence separation minimum if the aircraft is taking-off after a HEAVY or SUPER aircraft has:

- a) used the same runway in the same or reciprocal direction; and
- b) taken-off or made a low or missed approach.

12.11.3.5 ATC shall issue a wake turbulence caution to the pilot of an aircraft if:

- a) less than the applicable wake turbulence separation minima may exist; or
- b) the applied wake turbulence separation minima may be infringed; or
- c) the pilot has waived the relevant departure wake turbulence separation requirement; or
- d) wake turbulence separation is not provided because of subsection 12.11.3.3 c) or d), and wake turbulence may have an adverse effect on the aircraft.

12.11.3.6 In applying wake turbulence separation minima, air traffic controllers shall:

- a) when using a time minimum between aircraft taking-off, ensure that a following aircraft does not become airborne until the specified time interval has elapsed since the leading aircraft became airborne;
- b) when using a time minimum between an aircraft executing a missed approach and the following aircraft taking-off, not issue the take-off clearance until the specified time interval has elapsed since the preceding aircraft crossed the threshold or initiated the missed approach (whichever occurs later);
- c) when using an ATS surveillance system minimum between aircraft taking off, ensure that the appropriate separation minimum exists between the aircraft at or before the time the following aircraft becomes airborne;

- d) when aircraft are using the same runway, ensure that the landing minimum will exist at the time the leading aircraft is over the landing threshold;
- e) when crossing runways are in use, apply the full length minima and ensure that the required separation exists at the intersection.

12.11.3.7 If the required wake turbulence separation can be determined by distance using an aircraft report or ATS surveillance system, ATC is not required to apply the relevant time minimum:

- a) between arriving aircraft; or
- b) unless the following aircraft will commence take-off from an intermediate point — between departing aircraft.

Note: Intermediate point is explained in subsection 12.11.1.

12.11.3.8 Due to the wake turbulence characteristics of the B757 and H47, for the purpose of wake turbulence separation, these aircraft shall be classified as a HEAVY aircraft if leading and as a MEDIUM aircraft if following.

12.12 Separation Standards—Aerodrome

12.12.1 Taxiing and Runway Standards

12.12.1.1 The separation of aircraft taxiing on the manoeuvring area is a joint pilot and controller responsibility.

12.12.1.2 When providing runway separation, the wake turbulence standards shall be applied in conjunction with the runway standards.

12.12.1.3 Runway separation standards apply equally to runway operations or to a strip having a single landing and take-off path.

12.12.1.4 When take-off or landing separation is based on the position of a preceding landing or taxiing aircraft and visual determination is limited, particularly at night or in reduced visibility, by poor azimuth resolution or other factors, the pilot of that aircraft should be instructed to report when the aircraft has:

- a) crossed and is clear of a runway intersection; or
- b) hold short of a runway holding point/position or stopped short of a runway strip; or
- c) vacated the runway.

12.12.1.5 As local circumstances such as aerodrome configuration and day/night visibility conditions may restrict controller visibility, unit Instructions shall specify when mandatory confirmation of position is required from the pilot.

12.12.2 **Arriving aircraft and an aircraft taking off**

12.12.2.1 Lateral separation is considered to exist between an arriving aircraft that subsequently commenced final approach, and a departing aircraft that has been cleared on a segregated flight path.

12.12.2.2 For this purpose, a segregated flight path is considered to exist when the departing aircraft will not be manoeuvring within 45 degrees either side of the reciprocal of the final approach path while the arriving aircraft is on the final approach track.

12.12.2.3 Except as specified in subsection 12.12.2.4, take-offs shall not be permitted after an arriving aircraft has commenced final approach until:

- a) it is sighted by the tower controller and reasonable assurance exists that a landing can be accomplished; or
- b) separation standards can be applied between an arriving aircraft which misses its approach and an aircraft desiring take-off clearance.

12.12.2.4 In the application of this standard, the controller must estimate that the required separation will exist at the time the take-off is commenced, and ATS surveillance system observation or DME report must be used to confirm that separation is not infringed.

12.12.3 **Simultaneous parallel operations**

12.12.3.1 Use by fixed wing aircraft of more than one landing/take-off path in the same direction on the one aerodrome is permissible if, the paths proposed to be used are treated as one runway for separation purposes.

12.12.3.2 The suitability of a landing area for simultaneous parallel landings or take-offs by fixed wing aircraft and the associated control procedures shall be established in consultation with CAAT.

12.12.4 Training approaches

12.12.4.1 If an aircraft, person or vehicle within the runway strip on a controlled aerodrome is likely to be overflown by an aircraft making a training approach, the controller shall instruct the training aircraft not to descend below:

- a) the relevant minimum altitude for the approach; or
- b) for a practice visual approach – not below 500 ft AGL

12.12.4.2 Under the above circumstances (subject to subsection 12.12.4.1), the controller should also:

- a) pass traffic information to the other aircraft before it enters the flight path over which the approaching aircraft will fly; and
- b) pass traffic information to persons, including the drivers of vehicles, operating within the runway strip of the runway to be overflown by the aircraft, other than persons operating within the works area associated with a displaced threshold.

12.12.5 Runway separation minima

12.12.5.1 The runway separation minima shall meet the requirements set forth in ICAO PANS-ATM Doc 4444. The ATSP shall clearly specify runway separation minima for aerodrome control service.

12.13 Air traffic control services to VFR Flight

12.13.1 When issuing instructions to VFR flights, controllers should be aware of the overriding requirements for the pilot to remain in VMC and to avoid obstacles. This may result in the pilot requesting an alternative clearance, particularly in marginal weather conditions.

12.13.2 Routing instructions may be issued which will reduce or eliminate points of conflict with other flights, such as final approach tracks and circuit areas, with a consequent reduction in the workload associated with passing extensive traffic information. Visual reference point may be established to assist in the definition of frequently utilised routes and the avoidance of instrument flight procedures tracks. Where controllers require VFR aircraft to hold at a specific point pending further clearance, this is to be explicitly stated to the pilot.

- 12.13.3 Approach radar controllers in particular should exercise extreme caution in vectoring VFR flights. Prior to vectoring, the controller must establish with the pilot the need to report if headings issued are not acceptable due to the requirements to remain in VMC and avoid obstacles. Controllers should be aware that pilots of some VFR flights may not be sufficiently experienced to comply accurately with vectors, or to recover to visual navigation after vectoring.

12.14 Minimum Altitude

- 12.14.1 The controller shall at all times be in possession of full and up-to-date information regarding:
- a) established minimum flight altitudes within the area of responsibility;
 - b) the lowest usable flight level or levels determined in accordance with AIP ENR 1.7; and
 - c) established minimum altitudes applicable to procedures based on tactical vectoring or procedural control.
- 12.14.2 Unless otherwise specified by the CAAT, minimum altitudes for procedures based on tactical vectoring with any ATS surveillance system shall be determined using the criteria applicable to tactical radar vectoring contained in Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Volume II.

Chapter 13 Information Provided to Pilots

13.1 General

13.1.1 Take-off or Landing Information

Where ATIS is available:

13.1.1.1 Changes to ATIS wind information shall be provided to pilots with a take-off or landing clearance if it is considered that it would be of significance to the aircraft operation.

13.1.1.2 The code 'ZULU' shall be retained exclusively in all locations for use only with ATIS broadcasts relating to out of hours operations or when a control zone is de-activated.

13.1.1.3 ATIS ZULU:

a) shall include the following:

- 1) the expected re-opening time of the Tower;
- 2) CTAF and PAL frequency (if available);
- 3) the preferred runway or circuit direction;
- 4) noise abatement procedures (if available);
- 5) works in progress; and

b) may include operational information of an unchanging nature which provides immediately useful information to pilots.

13.1.2 Safety Alerts

13.1.2.1 A safety alert shall be issued to an aircraft when a controller is aware the aircraft is in a situation which is considered to place it in unsafe proximity to terrain, obstructions, or other aircraft.

13.1.2.2 Once the pilot advises that action is being taken to resolve the situation, the issuance of further alerts may be discontinued.

13.1.3 Altimetry

13.1.3.1 Requirement concerning altimeter setting procedures can be found in AIP ENR 1.7.

13.1.4 Traffic Information

13.1.4.1 In providing ATS surveillance services within controlled airspace, including designated restricted airspace, ATC has no responsibility to initiate avoiding action in respect of unknown aircraft which can reasonably be assumed to be outside controlled airspace.

13.1.4.2 ATC shall advise aircraft leaving controlled airspace to uncontrolled airspace of observed traffic within the airspace to be entered where in the opinion of the controller other information indicates a potential conflict exists.

Chapter 14 Information Transfer

14.1 General

14.1.1 Validity of an ATC Clearance

14.1.1.1 An ATC clearance, and its amendments during the flight apply only:

- a) to the first point at which the aircraft leaves controlled airspace; or
- b) to the first landing point if the flight is wholly within controlled airspace; or
- c) to the clearance limit if issued; or
- d) until the expiration of a clearance void time; or
- e) until cancelled by a controller.

14.1.2 Clearances for special VFR aircraft

14.1.2.1 At pilot request, a SPECIAL VFR clearance may be issued for a VFR flight when:

- a) within a control zone;
- b) in a control area next to a control zone for the purpose of entering or leaving the zone;
- c) by day;
- d) when VMC do not exist and when ground visibility is not less than 1 500 m; and
- e) an IFR flight will not be unduly delayed.

14.1.3 Clearances below Minimum Altitude

14.1.3.1 A pilot may be assigned a level below the Minimum Altitude provided that:

- a) the pilot has reported “VISUAL”; and
- b) “VISUAL” is appended to the level assigned; and
- c) by night, the clearance is prefixed with “WHEN ESTABLISHED IN THE CIRCLING AREA”.

14.1.3.2 ATC may authorise operations below the Minimum Altitude to the pilot of a military or Coastwatch flight when requested by the pilot of the operation for operational reasons. This procedure does not substitute for the conditions of a visual approach at night.

14.1.4 Clearance Limits

14.1.4.1 When a clearance limit is cancelled, an onwards clearance specifying the level and route to be flown from that point shall be issued.

14.1.4.2 A description of a holding path to be flown at the clearance limit is not required when:

- a) the holding point is published in aeronautical documents;
- b) a clearance limit has been imposed temporarily and it is expected that the requirement to hold will have elapsed before the aircraft arrives at the designated holding point.

14.1.5 Clearance Readbacks

14.1.5.1 ATS personnel shall ensure that those elements identified in ICAO Doc 4444 are to be read back correctly by the pilot.

14.1.6 Transfer of identification

14.1.6.1 Transfer of identification may be carried out by one of the following methods:

- a) designation of the position indication by automated means, if only one position indication is indicated and there is no possible doubt of correct identification;
- b) notification of the aircraft's discrete SSR code or aircraft address;
- c) notification that the aircraft is SSR Mode S -equipped with an aircraft identification feature when SSR Mode S coverage is available;
- d) notification that the aircraft is ADS-B equipped with an aircraft identification feature when compatible ADS-B coverage is available;
- e) direct designation (pointing with the finger) of the position indication, if the 2 situation displays are adjacent, or if a common conference type of situation display is used;
Note: Attention shall be given to any errors which might occur due to parallax effects.
- f) designation of the position indication by reference to, or in terms of bearing and distance from, a geographical position or navigational facility accurately indicated on both situation displays, together with the track of the observed position indication if the route of the aircraft is not known to both controllers;

Note: Caution shall be exercised before transferring identification using this method, particularly if other position indications are observed on similar headings and in close proximity to the aircraft under control. Inherent radar deficiencies, such as inaccuracies in bearing and distance of the radar position indications displayed on individual situation displays and parallax errors, may cause the indicated position of an aircraft in relation to the known point to differ between the 2 situation displays.

- g) the transferring controller instructing the aircraft to change SSR code, and the accepting controller observing the change;
- h) the transferring controller instructing the aircraft to squawk/transmit IDENT, and the accepting controller observing this response.

Note: Use of procedures g) and h) requires prior coordination between the controllers, since the indications to be observed by the accepting controller are of short duration.

14.1.7 Clearance by Establishment of two-way communications

14.1.7.1 For this subsection, two-way communication is established if ATC responds to a pilot's radio call with the aircraft's radio identification.

14.1.7.2 In addition to issuing a pilot with a specific clearance or instruction, ATC may authorize an aircraft to enter Class D airspace by establishing two-way communication with it.

Notes:

1. *If ATC responds to a radio call with the aircraft identification (generally including an instruction or report requirement), two-way radio communications have been established and the pilot can enter the Class D airspace.*
2. *If ATC responds to the initial radio call without using the aircraft identification, 2-way radio communication has not been established and the pilot may not enter the Class D airspace.*
3. *If workload or traffic conditions prevent immediate entry into the Class D airspace, ATC should expressly instruct the pilot to remain outside the Class D airspace.*
4. *The pilot of an aircraft is required to comply with any instruction that ATC includes with the establishment of two-way communication, including an instruction to remain outside the Class D airspace.*

14.2 En-route/Terminal Clearances

14.2.1 Departure clearances

14.2.1.1 Where SIDs are published, they shall be issued to IFR aircraft departing at night, or by day in IMC.

14.2.1.2 Tracking instructions shall be specified when:

- a) SIDS are not published; or
- b) a SID is cancelled; or
- c) a visual departure clearance is issued in VMC by day in lieu of a SID; or
- d) aircraft or ground based navigation aid(s) are not available.

14.2.1.3 ATC shall notify the pilot of the expectation for a visual departure.

14.2.2 ATC Route Clearances

14.2.2.1 An ATC route clearance shall include at least the first position at which the flight-planned route is joined.

14.2.2.2 Route clearances authorizing RNAV tracking shall only be permitted for flight segments contained within ATS surveillance system coverage unless:

- a) the route is published in AIP-Thailand; or
- b) prior coordination has been conducted between affected units.

14.2.3 STAR Clearances

14.2.3.1 A STAR clearance shall contain:

- a) STAR identifier;
- b) a TRANSITION route when applicable;
- c) a RUNWAY when applicable; and
- d) an instrument or visual termination procedure when applicable; and
- e) a LEVEL assignment.

14.2.3.2 Descent shall be assigned in sufficient time to allow pilots to comply with vertical navigation requirements.

14.2.3.3 When an aircraft is vectored away from a Transition Route associated with a STAR, and the intention is that the aircraft will rejoin the Transition to complete the STAR procedure, ATC shall re-state any restrictions/ requirements applicable to the Transition Route. When an aircraft is vectored, the aircraft shall be re-positioned to enable the Arrival Route to be flown and re-cleared.

14.2.4 Approach Clearances

14.2.4.1 A controller shall not issue an air traffic clearance which authorizes or requires a pilot to descend in IMC below the Minimum Altitude for the route segment in a manner different from that specified in:

- a) Instrument flight procedures;
- b) approved ATS surveillance system procedures.

14.2.4.2 When a flight other than that described in subsection 14.2.4.3, a visual approach may be authorized by day or night to:

- a) a VFR flight; or
- b) an IFR flight when:
 - 1) the pilot has established and can continue flight to the aerodrome with continuous visual reference to the ground or water; and
 - 2) the visibility along the flight path is not less than 5 000 M (or by day, the aerodrome is in sight).

14.2.4.3 In addition to the requirements of subsection 14.2.4.2, aircraft conducting independent visual approaches, HEAVY jet aircraft may only be assigned a visual approach when:

- a) specifically requested by the pilot and the pilot has reported the landing runway is in sight; or
- b) the straight-in approach navigation aid is unserviceable.

14.2.4.4 In case of the navigation aid that supports straight-in approach is unserviceable, the aircraft shall be:

- a) vectored to intercept final no closer than 8 NM from the runway threshold, at an altitude not less than 2 500 FT above aerodrome level (AAL); and
- b) assigned a straight-in visual approach when:
 - 1) established on final or on a heading to intercept final course at an angle of not more than 30 degrees;

- 2) Visual Approach Slope Indicator System guidance (VASIS/PAPI) is available; and
- 3) the pilot has reported the runway in sight.

14.2.4.5 When being vectored at night, an IFR aircraft, other than a HEAVY jet aircraft as described at subsection 14.2.4.3, may be assigned a visual approach at any distance from an aerodrome, if:

- a) the aircraft has been assigned the minimum vector altitude; and
- b) the aircraft has been given heading instructions to intercept final or to position the aircraft within the circling area of the aerodrome; and
- c) the following phraseology is used to assign the visual approach:
 - 1) “WHEN ESTABLISHED ON THE VASIS/GLIDE PATH CLEARED VISUAL APPROACH”;
or
 - 2) “WHEN ESTABLISHED IN THE CIRCLING AREA CLEARED VISUAL APPROACH”.

14.3 Aerodrome Clearances

14.3.1 General

14.3.1.1 In addition to the provisions of ICAO PANS-ATM, Chapter 7.1, aerodrome controllers shall issue information and clearances with the object of preventing collisions between aircraft and vehicles operating on the helicopter movement area, but excluding helicopter landing sites situated on apron areas or beyond the sight of the tower controller

14.3.1.2 Whenever more than one runway is in use, the runway number shall be included in the lineup, take-off or landing clearance.

14.3.1.3 When issuing clearances or instructions, controllers shall take into account the hazards that may be caused by thrust stream turbulence. When such hazards may not be obvious to other aircraft, vehicles and personnel, an appropriate caution shall be issued.

14.3.2 Taxi and Pre-Taxi Instructions

14.3.2.1 A Taxi instruction which contains a taxi limit beyond a runway shall include a “CROSS RUNWAY (number)” instruction.

14.3.2.2 Aircraft required to hold short of a runway intersecting the taxi route, shall be issued a taxi instruction limit of the holding point associated with the intersecting runway. Taxi instructions shall not include a position beyond that of a required intermediate holding point.

14.3.2.3 Departing and arriving aircraft shall be issued with an instruction to “CROSS RUNWAY (number)” if previously issued with:

- a) a taxi instruction limit of the holding point of a runway intersecting the taxi route;
- or
- b) an instruction to “HOLD SHORT” of a runway.

14.3.3 Line up and Take-off Clearances

14.3.3.1 When aircraft are authorized to line up on the same or intersecting runways simultaneously, traffic information shall be provided as appropriate.

14.3.3.2 An aircraft delayed by the traffic situation shall be issued traffic information if appropriate, and instructed to hold position off the runway, or shall be issued a conditional line-up clearance.

14.3.3.3 When an instruction to line up does not include a take-off clearance and is issued with the departure instructions, the appropriate holding instruction shall be given.

14.3.3.4 The words “TAKE-OFF” shall be used only for clearing an aircraft for take-off.

14.3.3.5 Unless requested, a take-off clearance shall not be issued to a helicopter when the tailwind component exceeds 5 KT.

14.3.4 Landing Clearances

14.3.4.1 Clearance to land shall not be issued before:

- a) the aircraft has commenced final approach of a PAR or straight in instrument approach; or
- b) the aircraft has been sighted by the tower controller:
 - 1) on downwind leg of the circuit pattern;
 - 2) on base leg; or
 - 3) on final in the case of a straight in visual approach.

14.3.5 Observation by radar satisfies the sighting requirement.

14.3.5.1 Unless requested by the pilot, a landing clearance shall not be issued to a helicopter when the tailwind exceeds 5 KT.

14.3.5.2 When a tower controller has been advised that a general aviation aircraft with retractable undercarriage has experienced abnormal operations, a check gear down call shall be made with the landing clearance.

14.3.5.3 A military aircraft shall be instructed to check gear down when being cleared for an overshoot, cleared to land or cleared for a touch-and-go landing. Controllers shall issue the instruction as soon as possible after a pilot indicates that his undercarriage is down and locked. Where a pilot neglects to declare his undercarriage status, the controller shall instruct the pilot to check gear down.

14.3.5.4 If an arriving aircraft reports at a position where it should normally have been seen but has not been sighted, the aircraft shall be advised of not being in sight by the controller when cleared to land.

14.3.5.5 Landing clearances shall apply to aircraft which are restricted to the same or crossing landing paths. However, when such aircraft are permitted to land in parallel paths, clearances may be given for simultaneous landings. In these circumstances, notwithstanding that the pilot of each aircraft shall be responsible for the maintenance of separation, the tower controller shall issue alternative instructions should the possibility of a conflict arise.

14.3.6 The tower controller shall allocate one landing sequence number to a landing formation, thus treating the formation as one aircraft.

14.3.7 When the landing area is occupied by another aircraft or is obstructed, arriving aircraft may be issued with a clearance to:

- a) continue approach if there is no immediate assurance that the landing areas will become available. This shall be followed by the appropriate clearance; or
- b) go around, or orbit if in a position to do so, should the landing area not be available. When required, a clearance to commence a second approach or hold shall follow these instructions. The nature of the obstruction shall be advised if not apparent to the approaching aircraft.

Chapter 15 Aeronautical Communications

15.1 General

15.1.1 Introduction

15.1.1.1 Communications are a vital part of the provision of air traffic services (ATS) and their timely and dependable availability have the most significant bearing on the quality of the service provided by ATS. Radiotelephony and/or data link shall be used in air-ground communications for air traffic services purposes. The basic provisions regarding requirements for communications by different air traffic services and ATS units are contained in ICAO Annex 11, Chapter 6 for the ANSP's compliance. Information on facility requirements can be found in Chapter 7 of this MOS.

15.1.2 Acknowledging Receipt of Verbal Coordination

15.1.2.1 When an ATS unit receives a verbal clearance or instruction from another ATS unit that includes any of the following, it shall read back:

- a) any ATS route number or name;
- b) any tracking point;
- c) assigned level;
- d) any SID;
- e) any STAR identifier, including any runway specified;
- f) assigned SSR code;
- g) an assigned speed;
- h) any heading, including direction of turn;
- i) any item notified in the clearance as "AMENDED" or "RECLEARED";
- j) cancellation of a clearance;
- k) a level requirement/restriction;
- l) any clearance limit imposed;
- m) the word "VISUAL" when appended to level, heading, or turn instructions.

15.1.2.2 When an ATS unit receives a position report, a level check or a change of level from another ATS unit, the acknowledgment shall include:

- a) the aircraft callsign;
- b) the advised level.

15.1.2.3 The originating unit shall obtain a correct readback. Such readback shall not be composed of only the callsign of the acknowledging unit.

15.1.2.4 An acknowledgment shall not be given until the receiving operator is satisfied that the transmitted information has been received correctly.

15.1.3 Telephony Protocols

15.1.3.1 The use of radiotelephony on aeronautical channels is to be in accordance with ICAO Annex 10 Volume II, ICAO PANS- ATM Doc4444 and Aeronautical Information Publication (AIP-Thailand). However, the AIP takes precedence in the event of any inconsistency.

15.1.4 Aeronautical Fixed Telecommunications Network

15.1.4.1 The use of the Aeronautical Fixed Telecommunication Network (AFTN) shall be in accordance with the provisions of ICAO.

Chapter 16 Abnormal Operations

16.1 Purpose

16.1.1 This Chapter contains the standards, rules and procedures for the provision of air traffic services that are additional to, or expand upon, or specify additional conditions for, the standards, rules and procedures contained in ICAO Annex 11, ICAO Doc 7030, ICAO PANS-ATM Doc 4444 and the Aeronautical Information Publication (AIP-Thailand).

16.1.2 However, the ATSP may deviate from the standards if an emergency, or other circumstance, arises that makes the deviation necessary in the interests of aviation safety. As soon as practicable, the provider shall tell CAAT of the deviation and how long it is likely to last.

16.2 Aircraft emergencies and irregular operation

16.2.1 The ATSP shall establish procedures to ensure maximum assistance and priority is given to an aircraft unknown, or believed to be, in a state of emergency.

16.2.2 Each of ATSP shall establish detailed procedures for air traffic services personnel as followed but are not limited to:

- a) unlawful interference and aircraft bomb threat;
- b) emergency descent;
- c) weather deviation procedures;
- d) air-ground communications failure;
- e) assistance to VFR flights;
- f) other in-flight contingencies:
 - (1) strayed or unidentified aircraft;
 - (2) interception of civil aircraft;
 - (3) fuel dumping; and
 - (4) fuel emergency and minimum fuel;
- g) ATC contingencies:
 - (1) radio communications contingencies;
 - (2) ground radio failure;
 - (3) blocked frequency (where appropriate);
 - (4) unauthorized use of ATC frequency (where appropriate); and

- (5) data link failure, if applicable.

16.3 Deviation from an ATC clearance

- 16.3.1 ATSP shall establish procedures to ensure that instructions issued by ATC to restore a loss of separation do not hinder the responses of a pilot to-
- a) an ACAS resolution advisory; or
 - b) a GPWS or TAWS alert; or
 - c) another emergency situation that necessitates a deviation from an ATC clearance.
- 16.3.2 The procedures required by subsection 16.2.1 must specify that if any separation has been lost it is restored once the emergency situation has been resolved in accordance with ICAO PANS-ATM Doc4444, Chapter15.

16.4 Safety nets

- 16.4.1 When applicable, the ATSP shall establish and implement procedures concerning use of MSAW, STCA and any safety net, inter alia:
- a) the type of flight which are eligible for generation of alerts;
 - b) the sectors or areas of airspace within which the safety net function is implemented;
 - c) the method of displaying the safety net to the controller;
 - d) in general terms, the parameters for generation of alerts as well as alert warning time;
 - e) the volumes of airspace within which safety net can be selectively inhibited and the conditions under which this will be permitted;
 - f) conditions under which specific alerts may be inhibited for individual flights; and
 - g) procedures applicable in respect of volume of airspace or flights for which safety net or specific alerts have been inhibited.
- 16.4.2 Following a safety net event, controllers should complete an air traffic incident report.
- 16.4.3 Following a safety net event that a separation minima was infringed, the ATSP shall ensure that controllers complete an air traffic incident report.

16.5 Weather Deviation and RVSM Contingency Procedures

16.5.1 Weather Deviation Procedures

16.5.1.1 In order to indicate priority, the pilot may initiate communication by stating “WEATHER DEVIATION REQUIRED”. The pilot retains the option of initiating the communications using the urgency call “PAN PAN” three times to alert all listening parties of a special handling condition which will receive ATC priority for issuance of a clearance or assistance.

16.5.1.2 When a pilot requests clearance to deviate from track, the controller shall:

- a) issue a clearance to deviate from track, if there is no conflicting traffic in the lateral dimension; or
- b) establish vertical separation and issue a clearance to deviate from track, if there is conflicting traffic in the lateral dimension; or
- c) if unable to establish vertical separation, and there is conflicting traffic in the lateral dimension;
 - 1) advise the pilot that clearance for the requested deviation is not available;
 - 2) provide traffic about, and to, all affected aircraft; and
 - 3) request pilot intentions.

Note: Position may be expressed as direction and distance, or actual or estimated location or ATS route/ track code

16.5.2 Aircraft Equipment Failures in RVSM Airspace

16.5.2.1 If a pilot of an RVSM approved aircraft operating in the RVSM flight level band advises “NEGATIVE RVSM”, the controller shall, as required:

- a) pass traffic information;
- b) obtain the pilot’s intentions;
- c) provide alternative separation;
- d) update the flight data display; and
- e) advise adjacent ATC facilities/sectors of the situation.

16.5.2.2 If a pilot advises that redundancy in primary altimetry systems is lost, but the remaining altimetry system is functioning normally, the controller should acknowledge the situation and continue to monitor the flight's progress.

Note: RVSM separation may still be applied in this instance.

16.6 In Flight Emergency Response

16.6.1 Emergency Changes of Level

16.6.1.1 As an emergency measure, the use of flight levels separated by 500 FT (below FL290 or in RVSM airspace) or 1 000 FT (at or above FL290 in non-RVSM airspace) may be used temporarily when standard procedural separation cannot be applied provided that traffic information is issued.

16.6.1.2 If an emergency makes it necessary to clear all traffic from a particular area, ATC shall broadcast the following message:

- a) "EMERGENCY TO ALL CONCERNED. EMERGENCY CLIMB/DESCENT AT... (location)."
Then as required by circumstances;
- b) (for aircraft in holding pattern) "ALL AIRCRAFT ABOVE/BELOW ... (level) TURN RIGHT 90 DEGREES (for left hand holding pattern or left 90 degrees for right hand pattern)"

16.6.2 Fuel Dumping

16.6.2.1 Other known traffic should be separated from the aircraft dumping fuel by:

- a) at least 19 km (10 NM) horizontally, but not behind the aircraft dumping fuel;
- b) vertical separation if behind the aircraft dumping fuel within 15 minutes flying time or a distance of 93 km (50 NM) by:
 - 1) at least 300 m (1 000 ft) if above the aircraft dumping fuel; and
 - 2) at least 900 m (3 000 ft) if below the aircraft dumping fuel.

Note: The horizontal boundaries of the area within which other traffic requires appropriate vertical separation extend for 19 km (10 NM) either side of the track flown by the aircraft which is dumping fuel, from 19 km (10 NM) ahead, to 93 km (50 NM) or 15 minutes along track behind it (including turns).

16.6.2.2 In an emergency, or when fuel shall be dumped without adequate warning or delay, controllers shall make every effort to keep other aircraft clear of the ‘vapour zone’.

Additionally, ATS is responsible for:

- a) noting the area where jettison was affected;
- b) recording weather conditions and reporting the incident to the appropriate authority without delay.

16.6.2.3 In other than emergency circumstances ATS shall specify which section of a nominated track may be used for the dumping of fuel and recommend that aircraft maintain a minimum height of 6 000 FT AGL. For safety reasons fuel is not to be dumped in a circular or race-track pattern.

16.6.2.4 For the purpose of providing separation, all the airspace containing the track specified, the selected altitude and a full allowance for the ‘vapour zone’ shall be treated as reserved airspace from the time dumping is expected to commence until 5 MIN after it has been completed.

16.6.2.5 Known aircraft in Class G airspace likely to be affected are to be warned of the fuel dumping and the approximate location of the ‘vapour zone’.

16.6.2.6 The warning shall also be broadcast on the appropriate frequencies. Warnings are to continue during the period of fuel dumping and for 5 MIN after it has been completed.

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Chapter 17 Flight Information Services

17.1 Flight Information Services

17.1.1 Application

17.1.1.1 Flight information service shall be provided to all aircraft which are likely to be affected by the information and which are:

- a) provided with air traffic control service; or
- b) otherwise known to the relevant air traffic services units.

Note: Flight information service does not relieve the pilot-in-command of an aircraft of any responsibilities and the pilot-in-command has to make the final decision regarding any suggested alteration of flight plan.

17.1.1.2 Where air traffic services units provide both flight information service and air traffic control service, the provision of air traffic control service shall have precedence over the provision of flight information service whenever the provision of air traffic control service so requires.

Note: It is recognized that in certain circumstances aircraft on final approach, landing, take-off and climb may require to receive, without delay essential information other than that pertaining to the provision of air traffic control service.

17.1.2 Scope of flight information service

17.1.2.1 Flight information service shall include the provision of pertinent:

- a) SIGMET and AIRMET information;
- b) information concerning pre-eruption volcanic activity, volcanic eruptions and volcanic ash clouds;
- c) information concerning the release into the atmosphere of radioactive materials or toxic chemicals;
- d) information on changes in the availability of radio navigation services;
- e) information on changes in condition of aerodromes and associated facilities, including information on the state of the aerodrome movement areas when they are affected by contaminants or significant depth of water;

- f) information on unmanned free balloons and of any other information likely to affect safety.

17.1.2.2 Flight information service provided to flights shall include, in addition to that outlined in subsection 17.1.2.1, the provision of information concerning:

- a) weather conditions reported or forecast at departure, destination and alternate aerodromes;
- b) collision hazards, to aircraft operating in airspace Classes C, D, E, F and G;
- c) for flight over water areas, in so far as practicable and when requested by a pilot, any available information such as radio call sign, position, true track, speed, etc., of surface vessels in the area.

Note 1: The information in b), including only known aircraft the presence of which might constitute a collision hazard to the aircraft informed, will sometimes be incomplete and air traffic services cannot assume responsibility for its issuance at all times or for its accuracy.

Note 2: When there is a need to supplement collision hazard information provided in compliance with b), or in case of temporary disruption of flight information service, traffic information broadcasts by aircraft may be applied in designated airspaces. Guidance on traffic information broadcasts by aircraft and related operating procedures is contained in ICAO Annex 11.

17.1.2.3 ATS units should transmit, as soon as practicable, special air-reports to other aircraft concerned, to the associated meteorological office, and to other ATS units concerned. Transmissions to aircraft should be continued for a period to be determined by agreement between the meteorological and air traffic services authorities.

17.1.2.4 Flight information service provided to VFR flights shall include, in addition to that outlined in subsection 17.1.2.1, the provision of available information concerning traffic and weather conditions along the route of flight that are likely to make operation under the visual flight rules impracticable.

17.2 Aerodrome flight information service

17.2.1 Each applicant for the grant of an air traffic service certificate in respect of an aerodrome flight information service shall establish systems and procedures to:

- a) determine, from information received and visual observation, the relative positions of known aircraft to each other; and
- b) provide for the issue of advice and information, including the designation of a preferred runway, for the purpose of the safe and efficient operation of
 - 1) aircraft flying in the vicinity of an aerodrome; and
 - 2) aircraft operating on the manoeuvring area; and
 - 3) aircraft landing and taking off; and
 - 4) aircraft, vehicles, and persons, on the manoeuvring area;
 - 5) aircraft on the manoeuvring area and obstructions on that area.

17.2.2 The applicant shall establish procedures to ensure that the designated preferred runway is that most suitable for the particular operation.

Note: Guidance for Aerodrome Flight Information Services Refer to ICAO Circular 211 Aerodrome Flight Information Services (AFIS).

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Chapter 18 Alerting Services

18.1 Application

18.1.1 Alerting service shall be provided:

- a) for all aircraft provided with air traffic control service;
- b) in so far as practicable, to all other aircraft having filed a flight plan or otherwise known to the air traffic services; and
- c) to any aircraft known or believed to be the subject of unlawful interference.

18.1.2 Area control centres shall serve as the central point for collecting all information relevant to a state of emergency of an aircraft operating within the State airspace and forwarding such information to the appropriate rescue coordination centre or other agencies as appropriate.

18.1.3 In the event of a state of emergency arising to an aircraft while it is under the service of an aerodrome control tower, aerodrome flight information service office, approach control unit or flight information centre such unit shall notify immediately area control centres who will in turn notify the rescue coordination centre or other appropriate agencies. Notification should also be made to the appropriate adjacent area control centres, except that such notification shall not be required when the nature of the emergency is such that the notification would be superfluous.

18.1.4 Nevertheless, whenever the urgency of the situation so requires, the aerodrome control tower, aerodrome flight information service office, approach control unit or flight information centre responsible shall first alert and take other necessary steps to set in motion all appropriate local rescue and emergency organizations which can give the immediate assistance required.

18.2 Notification of Rescue Coordination Centres

18.2.1 Without prejudice to any other circumstances that may render such notification advisable, air traffic services units shall notify rescue coordination centre immediately when an aircraft is considered to be in a state of emergency in accordance with the following:

- a) **Uncertainty phase** when:
 - 1) no communication has been received from an aircraft within a period of thirty minutes after the time a communication should have been received, or from the time an unsuccessful attempt to establish communication with such aircraft was first made, whichever is the earlier, or when
 - 2) an aircraft fails to arrive within thirty minutes of the estimated time of arrival last notified to or estimated by air traffic services units, whichever is the later, except when no doubt exists as to the safety of the aircraft and its occupants.

- b) **Alert phase** when:
 - 1) following the uncertainty phase, subsequent attempts to establish communication with the aircraft or inquiries to other relevant sources have failed to reveal any news of the aircraft, or when
 - 2) an aircraft has been cleared to land and fails to land within five minutes of the estimated time of landing and communication has not been reestablished with the aircraft, or when
 - 3) information has been received which indicates that the operating efficiency of the aircraft has been impaired, but not to the extent that a forced landing is likely, except when evidence exists that would allay apprehension as to the safety of the aircraft and its occupants, or when
 - 4) an aircraft is known or believed to be the subject of unlawful interference.

- c) **Distress phase** when:
 - 1) following the alert phase, further unsuccessful attempts to establish communication with the aircraft and more widespread unsuccessful inquiries point to the probability that the aircraft is in distress, or when
 - 2) the fuel on board is considered to be exhausted, or to be insufficient to enable the aircraft to reach safety, or when
 - 3) information is received which indicates that the operating efficiency of the aircraft has been impaired to the extent that a forced landing is likely, or when
 - 4) information is received or it is reasonably certain that the aircraft is about to make or has made a forced landing, except when there is reasonable certainty that the aircraft and its occupants are not threatened by grave and imminent danger and do not require immediate assistance.

18.2.2 The notification shall contain such of the following information as is available in the order listed:

- a) INCERFA, ALERFA or DETRESFA, as appropriate to the phase of the emergency;
- b) agency and person calling;
- c) nature of the emergency;
- d) significant information from the flight plan;
- e) unit which made last contact, time and means used;
- f) last position report and how determined;
- g) color and distinctive marks of aircraft;
- h) dangerous goods carried as cargo;
- i) any action taken by reporting office; and
- j) other pertinent remarks.

18.2.3 Such part of the information specified in subsection 18.2.2, which is not available at the time notification is made to a rescue coordination centre, should be sought by an air traffic services unit prior to the declaration of a distress phase, if there is reasonable certainty that this phase will eventuate.

18.2.4 Further to the notification in subsection 18.2.1, the rescue coordination centre shall, without delay, be furnished with:

- a) any useful additional information, especially on the development of the state of emergency through subsequent phases; or
- b) information that the emergency situation no longer exists.

Note: The cancellation of action initiated by the rescue coordination centre is the responsibility of that centre

18.3 Use of communication facilities

18.3.1 Air traffic services units shall, as necessary, use all available communication facilities to endeavor to establish and maintain communication with an aircraft in a state of emergency, and to request news of the aircraft.

18.4 Plotting aircraft in a state of emergency

18.4.1 When a state of emergency is considered to exist, the flight of the aircraft involved shall be plotted on a chart in order to determine the probable future position of the

aircraft and its maximum range of action from its last known position. The flights of other aircraft known to be operating in the vicinity of the aircraft involved shall also be plotted in order to determine their probable future positions and maximum endurance.

18.5 Information to the operator

18.5.1 When it has been ascertained that that an aircraft is in the uncertainty or the alert phase, it shall, when practicable, advise the operator prior to notifying the rescue coordination centre.

Note: If an aircraft is in the distress phase, action will be taken in accordance with subsection 18.2.1 of this document

18.5.2 All relevant information notified to appropriate rescue coordination agencies by an air traffic services unit shall, whenever practicable, also be communicated, without delay, to the operator.

18.6 Information to aircraft operating in the vicinity of an aircraft in a state of emergency

18.6.1 When it has been established by an air traffic services unit that an aircraft is in a state of emergency, other aircraft known to be in the vicinity of the aircraft involved shall, except as provided in subsection 18.6.2, be informed of the nature of the emergency as soon as practicable.

18.6.2 When an air traffic services unit knows or believes that an aircraft is being subjected to unlawful interference, no reference shall be made in ATS air- ground communications to the nature of the emergency unless it has first been referred to in communications from the aircraft involved and it is certain that such reference will not aggravate the situation.

Chapter 19 Coordination Requirements

19.1 General

- 19.1.1 The ATSP shall establish systems and procedures for ensuring, when applicable, co-ordination between each ATS unit listed in the exposition and the following agencies
- a) aviation meteorological service provider
 - b) aeronautical information service provider
 - c) instrument flight procedure design service provider
 - d) CNS service provider
 - e) aircraft operators
 - f) military authority
 - g) search and rescue authorities
 - h) if the listed is an aerodrome control or aerodrome flight information unit
 - 1) the aerodrome operator; and
 - 2) the apron management service, if the service is not provided by the aerodrome control unit.
- 19.1.2 The ATSP shall establish procedures for ensuring that an ATS formal agreement is in place between each ATS unit listed in the exposition and
- a) each ATS unit responsible for adjoining airspace; and
 - b) any other ATS unit with which regular operational co-ordination is required.
- 19.1.3 The ATSP shall establish procedures for ensuring that each formal agreement:
- a) details matters that are necessary for effective co-ordination between the units party to the agreement; and
 - b) is kept current; and
 - c) is signed by senior representatives of the participating units; and
 - d) is part of the ATSP's operations manual.
- 19.1.4 The ATSP shall provide systems and procedures for facilitating communications between those ATS units, aircraft operators, and aviation meteorological service providers, if they require information, are provided, through the exchange of ATS messages or MET messages.

- 19.1.5 The ATSP shall establish procedures for ensuring that ATS messages are prepared and transmitted in accordance with procedures detailed and cross-referenced in ICAO PANS-ATM Doc 4444.

19.2 Air Traffic Services Requirements for Information

19.2.1 Meteorological information

19.2.1.1 Air traffic services units shall be supplied with up-to-date information on existing and forecast meteorological conditions as necessary for the performance of their respective functions. The information shall be supplied in such a form as to require a minimum of interpretation on the part of air traffic services personnel and with a frequency which satisfies the requirements of the air traffic services units concerned.

19.2.1.2 Air traffic services units should be supplied with available detailed information on the location, vertical extent, direction and rate of movement of meteorological phenomena in the vicinity of the aerodrome, and particularly in the climb-out and approach areas, which could be hazardous to aircraft operations.

Note: The meteorological phenomena are listed in ICAO Annex 3.

19.2.1.3 When computer-processed upper air data are made available to air traffic services units in digital form for use by air traffic services computers, the contents, format and transmission arrangements should be as agreed between the Meteorological Authority and the appropriate ATS authority.

19.2.2 Flight information centres and area control centres

19.2.2.1 Flight information centres and area control centres shall be supplied with meteorological information as described in ICAO Annex 3, particular emphasis being given to the occurrence or expected occurrence of weather deterioration as soon as this can be determined. These reports and forecasts shall cover the flight information region or control area and such other areas as may be determined on the basis of regional air navigation agreements.

Note: For the purpose of this provision, certain changes in meteorological conditions are construed as deterioration in a weather element, although they are not ordinarily considered as such. An increase in temperature may, for example, adversely affect the operation of certain types of aircraft.

19.2.2.2 Flight information centres and area control centres shall be provided, at suitable intervals, with current pressure data for setting altimeters, for locations specified by the flight information centre or area control centre concerned.

19.2.3 Units providing approach control service

19.2.3.1 Units providing approach control service shall be supplied with meteorological information as described in ICAO Annex 3 for the airspace and the aerodromes with which they are concerned. Special reports and amendments to forecasts shall be communicated to the units providing approach control service as soon as they are necessary in accordance with established criteria, without waiting for the next routine report or forecast. Where multiple anemometers are used, the indicators to which they are related shall be clearly marked to identify the runway and section of the runway monitored by each anemometer.

Note: See Note following subsection 19.2.2.1.

19.2.3.2 Units providing approach control service shall be provided with current pressure data for setting altimeters, for locations specified by the unit providing approach control service.

19.2.3.3 Units providing approach control service for final approach, landing and take-off shall be equipped with surface wind display(s). The display(s) shall be related to the same location(s) of observation and be fed from the same sensor(s) as the corresponding display(s) in the aerodrome control tower and in the meteorological station, where such a station exists.

19.2.3.4 Units providing approach control service for final approach, landing and takeoff at aerodromes where runway visual range values are assessed by instrumental means shall be equipped with display(s) permitting read-out of the current runway visual range value(s). The display(s) shall be related to the same location(s) of observation and be fed from the same sensor(s) as the corresponding displays in the aerodrome control tower and in the meteorological station, where such a station exists.

19.2.3.5 Units providing approach control service for final approach, landing and take-off at aerodromes where the height of cloud base is assessed by instrumental means should be equipped with display(s) permitting read-out of the current value(s) of the height of cloud base. The displays should be related to the same location(s) of observations and be fed from the same sensor(s) as the corresponding display(s) in the aerodrome control tower and in the meteorological station, where such a station exists.

19.2.3.6 Units providing approach control service for final approach, landing and take-off shall be supplied with information on wind shear which could adversely affect aircraft on the approach or take-off paths or during circling approach.

Note: Provisions concerning the issuance of wind shear warnings and alerts and ATS requirements for meteorological information are given in ICAO Annex 3.

19.2.4 Aerodrome Control Towers and Aerodrome Flight Information Offices

19.2.4.1 Aerodrome control towers and aerodrome flight information offices shall be supplied with meteorological information as described in ICAO Annex 3 for the aerodrome with which they are concerned. Special reports and amendments to forecasts shall be communicated to the aerodrome control towers as soon as they are necessary in accordance with established criteria, without waiting for the next routine report or forecast.

Note: See Note following subsection 19.2.2.1.

19.2.4.2 Aerodrome control towers and aerodrome flight information offices shall be provided with current pressure data for setting altimeters for the aerodrome concerned

19.2.4.3 Aerodrome control towers and aerodrome flight information offices shall be equipped with surface wind display(s). The display(s) shall be related to the same location(s) of observation and be fed from the same sensor(s) as the corresponding display(s) in the meteorological station, where such a station exists. Where multiple sensor(s) are used, the displays to which they are related shall be clearly marked to identify the runway and section of the runway monitored by each sensor.

19.2.4.4 Aerodrome control towers and aerodrome flight information offices at aerodromes where runway visual range values are measured by instrumental means shall be equipped with display(s) permitting read-out of the current runway visual range value(s). The display(s) shall be related to the same location(s) of observation and be fed from the same sensor(s) as the corresponding display(s) in the meteorological station, where such a station exists.

19.2.4.5 Aerodrome control towers and aerodrome flight information offices at aerodromes where the height of cloud base is assessed by instrumental means should be equipped with display(s) permitting read-out of the current value(s) of the height of cloud base. The displays should be related to the same location(s) of observations and be fed from the same sensor(s) as the corresponding display(s) in the meteorological station, where such a station exists.

19.2.4.6 Aerodrome control towers and aerodrome flight information offices shall be supplied with information on wind shear which could adversely affect aircraft on the approach or take-off paths or during circling approach and aircraft on the runway during the landing roll or take-off run

19.2.4.7 Aerodrome control towers, aerodrome flight information offices and/ or other appropriate units should be supplied with aerodrome warnings.

Note: The meteorological conditions for which aerodrome warnings are issued are listed in ICAO Annex 3

19.2.5 **Communication Stations**

19.2.5.1 Where necessary for flight information purposes, current meteorological reports and forecasts shall be supplied to communication stations. A copy of such information shall be forwarded to the flight information centre or the area control centre.

19.2.6 **Information on aerodrome conditions and the operational status of associated facilities**

19.2.6.1 Aerodrome control towers, aerodrome flight information offices and units providing approach control service shall be kept currently informed of the operationally significant conditions of the movement area, including the existence of temporary hazards, and the operational status of any associated facilities at the aerodrome(s) with which they are concerned.

19.2.7 **Information on the operational status of navigation services**

19.2.7.1 ATS units shall be kept currently informed of the operational status of radio navigation services and visual aids essential for take-off, departure, approach and landing procedures within their area of responsibility and those radio navigation services and visual aids essential for surface movement.

19.2.7.2 Information on the operational status, and any changes thereto, of radio navigation services and visual aids as referred to in subsection 19.2.7.1 should be received by the appropriate ATS unit(s) on a timely basis consistent with the use of the service(s) and aid(s) involved.

Note: Guidance material regarding the provision of information to ATS units in respect to visual and non-visual navigation aids is contained in the Air Traffic Services Planning Manual (Doc 9426). Specifications for monitoring visual aids are contained in ICAO Annex 14, Volume I, and related guidance material is in the Aerodrome

Design Manual (Doc 9157). Specifications for monitoring non-visual aids are contained in ICAO Annex 10, Volume I.

19.2.8 Information on unmanned free balloons

19.2.8.1 Operators of unmanned free balloons shall keep the appropriate air traffic services units informed of details of flights of unmanned free balloons in accordance with the provisions contained in ICAO Annex 2.

19.2.9 Information concerning volcanic activity

19.2.9.1 ATS units shall be informed, in accordance with local agreement, of pre-eruption volcanic activity, volcanic eruptions and volcanic ash cloud which could affect airspace used by flights within their area of responsibility.

19.2.9.2 Area control centres and flight information centres shall be provided with volcanic ash advisory information issued by the associated VAAC.

Note: VAACs are designated by regional air navigation agreements in accordance with ICAO Annex 3.

19.2.10 Information concerning radioactive materials and toxic chemical “clouds”

19.2.10.1 ATS units shall be informed, in accordance with local agreement, of the release into the atmosphere of radioactive materials or toxic chemicals which could affect airspace used by flights within their area of responsibility.

Chapter 20 ATS System Capacity

20.1 Capacity Management

20.1.1 ATSP shall assess and declare the ATC capacity for control areas, control sectors within a control area and for aerodromes in accordance with ICAO PANS-ATM Doc 4444 and ICAO Doc 9426.

20.1.2 The ATSP shall document its methodologies for determining the declared capacities, which shall take into consideration factors such as weather-related factors, ATC unit configuration, staff and equipment available, and any other factors that may affect the workload of a controller responsible for that control sector or aerodrome.

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