



# **Sample Civil Aviation Regulations for Air Navigation Services (ANS)**

---

**First Edition (unedited version) — November 2013**

***Notice to users:***

*This document is an unedited version which is made available to the public for convenience. Its content may be supplemented, removed or otherwise modified during the editing process. ICAO shall not be responsible whatsoever for any cost or liabilities incurred as a result of its use.*

**International Civil Aviation Organization**

**SAMPLE CIVIL AVIATION REGULATIONS**

**[STATE]**

**PART 11 — AIR NAVIGATION SERVICES**

**NOVEMBER 2013**



**INSTRUCTIONS TO STATES**  
(not for inclusion in the regulation)

1. The Air Navigation Services (ANS) Sample Regulation, Part 11, is divided into six parts as outlined below. Where the service provider is a State entity, a State may wish to implement these requirements through appropriately approved internal policies and procedures.

- 11.1 General
- 11.2 Air Traffic Services (ATS)
- 11.3 Instrument Flight Procedure Design (IFPD) service
- 11.4 Aeronautical Information Services (AIS)
- 11.5 Aeronautical Telecommunications (ATE)
- 11.6 Aeronautical Meteorology Services (MET)

2. Part 11 of the sample regulations prescribes regulatory requirements for Air Navigation Service Providers (ANSPs). This version of the sample regulations is based mainly upon the requirements of Annex 3 — *Meteorological Service for International Air Navigation*, Amendment 76; Annex 5 — *Units of Measurement to be Used in Air and Ground Operations*, Amendment 17; Annex 11 — *ATS*, Amendment 49; and Annex 15 — *AIS*, Amendment 37. In addition, some material from various Procedures for Air Navigation Services (PANs) documents has been incorporated as required.

3. The sample regulations incorporate ICAO standards and with a few exceptions do not include any recommended practices. An exception is made where the recommended practice clearly supports the implementation of a standard. In adapting the regulations, States should review the recommended practices to determine which should be incorporated into these regulations.

4. It should be recognized, that with respect to service providers, there are considerable differences in State legislation and processes, particularly the authority that may be found in enabling statutes which will impact on the degree to which regulation may be necessary. In adapting this material consideration should be taken to determine the extent to which regulation is required to achieve the desired outcome of ICAO SARPs.

5. The sample regulations should be considered as technical drafts which would serve as a basis for development of legal drafts based on the appropriate legal structure and processes of your State.

6. When adapting this material, as a minimum, States will need to replace all wording within [ ] with wording appropriate to your State. Notes have been added, e.g. [*Note.— If your State requires ... then revise as follows ...*]. These notes are to be reviewed and the text amended depending on the particular requirements in your State, then the [*Note.— ...*] is to be deleted.

## TABLE OF CONTENTS

	<i>Page</i>
Part 11.1 – General .....	5
Part 11.2 – Air Traffic Services (ATS).....	12
Part 11.3 – Instrument Flight Procedure Design (IFPD) Service.....	45
Part 11.4 – Aeronautical Information Service (AIS) .....	52
Part 11.5 – Aeronautical Telecommunication (ATE) .....	73
Part 11.6 – Aeronautical Meteorology Services (MET) .....	77

## **Part 11.1 – General**

### **11.1.1 Applicability**

11.1.1.1 Part 11 prescribes the requirements applicable to all ANSPs, who are authorized by [State] as a service provider for one or more of the following:

- a) Air Traffic Services (ATS) as outlined in Part 11.2;
- b) Instrument Flight Procedure Design (IFPD) Service as outlined in Part 11.3;
- c) Provision of Aeronautical Information Services (AIS) as outlined in Part 11.4;
- d) Provision of and maintenance of Aeronautical Telecommunications (ATE) equipment as outlined in Part 11.5;
- e) Provision of Aeronautical Meteorology Services (MET) as outlined in Part 11.6.

### **11.1.2 Exemptions**

11.1.2.1 [Appropriate authority designated by the State] may, in writing, exempt an ANSP from compliance with the specified provisions of this regulation.

11.1.2.2 Before deciding to exempt an ANSP from any requirements of this regulation, [appropriate authority designated by the State] will take into account any relevant considerations relating to the safety of air navigation.

11.1.2.3 The validity of any exemption is dependent on the ANSP complying with any condition that [appropriate authority designated by the State] specifies in the exemption as being necessary in the interests of safety of air navigation.

11.1.2.4 The ANSP must comply with a condition specified in the exemption.

### **11.1.3 Definitions**

11.1.3.1 For the purpose of these regulations, the definitions as contained in Annexes 1 through to 19, as amended from time to time, shall apply unless as otherwise indicated in sub-regulation 11.1.3.2.

11.1.3.2 Additional definitions or any definitions that differ from those contained in the ICAO Annexes are as follows:

- a) ANSP – An organization that has been duly authorized by [State] to provide one or more of the following services on behalf of the [State] in accordance with these regulations:
  - (i) ATS;
  - (ii) IFPD services;
  - (iii) Provision of AIS;
  - (iv) Provision of and maintenance of ATE equipment;

- (v) Provision of MET;
- b) Annex – Reference to any Annex in these regulations shall mean Annexes as established by the International Civil Aviation Organization (ICAO) in accordance with the Convention on International Civil Aviation.
- c) Doc 4444 – means the ICAO document titled *Procedures for Air Navigation Services — Rules of the Air and ATS*.
- d) Doc 7030 – means the ICAO document titled *Regional Supplementary Procedures* as applicable to the [insert applicable ICAO region(s)].

#### **11.1.4 Units of measurement**

##### **11.1.4.1 International System of Units (SI Units)**

11.1.4.1.1 The SI Units developed and maintained by the General Conference of Weights and Measures (CGPM) shall, subject to the provisions of sub-regulation 11.1.4.2, be used as the standard system of units of measurement for all aspects of international civil aviation air and ground operations in [State].

11.1.4.1.2 The prefixes and symbols listed in Table 3-1 of Annex 5 shall be used to form names and symbols of the decimal multiples and sub-multiples of SI Units.

##### **11.1.4.2 Non-SI Units**

11.1.4.2.1 The non-SI Units listed in Annex 5, Table 3-2 shall be used either in lieu of, or in addition to, the SI Units as the units of measurement but only as specified in Annex 5, Table 3-4.

11.1.4.2.2 The non-SI Units listed in Annex 5, Table 3-3 shall be permitted for temporary use as alternative units of measurement but only for those specific quantities listed in Annex 5, Table 3-4.

11.1.4.3 The application of units of measurements for certain quantities used in international civil aviation air and ground operations in [State] shall be in accordance with Annex 5, Table 3-4.

11.1.4.4 Means and provisions for design, procedures and training should be established for operations in environments involving the use of standard and non-SI Units of measurement, or the transition between environments using different units, with due consideration to human performance.

#### **11.1.5 Safety Management System (SMS)**

11.1.5.1 The ANSPs, must establish an acceptable SMS that shall be:

- a) established in accordance with the framework elements contained in Appendix 1 of these regulations; and
- b) commensurate with the size of the service provider and the complexity of its services.

11.1.5.2 The SMS of an ATS provider established in accordance with sub-regulation 11.1.5.1, shall be subject to the acceptance of [appropriate authority designated by State].

*Note.— The provision of AIS, CNS, MET and/or SAR services, when under the authority of an ATS provider, are included in the scope of the ATS provider's SMS. When the provision of AIS, CNS, MET and/or SAR services are wholly or partially provided by an entity other than an ATS provider, the related services that come under the authority of the ATS provider, or those aspects of the services with direct operational implications, are included in the scope of the ATS provider's SMS.*



## Appendix 1

### FRAMEWORK FOR A SMS

This appendix specifies the framework for the implementation and maintenance of an SMS. The framework comprises four components and twelve elements as the minimum requirements for an SMS implementation:

1. Safety policy and objectives
  - 1.1 Management commitment and responsibility
  - 1.2 Safety accountabilities
  - 1.3 Appointment of key safety personnel
  - 1.4 Coordination of emergency response planning
  - 1.5 SMS documentation
2. Safety risk management
  - 2.1 Hazard identification
  - 2.2 Safety risk assessment and mitigation
3. Safety assurance
  - 3.1 Safety performance monitoring and measurement
  - 3.2 The management of change
  - 3.3 Continuous improvement of the SMS
4. Safety promotion
  - 4.1 Training and education
  - 4.2 Safety communication

#### 1. Safety policy and objectives

- 1.1 Management commitment and responsibility
  - 1.1.1 The service provider shall define its safety policy in accordance with international and national requirements. The safety policy shall:
    - a) reflect organizational commitment regarding safety;
    - b) include a clear statement about the provision of the necessary resources for the implementation of the safety policy;
    - c) include safety reporting procedures;
    - d) clearly indicate which types of behaviours are unacceptable related to the service provider's aviation activities and include the circumstances under which disciplinary action would not apply;
    - e) be signed by the accountable executive of the organization;

- f) be communicated, with visible endorsement, throughout the organization; and
- g) be periodically reviewed to ensure it remains relevant and appropriate to the service provider.

1.2 Safety accountabilities

1.2.1 The service provider shall:

- a) identify the accountable executive who, irrespective of other functions, has ultimate responsibility and accountability, on behalf of the organization, for the implementation and maintenance of the SMS;
- b) clearly define lines of safety accountability throughout the organization, including a direct accountability for safety on the part of senior management;
- c) identify the accountabilities of all members of management, irrespective of other functions, as well as of employees, with respect to the safety performance of the SMS;
- d) document and communicate safety responsibilities, accountabilities and authorities throughout the organization; and
- e) define the levels of management with authority to make decisions regarding safety risk tolerability.

1.3 Appointment of key safety personnel

1.3.1 The service provider shall appoint a safety manager who is responsible for the implementation and maintenance of an effective SMS.

1.4 Coordination of emergency response planning

1.4.1 The service provider shall ensure that an emergency response plan is properly coordinated with the emergency response plans of those organizations it must interface with during the provision of its products and services.

1.5 SMS documentation

1.5.1 The service provider shall develop an SMS implementation plan, formally endorsed by the organization that defines the organization's approach to the management of safety in a manner that meets the organization's safety objectives.

1.5.2 The service provider shall develop and maintain SMS documentation that describes:

- a) safety policy and objectives;
- b) SMS requirements;
- c) SMS processes and procedures;

- d) accountabilities, responsibilities and authorities for SMS processes and procedures; and
- e) SMS outputs.

1.5.3 The service provider shall develop and maintain an SMS manual as part of its SMS documentation.

*Note.— An acceptable SMS Manual can be a stand-alone document or integrated within existing documents.*

## **2. Safety risk management**

### **2.1 Hazard identification**

2.1.1 The service provider shall develop and maintain a process that ensures that hazards associated with its aviation services are identified.

2.1.2 Hazard identification shall be based on a combination of reactive, proactive and predictive methods of safety data collection.

### **2.2 Safety risk assessment and mitigation**

2.2.1 The service provider shall develop and maintain a process that ensures analysis, assessment, and control of the safety risks associated with identified hazards.

## **3. Safety assurance**

### **3.1 Safety performance monitoring and measurement**

3.1.1 The service provider shall develop and maintain the means to verify the safety performance of the organization and to validate the effectiveness of safety risk controls.

3.1.2 The service provider's safety performance shall be verified in reference to the safety performance indicators and safety performance targets of the SMS.

### **3.2 The management of change**

3.2.1 The service provider shall develop and maintain a process to identify changes which may affect the level of safety risk associated with its aviation services and to identify and manage the safety risks that may arise from those changes.

### **3.3 Continuous improvement of the SMS**

3.3.1 The Service provider shall monitor and assess the effectiveness of their SMS processes to enable continuous improvement of the overall performance of the SMS.

#### **4. Safety promotion**

##### 4.1 Training and education

4.1.1 The service provider shall develop and maintain a safety training programme that ensures that personnel are trained and competent to perform their SMS duties.

4.1.2 The scope of the safety training programme shall be appropriate to each individual's involvement in the SMS.

##### 4.2 Safety communication

4.2.1 The service provider shall develop and maintain a formal means for safety communication that:

- a) ensures personnel are aware of the SMS to a degree commensurate with their positions;
- b) conveys safety-critical information;
- c) explains why particular safety actions are taken; and
- d) explains why safety procedures are introduced or changed.

## **Part 11.2 – Air Traffic Services (ATS)**

### **11.2.1 Establishment of authority**

11.2.1.1 The ANSP shall arrange for ATS to be provided in accordance with the provisions of this regulation. These services shall be provided in accordance with the airspace classification established by [appropriate authority designated by the State] and at the aerodromes designated as controlled aerodromes.

11.2.1.2 If applicable, the ANSP shall provide ATS over the high seas or the airspace of undetermined sovereignty in accordance with the provisions of this regulation.

11.2.1.3 The ANSP shall be designated by [appropriate authority designated by the State] for providing such services.

### **11.2.2 Objectives of the ATS**

11.2.2.1 The objectives of the ATS 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; and
- e) notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

### **11.2.3 ATS organization exposition manual**

11.2.3.1 The ANSP shall provide, for compliance by its personnel, an ATS exposition manual or system of manuals for the ATS listed in its exposition manual.

11.2.3.2 The exposition manual shall contain:

- a) a description of the provider's organizational structure and the names, qualifications, experience and positions of the key officers of the organization;
- b) a statement of the duties and responsibilities of the supervisory positions within the organizational structure;
- c) a statement showing how the provider determines the number of operational staff required, including the number of operational supervisory staff;
- d) a statement setting out the ATS and related functions, that the provider will perform;
- e) the hours of operation of each service;

- f) the airspace within which each service is to be provided. This may be by reference to an aeronautical chart;
- g) if the service is an ATS for a controlled aerodrome:
  - (i) a chart of the manoeuvring area of the aerodrome showing all runways, taxiways, parking areas, etc.;
  - (ii) extracts from the Airport Emergency Plan (AEP) relevant to the ATS functions;
  - (iii) a copy of the procedures as set out in the aerodrome manual for preventing unauthorized entry of persons or things onto the movement area of the aerodrome; and
  - (iv) a copy of the procedures set out in the aerodrome manual for the control of surface vehicles operating on or in the vicinity of the manoeuvring area;
- h) a duty statement including the functions, responsibilities and hours of operation, of each operating position.
- i) a description of the arrangements made by the applicant to ensure that it has, and will continue to receive, the information necessary for providing each service:
  - (i) this requirement includes information that is both internally and externally sourced; and
  - (ii) the description should nominate the information requirement, its use in service provision, its source, and the means of its transfer, receipt and display;
- j) a description of the arrangements made by the applicant to ensure that it can, and will continue to be able to, provide the information in relation to its ATS to other organizations whose functions reasonably require that information (e.g. other ATS units and centres);
- k) the requirement for a record keeping system that covers identification, collection, storage, security, maintenance, access and disposal of records necessary for the provision of ATS. The record systems shall provide an accurate chronicle of ATS activities for the purpose of reconstruction of events for air accident and incident investigation or for system safety analysis within the SMS;
- l) a copy of any agreement entered into by the provider in relation to the provision of any of the ATS;
- m) a copy of the document that sets out the provider's SMS;
- n) 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;

- o) a description of the provider's training and checking program and provide assurance that any individual performing any functions in ATS is competent to perform that function; and
- p) the processes for the preparation, authorization and issue of amendments to its exposition manual.

11.2.3.3 The exposition manual shall be issued under the authority of the ANSP which shall control the distribution of the exposition manual and ensure that it is amended whenever necessary to maintain the accuracy of the information.

#### **11.2.4 ATS procedures and standards**

11.2.4.1 The ANSP shall provide ATS in accordance with these regulations, Doc 4444, supplemented by Doc 7030 as applicable.

11.2.4.2 Detailed procedures to be employed by the ATS unit concerned, with any applicable limitations, shall be set out in the unit's manual of ATS.

11.2.4.3 The ANSP shall provide, for compliance by its personnel, the manual of ATS for the services listed in its exposition manual.

11.2.4.4 The ANSP which provides ATS or services from more than one location shall ensure that the manual of ATS is supplemented by directives specific to each location.

11.2.4.5 The manual shall be kept up to date and be forwarded to the [appropriate authority designated by the State] without delay.

11.2.4.6 The manual shall describe the operational procedures of ATS unit(s) which comply with Annex 11 and Doc 4444 and shall include:

- a) the information required regarding hours of service, the establishment of an ATS and any transitional arrangements;
- b) details of the procedures required regarding the control of documentation;
- c) details of the systems and procedures regarding general information requirements that could have an operational impact on the ATS being provided;
- d) details of the procedures required regarding the notification of facility status;
- e) details of the systems and procedures regarding meteorological information and reporting by ATS personnel;
- f) details of the procedures regarding the keeping of logbooks;
- g) procedures regarding shift administration;
- h) procedures to mitigate the effects of fatigue;

- i) procedures required regarding responsibility for control;
- j) systems and procedures regarding coordination requirements;
- k) the contingency plans as required by these regulations;
- l) procedures regarding incidents and accidents;
- m) systems and procedures regarding the retention and management of records;
- n) procedures regarding disruptions to service;
- o) procedures for issuing ATC clearances and obtaining a correct read-back of clearances and safety-related information;
- p) systems and procedures regarding the provision of approach control services, where applicable;
- q) systems and procedures regarding the provision of aerodrome control service, where applicable;
- r) procedures regarding the application of priorities;
- s) procedures regarding flow control;
- t) procedures regarding the provision of flight information service;
- u) details of systems and procedures regarding the provision of aerodrome flight information service;
- v) systems and procedures regarding the provision of alerting service;
- w) procedures regarding the processing of flight plans;
- x) procedures regarding time system and accuracy in the provision of ATS;
- y) radiotelephony procedures;
- z) procedures regarding the provision of radar services, where applicable;
- aa) procedures regarding aircraft emergencies and irregular operation;
- bb) procedures for aircraft in the event of in-flight contingencies;
- cc) arrangements in place for provision of AIS to the unit;
- dd) systems and procedures governing ATIS broadcasts.



### **11.2.5 Training and assessment**

11.2.5.1 An ANSP shall establish training programmes and procedures to assess and ensure the initial and continuing competence of operational personnel including continued competence in using new equipment, procedures and updated communications.

11.2.5.2 The programmes and procedures in sub-regulation 11.2.5.1 shall ensure that operational personnel are trained, given regular recurrent training in normal and emergency procedures and are assessed on such.

### **11.2.6 Divisions of the ATS**

11.2.6.1 The ATS shall comprise three services identified as follows:

- a) the air traffic control service, to accomplish objectives a), b) and c) of sub-regulation 11.2.2.1. This service being divided in three parts as follows:
  - (i) area control service: the provision of air traffic control service for controlled flights, except for those parts of such flights described in sub-regulation 11.2.6.1 (ii) and (iii), in order to accomplish objectives a) and c) of sub-regulation 11.2.2.1;
  - (ii) approach control service: the provision of air traffic control service for those parts of controlled flights associated with arrival or departure, in order to accomplish objectives a) and c) of sub-regulation 11.2.2.1;
  - (iii) aerodrome control service: the provision of air traffic control service for aerodrome traffic, except for those parts of flights described in sub-regulation 11.2.6.1 (ii), in order to accomplish objectives a), b) and c) of sub-regulation 11.2.2.1.

11.2.6.2 The flight information service, to accomplish objective d) of sub-regulation 11.2.2.1.

11.2.6.3 The alerting service, to accomplish objective e) of sub-regulation 11.2.2.1.

### **11.2.7 Determination of the need for ATS**

11.2.7.1 The ANSP may propose changes to the State for the classification of airspace and provision of ATS by consideration of the following factors:

- a) the types of air traffic involved;
- b) the density of air traffic;
- c) the meteorological conditions; and
- d) such other factors as may be relevant.

11.2.7.2 The carriage of airborne collision avoidance systems (ACAS) by aircraft in a given area shall not be a factor in determining the need for ATS in that area.

11.2.8 – 11.2.10 RESERVED

### 11.2.11 Classification of airspaces

11.2.11.1 ATS airspaces shall be classified and designated in accordance with the following:

- a) Class A. IFR flights only are permitted, all flights are provided with air traffic control service and are separated from each other.
- b) Class B. IFR and VFR flights are permitted, all flights are provided with air traffic control service and are separated from each other.
- c) Class C. IFR and VFR flights are permitted, all flights are provided with air traffic control service and IFR flights are separated from other IFR flights and from VFR flights. VFR flights are separated from IFR flights and receive traffic information in respect of other VFR flights.
- d) Class D. IFR and VFR flights are permitted and all flights are provided with air traffic control service, IFR flights are separated from other IFR flights and receive traffic information in respect of VFR flights, VFR flights receive traffic information in respect of all other flights.
- e) Class E. IFR and VFR flights are permitted; IFR flights are provided with air traffic control service and are separated from other IFR flights. All flights receive traffic information as far as is practical. Class E shall not be used for control zones.
- f) Class F. IFR and VFR flights are permitted, all participating IFR flights receive an air traffic advisory service and all flights receive flight information service if requested.
- g) Class G. IFR and VFR flights are permitted and receive flight information service if requested.

11.2.11.2 The [appropriate authority designated by the State] shall select those airspace classes appropriate to the needs.

11.2.11.3 The requirements for flights within each class of airspace shall be as shown in the table in Annex 11, Appendix 4.

### 11.2.12 Performance-based navigation (PBN) operations

11.2.12.1 When applicable, the navigation specification(s) for designated areas, tracks or ATS routes shall be prescribed on the basis of regional air navigation agreements. In designating a navigation specification, limitations may apply as a result of navigation infrastructure constraints or specific navigation functionality requirements.

11.2.12.2 The prescribed navigation specification shall be appropriate to the level of communications, navigation and ATS provided in the airspace concerned as prescribed in the ICAO Doc 9613 — *Performance Based Navigation Manual*.

### 11.2.13 Required communication performance (RCP)

11.2.13.1 As required, the RCP type(s) shall be prescribed on the basis of regional air navigation agreements.

11.2.13.2 The prescribed RCP type shall be appropriate to the ATS provided in the airspace concerned.

#### **11.2.14 Establishment and designation of the units providing ATS**

The ATS shall be provided by units established and designated as follows:

11.2.14.1 Flight information centres shall be established to provide flight information service and alerting service within flight information regions, unless the responsibility of providing such services within a flight information region is assigned to an air traffic control unit having adequate facilities for the discharge of such responsibility.

11.2.14.2 Air traffic control units shall be established to provide air traffic control service, flight information service and alerting service in accordance with the airspace classification and controlled aerodromes.

#### **11.2.15 Specifications for flight information regions, control areas and control zones**

11.2.15.1 Flight information regions shall be delineated to cover the whole of the air route structure to be served by such regions.

11.2.15.2 A flight information region shall include all airspace within its lateral limits, except as limited by an upper flight information region.

11.2.15.3 Where a flight information region is limited by an upper flight information region, the lower limit specified for the upper flight information region shall constitute the upper vertical limit of the flight information region and shall coincide with a VFR cruising level of the tables in Appendix 3 to Annex 2.

11.2.15.4 Control areas including airways and terminal control areas shall be delineated so as to encompass sufficient airspace to contain the flight paths of those IFR flights or portions thereof to which it is desired to provide the applicable parts of the air traffic control service, taking into account the capabilities of the navigation aids normally used in that area.

11.2.15.5 A lower limit of a control area shall be established at a height above the ground or water of not less than 200 m (700 ft.).

11.2.15.6 An upper limit of a control area shall be established when either:

- a) air traffic control service will not be provided above such upper limit; or
- b) the control area is situated below an upper control area, in which case the upper limit shall coincide with the lower limit of the upper control area. When established, such upper limit shall coincide with a VFR cruising level of the tables in Appendix 3 to Annex 2.

11.2.15.7 The lateral limits of control zones shall encompass at least those portions of the airspace, which are not within control areas, containing the paths of IFR flights arriving at and departing from aerodromes to be used under instrument meteorological conditions.

11.2.15.8 The lateral limits of a control zone shall extend to at least 9.3 km (5 NM) from the centre of the aerodrome or aerodromes concerned in the directions from which approaches may be made.

11.2.15.9 If a control zone is located within the lateral limits of a control area, it shall extend upwards from the surface of the earth to at least the lower limit of the control area.

#### **11.2.16 Establishment and identification of ATS routes**

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

11.2.16.2 ATS routes shall be identified by designators.

11.2.16.3 Designators for ATS routes other than standard departure and arrival routes shall be selected in accordance with the principles set forth in Annex 11, Appendix 1.

11.2.16.4 Standard departure and arrival routes and associated procedures shall be identified in accordance with the principles set forth in Annex 11, Appendix 3.

#### **11.2.17 Establishment and identification of significant points**

11.2.17.1 Significant points shall be established for the purpose of defining an ATS route or instrument approach procedure and/or in relation to the requirements of ATS for information regarding the progress of aircraft in flight.

11.2.17.2 Significant points shall be identified by designators.

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

#### **11.2.18 Coordination between the operator and ATS**

11.2.18.1 ATS units, in carrying out their objectives, shall have due regard for the requirements of the operators consequent on their obligations as specified in Annex 6, and, if so required by the operators, shall make available to them or their designated representatives such information as may be available to enable them or their designated representatives to carry out their responsibilities.

11.2.18.2 When requested by an operator, messages (including position reports) received by ATS units and relating to the operation of the aircraft for which operational control service is provided by that operator shall, so far as practicable, be made available immediately to the operator or a designated representative in accordance with locally agreed procedures.

#### **11.2.19 Coordination between military authorities and ATS**

11.2.19.1 ATS authorities shall establish and maintain close cooperation with military authorities responsible for activities that may affect flights of civil aircraft.

11.2.19.2 Coordination of activities potentially hazardous to civil aircraft shall be effected in accordance with regulation 11.2.20.

11.2.19.3 Arrangements shall be made to permit information relevant to the safe and expeditious conduct of flights of civil aircraft to be promptly exchanged between ATS units and appropriate military units.

11.2.19.4 ATS units shall, either routinely or on request, in accordance with locally agreed procedures, provide appropriate military units with pertinent flight plan and other data concerning flights of civil aircraft. In order to eliminate or reduce the need for interceptions, ATS authorities shall designate any areas or routes where the requirements of Annex 2 concerning flight plans, two-way communications and position reporting apply to all flights to ensure that all pertinent data is available in appropriate ATS units specifically for the purpose of facilitating identification of civil aircraft.

11.2.19.5 Special procedures shall be established in order to ensure that:

- a) ATS units are notified if a military unit observes that an aircraft which is, or might be, a civil aircraft is approaching, or has entered, any area in which interception might become necessary; and
- b) all possible efforts are made to confirm the identity of the aircraft and to provide it with the navigational guidance necessary to avoid the need for interception.

#### **11.2.20 Coordination of activities potentially hazardous to civil aircraft**

11.2.20.1 The arrangements for activities potentially hazardous to civil aircraft shall be coordinated with the [appropriate authority designated by the State]. The coordination shall be effected early enough to permit timely promulgation of information regarding the activities in accordance with the provisions of Annex 15.

11.2.20.2 The objective of the coordination shall be to achieve the best arrangements which will avoid hazards to civil aircraft and minimize interference with the normal operations of such aircraft.

11.2.20.3 The appropriate ATS authorities shall be responsible for initiating the promulgation of information regarding the activities.

11.2.20.4 The ANSP shall develop procedures to implement steps taken by [appropriate authority designated by the State] to prevent emission of laser beams from adversely affecting flight operations.

#### **11.2.21 Aeronautical data**

11.2.21.1 Determination and reporting of ATS related aeronautical data shall be in accordance with the accuracy and integrity requirements set forth in Tables 1 to 5 contained in Appendix 5 to Annex 11 while taking into account the established quality system procedures. Accuracy requirements for aeronautical data are based upon a 95 per cent confidence level, and in that respect, three types of positional data shall be identified: surveyed points, calculated points (mathematical calculations from the known surveyed points of points in space/fixes) and declared points.

11.2.21.2 The ANSP shall ensure that integrity of aeronautical data is maintained throughout the data process from survey/origin to the next intended user. Based on the applicable integrity classification, the validation and verification procedures shall:

- a) for routine data: avoid corruption throughout the processing of the data;
- b) for essential data: assure corruption does not occur at any stage of the entire process and may include additional processes as needed to address potential risks in the overall system architecture to further assure data integrity at this level; and

- c) for critical data: assure corruption does not occur at any stage of the entire process and include additional integrity assurance procedures to fully mitigate the effects of faults identified by thorough analysis of the overall system architecture as potential data integrity risks.

11.2.21.3 Protection of electronic aeronautical data while stored or in transit shall be totally monitored by the cyclic redundancy check (CRC). To achieve protection of the integrity level of critical and essential aeronautical data as classified in sub-regulation 11.2.21.2, a 32- or 24-bit CRC algorithm shall apply respectively.

11.2.21.4 Geographical coordinates indicating latitude and longitude shall be determined and reported to the AIS authority in terms of the World Geodetic System — 1984 (WGS-84) geodetic reference datum, identifying those geographical coordinates which have been transformed into WGS-84 coordinates by mathematical means and whose accuracy of original field work does not meet the requirements in Appendix 5, Table 1 of Annex 11.

11.2.21.5 The order of accuracy of the field work and determinations and calculations derived therefrom shall be such that the resulting operational navigation data for the phases of flight will be within the maximum deviations, with respect to an appropriate reference frame, as indicated in the tables contained in Appendix 5 of Annex 11.

#### **11.2.22 Coordination between meteorological and ATS authorities**

11.2.22.1 To ensure that aircraft receive the most up-to-date meteorological information for aircraft operations, arrangements shall be made, where necessary, between meteorological and ATS authorities for ATS personnel:

- a) in addition to using indicating instruments, to report, if observed by ATS personnel or communicated by aircraft, such other meteorological elements as may be agreed upon;
- b) to report as soon as possible to the associated meteorological office meteorological phenomena of operational significance, if observed by ATS personnel or communicated by aircraft, which have not been included in the aerodrome meteorological report;
- c) to report as soon as possible to the associated meteorological office pertinent information concerning pre-eruption volcanic activity, volcanic eruptions and information concerning volcanic ash cloud. In addition, area control centres and flight information centres shall report the information to the associated meteorological watch office and volcanic ash advisory centres (VAACs).

11.2.22.2 Close coordination shall be maintained between area control centres, flight information centres and associated meteorological watch offices to ensure that information on volcanic ash included in NOTAM and SIGMET messages is consistent.

#### **11.2.23 Coordination between AIS and ATS authorities**

11.2.23.1 To ensure that AIS units obtain information to enable them to provide up-to-date pre-flight information and to meet the need for in-flight information, arrangements shall be made between AIS and ATS authorities responsible for ATS to report to the responsible AIS unit, with a minimum of delay:

- a) information on aerodrome conditions;

- b) the operational status of associated facilities, services and navigation aids within their area of responsibility;
- c) the occurrence of volcanic activity observed by ATS personnel or reported by aircraft; and
- d) any other information considered to be of operational significance.

11.2.23.2 Before introducing changes to the air navigation system, due account shall be taken by the services responsible for such changes of the time needed by the aeronautical information service for the preparation, production and issuance of relevant material for promulgation. To ensure timely provision of the information to the aeronautical information service, close coordination between those services concerned is therefore required.

11.2.23.3 Of particular importance are changes to aeronautical information that affect charts and/or computer-based navigation systems which qualify to be notified by the Aeronautical Information Regulation and Control (AIRAC) system, as specified in Annex 15, Chapter 6 and Appendix 4. The predetermined, internationally agreed AIRAC effective dates in addition to 14 days postage time shall be observed by the responsible ATS when submitting the raw information/data to AIS.

11.2.23.4 The ATS responsible for the provision of raw aeronautical information/data to the AIS shall do so while taking into account accuracy and integrity requirements for aeronautical data as specified in Appendix 5 to Annex 11.

11.2.24 – 11.2.27 RESERVED

### **11.2.28 Minimum flight altitudes**

11.2.28.1 Minimum flight altitudes shall be determined and promulgated by the ANSP for each ATS route and control area over its territory. The minimum flight altitudes determined shall provide a minimum clearance above the controlling obstacle located within the areas concerned.

### **11.2.29 Service to aircraft in the event of an emergency**

11.2.29.1 An aircraft known or believed to be in a state of emergency, including being subjected to unlawful interference, shall be given maximum consideration, assistance and priority over other aircraft as may be necessitated by the circumstances.

11.2.29.2 When an occurrence of unlawful interference with an aircraft takes place or is suspected, ATS units shall attend promptly to requests by the aircraft. Information pertinent to the safe conduct of the flight shall continue to be transmitted and necessary action shall be taken to expedite the conduct of all phases of the flight, especially the safe landing of the aircraft.

11.2.29.3 When an occurrence of unlawful interference with an aircraft takes place or is suspected, ATS units shall, in accordance with locally agreed procedures, immediately inform the appropriate authority designated by the State and exchange necessary information with the operator or its designated representative.

### 11.2.30 In-flight contingencies

11.2.30.1 As soon as an ATS unit becomes aware of a strayed aircraft it shall take all necessary steps as outlined in sub-regulations 11.2.30.2 and 11.2.30.3 to assist the aircraft and to safeguard its flight.

11.2.30.2 If the aircraft's position is not known, the ATS unit shall:

- a) attempt to establish two-way communication with the aircraft, unless such communication already exists;
- b) use all available means to determine its position;
- c) inform other ATS units into whose area the aircraft may have strayed or may stray, taking into account all the factors which may have affected the navigation of the aircraft in the circumstances;
- d) inform, in accordance with locally agreed procedures, appropriate military units and provide them with pertinent flight plan and other data concerning strayed aircraft;
- e) request from the units referred to in sub-regulation 11.2.30.2 c) and d) and from other aircraft in flight every assistance in establishing communication with the aircraft and determining its position.

11.2.30.3 When the aircraft's position is established, the ATS unit shall:

- a) advise the aircraft of its position and corrective action to be taken; and
- b) provide, as necessary, other ATS units and appropriate military units with relevant information concerning the strayed aircraft and any advice given to that aircraft.

11.2.30.4 As soon as an ATS unit becomes aware of an unidentified aircraft in its area, it shall endeavour to establish the identity of the aircraft whenever this is necessary for the provision of ATS or required by the appropriate military authorities in accordance with locally agreed procedures. To this end, the ATS unit shall take such of the following steps as are appropriate in the circumstances:

- a) attempt to establish two-way communication with the aircraft;
- b) inquire of other ATS units within the flight information region about the flight and request their assistance in establishing two-way communication with the aircraft;
- c) inquire of ATS units serving the adjacent flight information regions about the flight and request their assistance in establishing two-way communication with the aircraft;
- d) attempt to obtain information from other aircraft in the area.

11.2.30.5 The ATS unit shall, as necessary, inform the appropriate military unit as soon as the identity of the aircraft has been established.

11.2.30.6 Should the ATS unit consider that a strayed or unidentified aircraft may be the subject of unlawful interference, the [appropriate authority designated by the State] shall immediately be informed, in accordance with locally agreed procedures.



### **11.2.31 Interception of civil aircraft**

11.2.31.1 As soon as an ATS unit learns that an aircraft is being intercepted in its area of responsibility, it shall take such of the following steps as are appropriate in the circumstances:

- a) attempt to establish two-way communication with the intercepted aircraft via any means available, including the emergency radio frequency 121.5 MHz, unless such communication already exists;
- b) inform the pilot of the intercepted aircraft of the interception;
- c) establish contact with the intercept control unit maintaining two-way communication with the intercepting aircraft and provide it with available information concerning the aircraft;
- d) relay messages between the intercepting aircraft or the intercept control unit and the intercepted aircraft, as necessary;
- e) in close coordination with the intercept control unit take all necessary steps to ensure the safety of the intercepted aircraft;
- f) inform ATS units serving adjacent flight information regions if it appears that the aircraft has strayed from such adjacent flight information regions.

11.2.31.2 As soon as an ATS unit learns that an aircraft is being intercepted outside its area of responsibility, it shall take such of the following steps as are appropriate in the circumstances:

- a) inform the ATS unit serving the airspace in which the interception is taking place, providing this unit with available information that will assist in identifying the aircraft and requesting it to take action in accordance with sub-regulation 11.2.31.1;
- b) relay messages between the intercepted aircraft and the appropriate ATS unit, the intercept control unit or the intercepting aircraft.

### **11.2.32 Time in ATS**

11.2.32.1 ATS units shall use Coordinated Universal Time (UTC) and shall express the time in hours and minutes and, when required, seconds of the 24-hour day beginning at midnight.

11.2.32.2 ATS units shall be equipped with clocks indicating the time in hours, minutes and seconds, clearly visible from each operating position in the unit concerned.

11.2.32.3 ATS unit clocks and other time-recording devices shall be checked as necessary to ensure correct time to within plus or minus 30 seconds of UTC. Wherever data link communications are utilized by an ATS unit, clocks and other time-recording devices shall be checked as necessary to ensure correct time to within 1 second of UTC.

11.2.32.4 The correct time shall be obtained from a standard time station or, if not possible, from another unit which has obtained the correct time from such station.

11.2.32.5 Aerodrome control towers shall, prior to an aircraft taxiing for take-off, provide the pilot with the correct time, unless arrangements have been made for the pilot to obtain it from other sources. ATS units shall, in addition, provide aircraft with the correct time on request. Time checks shall be given to the nearest half minute.

11.2.32.6 Any significant safety-related change to the ATS system, including the implementation of a reduced separation minimum or a new procedure, shall only be effected after a safety assessment has demonstrated that an acceptable level of safety will be met and users have been consulted. When appropriate, the ANSP shall ensure that adequate provision is made for post-implementation monitoring to verify that the defined level of safety continues to be met.

### **11.2.33 Common reference systems**

11.2.33.1 World Geodetic System — 1984 (WGS-84) shall be used as the horizontal (geodetic) reference system for air navigation. Reported aeronautical geographical coordinates (indicating latitude and longitude) shall be expressed in terms of the WGS-84 geodetic reference datum.

11.2.33.2 Mean sea level (MSL) datum, which gives the relationship of gravity-related height (elevation) to a surface known as the geoid, shall be used as the vertical reference system for air navigation.

11.2.33.3 The Gregorian calendar and Coordinated Universal Time (UTC) shall be used as the temporal reference system for air navigation.

### **11.2.34 Language proficiency**

11.2.34.1 An ATS provider shall ensure that air traffic controllers speak and understand the language(s) used for radiotelephony communications as specified in Annex 1.

11.2.34.2 Except when communications between air traffic control units are conducted in a mutually agreed language, the English language shall be used for such communications.

### **11.2.35 Contingency arrangements**

11.2.35.1 ATS authorities shall develop and promulgate contingency plans for implementation in the event of disruption, or potential disruption, of ATS and related supporting services in the airspace for which they are responsible for the provision of such services. Such contingency plans shall be developed in close coordination with the ATS authorities responsible for the provision of services in adjacent portions of airspace and with airspace users concerned.

11.2.36 – 11.2.37 RESERVED

### **11.2.38 Provisions of Air Traffic Control Service**

11.2.38.1 Air traffic control service shall be provided:

- a) to all IFR flights in airspace Classes A, B, C, D and E;
- b) to all VFR flights in airspace Classes B, C and D;
- c) to all special VFR flights; and

- d) to all aerodrome traffic at controlled aerodromes.

11.2.38.2 The parts of air traffic control service described in 11.2.6.1 shall be provided by the various units as follows:

- a) area control service:
  - (i) by an area control centre; or
  - (ii) 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 and where no area control centre is established;
- b) approach control service:
  - (i) by an aerodrome control tower or area control centre when it is necessary or desirable to combine under the responsibility of one unit the functions of the approach control service with those of the aerodrome control service or the area control service;
  - (ii) by an approach control unit when it is necessary or desirable to establish a separate unit; and
- c) aerodrome control service: by an aerodrome control tower.

### **11.2.39 Operation of air traffic control service**

11.2.39.1 In order to provide air traffic control service, an air traffic control unit shall:

- a) be provided with information on the intended movement of each aircraft, or variations therefrom, and with current information on the actual progress of each aircraft;
- b) determine from the information received, the relative positions of known aircraft to each other;
- c) issue clearances and information for the purpose of preventing collision between aircraft under its control and of expediting and maintaining an orderly flow of traffic;
- d) coordinate clearances as necessary with other units:
  - (i) whenever an aircraft might otherwise conflict with traffic operated under the control of such other units; and
  - (ii) before transferring control of an aircraft to such other units.

11.2.39.2 Information on aircraft movements, together with a record of air traffic control clearances issued to such aircraft, shall be so displayed as to permit ready analysis in order to maintain an efficient flow of air traffic with adequate separation between aircraft.

11.2.39.3 Clearances issued by air traffic control units shall provide separation:

- a) between all flights in airspace Classes A and B;
- b) between IFR flights in airspace Classes C, D and E;
- c) between IFR flights and VFR flights in airspace Class C;
- d) between IFR flights and special VFR flights;
- e) between special VFR flights when so prescribed by the appropriate ATS authority, except that, when requested by an aircraft and if so prescribed by the appropriate ATS authority for the cases listed under b) above in airspace Classes D and E, a flight may be cleared without separation being so provided in respect of a specific portion of the flight conducted in visual meteorological conditions.

11.2.39.4 Separation by an air traffic control unit shall be obtained by at least one of the following:

- a) vertical separation, obtained by assigning different levels selected from:
  - (i) the appropriate table of cruising levels in Appendix 3 of Annex 2, or
  - (ii) a modified table of cruising levels, when so prescribed in accordance with Appendix 3 of Annex 2 for flight above FL 410, except that the correlation of levels to track as prescribed therein shall not apply whenever otherwise indicated in appropriate AIPs or air traffic control clearances;
- b) horizontal separation, obtained by providing:
  - (i) longitudinal separation, by maintaining an interval between aircraft operating along the same, converging or reciprocal tracks, expressed in time or distance; or
  - (ii) lateral separation, by maintaining aircraft on different routes or in different geographical areas; and
- c) composite separation, consisting of a combination of vertical separation and one of the other forms of separation contained in b) above, using minima for each which may be lower than, but not less than half of, those used for each of the combined elements when applied individually. Composite separation shall only be applied on the basis of regional air navigation agreements.

11.2.39.5 For all airspace where a reduced vertical separation minimum of 300 m (1 000 ft.) is applied between FL 290 and FL 410 inclusive, a programme shall be instituted, on a regional basis, for monitoring the height-keeping performance of aircraft operating at these levels, in order to ensure that the implementation and continued application of this vertical separation minimum meets the safety objectives. The coverage of the height-monitoring facilities provided under this programme shall be adequate to permit monitoring of the relevant aircraft types of all operators that operate in RVSM airspace.

11.2.39.6 Arrangements shall be put in place, through interregional agreement, for the sharing between regions of data from monitoring programmes.

### **11.2.40 Separation minima**

11.2.40.1 The selection of separation minima for application within a given portion of airspace shall be as follows:

- a) the separation minima shall be selected from those prescribed by the provisions of the PANS-ATM and the Regional Supplementary Procedures as applicable under the prevailing circumstances except that, where types of aids are used or circumstances prevail which are not covered by current ICAO provisions, other separation minima shall be established as necessary by:
  - (i) following consultation with operators, for routes or portions of routes contained within the sovereign airspace of [State];
  - (ii) regional air navigation agreements for routes or portions of routes contained within airspace over the high seas or over areas of undetermined sovereignty;
- b) the selection of separation minima shall be made in consultation between the appropriate ATS authorities responsible for the provision of ATS in neighbouring airspace when:
  - (i) traffic will pass from one into the other of the neighbouring airspaces;
  - (ii) routes are closer to the common boundary of the neighbouring airspaces than the separation minima applicable in the circumstances.

11.2.40.2 Details of the selected separation minima and of their areas of application shall be notified:

- a) to the ATS units concerned; and
- b) to pilots and operators through AIPs, where separation is based on the use by aircraft of specified navigation aids or specified navigation techniques.

### **11.2.41 Responsibility for control**

11.2.41.1 A controlled flight shall be under the control of only one air traffic control unit at any given time.

11.2.41.2 Responsibility for the control of all aircraft operating within a given block of airspace shall be vested in a single air traffic control unit. However, control of an aircraft or groups of aircraft may be delegated to other air traffic control units provided that coordination between all air traffic control units concerned is assured.

### **11.2.42 Transfer of responsibility for control**

The responsibility for the control of an aircraft shall be transferred from one air traffic control unit to another as follows:

11.2.42.1 Between two units providing area control service. 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 area control centre having control of the aircraft or at such other point or time as has been agreed between the two units.

11.2.42.2 Between a unit providing area control service and a unit providing approach control service. The responsibility for the control of an aircraft shall be transferred from a unit providing area control service to a unit providing approach control service, and vice versa, at a point or time agreed between the two units.

11.2.42.3 Between a unit providing approach control service and an aerodrome control tower:

11.2.42.3.1 Arriving aircraft. The responsibility for the control of an arriving aircraft shall be transferred from the unit providing approach control service to the aerodrome control tower, when the aircraft:

- a) is in the vicinity of the aerodrome, and:
  - (i) it is considered that approach and landing will be completed in visual reference to the ground, or
  - (ii) it has reached uninterrupted visual meteorological conditions, or
- b) is at a prescribed point or level, as specified in letters of agreement or ATS unit instructions; or
- c) has landed.

11.2.42.3.2 Departing aircraft. The responsibility for control of a departing aircraft shall be transferred from the aerodrome control tower to the unit providing approach control service:

- a) when visual meteorological conditions prevail in the vicinity of the aerodrome:
  - (i) prior to the time the aircraft leaves the vicinity of the aerodrome, or
  - (ii) prior to the aircraft entering instrument meteorological conditions, or
  - (iii) at a prescribed point or level,as specified in letters of agreement or ATS unit instructions;
- b) when instrument meteorological conditions prevail at the aerodrome:
  - (i) immediately after the aircraft is airborne, or
  - (ii) at a prescribed point or level,as specified in letters of agreement or ATS unit instructions.

11.2.42.4 Between control sectors/positions within the same air traffic control unit. The responsibility for control of an aircraft shall be transferred from one control sector/position to another control sector/position within the same air traffic control unit at a point, level or time, as specified in ATS unit instructions.

11.2.42.5 Responsibility for control of an aircraft shall not be transferred from one air traffic control unit to another without the consent of the accepting control unit, which shall be obtained in accordance with sub-regulations 11.2.42.6, 11.2.42.7, 11.2.42.8 and 11.2.42.9.

11.2.42.6 The transferring control unit shall communicate to the accepting control unit the appropriate parts of the current flight plan and any control information pertinent to the transfer requested.

11.2.42.7 Where transfer of control is to be effected using radar or ADS-B data, the control information pertinent to the transfer shall include information regarding the position and, if required, the track and speed of the aircraft, as observed by radar or ADS-B immediately prior to the transfer.

11.2.42.8 Where transfer of control is to be effected using ADS-C data, the control information pertinent to the transfer shall include the four-dimensional position and other information as necessary.

11.2.42.9 The accepting control unit shall:

- a) indicate its ability to accept control of the aircraft on the terms specified by the transferring control unit, unless by prior agreement between the two units concerned, the absence of any such indication is understood to signify acceptance of the terms specified, or indicate any necessary changes thereto; and
- b) specify any other information or clearance for a sub-sequent portion of the flight, which it requires the aircraft to have at the time of transfer.

11.2.42.10 The accepting control unit shall notify the transferring control unit when it has established two-way voice and/or data link communications with and assumed control of the aircraft concerned, unless otherwise specified by agreement between the two control units concerned.

11.2.42.11 Applicable coordination procedures, including transfer of control points, shall be specified in letters of agreement and ATS unit instructions as appropriate.

11.2.43 RESERVED

#### **11.2.44 Control of persons and vehicles at aerodromes**

11.2.44.1 The movement of persons or vehicles including towed aircraft on the manoeuvring area of an aerodrome shall be controlled by the aerodrome control tower as necessary to avoid hazard to them or to aircraft landing, taxiing or taking off.

11.2.44.2 In conditions where low visibility procedures are in operation:

- a) persons and vehicles operating on the manoeuvring area of an aerodrome shall be restricted to the essential minimum, and particular regard shall be given to the requirements to protect the ILS/MLS sensitive area(s) when Category II or Category III precision instrument operations are in progress;
- b) subject to the provisions in sub-regulation 11.2.44.3, the minimum separation between vehicles and taxiing aircraft shall be as prescribed by the appropriate ATS authority taking into account the aids available; and

- c) when mixed ILS and MLS Category II or Category III precision instrument operations are taking place to the same runway continuously, the more restrictive ILS or MLS critical and sensitive areas shall be protected.

11.2.44.3 Emergency vehicles proceeding to the assistance of an aircraft in distress shall be afforded priority over all other surface movement traffic.

#### **11.2.45 Flight information service – application**

11.2.45.1 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 ATS units.

11.2.45.2 Where ATS 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.

#### **11.2.46 Scope of flight information service**

11.2.46.1 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 snow, ice or significant depth of water;
- f) information on unmanned free balloons; and
- g) of any other information likely to affect safety.

11.2.46.2 Flight information service provided to flights shall include, in addition to that outlined in sub-regulation 11.2.46.1, 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.

11.2.46.3 Flight information service provided to VFR flights shall include, in addition to that outlined in sub-regulation 11.2.46.1, 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.

#### **11.2.47 Operational flight information service broadcasts**

11.2.47.1 The meteorological information and operational information concerning radio navigation services and aerodromes included in the flight information service shall, whenever available, be provided in an operationally integrated form.

11.2.47.2 When requested by the pilot, the applicable Operational Flight Information Service message(s) shall be transmitted by the appropriate ATS unit.

#### **11.2.48 Voice ATIS Broadcasts**

11.2.48.1 Voice-automatic terminal information service (Voice-ATIS) broadcasts shall be provided at aerodromes where there is a requirement to reduce the communication load on the ATS VHF air-ground communication channels. When provided, they shall comprise:

- a) one broadcast serving arriving aircraft; or
- b) one broadcast serving departing aircraft; or
- c) one broadcast serving both arriving and departing aircraft; or
- d) two broadcasts serving arriving and departing aircraft respectively at those aerodromes where the length of a broadcast serving both arriving and departing aircraft would be excessively long.

11.2.48.2 A discrete VHF frequency shall, whenever practicable, be used for Voice-ATIS broadcasts. If a discrete frequency is not available, the transmission may be made on the voice channel(s) of the most appropriate terminal navigation aid(s), preferably a VOR, provided the range and readability are adequate and the identification of the navigation aid is sequenced with the broadcast so that the latter is not obliterated.

11.2.48.3 Voice-ATIS broadcasts shall not be transmitted on the voice channel of an ILS.

11.2.48.4 Whenever Voice-ATIS is provided, the broadcast shall be continuous and repetitive.

11.2.48.5 The information contained in the current broadcast shall immediately be made known to the ATS unit(s) concerned with the provision to aircraft of information relating to approach, landing and take-off, whenever the message has not been prepared by that (those) unit(s).

11.2.48.6 Voice-ATIS broadcasts provided at designated aerodromes for use by international air services shall be available in the English language as a minimum.

11.2.48.7 Where a D-ATIS supplements the existing availability of Voice-ATIS, the information shall be identical in both content and format to the applicable Voice-ATIS broadcast.

11.2.48.8 Where real-time meteorological information is included but the data remains within the parameters of the significant change criteria as specified in 2.3.2 of Appendix 3 to Annex 3, the content, for the purpose of maintaining the same designator, shall be considered identical.

11.2.48.9 Where a D-ATIS supplements the existing availability of Voice-ATIS and the ATIS requires updating, Voice-ATIS and D-ATIS shall be updated simultaneously.

11.2.48.10 Whenever Voice-ATIS and/or D-ATIS is provided:

- a) the information communicated shall relate to a single aerodrome;
- b) the information communicated shall be updated immediately a significant change occurs;
- c) the preparation and dissemination of the ATIS message shall be the responsibility of the ATS;
- d) individual ATIS messages shall be identified by a designator in the form of a letter of the ICAO spelling alphabet. Designators assigned to consecutive ATIS messages shall be in alphabetical order;
- e) aircraft shall acknowledge receipt of the information upon establishing communication with the ATS unit providing approach control service or the aerodrome control tower, as appropriate;
- f) the appropriate ATS unit shall, when replying to the message in e) above or, in the case of arriving aircraft, at such other time as may be prescribed by the appropriate ATS authority, provide the aircraft with the current altimeter setting; and
- g) the meteorological information shall be extracted from the local meteorological routine or special report.

11.2.48.11 When rapidly changing meteorological conditions make it inadvisable to include a weather report in the ATIS, the ATIS messages shall indicate that the relevant weather information will be given on initial contact with the appropriate ATS unit.

11.2.48.12 Information contained in a current ATIS, the receipt of which has been acknowledged by the aircraft concerned, need not be included in a directed transmission to the aircraft, with the exception of the altimeter setting, which shall be provided in accordance with sub-regulation 11.2.48.10, f).

11.2.48.13 If an aircraft acknowledges receipt of an ATIS that is no longer current, any element of information that needs updating shall be transmitted to the aircraft without delay.

11.2.48.14 ATIS messages containing both arrival and departure information shall contain the following elements of information in the order listed:

- a) name of aerodrome;
- b) arrival and/or departure indicator;

- c) contract type, if communication is via D-ATIS;
- d) designator;
- e) time of observation, if appropriate;
- f) type of approach(es) to be expected;
- g) the runway(s) in use; status of arresting system constituting a potential hazard, if any;
- h) significant runway surface conditions and, if appropriate, braking action;
- i) holding delay, if appropriate;
- j) transition level, if applicable;
- k) other essential operational information;
- l) surface wind direction and speed, including significant variations and, if surface wind sensors related specifically to the sections of runway(s) in use are available and the information is required by operators, the indication of the runway and the section of the runway to which the information refers;
- m) visibility and, when applicable, RVR;\*
- n) present weather;\*
- o) cloud below 1 500 m (5 000 ft.) or below the highest minimum sector altitude, whichever is greater; cumulonimbus; if the sky is obscured, vertical visibility when available;\*
- p) air temperature;
- q) dew point temperature;†
- r) altimeter setting(s);
- s) any available information on significant meteorological phenomena in the approach and climb-out areas including wind shear, and information on recent weather of operational significance;
- t) trend forecast, when available; and
- u) specific ATIS instructions.

---

\* These elements are replaced by the term “CAVOK”, whenever the conditions as specified in the PANS-ATM (Doc 4444), Chapter 11 prevail.

† As determined on the basis of regional air navigation agreements.

11.2.48.15 ATIS messages containing arrival information only shall contain the following elements of information in the order listed:

- a) name of aerodrome;
- b) arrival indicator;
- c) contract type, if communication is via D-ATIS;
- d) designator;
- e) time of observation, if appropriate;
- f) type of approach(es) to be expected;
- g) main landing runway(s); status of arresting system constituting a potential hazard, if any;
- h) significant runway surface conditions and, if appropriate, braking action;
- i) holding delay, if appropriate;
- j) transition level, if applicable;
- k) other essential operational information;
- l) surface wind direction and speed, including significant variations and, if surface wind sensors related specifically to the sections of runway(s) in use are available and the information is required by operators, the indication of the runway and the section of the runway to which the information refers;
- m) visibility and, when applicable, RVR;<sup>\*\*</sup>
- n) present weather;<sup>\*</sup>
- o) cloud below 1 500 m (5 000 ft.) or below the highest minimum sector altitude, whichever is greater; cumulonimbus; if the sky is obscured, vertical visibility when available;<sup>\*</sup>
- p) air temperature;
- q) dew point temperature;<sup>†</sup>
- r) altimeter setting(s);

---

<sup>\*</sup> These elements are replaced by the term “CAVOK”, whenever the conditions as specified in the PANS-ATM (Doc 4444), Chapter 11 prevail.

<sup>†</sup> As determined on the basis of regional air navigation agreements.

- s) any available information on significant meteorological phenomena in the approach area including wind shear, and information on recent weather of operational significance;
- t) trend forecast, when available; and
- u) specific ATIS instructions.

11.2.48.16 ATIS messages containing departure information only shall contain the following elements of information in the order listed:

- a) name of aerodrome;
- b) departure indicator;
- c) contract type, if communication is via D-ATIS;
- d) designator;
- e) time of observation, if appropriate;
- f) runway(s) to be used for take-off; status of arresting system constituting a potential hazard, if any;
- g) significant surface conditions of runway(s) to be used for take-off and, if appropriate, braking action;
- h) departure delay, if appropriate;
- i) transition level, if applicable;
- j) other essential operational information;
- k) surface wind direction and speed, including significant variations and, if surface wind sensors related specifically to the sections of runway(s) in use are available and the information is required by operators, the indication of the runway and the section of the runway to which the information refers;
- l) visibility and, when applicable, RVR;\*
- m) present weather;\*
- n) cloud below 1 500 m (5 000 ft.) or below the highest minimum sector altitude, whichever is greater; cumulonimbus; if the sky is obscured, vertical visibility when available;\*
- o) air temperature;

---

\* These elements are replaced by the term “CAVOK”, whenever the conditions as specified in the PANS-ATM (Doc 4444), Chapter 11 prevail.

- p) dew point temperature;\*
- q) altimeter setting(s);
- r) any available information on significant meteorological phenomena in the climb-out area including wind shear;
- s) trend forecast, when available; and
- t) specific ATIS instructions.

### 11.2.49 Alerting services

11.2.49.1 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 ATS; and
- c) to any aircraft known or believed to be the subject of unlawful interference.

11.2.49.2 Flight information centres or 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 flight information region or control area concerned and for forwarding such information to the appropriate rescue coordination centre.

11.2.49.3 In the event of a state of emergency arising to an aircraft while it is under the control of an aerodrome control tower or approach control unit, such unit shall notify immediately the flight information centre or area control centre responsible which shall in turn notify the rescue coordination centre, except that notification of the area control centre, flight information centre, or rescue coordination centre shall not be required when the nature of the emergency is such that the notification would be superfluous.

11.2.49.4 Nevertheless, whenever the urgency of the situation so requires, the aerodrome control tower or approach control unit 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.

11.2.49.5 Without prejudice to any other circumstances that may render such notification advisable, ATS units shall, except as prescribed in 11.2.49.10, notify rescue coordination centres immediately an aircraft is considered to be in a state of emergency in accordance with the following:

- a) Uncertainty phase when:
  - (i) 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

---

\* As determined on the basis of regional air navigation agreements.

- (ii) an aircraft fails to arrive within thirty minutes of the estimated time of arrival last notified to or estimated by ATS units, whichever is the later, except when no doubt exists as to the safety of the aircraft and its occupants.
- b) Alert phase when:
- (i) 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
  - (ii) 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 re-established with the aircraft, or when
  - (iii) 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
  - (iv) an aircraft is known or believed to be the subject of unlawful interference.
- c) Distress phase when:
- (i) 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
  - (ii) the fuel on board is considered to be exhausted, or to be insufficient to enable the aircraft to reach safety, or when
  - (iii) 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
  - (iv) 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.

11.2.49.6 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) colour and distinctive marks of aircraft;
- h) dangerous goods carried as cargo;
- i) any action taken by reporting office; and
- j) other pertinent remarks.

11.2.49.7 Further to the notification in sub-regulation 11.2.49.5, 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.

11.2.49.8 ATS units shall, as necessary, use all available communication facilities to endeavour to establish and maintain communication with an aircraft in a state of emergency, and to request news of the aircraft.

1.2.49.9 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.

11.2.49.10 When an area control or a flight information centre decides 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.

11.2.49.11 All information notified to the rescue coordination centre by an area control or flight information centre shall, whenever practicable, also be communicated, without delay, to the operator.

11.2.49.12 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 sub-regulation 11.2.49.13, be informed of the nature of the emergency as soon as practicable.

11.2.49.13 When an ATS 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.

11.2.50 – 11.2.51 RESERVED

#### **11.2.52 ATS requirements for communications**

11.2.52.1 Radiotelephony and/or data link shall be used in air-ground communications for ATS purposes.



11.2.52.2 ATS units shall, in addition to the requirements specified in 11.2.52.1 be provided with communication equipment which will enable them to provide ATS in accordance with the RCP type(s) prescribed by [appropriate authority designated by the State] and promulgated in the ICAO Regional Air Navigation.

11.2.52.3 When direct pilot-controller two-way radio- telephony or data link communications are used for the provision of air traffic control service, recording facilities shall be provided on all such air-ground communication channels.

11.2.52.4 Recordings of communications channels as required in paragraph 11.2.52.3 shall be retained for a period of at least thirty days.

11.2.52.5 Air-ground communication facilities shall enable two-way communications to take place between a unit providing flight information service and appropriately equipped aircraft flying anywhere within the flight information region.

11.2.52.6 Air-ground communication facilities shall enable two-way communications to take place between a unit providing area control service and appropriately equipped aircraft flying anywhere within the control area(s).

11.2.52.7 Air-ground communication facilities shall enable direct, rapid, continuous and static-free two-way communications to take place between the unit providing approach control service and appropriately equipped aircraft under its control.

11.2.52.8 Where the unit providing approach control service functions as a separate unit, air-ground communications shall be conducted over communication channels provided for its exclusive use.

11.2.52.9 Air-ground communication facilities shall enable direct, rapid, continuous and static-free two-way communications to take place between an aerodrome control tower and appropriately equipped aircraft operating at any distance within 45 km (25 NM) of the aerodrome concerned.

11.2.52.10 Direct-speech and/or data link communications shall be used in ground-ground communications for ATS purposes.

11.2.52.11 ATS units shall, in addition to the requirements specified in 11.2.52.10, be provided with communication equipment which will enable them to provide ATS in accordance with the RCP type(s) prescribed by [appropriate authority designated by the State] and promulgated in the ICAO Regional Air Navigation.

11.2.52.12 A flight information centre shall have facilities for communications with the following units providing a service within its area of responsibility:

- a) the area control centre, unless collocated;
- b) approach control units;
- c) aerodrome control towers.

11.2.52.13 An area control centre, in addition to being connected to the flight information centre as prescribed in sub-regulation 11.2.52.12, shall have facilities for communications with the following units providing a service within its area of responsibility:

- a) approach control units;
- b) aerodrome control towers; and
- c) ATS reporting offices, when separately established.

11.2.52.14 An approach control unit, in addition to being connected to the flight information centre and the area control centre as prescribed in sub-regulations 11.2.52.12 and 11.2.52.13, shall have facilities for communications with the associated aerodrome control tower(s) and, when separately established, the associated ATS reporting office(s).

11.2.52.15 An aerodrome control tower, in addition to being connected to the flight information centre, the area control centre and the approach control unit as prescribed in sub-regulations 11.2.52.12, 11.2.52.13 and 11.2.52.14 shall have facilities for communications with the associated ATS reporting office, when separately established.

11.2.52.16 A flight information centre and an area control centre shall have facilities for communications with the following units providing a service within their respective area of responsibility:

- a) appropriate military units;
- b) the meteorological office serving the centre;
- c) the ATE station serving the centre;
- d) appropriate operator's offices;
- e) the rescue coordination centre or, in the absence of such centre, any other appropriate emergency service;
- f) the international NOTAM office serving the centre.

11.2.52.17 An approach control unit and an aerodrome control tower shall have facilities for communications with the following units providing a service within their respective area of responsibility:

- a) appropriate military units;
- b) rescue and emergency services (including ambulance, fire, etc.);
- c) the meteorological office serving the unit concerned;
- d) the ATE station serving the unit concerned;
- e) the unit providing apron management service, when separately established.

11.2.52.18 The communication facilities required under sub-regulations 11.2.52.16, a) and 11.2.52.17, a) shall include provisions for rapid and reliable communications between the ATS unit

concerned and the military unit(s) responsible for control of interception operations within the area of responsibility of the ATS unit.

11.2.52.19 The communication facilities required under sub-regulations 11.2.52.12, 11.2.52.13, 11.2.52.15, 11.2.52.16 a) and 11.2.52.17 a), b) and c) shall include provisions for:

- a) communications by direct speech alone, or in combination with data link communications, whereby for the purpose of transfer of control using radar or ADS-B, the communications can be established instantaneously and for other purposes the communications can normally be established within fifteen seconds; and
- b) printed communications, when a written record is required; the message transit time for such communications being no longer than five minutes.

11.2.52.20 In all cases where automatic transfer of data to and/or from ATS computers is required, suitable facilities for automatic recording shall be provided.

11.2.52.21 The communication facilities required under 11.2.52.17 a), b) and c) shall include provisions for communications by direct speech arranged for conference communications.

11.2.52.22 All facilities for direct-speech or data link communications between ATS units and between ATS units and other units described under sub-regulations 11.2.52.16 and 11.2.52.17 shall be provided with automatic recording.

11.2.52.23 Recordings of data and communications as required in sub-regulations 11.2.52.20 and 11.2.52.22 shall be retained for a period of at least thirty days.

11.2.52.24 Flight information centres and area control centres shall have facilities for communications with all adjacent flight information centres and area control centres.

11.2.52.25 These communication facilities shall in all cases include provisions for messages in a form suitable for retention as a permanent record, and delivery in accordance with transit times specified by regional air navigation agreements.

11.2.52.26 Unless otherwise prescribed on the basis of regional air navigation agreements, facilities for communications between area control centres serving contiguous control areas shall, in addition, include provisions for direct speech and, where applicable, data link communications, with automatic recording, whereby for the purpose of transfer of control using radar, ADS-B or ADS-C data, the communications can be established instantaneously and for other purposes the communications can normally be established within fifteen seconds.

11.2.52.27 When so required by agreement between the States concerned in order to eliminate or reduce the need for interceptions in the event of deviations from assigned track, facilities for communications between adjacent flight information centres or area control centres other than those mentioned in sub-regulation 11.2.52.26 shall include provisions for direct speech alone, or in combination with data link communications. The communication facilities shall be provided with automatic recording.

11.2.52.28 In all cases where automatic exchange of data between ATS computers is required, suitable facilities for automatic recording shall be provided.

11.2.52.29 Recordings of data and communications as required in 11.2.52.28 shall be retained for a period of at least thirty days.

11.2.52.30 Two-way radiotelephony communication facilities shall be provided for aerodrome control service for the control of vehicles on the manoeuvring area, except where communication by a system of visual signals is deemed to be adequate.

11.2.52.31 Where conditions warrant, separate communication channels shall be provided for the control of vehicles on the manoeuvring area. Automatic recording facilities shall be provided on all such channels.

11.2.52.32 Recordings of communications as required in 11.2.52.31 shall be retained for a period of at least thirty days.

11.2.52.33 Surveillance data from primary and secondary radar equipment or other systems (e.g. ADS-B, ADS-C), used as an aid to ATS, shall be automatically recorded for use in accident and incident investigations, search and rescue, air traffic control and surveillance systems evaluation and training.

11.2.52.34 Automatic recordings shall be retained for a period of at least thirty days. When the recordings are pertinent to accident and incident investigations, they shall be retained for longer periods until it is evident that they will no longer be required.

### **11.2.53 ATS requirements for information**

11.2.53.1 ATS 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 ATS personnel and with a frequency which satisfies the requirements of the ATS units concerned.

11.2.53.2 Flight information centres and area control centres shall be supplied with meteorological information as described in Annex 3, Appendix 9, 1.3, 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.

11.2.53.3 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.

11.2.53.4 Units providing approach control service shall be supplied with meteorological information as described in Annex 3, Appendix 9, 1.2 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.

11.2.53.5 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.

11.2.53.6 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.

11.2.53.7 Units providing approach control service for final approach, landing and take-off 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.

11.2.53.8 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.

11.2.53.9 Aerodrome control towers shall be supplied with meteorological information as described in Annex 3, Appendix 9, 1.1 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.

11.2.53.10 Aerodrome control towers shall be provided with current pressure data for setting altimeters for the aerodrome concerned.

11.2.53.11 Aerodrome control towers 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.

11.2.53.12 Aerodrome control towers 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.

11.2.53.13 Aerodrome control towers 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.

11.2.53.14 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.

11.2.53.15 Aerodrome control towers 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.

11.2.53.16 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.

11.2.53.17 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.

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

11.2.53.19 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.

## **Part 11.3 – Instrument Flight Procedure Design (IFPD) Service**

### **11.3.1 General**

11.3.1.1 This subpart prescribes the requirements for the design, continuous maintenance and periodic review of instrument flight procedures (IFP).

11.3.1.2 An ANSP shall be designated by [appropriate authority designated by the State] for providing such services.

11.3.1.3 The designated ANSP shall follow an instrument flight procedure process that encompasses acquisition of data, design and promulgation of procedures.

11.3.1.4 The designated ANSP shall ensure that the quality and safety of the procedure design product are assured through review, verification, coordination and validation of the procedure at appropriate points in the process.

11.3.1.5 The designated ANSP shall ensure that the units of measurement, as specified in Part 11 of this document are used in the design of IFP.

### **11.3.2 IFPD organization**

11.3.2.1 The ANSP designated as the IFPD organization shall maintain an appropriate instrument design office to enable the IFP designer to carry on design work in IFP in accordance with the requirements set out in this regulation.

11.3.2.2 The designated ANSP shall ensure that the designs of instrument flight procedure are in accordance with:

- a) applicable standards set out or referred to in PANS-OPS, and/or
- b) applicable standards as set out in this regulation.

11.3.2.3 The designated ANSP shall make provisions for person(s) trained in IFP design to check and verify independently the plans of each instrument flight procedure designed.

11.3.2.4 The ANSP designated as the IFPD organization shall develop and maintain an operations manual which shall serve to demonstrate how the service provider will comply with the requirements set out in this regulation.

- 11.3.2.5 The contents of the operations manual shall include but not limited to the following:
- a) the information required of the designated ANSP as mentioned in this regulation; and
  - b) a description of the IFPD office that shows the role, responsibilities and job functions of the IFP design office personnel who are responsible for ensuring the compliance of the organization with the requirements in sub-paragraph a).
- 11.3.2.6 The designated ANSP shall:
- a) keep the operations manual in a readily accessible form;
  - b) ensure that the IFP designer has ready access to the operations manual; and
  - c) amend the operations manual whenever necessary to keep its content up to date.
- 11.3.2.7 The designated ANSP shall submit a copy of the most current operations manual to [appropriate authority designated by the State] for approval.
- 11.3.2.8 The designated ANSP shall provide and maintain facilities for the design work on IFP as follows:
- a) having available equipment appropriate for the design, design verification, flight validation, and maintenance of the types of IFP;
  - b) access to relevant and current data including, but not limited to, aeronautical data, land contour data, and obstacle data for the design, design verification, flight verification, and maintenance of the IFP; and
  - c) ready access to copies of relevant documentation comprising technical standards, practices, and instructions, and any other documentation that may be necessary for the design, design verification, flight validation, and maintenance of the types of instrument flight procedure.
- 11.3.2.9 If an aeronautical database and aeronautical data is required for designing an instrument flight procedure, the IFP design organization shall ensure the integrity of the database and the data. The data used shall be current, traceable, and meets the required level of verifiable accuracy for the design.
- 11.3.2.10 The designated ANSP shall establish and put into effect, a system for controlling documents and records relating to the IFP on which the designer carries on design work, including the policies and procedures for making, amending, preserving and disposing of those documents and records.
- 11.3.2.11 The designated ANSP shall, at [appropriate authority designated by the State] request, make the documents and records, or copies of them or extracts from them, available for inspection.

### **11.3. 3 IFP designer qualifications and training**

11.3.3.1 The designated ANSP shall ensure that a person designing or amending a flight instrument procedure demonstrates required competency level for flight procedure design. IFP designers shall acquire and maintain this competency level through training and supervised on-the-job training (OJT).

11.3.3.2 The training for IFP designers shall include an initial training and recurrent training at periodic intervals.

11.3.3.3 The designated ANSP shall ensure that the IFP designer is able to demonstrate a basic level of competency through initial training that includes at least the following elements:

- a) knowledge of information contained in PANS-OPS, Volumes I and II and other related ICAO provisions relevant to the State;
- b) skills in the design of procedures; and
- c) demonstration of competency as outlined in the competency framework for flight procedures designed as outlined in ICAO Doc 9906 — *Quality Assurance Manual for Flight Procedure Design*, Volume 2 — *Flight Procedure Designer Training*, Table 2-1.

11.3.3.4 The designated ANSP shall ensure that the IFP designer is able to demonstrate a basic level of competency through recurrent training that includes at least the following elements:

- a) knowledge about updates in ICAO provisions and other provisions pertaining to procedure design; and
- b) maintenance and enhancement of knowledge and skills in the design of procedures.

11.3.3.4 The designated ANSP shall maintain training records for their IFP designers.

#### **11.3.4 Procedure Design Information Acquisition**

11.3.4.1 The designated ANSP shall ensure that the survey and subsequent IFP design activities are controlled and monitored by a person(s) trained in procedure design.

11.3.4.2 In the obstacle survey for procedure design, the IFP designer shall consider that:

- a) all obstacles be accounted for. Items, such as trees and heights of tall buildings shall be accounted for either by physical examination of the site or by addition of a suitable margin above terrain contours; and
- b) the accuracy of the vertical and horizontal data obtained may be adjusted by adding an amount equal to the specified survey error to the height of all measured obstructions and by making a corresponding adjustment for specified horizontal error.

11.3.4.3 The procedure design information shall be coordinated with all relevant stakeholders. As input for the procedure design process the following aspects need to be assessed:

- a) airport, navigation aid, obstacle, terrain coordinate and elevation data, based on verified surveys and complying with Annex 11, 14 and 15 requirements;
- b) airspace requirements;
- c) user requirements – the needs of Air Traffic Service provider and operators who will use this procedure;



- d) airport infrastructure such as runway classification, lighting, communications, runway markings, and availability of local altimeter setting;
- e) environmental considerations; and
- f) any other potential issue associated with the procedure.

### **11.3.5 IFPD**

11.3.5.1 Procedures shall be designed according to the PANS-OPS criteria. Coordination with all concerned parties shall continue throughout the procedure design and validation process to ensure that the procedure meets the needs of the user and the community.

11.3.5.2 Each new or revised procedure shall be verified by a qualified procedure designer other than the one who designed the procedure, to ensure compliance with applicable criteria.

11.3.5.3 Published procedures shall be subject to periodic review to ensure that they continue to comply with changing criteria, and continue to meet user requirements. The maximum interval for this review is five years.

11.3.5.4 The documentation provided by the IFP designer is divided into three categories and includes:

- a) documentation required for publication in the AIP in accordance with Annexes 4 and 15;
- b) documentation required to maintain transparency concerning the details and assumptions used by the IFP designer, which should include supporting information/data used in the design, such as:
  - (i) controlling obstacle for each segment of the procedure;
  - (ii) effect of environmental considerations on the design of the procedure;
  - (iii) infrastructure assessment;
  - (iv) airspace constraints;
  - (v) for modifications or amendments to existing procedures, the reasons for any changes;
  - (vi) for any deviation from existing standards, the reasons for such a deviation and details of the mitigations applied to assure continued safe operations; and
  - (vii) the results of the final verification for accuracy and completeness (quality assurance checks) prior to validation and then prior to publication.
- c) additional documentation required to facilitate ground and flight validation of the procedure.

11.3.5.5 All calculations and results of calculations shall be presented in a manner that enables the reader to follow and trace the logic and resultant output. A record of all calculations shall be kept in order to prove compliance to or variation from the standard criteria.

11.3.5.6 Formulae used during calculation shall be the standard formulae as stated in the PANS-OPS. Units of measurement and conversion factors between such units shall be in accordance to Annexes 4 and 5.

11.3.5.7 Rounding of results shall follow the standard guidelines in the PANS-OPS. Rounding shall only be made at the publication stage to facilitate usable figures on maps and charts. Where rounding is required at earlier stages rounding shall be made to the pessimistic consideration.

11.3.5.8 All documentation shall undergo a final verification for accuracy and completeness prior to validation and publication.

11.3.5.9 All documentation shall be retained to assist in recreating the procedure in the future in the case of incidents and for periodic review and maintenance. The periodic retention shall not be less than the operational lifetime of the procedure.

11.3.5.10 Validation shall consist of ground validation and flight validation.

11.3.5.11 Ground validation shall always be undertaken.

11.3.5.12 When ground validation can verify the accuracy and completeness of all obstacle and navigation data considered in the procedure design, and any other factors normally considered in the flight validation, then the flight validation requirement may be dispensed with.

11.3.5.13 Ground validation shall review of the entire instrument flight procedure package by a person(s) trained in procedure design and with appropriate knowledge of flight validation issues.

11.3.5.14 The ground validation shall be conducted to determine if flight validation is needed for modifications and amendments to previously published procedures.

11.3.5.15 Flight validation of IFP when require shall be carried out as part of the initial record and shall be included as part of the periodic quality assurance programme. It shall be accomplished by a qualified and experienced Flight Validation Pilot (FVP).

11.3.5.16 The flight validation of IFP shall:

- a) provide assurance that adequate obstacle clearance has been provided;
- b) verify that the navigation data to be published, as well as that used in the design of the procedure, is correct;
- c) verify that all required infrastructure, such as runway markings, lighting, and communications and navigation sources, are in place and operative;
- d) conduct an assessment of fly ability to determine that the procedure can be safely flown;  
and
- e) evaluate the charting, required infrastructure, visibility and other operational factors.

11.3.5.17 The IFP design organization shall ensure that flight validation is conducted in accordance with the requirements of ICAO Doc 9906, Volume 5 — *Validation of IFP*.

11.3.5.18 The qualifications for FVP shall include:

- a) at least a commercial pilot licence with instrument rating. Alternatively, an equivalent authorization from the [appropriate authority designated by the State] meeting the Annex 1 knowledge and skill requirements for issuing the commercial pilot license and instrument rating is acceptable;
- b) the licence held by the FVP shall be for the aircraft category (e.g. aeroplane or helicopter) appropriate for the procedure to be validated; and
- c) FVPs shall meet all the experience requirements for the airline transport pilot licence in the relevant category of aircraft (e.g. aeroplane or helicopter) as defined in Annex 1. The FVP does not have to be the pilot-in-command of the validation flight nor is he required to have the type rating on the aircraft used for the validation flight.

11.3.5.19 In order to adequately validate instrument procedures, FVPs training shall include the following:

- a) Standards, procedures and guidance pertinent to AIS, including Annex 15;
- b) Standards, procedures and guidance pertinent to flight inspection, including Annex 10 and ICAO Doc 8071 — *Manual on Testing of Radio Navigation Aids*;
- c) Standards, procedures and guidance pertinent to aerodromes, including Annex 14, ICAO Doc 9157 — *Airport Services Manual* and ICAO Doc 9157 — *Aerodrome Design Manual*;
- d) Standards, procedures and guidance pertinent to charting and aviation publications including Annex 4 and ICAO Doc 8697 — *Aeronautical Chart Manual*;
- e) performance-based navigation (PBN) and conventional instrument procedure construction such as standard instrument departures/standard instrument arrivals (SIDs/STARs) and holding/reversal procedures, including the PANS-OPS;
- f) the PBN concept including the ICAO Doc 9613 — *Performance-based Navigation (PBN) Manual*;
- g) the basic concept of and differences between flight validation and flight inspection;
- h) ARINC 424 coding;
- i) Human Factors;
- j) different types of aircraft operations and aircraft performance (i.e. limitations and equipment);
- k) obstacle assessment methodology;

- l) safety assessment process;
- m) geodesy, including ICAO Doc 9906, Volume 2, paragraph 3.3.3.8; and
- n) comprehensive understanding of ICAO Doc 9906, Volume 5.

11.3.5.20 The IFP designer shall be the originator of all data applicable to conduct a flight validation provided to the flight inspection operations activity.

### **11.3.6 Design Publication**

11.3.6.1 The designated ANSP shall ensure that IFP designs/charts, are provided to the Aeronautical Information Service (AIS) provider for publication in the AIP.

11.3.6.2 The IFP shall be accompanied by a narrative, which describes the procedure in textual format.

11.3.6.3 The intended effective date for operational use of the IFP shall be included in the document narrative.

11.3.6.4 The designs/charts published in the AIP shall be produced in accordance with the provisions contained in the documents listed below:

- a) ICAO Annex 4 — *Aeronautical Charts*
- b) ICAO Doc 8168 — *Procedures for Air Navigation Services — Aircraft Operations*, Volumes I and II (PANS-OPS);
- c) ICAO Doc 8697; and
- d) Subpart 7.5 – AIS regulation.

11.3.6.5 The aeronautical charts included in the AIP shall be kept up-to-date by means of replacement sheets where necessary. Significant amendments or revisions in the IFP shall be clearly indicated in the revised charts.

### **11.3.7 Procedure design automation**

11.3.7.1 The designated ANSP shall ensure that the software packages used in the design of procedures have been validated.

11.3.7.2 Validation of the software shall be in accordance with the requirements of ICAO Doc 9906, Volume 3 — *Flight Procedure Design Software Validation*.

## Part 11.4 – Aeronautical Information Service (AIS)

### 11.4.1 Responsibilities and Functions

11.4.1.1 The ANSP shall arrange for the provisions of AIS over the territory of [State] and if applicable those areas over the high seas for which [State] is responsible for the provision of AIS.

11.4.1.2 The ANSP shall be designated by [appropriate authority designated by the State] as the AIS provider for providing such services in accordance with these regulations.

11.4.1.3 Aeronautical data and aeronautical information provided by the AIS provider on behalf of [State] shall clearly indicate that it is published under the authority of [appropriate authority designated by the State].

11.4.1.4 The AIS provider shall establish formal arrangements with originators of aeronautical data and aeronautical information in relation to the timely and complete provision of aeronautical data and aeronautical information.

11.4.1.5 An AIS provider shall ensure that aeronautical data and aeronautical information necessary for the safety, regularity or efficiency of air navigation is made available in a form suitable for the operational requirements of the ATM community, including:

- a) those involved in flight operations, including flight crews, flight planning and flight simulators; and
- b) the ATS units responsible for flight information service and the services responsible for pre-flight information.

11.4.1.6 An aeronautical information service shall receive, collate or assemble, edit, format, publish/store and distribute aeronautical data and aeronautical information/data concerning the entire territory of [State] as well as those areas over the high seas in which the [State] is responsible for the provision of ATS outside its territory. Aeronautical data and aeronautical information shall be provided as an Integrated Aeronautical Information Package.

11.4.1.7 Where 24 hours of service is not provided by the AIS provider, service shall be provided during the whole period an aircraft is in flight in the area of responsibility of the aeronautical information service, plus a period of at least two hours before and after such a period. The service shall also be available at such other time as may be requested by an appropriate ground organization.

11.4.1.8 An AIS provider shall, in addition, obtain aeronautical data and aeronautical information to enable it to provide pre-flight information service and to meet the need for inflight information.

- a) from the AIS of other States;
- b) from other sources that may be available.

11.4.1.9 Aeronautical data and aeronautical information obtained under sub-regulation 11.4.1.8 a) shall, when distributed, be clearly identified as having the authority of the State of Origin.

11.4.1.10 Aeronautical data and aeronautical information obtained under 11.4.1.8 b) shall, if possible, be verified before distribution and if not verified shall, when distributed, be clearly identified as such.

11.4.1.11 The AIS provider shall promptly make available to the AIS of other States any aeronautical data and aeronautical information necessary for the safety, regularity or efficiency of air navigation required by them, to enable them to comply with sub-regulation 11.4.1.5.

11.4.2 – RESERVED

#### **11.4.3 Exchange of aeronautical data and aeronautical information/data**

11.4.3.1 The AIS provider shall designate the office to which all elements of the Integrated Aeronautical Information Package originated by other States shall be addressed. Such an office shall be qualified to deal with requests for aeronautical data and aeronautical information originated by other States.

11.4.3.2 Where more than one international NOTAM office is designated within [State], the extent of responsibility and the territory covered by each office shall be defined.

11.4.3.3 The AIS provider shall arrange, as necessary, to satisfy operational requirements for the issuance and receipt of NOTAM distributed by telecommunication.

11.4.3.4 Wherever practicable, the AIS provider shall establish direct contact with other AIS in order to facilitate the international exchange of aeronautical data and aeronautical information.

11.4.3.5 One copy of each of the elements of the Integrated Aeronautical Information Package that have been requested by the aeronautical information service of an ICAO Contracting State shall be made available by the AIS provider in the mutually agreed form(s), without charge.

#### **11.4.4 Copyright**

11.4.4.1 Any product received by the AIS provider in accordance with sub-regulation 11.4.3 from of another State's AIS which has been granted copyright protection by that State shall only be made available to a third party on the condition that the third party is made aware that the product is copyright protected and provided that it is appropriately annotated that the product is subject to copyright by the originating State.

#### **11.4.5 Information Management requirements**

11.4.5.1 The information management resources and processes established by the AIS provider shall be adequate to ensure the timely collection, processing, storing, integration, exchange and delivery of quality-assured aeronautical data and aeronautical information within the ATM system.

#### **11.4.6 Aeronautical data and aeronautical information validation and verification**

11.4.6.1 The AIS provider shall ensure that material to be issued as part of the Integrated Aeronautical Information Package is thoroughly checked before it will be accepted AIS provider, in order to make certain that all necessary information has been included and that it is correct in detail prior to distribution.

11.4.6.2 The AIS provider shall establish verification and validation procedures which ensure that upon receipt of aeronautical data and aeronautical information, quality requirements (accuracy, resolution, integrity, and traceability) are met.

### **11.4.7 Data Quality Specification**

11.4.7.1 The order of accuracy for aeronautical data, shall be as specified in Annex 11, Chapter 2, and Annex 14, Volumes I and II, Chapter 2. In that respect, three types of positional data shall be identified: surveyed points (runway thresholds, navigation aid positions, etc.), calculated points (mathematical calculations from the known surveyed points of points in space/fixes) and declared points (e.g. flight information region boundary points).

11.4.7.2 The order of publication resolution of aeronautical data shall be that as specified in Annex 15, Appendices 1 and 7.

11.4.7.3 The integrity classification and data integrity related to aeronautical data shall be as provided in Annex 15, Tables A7-1 to A7-5 of Appendix 7.

11.4.7.4 The integrity of aeronautical data shall be maintained by the AIS provider to the next intended user. Based on the applicable integrity classifications, the validation and verification procedures shall:

- a) for routine data: avoid corruption throughout the processing of the data;
- b) for essential data: assure corruption does not occur at any stage of the entire process and may include additional processes as needed to address potential risks in the overall system architecture to further assure data integrity at this level; and
- c) for critical data: assure corruption does not occur at any stage of the entire process and include additional integrity assurance processes to fully mitigate the effects of faults identified by thorough analysis of the overall system architecture as potential data integrity risks.

### **11.4.8 Metadata**

11.4.8.1 Metadata shall be collected for aeronautical data processes and exchange points. This metadata collection shall be applied throughout the aeronautical information data chain, from survey/origin to distribution to the next intended user.

11.4.8.2 The metadata to be collected shall include, as a minimum:

- a) the name of the organizations or entities performing any action of originating, transmitting or manipulating the data;
- b) the action performed; and
- c) the date and time the action was performed.

### **11.4.9 Data protection**

11.4.9.1 Aeronautical data and data sets shall be protected in accordance with data error detection, security, and authentication techniques.

11.4.9.2 Electronic aeronautical data sets shall be protected by the inclusion in the data sets of a 32-bit cyclic redundancy check (CRC) implemented by the application dealing with the data sets. This shall apply to the protection of the integrity classification of data sets as specified in sub-regulation 11.4.7.

#### **11.4.10 Use of automation**

11.4.10.1 Automation shall be introduced with the objective of improving the timeliness, quality, efficiency and cost-effectiveness of AIS.

11.4.10.2 Where aeronautical data and aeronautical information are provided in multiple formats, processes shall be implemented to ensure data and information consistency between formats.

11.4.10.3 In order to meet the data quality requirements, automation shall:

- a) enable digital aeronautical data exchange between the parties involved in the data processing chain; and
- b) use aeronautical information exchange models and data exchange models designed to be globally interoperable.

#### **11.4.11 Quality Management System**

11.4.11.1 Quality management systems shall be implemented and maintained by an AIS provider encompassing all functions of an aeronautical information service, as described in sub-regulation 11.4.1. The execution of such quality management systems shall be made demonstrable for each function stage.

11.4.11.2 Within the context of the established quality management system, competencies and the associated knowledge, skills and abilities required for each function shall be identified, and personnel assigned to perform those functions shall be appropriately trained. Processes shall be in place to ensure that personnel possess the skills and competencies required to perform specific assigned functions. Appropriate records shall be maintained so that the qualifications of personnel can be confirmed. Initial and periodic assessments shall be established that require personnel to demonstrate the required competencies. Periodic assessments of personnel shall be used as a means to detect and correct shortfalls.

11.4.11.3 The quality management system established by the AIS provider shall include the necessary policies, processes and procedures, including those for the use of metadata, to ensure and verify that aeronautical data is traceable throughout the aeronautical information data chain so as to allow any data anomalies or errors detected in use to be identified by root cause, corrected and communicated to affected users.

11.4.11.4 The quality management system established by the AIS provider shall provide users with the necessary assurance and confidence that the aeronautical data and aeronautical information satisfy the aeronautical data quality for accuracy, resolution and integrity as specified in sub-regulations 11.4.6 and 11.4.7 and that the data traceability requirements are met through the provision of appropriate metadata as specific in sub-regulation 11.4.8. The system shall also provide assurance of the applicability period of intended use of aeronautical information/data as well as that the agreed distribution dates will be met.

11.4.11.5 All necessary measures shall be taken to monitor compliance with the quality management system in place.



11.4.11.6 Demonstration of compliance of the quality management system applied shall be by audit. If nonconformity is identified, initiating action to correct its cause shall be determined and taken without undue delay. All audit observations and remedial actions shall be evidenced and properly documented.

#### **11.4.12 Human factors considerations**

11.4.12.1 The organization of the AIS as well as the design, contents, processing and distribution of aeronautical data and aeronautical information shall take into consideration Human Factors principles which facilitate their optimum utilization.

11.4.12.2 Due consideration shall be given to the integrity of information where human interaction is required and mitigating steps taken where risks are identified.

#### **11.4.13 Common reference systems for air navigation**

11.4.13.1 The *World Geodetic System — 1984 (WGS-84) Manual* (Doc 9674) shall be used as the horizontal (geodetic) reference system for international air navigation. Published aeronautical geographical coordinates (indicating latitude and longitude) shall be expressed in terms of the WGS-84 geodetic reference datum.

11.4.13.2 Geographical coordinates which have been transformed into WGS-84 coordinates but whose accuracy of original field work does not meet the requirements in Annex 11, Chapter 2 and Annex 14, Volumes I and II, Chapter 2, shall be identified by an asterisk.

11.4.13.3 The order of publication resolution of geographical coordinates shall be that specified in Annex 15, Appendix 1 and Table A7-1 of Appendix 7 while the order of chart resolution of geographical coordinates shall be that specified in Annex 4, Appendix 6, Table 1.

11.4.13.4 Mean sea level (MSL) datum, which gives the relationship of gravity-related height (elevation) to a surface known as the geoid, shall be used as the vertical reference system for international air navigation.

11.4.13.5 The Earth Gravitational Model — 1996 (EGM-96), containing long wavelength gravity field data to degree and order 360, shall be used by international air navigation as the global gravity model.

11.4.13.6 At those geographical positions where the accuracy of EGM-96 does not meet the accuracy requirements for elevation and geoid undulation specified in Annex 14, Volumes I and II, on the basis of EGM-96 data, regional, national or local geoid models containing high resolution (short wavelength) gravity field data shall be developed and used. When a geoid model other than the EGM-96 model is used, a description of the model used, including the parameters required for height transformation between the model and EGM-96, shall be provided in the Aeronautical Information Publication (AIP).

11.4.13.7 In addition to elevation referenced to the MSL (geoid), for the specific surveyed ground positions, geoid undulation (referenced to the WGS-84 ellipsoid) for those positions specified in Annex 15, Appendix 1 shall also be published.

11.4.13.8 The order of publication resolution of elevation and geoid undulation shall be that specified in Annex 15, Appendix 1 and Table A7-2 of Appendix 7 while the order of chart resolution of elevation and geoid undulation shall be that specified in Annex 4, Appendix 6, Table 2.

11.4.13.9 For international civil aviation, the Gregorian calendar and Coordinated Universal Time (UTC) shall be used as the temporal reference system.

11.4.13.10 When a different temporal reference system is used for some applications, the feature catalogue, or the metadata associated with an application schema or a data set, as appropriate, shall include either a description of that system or a citation for a document that describes that temporal reference system.

#### **11.4.14 Miscellaneous specifications**

11.4.14.1 Each element of the Integrated Aeronautical Information Package for international distribution shall include English text for those parts expressed in plain language.

11.4.14.2 Place names shall be spelt in conformity with local usage, transliterated, when necessary, into the Latin alphabet.

11.4.14.3 ICAO abbreviations shall be used in the AIS whenever they are appropriate and their use will facilitate distribution of aeronautical data and aeronautical information.

11.4.15 – 11.4.16 RESERVED

#### **11.4.17 AIP Contents**

11.4.17.1 The AIS provider shall publish an Aeronautical Information Publication (AIP) containing current information, data and aeronautical charts relating to the airspace in which [State] has responsibility for ATS. The contents of the AIP shall be in accordance Annex 15 Appendix 1 as applicable except that when the AIP, or volume of the AIP, is designed basically to facilitate operational use in flight, the precise format and arrangement is at the discretion of the AIS provider, providing that an adequate table of contents is included.

11.4.17.2 The AIS provider shall ensure that the AIP to be published shall include in Part 1 – General (GEN):

- a) a statement of the competent authority responsible for the air navigation facilities, services or procedures covered by the AIP;
- b) the general condition under which the services or facilities are available for international use;
- c) a list of significant differences between the national regulations and practices of [State] and the related ICAO Standards, Recommended Practices and Procedures, given in a form that would enable a user to differentiate readily between the requirements of the [State] and the related ICAO provisions; and
- d) the choice made by [State] in each significant case where an alternative course of action is provided for in ICAO Standards, Recommended Practices and Procedures.

11.4.17.3 The aeronautical charts listed alphabetically below shall, when available for designated international aerodromes/heliports, form part of the AIP, or be distributed separately to recipients of the AIP:

- a) Aerodrome/Heliport Chart — ICAO;
- b) Aerodrome Ground Movement Chart — ICAO;
- c) Aerodrome Obstacle Chart — ICAO Type A;
- d) Aerodrome Terrain and Obstacle Chart — ICAO (Electronic);
- e) Aircraft Parking/Docking Chart — ICAO;
- f) Area Chart — ICAO;
- g) ATC Surveillance Minimum Altitude Chart — ICAO;
- h) Instrument Approach Chart — ICAO;
- i) Precision Approach Terrain Chart — ICAO;
- j) Standard Arrival Chart — Instrument (STAR) — ICAO;
- k) Standard Departure Chart — Instrument (SID) — ICAO; and
- l) Visual Approach Chart — ICAO.

11.4.17.4 Charts, maps or diagrams shall be used, when appropriate, to complement or as a substitute for the tabulations or text of AIPs.

#### **11.4.18 AIP general specifications**

11.4.18.1 Each AIP shall be self-contained and shall include a table of contents.

11.4.18.2 Each AIP shall not duplicate information within itself or from other sources.

11.4.18.3 When two or more States/AIS providers combine to issue a joint AIP, this shall be made clear both on the cover and in the table of contents.

11.4.18.4 Each AIP shall be dated. In the case of AIPs issued in loose-leaf form, each page shall be dated. The date, consisting of the day, month (by name) and year, shall be the publication date or the effective date of the information.

11.4.18.5 A checklist giving the current date of each page in the AIP series shall be reissued frequently to assist the user in maintaining a current publication. The page number/chart title and date of the checklist shall appear on the checklist itself.

11.4.18.6 Each AIP issued as a bound volume and each page of an AIP issued in loose-leaf form shall be so annotated as to indicate clearly:

- a) the identity of the AIP;
- b) the territory covered and subdivisions when necessary;

- c) the identification of the issuing State and producing organization (authority);
- d) page numbers/chart titles; and
- e) the degree of reliability if the information is doubtful.

11.4.18.7 All changes to the AIP, or new information on a republished page, shall be identified by a distinctive symbol or annotation.

11.4.18.8 Operationally significant changes to the AIP shall be published in accordance with AIRAC procedures and shall be clearly identified by the acronym — AIRAC.

11.4.18.9 AIP shall be amended or reissued at such regular intervals as may be necessary to keep them up to date. Recourse to hand amendments or annotations shall be kept to the minimum. The normal method of amendment shall be by means of replacement sheets.

11.4.18.10 The regular interval referred to in 11.4.18.9 shall be specified in the AIP, Part 1 — General (GEN).

#### **11.4.19 Specification for AIP Amendment**

11.4.19.1 Permanent changes to the AIP shall be published as AIP Amendments.

11.4.19.2 Each AIP Amendment shall be allocated a serial number, which shall be consecutive.

11.4.19.3 Each AIP Amendment page, including the cover sheet, shall display a publication date.

11.4.19.4 Each AIRAC AIP Amendment page, including the cover sheet, shall display an effective date. When an effective time other than 0000 UTC is used, the effective time shall also be displayed on the cover sheet.

11.4.19.5 When an AIP Amendment is issued, it shall include references to the serial number of those elements, if any, of the Integrated Aeronautical Information Package which have been incorporated into the amendment.

11.4.19.6 A brief indication of the subjects affected by the amendment shall be given on the AIP Amendment cover sheet.

11.4.19.7 When an AIP Amendment will not be published at the established interval or publication date, a NIL notification shall be originated and distributed by the monthly plain-language list of valid NOTAM required by sub-regulation 11.4.27.15.

#### **11.4.20 Specifications AIP Supplement**

11.4.20.1 Temporary changes of long duration (three months or longer) and information of short duration which contains extensive text and/or graphics shall be published as AIP Supplement.

11.4.20.2 Each AIP Supplement shall be allocated a serial number which shall be consecutive and based on the calendar year. AIP Supplement pages shall be kept in the AIP as long as all or some of their contents remain valid.

11.4.20.3 When an error occurs in an AIP Supplement or when the period of validity of an AIP Supplement is changed, a new AIP Supplement shall be published as a replacement.

11.4.20.4 When an AIP Supplement is sent in replacement of a NOTAM, it shall include a reference to the serial number of the NOTAM.

11.4.20.5 A checklist of valid AIP Supplements shall be issued at intervals of not more than one month. This information shall be issued through the medium of the monthly plain-language list of valid NOTAM required by sub-regulation 11.4.27.15.

#### **11.4.21 Distribution**

11.4.21.1 AIP, AIP Amendments and AIP Supplements shall be made available by the most expeditious means.

#### **11.4.22 Electronic AIP (eAIP)**

11.4.22.1 The AIS provider may publish the AIP, AIP Amendment, AIP Supplement and AIC in a format that allows for displaying on a computer screen and printing on paper. This composite electronic document is named “Electronic AIP” (eAIP) and may be based on a format that allows for digital data exchange.

11.4.22.2 When provided, the information content of the eAIP and the structure of chapters, sections and sub-sections shall follow the content and structure of the paper AIP. The eAIP shall include files that allow for printing a paper AIP.

11.4.23 – 11.4.25 RESERVED

#### **11.4.26 NOTAM Origination**

11.4.26.1 The AIS provider shall promptly originate and issue a NOTAM whenever the information to be distributed is of a temporary nature and of short duration or when operationally significant permanent changes concerning circumstances as listed in Annex 15, Appendix 4, Part 1, or temporary changes of long duration are made at short notice, except for extensive text and/or graphics.

11.4.26.2 A NOTAM shall be originated and issued concerning the following information:

- a) establishment, closure or significant changes in operation of aerodrome(s)/heliport(s) or runways;
- b) establishment, withdrawal and significant changes in operation of aeronautical services (AGA, AIS, ATS, CNS, MET, SAR, etc.);
- c) establishment, withdrawal and significant changes in operational capability of radio navigation and air-ground communication services. This includes: interruption or return to operation, change of frequencies, change in notified hours of service, change of identification, change of orientation (directional aids), change of location, power increase or decrease amounting to 50 per cent or more, change in broadcast schedules or contents, or irregularity or unreliability of operation of any radio navigation and air-ground communication services;

- d) establishment, withdrawal or significant changes made to visual aids;
- e) interruption of or return to operation of major components of aerodrome lighting systems;
- f) establishment, withdrawal or significant changes made to procedures for air navigation services;
- g) occurrence or correction of major defects or impediments in the manoeuvring area;
- h) changes to and limitations on availability of fuel, oil and oxygen;
- i) major changes to search and rescue facilities and services available;
- j) establishment, withdrawal or return to operation of hazard beacons marking obstacles to air navigation;
- k) changes in regulations requiring immediate action, e.g. prohibited areas for SAR action;
- l) presence of hazards which affect air navigation (including obstacles, military exercises, displays, races and major parachuting events outside promulgated sites);
- m) erecting or removal of, or changes to, obstacles to air navigation in the take-off/climb, missed approach, approach areas and runway strip;
- n) establishment or discontinuance (including activation or deactivation) as applicable, or changes in the status of prohibited, restricted or danger areas;
- o) establishment or discontinuance of areas or routes or portions thereof where the possibility of interception exists and where the maintenance of guard on the VHF emergency frequency 121.5 MHz is required;
- p) allocation, cancellation or change of location indicators;
- q) significant changes in the level of protection normally available at an aerodrome/heliport for rescue and firefighting purposes. NOTAM shall be originated only when a change of category is involved and such change of category shall be clearly stated;
- r) presence or removal of, or significant changes in, hazardous conditions due to snow, slush, ice, radioactive material, toxic chemicals, volcanic ash deposition or water on the movement area;
- s) outbreaks of epidemics necessitating changes in notified requirements for inoculations and quarantine measures;
- t) forecasts of solar cosmic radiation, where provided;
- u) an operationally significant change in volcanic activity, the location, date and time of volcanic eruptions and/or horizontal and vertical extent of volcanic ash cloud, including direction of movement, flight levels and routes or portions of routes which could be affected;

- v) release into the atmosphere of radioactive materials or toxic chemicals following a nuclear or chemical incident, the location, date and time of the incident, the flight levels and routes or portions thereof which could be affected and the direction of movement;
- w) establishment of operations of humanitarian relief missions, such as those undertaken under the auspices of the United Nations, together with procedures and/or limitations which affect air navigation;
- x) implementation of short-term contingency measures in cases of disruption, or partial disruption, of ATS and related supporting services; and
- y) the need for origination of a NOTAM shall be considered in any other circumstance which may affect the operations of aircraft.

11.4.26.3 The following information shall not be notified by NOTAM:

- a) routine maintenance work on aprons and taxiways which does not affect the safe movement of aircraft;
- b) runway marking work, when aircraft operations can safely be conducted on other available runways, or the equipment used can be removed when necessary;
- c) temporary obstructions in the vicinity of aerodromes/heliports that do not affect the safe operation of aircraft;
- d) partial failure of aerodrome/heliport lighting facilities where such failure does not directly affect aircraft operations;
- e) partial temporary failure of air-ground communications when suitable alternative frequencies are known to be available and are operative;
- f) the lack of apron marshalling services and road traffic control;
- g) the unserviceability of location, destination or other instruction signs on the aerodrome movement area;
- h) parachuting when in uncontrolled airspace under VFR , when controlled, at promulgated sites or within danger or prohibited areas;
- i) other information of a similar temporary nature

11.4.26.4 At least seven days' advance notice shall be given of the activation of established danger, restricted or prohibited areas and of activities requiring temporary airspace restrictions other than for emergency operations.

11.4.26.5 NOTAM notifying unserviceability of aids to air navigation, facilities or communication services shall give an estimate of the period of unserviceability or the time at which restoration of service is expected.

11.4.26.6 When an AIP Amendment or an AIP Supplement is published in accordance with AIRAC procedures, a NOTAM shall be originated giving a brief description of the contents, the effective date and time, and the reference number of the amendment or supplement. This NOTAM shall come into force on the same effective date and time as the amendment or supplement and shall remain valid in the pre-flight information bulletin for a period of fourteen days.

#### **11.4.27 General NOTAM specification**

11.4.27.1 Except as otherwise provided in sub-regulations 11.4.27.4 and 11.4.27.5, each NOTAM shall contain the information in the order shown in the NOTAM Format in Annex 15, Appendix 6.

11.4.27.2 Text of NOTAM shall be composed of the significations/uniform abbreviated phraseology assigned to the ICAO NOTAM Code complemented by ICAO abbreviations, indicators, identifiers, designators, call signs, frequencies, figures and plain language.

11.4.27.3 When NOTAM is selected for international distribution, English text shall be included for those parts expressed in plain language.

11.4.27.4 Information concerning snow, slush, ice and standing water on aerodrome/heliport pavements shall, when reported by means of a SNOWTAM, contain the information in the order shown in the SNOWTAM Format in Annex 15, Appendix 2.

11.4.27.5 Information concerning an operationally significant change in volcanic activity, a volcanic eruption and/or volcanic ash cloud shall, when reported by means of an ASHTAM, contain the information in the order shown in Annex 15, the ASHTAM Format in Appendix 3.

11.4.27.6 The NOTAM originator shall allocate to each NOTAM a series identified by a letter and a four-digit number followed by a stroke and a two-digit number for the year. The four-digit number shall be consecutive and based on the calendar year.

11.4.27.7 When errors occur in a NOTAM, a NOTAM with a new number to replace the erroneous NOTAM shall be issued or the erroneous NOTAM shall be cancelled and a new NOTAM issued.

11.4.27.8 When a NOTAM is issued which cancels or replaces a previous NOTAM, the series and number of the previous NOTAM shall be indicated. The series, location indicator and subject of both NOTAM shall be the same. Only one NOTAM shall be cancelled or replaced by a NOTAM.

11.4.27.9 Each NOTAM shall deal with only one subject and one condition of the subject.

11.4.27.10 Each NOTAM shall be as brief as possible and so compiled that its meaning is clear without the need to refer to another document.

11.4.27.11 Each NOTAM shall be transmitted as a single telecommunication message.'

11.4.27.12 A NOTAM containing permanent or temporary information of long duration shall carry appropriate AIP or AIP Supplement references.

11.4.27.13 Location indicators included in the text of a NOTAM shall be those contained in ICAO Location Indicators (Doc 7910).

- a) In no case shall a curtailed form of such indicators be used; and



- b) where no ICAO location indicator is assigned to the location, its place name spelt in accordance with sub-regulation 11.4.14.2 shall be entered in plain language.

11.4.27.14 A checklist of valid NOTAM shall be issued as a NOTAM over the Aeronautical Fixed Service (AFS) at intervals of not more than one month using the NOTAM Format specified in Annex 15, Appendix 6. One NOTAM shall be issued for each series.

- a) A checklist of NOTAM shall refer to the latest AIP Amendments, AIP Supplements and at least the internationally distributed AIC; and
- b) a checklist of NOTAM shall have the same distribution as the actual message series to which they refer and shall be clearly identified as checklist.

11.4.27.15 A monthly plain-language list of valid NOTAM, including indications of the latest AIP Amendments, AIC issued and a checklist of AIP Supplements, shall be prepared with a minimum of delay and forwarded by the most expeditious means to recipients of the Integrated Aeronautical Information Package.

#### **11.4.28 NOTAM Distribution**

11.4.28.1 NOTAM shall be distributed on the basis of a request.

11.4.28.2 NOTAM shall be prepared in conformity with the relevant provisions of the ICAO communication procedures.

- a) The AFS shall, whenever practicable, be employed for NOTAM distribution; and
- b) when a NOTAM exchanged as specified in 11.4.28.4 is sent by means other than the AFS, a six-digit date-time group indicating the date and time of NOTAM origination, and the identification of the originator shall be used, preceding the text.

11.4.28.3 The originating AIS provider shall select the NOTAM that are to be given international distribution.

11.4.28.4 International exchange of NOTAM shall take place only as mutually agreed between the international NOTAM offices concerned. The international exchange of ASHTAM and NOTAM where States continue to use NOTAM for distribution of information on volcanic activity, shall include volcanic ash advisory centres and the centres designated by regional air navigation agreement for the operation of AFS satellite distribution systems (satellite distribution system for information relating to air navigation (SADIS) and international satellite communications system (ISCS)), and shall take account of the requirements of long-range operations.

- a) These exchanges of NOTAM between international NOTAM offices shall, as far as practicable, be limited to the requirements of the receiving States concerned by means of separate series providing for at least international and domestic flights; and
- b) a predetermined distribution system for NOTAM transmitted on the AFS in accordance with Annex 15 Appendix 5 shall be used whenever possible.

11.4.29 – 11.4.31 RESERVED

#### **11.4.32 AIRAC general specifications**

11.4.32.1 Information concerning the circumstances listed in Annex 15, Appendix 4, Part 1, shall be distributed under the regulated system (AIRAC), i.e. basing establishment, withdrawal or significant changes upon a series of common effective dates at intervals of 28 days, including 14 January 2010. The information notified therein shall not be changed further for at least another 28 days after the effective date, unless the circumstance notified is of a temporary nature and would not persist for the full period.

11.4.32.2 When information has not been submitted by the AIRAC date, a NIL notification shall be originated and distributed by NOTAM or other suitable means, not later than one cycle before the AIRAC effective date concerned.

11.4.32.3 Implementation dates other than AIRAC effective dates shall not be used for pre-planned operationally significant changes requiring cartographic work and/or for updating of navigation databases.

#### **11.4.33 Provisions of information in paper copy form**

11.4.33.1 Information provided under the AIRAC system in paper copy form shall be distributed by the AIS unit at least 42 days in advance of the effective date with the objective of reaching recipients at least 28 days in advance of the effective date.

#### **11.4.34 Provision of information as electronic media**

11.4.34.1 If the AIS provider has established an aeronautical database, it shall, when updating its contents concerning the circumstances listed in Annex 15, Appendix 4, Part 1, ensure that the effective dates of data coincide with the established AIRAC effective dates.

11.4.34.2 Information provided as electronic media, concerning the circumstances listed in Annex 15, Appendix 4, Part 1, shall be distributed/made available by the AIS unit so as to reach recipients at least 28 days in advance of the AIRAC effective date.

#### **11.4.35 AIC origination**

11.4.35.1 The AIS provider shall originate an AIC whenever it is necessary to promulgate aeronautical information which does not qualify for inclusion in the AIP or NOTAM. An AIC shall be originated whenever it is desirable to promulgate:

- a) a long-term forecast of any major change in legislation, regulations, procedures or facilities;
- b) information of a purely explanatory or advisory nature liable to affect flight safety;
- c) information or notification of an explanatory or advisory nature concerning technical, legislative or purely administrative matters.

This shall include:

- 1) forecasts of important changes in the air navigation procedures, services and facilities provided;

- 2) forecasts of implementation of new navigational systems;
- 3) significant information arising from aircraft accident/incident investigation which has a bearing on flight safety;
- 4) information on regulations relating to the safeguarding of international civil aviation against acts of unlawful interference;
- 5) advice on medical matters of special interest to pilots;
- 6) warnings to pilots concerning the avoidance of physical hazards;
- 7) effect of certain weather phenomena on aircraft operations;
- 8) information on new hazards affecting aircraft handling techniques;
- 9) regulations relating to the carriage of restricted articles by air;
- 10) reference to the requirements of, and publication of changes in, national legislation;
- 11) aircrew licensing arrangements;
- 12) training of aviation personnel;
- 13) application of, or exemption from, requirements in national legislation;
- 14) advice on the use and maintenance of specific types of equipment;
- 15) actual or planned availability of new or revised editions of aeronautical charts;
- 16) carriage of communication equipment;
- 17) explanatory information relating to noise abatement;
- 18) selected airworthiness directives;
- 19) changes in NOTAM series or distribution, new editions of AIP or major changes in their contents, coverage or format;
- 20) advance information on the snow plan; and
- 21) other information of a similar nature.

11.4.35.2 The snow plan published under Annex 15, of Appendix 1 shall be supplemented by seasonal information, to be issued well in advance of the beginning of each winter – not less than one month before the normal onset of winter conditions and shall contain information such as that listed below:

- a) a list of aerodromes/heliports where snow clearance is expected to be performed during the coming winter:

- (i) in accordance with the runway and taxiway systems;\* or
- (ii) planned snow clearing, deviating from the runway system (length, width and number of runways, affected taxiways and aprons or portions thereof);
- b) information concerning any centre designated to coordinate information on the current state of progress of clearance and on the current state of runways, taxiways and aprons;\*
- c) a division of the aerodromes/heliports into SNOWTAM distribution lists in order to avoid excessive NOTAM distribution;
- d) an indication, as necessary, of minor changes to the standing snow plan;\*
- e) a descriptive list of clearance equipment;\*
- f) a listing of what will be considered as the minimum critical snow bank to be reported at each aerodrome/heliport at which reporting will commence.\*

*Note to States.— Where snow conditions do not exist in your State, related references could be deleted.*

#### **11.4.36 AIC general specifications**

11.4.36.1 The AIS provider shall select the AIC originated by them that are to be given international distribution.

11.4.36.2 Each AIC shall be allocated a serial number which shall be consecutive and based on the calendar year.

11.4.36.3 When AIC are distributed in more than one series, each series shall be separately identified by a letter.

11.4.36.4 A checklist of AIC currently in force shall be issued at least once a year, with distribution as for the AIC.

#### **11.4.37 Pre-Flight information**

11.4.37.1 At any aerodrome/heliport normally used for international air operations, aeronautical information essential for the safety, regularity and efficiency of air navigation and relative to the route stages originating at the aerodrome/heliport shall be made available to flight operations personnel, including flight crews and services responsible for pre-flight information.

11.4.37.2 Aeronautical information provided for pre-flight planning purposes at the aerodromes/heliports referred to in sub-regulation 11.4.37.1 shall include relevant:

- a) elements of the Integrated Aeronautical Information Package;
- b) maps and charts.

---

\* This information, or any part of it, may be included in the AIP, if so desired.

- c) Additional current information relating to the aerodrome of departure shall be provided concerning the following:
- 1) construction or maintenance work on or immediately adjacent to the manoeuvring area;
  - 2) rough portions of any part of the manoeuvring area, whether marked or not, e.g. broken parts of the surface of runways and taxiways;
  - 3) presence and depth of snow, ice or water on runways and taxiways, including their effect on surface friction;
  - 4) snow drifted or piled on or adjacent to runways or taxiways;
  - 5) parked aircraft or other objects on or immediately adjacent to taxiways;
  - 6) presence of other temporary hazards;
  - 7) presence of birds constituting a potential hazard to aircraft operations;
  - 8) failure or irregular operation of part or all of the aerodrome lighting system including approach, threshold, runway, taxiway, obstruction and manoeuvring area unserviceability lights and aerodrome power supply;
  - 9) failure, irregular operation and changes in the operational status of SSR, ADS-B, ADS-C, CPDLC, D-ATIS, D-VOLMET, radio navigation services, VHF aeromobile channels, RVR observing system, and secondary power supply; and
  - 10) presence and operation of humanitarian relief missions, such as those undertaken under the auspices of the United Nations, together with any associated procedures and/or limitations applied thereof.

11.4.37.3 A recapitulation of valid NOTAM of operational significance and other information of urgent character shall be made available to flight crews in the form of plain-language pre-flight information bulletins (PIB).

#### **11.4.38 Automated Pre-flight Information System**

11.4.38.1 Automated pre-flight information systems shall be used to make aeronautical data and aeronautical information available to operations personnel including flight crew members for self-briefing, flight planning and flight information service purposes. The aeronautical data and aeronautical information made available shall comply with the provisions of sub-regulations 11.4.37.2 and 11.4.37.3.

11.4.38.2 Self-briefing facilities of an automated pre-flight information system shall provide access to operations personnel, including flight crew members and other aeronautical personnel concerned, for consultation as necessary with the aeronautical information service by telephone or other suitable telecommunications means. The human/machine interface of such facilities shall ensure easy access in a guided manner to all relevant information/data.

11.4.38.3 Automated pre-flight information systems for the supply of aeronautical data and aeronautical information for self-briefing, flight planning and flight information service shall:

- a) provide for continuous and timely updating of the system database and monitoring of the validity and quality of the aeronautical data stored;
- b) permit access to the system by operations personnel including flight crew members, aeronautical personnel concerned and other aeronautical users through suitable telecommunications means;
- c) ensure provision, in paper copy form, of the aeronautical data and aeronautical information accessed, as required;
- d) use access and interrogation procedures based on abbreviated plain language and ICAO location indicators, as appropriate, or based on a menu-driven user interface or other appropriate mechanism as agreed between the civil aviation authority and operator concerned; and
- e) provide for rapid response to a user request for information.

11.4.38.4 Where automated pre-flight information systems are used to provide the harmonized, common point of access by operations personnel, including flight crew members and other aeronautical personnel concerned, to aeronautical data and aeronautical information and meteorological information, the AIS provider shall remain responsible for the quality and timeliness of the aeronautical data and aeronautical information provided by means of such a system.

#### **11.4.39 Post-flight information**

11.4.39.1 The AIS provider shall ensure that arrangements are made to receive at aerodromes/heliports information concerning the state and operation of air navigation facilities or services noted by aircrews and shall ensure that such information is distribution as the circumstances necessitate.

11.4.39.2 The AIS provider shall ensure that arrangements are made to receive at aerodromes/heliports information concerning the presence of birds observed by aircrews and shall ensure that such information is distribution as the circumstances necessitate.

#### **11.4.40 Telecommunications requirements**

11.4.40.1 International NOTAM offices shall be connected to the aeronautical fixed service (AFS) and the connections shall provide for printed communications.

11.4.40.2 Each international NOTAM office shall be connected, through the aeronautical fixed service (AFS), to the following points within the territory for which it provides service:

- a) area control centres and flight information centres; and
- b) aerodromes/heliports at which an information service is established in accordance with sub-regulation 11.4.37.1.

11.4.41 – 11.4.43 RESERVED

#### **11.4.44 Electronic Terrain and Obstacle Data**

11.4.44.1 The coverage areas for sets of electronic terrain and obstacle data shall be specified as:

- a) Area 1- the entire territory of [State];
- b) Area 2 - within the vicinity of an aerodrome, sub-divided as follows;
  - (i) Area 2a - a rectangular area around a runway that comprises the runway strip plus any clearway that exists.
  - (ii) Area 2b - an area extending from the ends of Area 2a in the direction of departure, with a length of 10 km and a splay of 15 per cent to each side;
  - (iii) Area 2c - an area extending outside Area 2a and Area 2b at a distance of not more than 10 km from the boundary of Area 2a; and
  - (iv) Area 2d - an area outside the Areas 2a, 2b and 2c up to a distance of 45 km from the aerodrome reference point, or to an existing TMA boundary, whichever is nearest;
- c) Area 3 - the area bordering an aerodrome movement area that extends horizontally from the edge of a runway to 90 m from the runway centre line and 50 m from the edge of all other parts of the aerodrome movement area.
- d) Area 4 - The area extending 900 m prior to the runway threshold and 60 m each side of the extended runway centre line in the direction of the approach on a precision approach runway, Category II or III.

11.4.44.2 Electronic terrain data shall be provided for Area 1. The obstacle data shall be provided for obstacles in Area 1 higher than 100 m above ground.

11.4.44.3 From 12 November 2015, at aerodromes regularly used by international civil aviation, electronic obstacle data shall be provided for all obstacles within Area 2 that are assessed as being a hazard to air navigation.

11.4.44.4 From 12 November 2015, at aerodromes regularly used by international civil aviation, electronic terrain data shall be provided for:

- a) Area 2a;
- b) the take-off flight path area; and
- c) an area bounded by the lateral extents of the aerodrome obstacle limitation surfaces.

11.4.44.5 From 12 November 2015, at aerodromes regularly used by international civil aviation, electronic obstacle data shall be provided for:

- a) Area 2a , for those obstacles that penetrate the relevant obstacle data collection surface specified in Annex 15, Appendix 8;
- b) objects in the take-off flight path area which project above a plane surface having a 1.2 per cent slope and having a common origin with the take-off flight path area; and
- c) penetrations of the aerodrome obstacle limitation surfaces.

11.4.44.6 At aerodromes regularly used by international civil aviation, electronic terrain and obstacle data shall be provided for Area 4 for terrain and obstacles that penetrate the relevant obstacle data collection surface specified in Annex 15, Appendix 8, for all runways where precision approach Category II or III operations have been established and where detailed terrain information is required by operators to enable them to assess the effect of terrain on decision height determination by use of radio altimeters.

#### **11.4.45 Terrain data set — content, numerical specification and structure**

11.4.45.1 A terrain data set shall contain digital sets of data representing terrain surface in the form of continuous elevation values at all intersections (points) of a defined grid, referenced to common datum. A terrain grid shall be angular or linear and shall be of regular or irregular shape.

11.4.45.2 Sets of electronic terrain data shall include spatial (position and elevation), thematic and temporal aspects for the surface of the Earth containing naturally occurring features such as mountains, hills, ridges, valleys, bodies of water, permanent ice and snow, and excluding obstacles. In practical terms, depending on the acquisition method used, this shall represent the continuous surface that exists at the bare earth, the top of the canopy or something in-between, also known as first reflective surface.

11.4.45.3 In terrain data sets, only one feature type, i.e. terrain, shall be provided. Feature attributes describing terrain shall be those listed in Annex 15, Table A8-3. The terrain feature attributes listed in Table A8-3 represent the minimum set of terrain attributes, and those annotated as mandatory shall be recorded in the terrain data set.

11.4.45.4 Electronic terrain data for each area shall conform to the applicable numerical requirements in Annex 15, Appendix 8, Table A8-1.

#### **11.4.46 Obstacle data set — content, numerical specification and structure**

11.4.46.1 Obstacle data shall comprise the digital representation of the vertical and horizontal extent of the obstacle. Obstacles shall not be included in terrain data sets. Obstacle data elements are features that shall be represented in the data sets by points, lines or polygons.

11.4.46.2 In an obstacle data set, all defined obstacle feature types shall be provided and each of them shall be described according to the list of mandatory attributes provided in Annex 15 Appendix 8, Table A8-4.

11.4.46.3 Electronic obstacle data for each area shall conform to the applicable numerical requirements in Annex 15 Appendix 8, Table A8-2.

#### **11.4.47 Terrain and obstacle data product specifications**

11.4.47.1 To allow and support the interchange and use of sets of electronic terrain and obstacle data among different data providers and data users, the ISO 19100 series of standards for geographic information shall be used as a general data modeling framework.

11.4.47.2 A comprehensive statement of available electronic terrain and obstacle data sets shall be provided in the form of terrain data product specifications as well as obstacle data product specifications on which basis air navigation users will be able to evaluate the products and determine whether they fulfill the requirements for their intended use (application).



11.4.47.3 Each terrain data product specification shall include an overview, a specification scope, data product identification, data content and structure, reference system, data quality, data capture, data maintenance, data portrayal, data product delivery, additional information, and metadata.

11.4.47.4 The overview of terrain data product specification or obstacle data product specification shall provide an informal description of the product and shall contain general information about the data product. Specification of terrain data may not be homogenous across the whole data product but may vary for different parts of the data sets. For each such subset of data, a specification scope shall be identified. Identification information concerning both terrain and obstacle data products shall include the title of the product; a brief narrative summary of the content, purpose, and spatial resolution if appropriate (a general statement about the density of spatial data); the geographic area covered by the data product; and supplemental information.

11.4.47.5 Content information of feature-based terrain data sets or of feature-based obstacle data sets shall each be described in terms of an application schema and a feature catalogue. Application schema shall provide a formal description of the data structure and content of data sets while the feature catalogue shall provide the semantics of all feature types together with their attributes and attribute value domains, association types between feature types and feature operations, inheritance relations and constraints. Coverage is considered a subtype of a feature and can be derived from a collection of features that have common attributes. Both terrain and obstacle data product specifications shall identify clearly the coverage and/or imagery they include and shall provide a narrative description of each of them.

11.4.47.6 Both terrain data product specifications and obstacle data product specifications shall include information that identifies the reference system used in the data product. This shall include the spatial reference system and temporal reference system. Additionally, both data product specifications shall identify the data quality requirements for each data product. This shall include a statement on acceptable conformance quality levels and corresponding data quality measures. This statement shall cover all the data quality elements and data quality sub-elements, even if only to state that a specific data quality element or sub-element is not applicable.

11.4.47.7 Terrain data product specifications shall include a data capture statement which shall be a general description of the sources and of processes applied for the capture of terrain data. The principles and criteria applied in the maintenance of terrain data sets and obstacle data sets shall also be provided with the data specifications, including the frequency with which data products are updated. Of particular importance shall be the maintenance information of obstacle data sets and an indication of the principles, methods and criteria applied for obstacle data maintenance.

11.4.47.8 Terrain data product specifications shall contain information on how data held with data sets is presented, i.e. as a graphic output, as a plot or as an image. The product specifications for both terrain and obstacles shall also contain data product delivery information which shall include delivery formats and delivery medium information.

11.4.47.9 The core terrain and obstacle metadata elements shall be included in the data product specifications. Any additional metadata items required to be supplied shall be stated in each product specification together with the format and encoding of the metadata.

11.4.47.10 The obstacle data product specification, supported by geographical coordinates for each aerodrome included within the dataset, shall describe Areas 2a, 2b, 2c, 2d; the take-off flight path area; and the obstacle limitation surfaces.

#### **11.4.48 Aerodrome mapping data product specification**

11.4.48.1 The ISO 19100 series of standards for geographic information shall be used as a reference framework.

11.4.48.2 Aerodrome mapping data products shall be described following the ISO 19131 data product specification standard.

#### **11.4.49 Aerodrome mapping database — data set content and structure**

11.4.49.1 The content and structure of aerodrome mapping data sets shall be defined in terms of an application schema and a feature catalogue.

11.4.49.2 Aerodrome mapping data sets shall contain aerodrome mapping data consisting of aerodrome features.

11.4.49.3 Aerodrome mapping metadata shall comply with ISO 19115.

### **Part 11.5 – Aeronautical Telecommunication (ATE)**

#### **11.5.1 Establishment of ANSP**

11.5.1.1 Sub-part 11.5 prescribes the requirements pertaining to the planning, operation and maintenance of aeronautical telecommunication facilities.

11.5.1.2 An ANSP shall ensure that the aeronautical telecommunication service that it provides is in conformity with the provisions in this regulation.

11.5.1.3 The ANSP shall be designated by [appropriate authority designated by the State] for providing such services.

#### **11.5.2 Operations manual**

11.5.2.1 The ANSP shall develop an operations manual which shall serve to demonstrate how the ANSP will comply with the requirements of this regulation.

11.5.2.2 The contents of the operations manual shall contain:

- a) the information required of the ANSP as mentioned in this regulation;
- b) an organization chart of the ANSP and its maintenance contractors, if any, that shows the position of each personnel and the name, qualification, experience, duties and responsibilities of personnel who are responsible for ensuring the compliance of the organization with the requirements in sub-paragraph a);
- c) an overall operation and maintenance plan for the aeronautical telecommunication service, and for each facility, an operation and maintenance plan, as described in sub-regulation 11.5.6 of this document;

- d) for each facility, information on the compliance of the facility with the applicable requirements of Annex 10; and
- e) the system performance target of each facility, such as its availability and reliability.

11.5.2.3 The operations manual may consist of a main manual covering the main areas that need to be addressed, as well as separate supporting documents and manuals (such as the operation and maintenance plan of each facility) that are referred to in the main manual.

11.5.2.4 The operations manual shall be issued under the authority of the ANSP. The ANSP 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.

### **11.5.3 Training and Personnel Requirement**

11.5.3.1 The ANSP shall ensure that all its personnel possess the skills and competencies required in the provision of the aeronautical telecommunication service. The ANSP shall develop an overall training policy and programme for the organization as well as job description for each of its staff. The training policy and programme shall lay down the training courses that different levels of staff have to undergo to perform his duties, including initial, recurrent and specialized training, where applicable. The job description shall depict the job purpose, key responsibilities, and outcome to be achieved of each staff.

11.5.3.2 The ANSP shall maintain individual training records for each of its staff.

11.5.3.3 The ANSP shall conduct a yearly review of the training plan for each staff at the beginning of the year to identify any gaps in competency, changes in training requirement and prioritize the type of training required for the coming year.

11.5.3.4 The ANSP shall ensure that the training requirements of sub-regulations 11.5.3.1 to 11.5.3.3 are similarly applied to its maintenance contractors, if any.

### **11.5.4 Commissioning of New Facility**

11.5.4.1 The ANSP shall establish procedures to ensure that each new facility:

- a) is commissioned to meet the specifications for that facility; and
- b) is in compliance with the SARPS prescribed in Annex 10, where applicable.

11.5.4.2 The ANSP shall ensure that the system performance of the new facility has been validated by the necessary tests, and that all parties involved with the operations and maintenance of the facility, including its maintenance contractors have accepted and are satisfied with the results of the tests.

11.5.4.3 The ANSP shall ensure that procedures include documentation of tests conducted on the facility prior to the commissioning, including those that test the compliance of the facility with the applicable Annex 10 SARPS and any flight check required in compliance with ICAO Doc 8071.

### **11.5.5 Safety case**

11.5.5.1 The ANSP shall ensure that for safety critical systems, including automated ATC systems, ICS and ILS, the commissioning of such systems shall include the conduct of a safety case or equivalent.

11.5.5.2 The ANSP shall ensure that human factors principles are observed in the design, operation and maintenance of ATE facilities.

### **11.5.6 Operation and maintenance plan**

11.5.6.1 The ANSP shall establish an overall operation and maintenance plan for the aeronautical telecommunication service.

11.5.6.2 All facilities shall:

- a) be tested for normal operations on a routine basis;
- b) meet the required level of reliability and availability;
- c) provide for the timely and appropriate detection and warning of system failures and degradations;
- d) include documentation on the consequences of system, sub-system and equipment failures and degradations; and
- e) include measures to control the probability of failures and degradations.

11.5.6.3 In addition to the overall operation and maintenance plan, the ANSP shall establish an operation and maintenance plan for each facility. The plan shall include:

- a) a procedure for the periodic inspection and testing of each facility to verify that it meets the operational and performance specifications of that facility;
- b) details of flight test, if necessary, such as the standards and procedures to be used and flight test interval, which shall be in compliance with guidelines to ICAO Doc 8071 or any other appropriate ICAO document;
- c) the interval between periodic inspection and flight test and the basis for that interval. Whenever the interval is changed, the reasons for such change should be documented;
- d) the operation and maintenance instructions for each facility;
- e) an analysis of the number of personnel required to operate and maintain each facility taking into account the workload required;
- f) the corrective plan and procedures for each facility, including such as whether the repair of modules and component are undertaken in-house or by equipment manufacturers; and
- g) the spare support plan for each facility.

### **11.5.7 Test equipment**

11.5.7.1 The ANSP shall ensure that appropriate inspection, measuring and test equipment are available for staff to maintain the operation of each facility. The ANSP shall ensure the control, calibration and maintenance of such equipment so that they have the precision and accuracy necessary for the measurements and tests to be performed.

### **11.5.8 Interface Arrangement for Support Services**

11.5.8.1 The ANSP shall formalize interface arrangements where applicable with external organizations in the form of service level agreements, detailing the following:

- a) interface and functional specifications of the support service;
- b) service level of the support service such as availability, accuracy, integrity and recovery time of failure of service; and
- c) monitoring and reporting of the operational status of the service to the service provider.

### **11.5.9 Facility malfunction incident and radio interference reporting**

11.5.9.1 The ANSP shall establish procedures for the reporting, collection and notification of facility malfunction incidents and safety incidents.

11.5.9.2 Reports of such incidents shall be compiled and reviewed periodically by the ANSP with its maintenance contractors to:

- a) determine the cause of the incidents and determine any adverse trends;
- b) implement corrective and preventive actions where necessary to prevent recurrence of the incidents; and
- c) implement any measures to improve the safety performance of the aeronautical telecommunication service.

11.5.9.3 Any serious service failure or safety incident shall be reported to [appropriate authority designated by the State] and be investigated by the ANSP. The purpose of the investigation shall be to understand how and why the incident happened, including possible organizational contributing factors and to recommend actions to prevent a recurrence.

11.5.9.4 A copy of the investigation report shall be forwarded to [appropriate authority designated by the State].

11.5.9.5 The ANSP shall establish a procedure for the management and protection of aeronautical radio spectrum. Any frequency allocation within the aeronautical radio spectrum shall be centrally controlled by a designated responsible person to ensure that there will be no conflict and interference to any radio stations or facility. Updated records shall be kept of all allocated frequencies.

11.5.9.6 The ANSP shall ensure that there is no willful transmission of unnecessary or anonymous radio signals, messages or data by any of its radio stations. Procedures shall also be established with the local telecommunication authority to address occurrence of radio frequency interference. Any frequency interference occurrence shall be reported, investigated and follow-up actions taken to prevent recurrence.

11.5.9.7 The ANSP shall, as soon as possible:

- a) forward to the AIS:

- (i) information on the operational details of any new facility for publication in the [State] AIP; and
  - (ii) information concerning any change in the operational status of any existing facility, for the issue of a NOTAM; and
- b) ensure that the information forwarded under sub-paragraph a) has been accurately published.

### **11.5.10 Documentation and records**

11.5.10.1 The ANSP shall maintain all documents and records which are necessary for the operation and maintenance of the service. Copies of these documents shall also be made available to personnel where needed. These documents shall include:

- a) these regulations;
- b) the ANSP's operations manual;
- c) ICAO Annex 10 Volumes I to V, ICAO Doc 8071 - Manual on Testing of Radio Navigation Aids, and other relevant ICAO documents;
- d) records of malfunction and safety incident reports;
- e) records of internal audit reports;
- f) records of investigation into serious incidents; and
- g) records of job description, training programme and plan of each staff member.

11.5.10.2 The ANSP shall establish a process for the authorization and amendment of these documents to ensure that they are constantly updated. The process shall ensure that:

- a) the currency of the documentation can be readily determined;
- b) amendments to the documentation are controlled in accordance with established quality management principles; and
- c) only current versions of documents are available.

11.5.10.3 The ANSP shall ensure that where documents are held as computer based records and where paper copies of computer based records are made, they are subjected to the same control as paper documents.

## **Part 11.6 – Aeronautical Meteorology Services (MET)**

### **11.6.1 Provision of meteorological service**

11.6.1.1 The meteorological authority shall be designated by [Appropriate authority designated by the State]. The meteorological authority will provide the meteorological service for air navigation for [State]

in accordance with these regulations. The objective of meteorological service for international air navigation shall be to contribute towards the safety, regularity and efficiency of international air navigation.

11.6.1.2 This objective shall be achieved by supplying the following users: operators, flight crew members, ATS units, search and rescue services units, airport managements and others concerned with the conduct or development of international air navigation, with the meteorological information necessary for the performance of their respective functions.

11.6.1.4 The meteorological authority shall comply with the requirements of the World Meteorological Organization in respect of qualifications and training of meteorological personnel providing service for international air navigation.

### **11.6.2 Supply, use and quality management of meteorological information**

11.6.2.1 Close liaison shall be maintained between those concerned with the supply and those concerned with the use of meteorological information on matters which affect the provision of meteorological service for international air navigation.

11.6.2.2 In order to meet the objective of meteorological service for international air navigation, the meteorological authority shall establish and implement a properly organized quality system comprising procedures, processes and resources necessary to provide for the quality management of the meteorological information to be supplied to the users listed in sub-regulation 11.6.1.2.

11.6.2.3 The quality system shall provide the users with assurance that the meteorological information supplied complies with the stated requirements in terms of the geographical and spatial coverage, format and content, time and frequency of issuance and period of validity, as well as the accuracy of measurements, observations and forecasts. When the quality system indicates that meteorological information to be supplied to the users does not comply with the stated requirements, and automatic error correction procedures are not appropriate, such information shall not be supplied to the users unless it is validated with the originator.

11.6.2.4 The meteorological information supplied to the users listed in 11.6.1.2 shall be consistent with Human Factors principles and shall be in forms which require a minimum of interpretation by these users and in conformance with these regulations.

### **11.6.3 Notifications required from operators**

11.6.3.1 An operator requiring meteorological service or changes in existing meteorological service shall notify the meteorological authority or the aerodrome meteorological office concerned sufficiently in advance when:

- a) new routes or new types of operations are planned;
- b) changes of a lasting character are to be made in scheduled operations; and
- c) other changes, affecting the provision of meteorological service, are planned.

Such information shall contain all details necessary for the planning of appropriate arrangements by the meteorological authority.

11.6.3.2 The aerodrome meteorological office shall be notified by the operator or a flight crew member:

- a) of flight schedules;
- b) when non-scheduled flights are to be operated; and
- c) when flights are delayed, advanced or cancelled.

11.6.4 – 11.6.5 RESERVED

### **11.6.6 Aerodrome meteorological offices**

11.6.6.1 The meteorological authority shall establish one or more aerodrome and/or other meteorological offices which shall be adequate for the provision of the meteorological service required to satisfy the needs of international air navigation.

11.6.6.2 An aerodrome meteorological office shall carry out all or some of the following functions as necessary to meet the needs of flight operations at the aerodrome:

- a) prepare and/or obtain forecasts and other relevant information for flights with which it is concerned; the extent of its responsibilities to prepare forecasts shall be related to the local availability and use of en-route and aerodrome forecast material received from other offices;
- b) prepare and/or obtain forecasts of local meteorological conditions;
- c) maintain a continuous survey of meteorological conditions over the aerodromes for which it is designated to prepare forecasts;
- d) provide briefing, consultation and flight documentation to flight crew members and/or other flight operations personnel;
- e) supply other meteorological information to aeronautical users;
- f) display the available meteorological information;
- g) exchange meteorological information with other aerodrome meteorological offices; and
- h) supply information received on pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud, to its associated ATS unit, aeronautical information service unit and meteorological watch office as agreed between the meteorological, aeronautical information service and ATS authorities concerned.

11.6.6.3 The aerodromes for which landing forecasts are required shall be as determined by regional air navigation agreement.

11.6.6.4 For aerodromes without an aerodrome meteorological offices located at the aerodrome:

- a) the meteorological authority concerned shall designate one or more aerodrome meteorological office(s) to supply meteorological information as required; and



- b) shall establish the means by which such information can be supplied to the aerodromes concerned.

#### **11.6.7 Meteorological watch offices**

11.6.7.1 If [State] has accepted the responsibility for providing ATS within a flight information region or a control area, then the meteorological authority shall establish, on the basis of regional air navigation agreement, such meteorological watch office(s).

11.6.7.2 A meteorological watch office shall:

- a) maintain continuous watch over meteorological conditions affecting flight operations within its area of responsibility;
- b) prepare SIGMET and other information relating to its area of responsibility;
- c) supply SIGMET information and, as required, other meteorological information to associated ATS units;
- d) disseminate SIGMET information;
- e) when required by regional air navigation agreement:
  - (i) prepare AIRMET information related to its area of responsibility;
  - (ii) supply AIRMET information to associated ATS units; and
  - (iii) disseminate AIRMET information;
- f) supply information received on pre-eruption volcanic activity, a volcanic eruption and volcanic ash cloud for which a SIGMET has not already been issued, to its associated ACC/FIC, as agreed between the meteorological and ATS authorities concerned, and to its associated VAAC as determined by regional air navigation agreement; and
- g) supply information received concerning the release of radioactive materials into the atmosphere, in the area for which it maintains watch or adjacent areas, to its associated ACC/FIC, as agreed between the meteorological and ATS authorities concerned, and to aeronautical information service units, as agreed between the meteorological and appropriate civil aviation authorities concerned. The information shall comprise location, date and time of the release, and forecast trajectories of the radioactive materials.

11.6.8 – 11.6.9 RESERVED

#### **11.6.10 Aeronautical meteorological stations and observations**

11.6.10.1 The meteorological authority shall establish, at aerodromes in [State] such aeronautical meteorological stations as it determines to be necessary. An aeronautical meteorological station may be a separate station or may be combined with a synoptic station.

11.6.10.2 Aeronautical meteorological stations shall make routine observations at fixed intervals. At aerodromes, the routine observations shall be supplemented by special observations whenever specified

changes occur in respect of surface wind, visibility, runway visual range, present weather, clouds and/or air temperature.

11.6.10.3 Meteorological authority shall arrange for its aeronautical meteorological stations to be inspected at sufficiently frequent intervals to ensure that a high standard of observation is maintained, that instruments and all their indicators are functioning correctly, and that the exposure of the instruments has not changed significantly.

11.6.10.4 At aerodromes which can be used for Category II and CAT III instrument approach and landing operations, automated equipment for measuring or assessing, as appropriate, and for monitoring and remote indicating of surface wind, visibility, runway visual range, height of cloud base, air and dew-point temperatures and atmospheric pressure shall be installed to support approach and landing and take-off operations. These devices shall be integrated automatic systems for acquisition, processing, dissemination and display in real time of the meteorological parameters affecting landing and take-off operations. The design of integrated automatic systems shall observe Human Factors principles and include back-up procedure.

11.6.10.5 The observations shall form the basis for the preparation of reports to be disseminated at the aerodrome of origin and of reports to be disseminated beyond the aerodrome of origin.

11.6.11 An agreement between the meteorological authority and the appropriate ATS authority shall be established to cover the following:

- a) the provision in ATS units of displays related to integrated automatic systems;
- b) the calibration and maintenance of these displays/instruments;
- c) the use to be made of these displays/instruments by ATS personnel;
- d) as and where necessary, supplementary visual observations if and when made by ATS personnel to update or supplement the information supplied by the meteorological station;
- e) meteorological information obtained from aircraft taking off or landing; and
- f) if available, meteorological information obtained from ground weather radar.

#### **11.6.12 Routine observations and reports**

11.6.12.1 At aerodromes, routine observations shall be made throughout the 24 hours each day except as otherwise agreed between the meteorological authority, the appropriate ATS authority and the operator concerned. Such observations shall be made at intervals of one hour, or if determined by regional air navigation agreement, at intervals of one half-hour.

11.6.12.2 Reports of routine observations shall be issued as:

- a) local routine reports, only for dissemination at the aerodrome of origin (intended for arriving and departing aircraft); and
- b) METAR for dissemination beyond the aerodrome of origin (mainly intended for flight planning, VOLMET broadcasts and D-VOLMET).

11.6.12.3 At aerodromes that are not operational throughout 24 hours in accordance with sub-regulation 11.6.12.1, METAR shall be issued prior to the aerodrome resuming operations in accordance with regional air navigation agreement.

### **11.6.13. Special observations and reports**

11.6.13.1 A list of criteria for special observations shall be established by the meteorological authority in consultation with the appropriate ATS authority, operators and other concerned.

11.6.13.2 Reports of special observations shall be issued as:

- a) local special reports, only for dissemination at the aerodrome of origin (intended for arriving and departing aircraft); and
- b) SPECI for dissemination beyond the aerodrome of origin (mainly intended for flight planning, VOLMET broadcasts and D-VOLMET) unless METAR are issued at half-hourly intervals.

11.6.13.3 At aerodromes that are not operational throughout 24 hours in accordance with 11.6.12.1, following resumption of the issuance of METAR, SPECI shall be issued, as necessary.

### **11.6.14 Contents of reports**

11.6.14.1 Local routine and special reports and METAR and SPECI shall contain the following elements in the order indicated:

- a) identification of the type of report;
- b) location indicator;
- c) time of the observation;
- d) identification of an automated or missing report, when applicable;
- e) surface wind direction and speed;
- f) visibility;
- g) runway visual range, when applicable;
- h) present weather;
- i) cloud amount, cloud type (only for cumulonimbus and towering cumulus clouds) and height of cloud base or, where measured, vertical visibility;
- j) air temperature and dew-point temperature; and
- k) QNH and, when applicable, QFE (QFE included only in local routine and special reports).

11.6.14.2 Optional elements included under supplementary information shall be included in METAR and SPECI in accordance with regional air navigation agreement.

#### **11.6.15. Observing and reporting meteorological elements**

11.6.15.1 Surface wind - The mean direction and the mean speed of the surface wind shall be measured, as well as significant variations of the wind direction and speed, and reported in degrees true and metres per second (or knots), respectively.

11.6.15.2 Visibility - The visibility as defined shall be measured or observed, and reported in metres or kilometres.

11.6.15.3 Runway visual range - Runway visual range shall be assessed on all runways intended for Category II and III instrument approach and landing operations.

11.6.15.4 The runway visual range, assessed in accordance with 11.6.15.3 shall be reported in metres throughout periods when either the visibility or the runway visual range is less than 1500 m.

11.6.15.5 Runway visual range assessments shall be representative of:

- a) the touchdown zone of the runway intended for non-precision or Category I instrument approach and landing operations;
- b) the touchdown zone and the mid-point of the runway intended for Category II instrument approach and landing operations; and
- c) the touchdown zone, the mid-point and stop-end of the runway intended for Category III instrument approach and landing operations.

11.6.15.6 The units providing air traffic service and aeronautical information service for an aerodrome shall be kept informed without delay of changes in the serviceability status of the automated equipment used for assessing runway visual range.

11.6.15.7 Present weather - The present weather occurring at the aerodrome shall be observed and reported as necessary. The following present weather phenomena shall be identified, as a minimum: rain, drizzle, snow and freezing precipitation (including intensity thereof), haze, mist, fog, freezing fog and thunderstorms (including thunderstorms in the vicinity).

11.6.15.8 Clouds - Cloud amount, cloud type and height of cloud base shall be observed and reported as necessary to describe the clouds of operational significance. When the sky is obscured, vertical visibility shall be observed and reported, where measured, in lieu of cloud amount, cloud type and height of cloud base. The height of cloud base and vertical visibility shall be reported in metres (or feet).

11.6.15.9 Air temperature and dew-point temperature - The air temperature and the dew-point temperature shall be measured and reported in degrees Celsius.

11.6.15.10 Atmospheric pressure - The atmospheric pressure shall be measured, and QNH and QFE values shall be computed and reported in hectopascals.

11.6.15.11 Local routine and special reports and METAR and SPECI from automatic observing systems shall be identified with the word “AUTO”.

### **11.6.16. Routine aircraft observations – designations**

11.6.16.1 The following aircraft observations shall be made:

- a) routine aircraft observations during en-route and climb-out phases of the flight for aircraft equipped with air-ground data link ; and
- b) special and other non-routine aircraft observations during any phase of the flight.

11.6.16.2 When air-ground data link is used and automatic dependent surveillance (ADS) or secondary surveillance radar (SSR) Mode S is being applied, automated routine observations shall be made every 15 minutes during the en-route phase and every 30 seconds during the climb-out phase for the first 10 minutes of the flight.

11.6.16.3 In the case of air routes with high-density air traffic, an aircraft from among the aircraft operating at each flight level shall be designated, at approximately hourly intervals, to make routine observations in accordance with sub-regulation 11.6.16.2. The designation procedures shall be subject to regional air navigation agreement.

11.6.16.4 In the case of the requirement to report during the climb-out phase, an aircraft shall be designated, at approximately hourly intervals, at each aerodrome to make routine observations in accordance with sub-regulation 11.6.16.2.

11.6.16.5 Aircraft not equipped with air-ground data link are exempted from making routine aircraft observations.

### **11.6.17 Special aircraft observations**

11.6.17.1 Special observations shall be made by all aircraft whenever the following conditions are encountered or observed:

- a) moderate or severe turbulence; or
- b) moderate or severe icing; or
- c) severe mountain wave; or
- d) thunderstorms, without hail, that are obscured, embedded, widespread or in squall lines; or
- e) thunderstorms, with hail, that are obscured, embedded, widespread or in squall lines; or
- f) heavy dust storm or heavy sandstorm; or
- g) volcanic ash cloud; or
- h) pre-eruption volcanic activity or a volcanic eruption.

11.6.17.2 When other meteorological conditions not listed under 11.6.17.1 are encountered and which, in the opinion of the pilot-in-command, may affect the safety or markedly affect the efficiency of other aircraft operations, the pilot-in-command shall advise the appropriate ATS unit as soon as practicable.

#### **11.6.18 Reporting of aircraft observations during flight**

11.6.18.1 Aircraft observations shall be reported by air-ground data link. Where air-ground data link is not available or appropriate, special and other non-routine aircraft observations during flight shall be reported by voice communications.

11.6.18.2 Aircraft observations shall be reported during flight at the time the observation is made or as soon thereafter as is practicable.

11.6.18.3 Aircraft observations shall be reported as air-reports.

11.6.18.4 The meteorological authority shall make arrangements with the appropriate ATS authority to ensure that on receipt by the ATS units of special air-reports by voice communication of:

- a) special air-reports by voice communications, the ATS units relay them without delay to their associated meteorological watch office; and
- b) routine and special air-reports by data link communications, the ATS units relay them without delay to their associated meteorological watch office and WAFCs.

#### **11.6.19 Recording and post-flight reporting of aircraft observations of volcanic activity**

11.6.19.1 Special aircraft observations of pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud shall be recorded on the special air-report of volcanic activity form. A copy of the form shall be included with the flight documentation provided to flights operating on routes which, in the opinion of the meteorological authority could be affected by volcanic ash clouds.

#### **11.6.20 Aerodrome forecasts**

11.6.20.1 An aerodrome forecast shall be prepared on the basis of regional air navigation agreement by the meteorological office designated by the meteorological authority.

11.6.20.2 An aerodrome forecast shall be issued at a specified time not earlier than one hour prior to the beginning of its validity period and consist of a concise statement of the expected meteorological conditions at an aerodrome for a specified period.

11.6.20.3 Aerodrome forecasts and amendments thereto shall be issued as TAF and include the following information in the order indicated:

- a) identification of the type of forecast;
- b) location indicator;
- c) time of issue of forecast;
- d) identification of a missing forecast, when applicable;

- e) date and period of validity of forecast;
- f) identification of a cancelled forecast, when applicable;
- g) surface wind;
- h) visibility;
- i) weather;
- j) cloud;
- k) expected significant changes to one or more of these elements during the period of validity; and
- l) optional elements shall be included in TAF in accordance with regional air navigation agreement.

11.6.20.4 Aerodrome meteorological offices preparing TAF shall keep the forecasts under continuous review and, when necessary, shall issue amendments promptly. The length of the forecast messages and the number of changes indicated in the forecast shall be kept to a minimum.

11.6.20.5 TAF that cannot be kept under continuous review shall be cancelled.

11.6.20.6 The period of validity of a routine TAF shall not be less than 6 hours nor more than 30 hours; the period of validity shall be determined by regional air navigation agreement. Routine TAF valid for less than 12 hours shall be issued every 3 hours and those valid for 12 to 30 hours shall be issued every 6 hours.

11.6.20.7 When issuing TAF, meteorological offices shall ensure that not more than one TAF is valid at an aerodrome at any given time.

#### **11.6.21 Landing forecasts**

11.6.21.1 A landing forecast shall be prepared by the aerodrome meteorological office designated by the meteorological authority concerned as determined by regional air navigation agreement; such forecasts are intended to meet the requirements of local users and of aircraft within about one hour's flying time from the aerodrome.

11.6.21.2 Landing forecasts shall be prepared in the form of a trend forecast.

11.6.21.3 A trend forecast shall consist of a concise statement of the expected significant changes in the meteorological conditions at that aerodrome to be appended to a local routine or local special report, or a METAR or SPECI. The period of validity of a trend forecast shall be 2 hours from the time of the report which forms part of the landing forecast.

#### **11.6.22 Forecasts for take-off**

11.6.22.1 A forecast for take-off shall be prepared by the aerodrome meteorological office designated by the meteorological authority concerned if required by agreement between the meteorological authority and operators.

### **11.6.23 Area forecasts for low-level flights**

11.6.23.1 When the density of traffic operating below flight level 100 (or up to flight level 150 in mountainous areas, or higher, where necessary) warrants the routine issue and dissemination of area forecasts for such operations, the frequency of issue, the form and the fixed time or period of validity of those forecasts and the criteria for amendments thereto shall be determined by the meteorological authority in consultation with the users.

11.6.23.2 When the density of traffic operating below flight level 100 warrants the issuance of AIRMET information, area forecasts for such operations shall be prepared in a format agreed upon between the meteorological authorities concerned. When abbreviated plain language is used, the forecast shall be prepared as a GAMET area forecast, employing approved ICAO abbreviations and numerical values; when chart form is used, the forecast shall be prepared as a combination of forecasts of upper wind and upper-air temperature, and of SIGWX phenomena. The area forecasts shall be issued to cover the layer between the ground and flight level 100 (or up to flight level 150 in mountainous areas, or higher, where necessary) and shall contain information on en-route weather phenomena hazardous to low-level flights, in support of the issuance of AIRMET information, and additional information required by low-level flights.

11.6.23.3 Area forecasts for low-level flights prepared in support of the issuance of AIRMET information shall be issued every 6 hours for a period of validity of 6 hours and transmitted to meteorological watch offices and/or aerodrome meteorological offices concerned not later than one hour prior to the beginning of their validity period.

### **11.6.24 SIGMET information**

11.6.24.1 SIGMET information shall be issued by a meteorological watch office and shall give a concise description in abbreviated plain language concerning the occurrence and/or expected occurrence of specified en-route weather phenomena, which may affect the safety of aircraft operations, and of the development of those phenomena in time and space.

11.6.24.2 SIGMET information shall be cancelled when the phenomena are no longer occurring or are no longer expected to occur in the area.

11.6.24.3 The period of validity of a SIGMET message shall be not more than 4 hours. In the special case of SIGMET messages for volcanic ash cloud and tropical cyclones, the period of validity shall be extended up to 6 hours.

11.6.24.4 Close coordination shall be maintained between the meteorological watch office and the associated area control centre/flight information centre to ensure that information on volcanic ash included in SIGMET and NOTAM messages is consistent.

11.6.24.5 SIGMET messages shall be issued not more than 4 hours before the commencement of the period of validity. In the special case of SIGMET messages for volcanic ash cloud and tropical cyclones, these messages shall be issued as soon as practicable but not more than 12 hours before the commencement of the period of validity. SIGMET messages for volcanic ash and tropical cyclones shall be updated at least every 6 hours.



### **11.6.25 AIRMET information**

11.6.25.1 AIRMET information shall be issued by a meteorological watch office in accordance with regional air navigation agreement, taking into account the density of air traffic operating below flight level 100. AIRMET information shall give a concise description in abbreviated plain language concerning the occurrence and/or expected occurrence of specified en-route weather phenomena, which have not been included in Section I of the area forecast for low-level flights and which may affect the safety of low-level flights, and of the development of those phenomena in time and space.

11.6.25.2 AIRMET information shall be cancelled when the phenomena are no longer occurring or are no longer expected to occur in the area.

11.6.25.3 The period of validity of an AIRMET message shall be not more than 4 hours.

### **11.6.26 Aerodrome warnings**

11.6.26.1 Aerodrome warnings shall be issued by the aerodrome meteorological office and shall give concise information of meteorological conditions which could adversely affect aircraft on the ground, including parked aircraft, and the aerodrome facilities and services.

11.6.26.2 Aerodrome warnings shall be cancelled when the conditions are no longer occurring and/or no longer expected to occur at the aerodrome.

### **11.6.27 Wind shear warnings and alerts**

11.6.27.1 Wind shear warnings shall be prepared by the aerodrome meteorological office designated by the meteorological authority for aerodromes where wind shear is considered a factor, in accordance with local arrangements with the appropriate ATS unit and operators concerned. Wind shear warnings shall give concise information on the observed or expected existence of wind shear which could adversely affect aircraft on the approach path or take-off path or during circling approach between runway level and 500 m (1 600 ft.) above that level and aircraft on the runway during the landing roll or take-off run. Where local topography has been shown to produce significant wind shears at heights in excess of 500 m (1 600 ft.) above runway level, then 500 m (1 600 ft.) shall not be considered restrictive.

11.6.27.2 At aerodromes where wind shear is detected by automated, ground-based, wind shear remote-sensing or detection equipment, wind shear alerts generated by these systems shall be issued. Wind shear alerts shall give concise, up-to-date information related to the observed existence of wind shear involving a headwind/tailwind change of 7.5 m/s (15 kt) or more which could adversely affect aircraft on the final approach path or initial take-off path and aircraft on the runway during the landing roll or take-off run.

11.6.28 – RESERVED

### **11.6.29 Provision of aeronautical climatological information**

11.6.29.1 Aeronautical climatological information required for the planning of flight operations shall be prepared in the form of aerodrome climatological tables and aerodrome climatological summaries. Such information shall be supplied to aeronautical users as agreed between the meteorological authority and those users.

### **11.6.30 Copies of meteorological observational data**

11.6.30.1 The meteorological authority, on request and to the extent practicable, shall make available to any meteorological authority, to operators and to others concerned with the application of meteorology to international air navigation, meteorological observational data required for research, investigation or operational analysis.

#### **11.6.31 Provision of service for operators and flight crew members**

11.6.31.1 Meteorological information shall be supplied to operators and flight crew members for:

- a) pre-flight planning by operators;
- b) in-flight re-planning by operators using centralized operational control of flight operations;
- c) use by flight crew members before departure; and
- d) aircraft in flight.

11.6.31.2 Meteorological information supplied to operators and flight crew members shall cover the flight in respect of time, altitude and geographical extent. Accordingly, the information shall relate to appropriate fixed times, or periods of time, and shall extend to the aerodrome of intended landing, also covering the meteorological conditions expected between the aerodrome of intended landing and alternate aerodromes designated by the operator.

11.6.31.3 Meteorological information supplied to operators and flight crew members shall be up to date and include the following information, as established by meteorological authority in consultation with operators concerned:

- a) forecasts of:
  - (i) upper wind and upper-air temperature;
  - (ii) upper-air humidity;
  - (iii) geopotential altitude of flight levels;
  - (iv) flight level and temperature of tropopause;
  - (v) direction, speed and flight level of maximum wind; and
  - (vi) SIGWX phenomena;
- b) METAR or SPECI (including trend forecasts as issued in accordance with regional air navigation agreement) for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;
- c) TAF or amended TAF for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;

- d) forecasts for take-off;
- e) SIGMET information and appropriate special air-reports relevant to the whole route;
- f) volcanic ash and tropical cyclone advisory information relevant to the whole route;
- g) subject to regional air navigation agreement, GAMET area forecast and/or area forecasts for low-level flights in chart form prepared in support of the issuance of AIRMET information, and AIRMET information for low-level flights relevant to the whole route;
- h) aerodrome warnings for the local aerodrome;
- i) meteorological satellite images; and
- j) ground-based weather radar information.

11.6.31.4 Forecasts listed under 11.6.31.3a) shall be generated from the digital forecasts provided by the WAFCs whenever these forecasts cover the intended flight path in respect of time, altitude and geographical extent, unless otherwise agreed between the meteorological authority and the operator concerned.

11.6.31.5 When forecasts are identified as being originated by the WAFCs, no modifications shall be made to their meteorological content.

11.6.31.6 Charts generated from the digital forecasts provided by the WAFCs shall be made available, as required by operators, for fixed areas of coverage as shown in Annex 3 Appendix 8, Figures A8-1, A8-2 and A8-3.

11.6.31.7 When forecasts of upper wind and upper-air temperature listed under 11.1.31.3a)1) are supplied in chart form, they shall be fixed time prognostic charts for flight levels as specified in Annex 3 Appendix 2, 1.2.2 a). When forecasts of SIGWX phenomena are supplied in chart form, they shall be fixed time prognostic charts for an atmospheric layer limited by flight levels as specified in Annex 3, Appendix 2, 1.3.2 and Appendix 5, 4.3.2.

11.6.31.8 The forecasts of upper wind and upper-air temperature and of SIGWX phenomena above flight level 100 requested for pre-flight planning and in-flight re-planning by the operator shall be supplied as soon as they become available, but not later than 3 hours before departure. Other meteorological information requested for pre-flight planning and in-flight re-planning by the operator shall be supplied as soon as is practicable.

11.6.31.9 Meteorological authority who is tasked to provide service for operators and flight crew members shall when necessary initiate coordinating action with the meteorological authorities of other States with a view to obtaining from them the reports and/or forecasts required.

11.6.31.10 Meteorological information shall be supplied to operators and flight crew members at the location to be determined by the meteorological authority, after consultation with the operators and at the time to be agreed upon between the aerodrome meteorological office and the operator concerned. The service for pre-flight planning shall be confined to flights originating within the territory of the State concerned. At an aerodrome without a meteorological office at the aerodrome, arrangements for the

supply of meteorological information shall be as agreed upon between the meteorological authority and the operator concerned.

#### **11.6.32 Briefing, consultation and display**

11.6.32.1 Briefing and/or consultation shall be provided, on request, to flight crew members and/or other flight operations personnel. Its purpose shall be to supply the latest available information on existing and expected meteorological conditions along the route to be flown, at the aerodrome of intended landing, alternate aerodromes and other aerodromes as relevant, either to explain and amplify the information contained in the flight documentation or, if so agreed between the meteorological authority and the operator, in lieu of flight documentation.

11.6.32.2 Meteorological information used for briefing, consultation and display shall include any or all of the information listed in sub-regulation 11.6.31.3.

11.6.32.3 If the aerodrome meteorological office expresses an opinion on the development of the meteorological conditions at an aerodrome which differs appreciably from the aerodrome forecast included in the flight documentation, the attention of flight crew members shall be drawn to the divergence. The portion of the briefing dealing with the divergence shall be recorded at the time of briefing and this record shall be made available to the operator.

11.6.32.4 The required briefing, consultation, display and/or flight documentation shall normally be provided by the aerodrome meteorological office associated with the aerodrome of departure. At an aerodrome where these services are not available, arrangements to meet the requirement of flight crew members shall be agreed upon between the meteorological authority and the operator concerned. In exceptional circumstances, such as an undue delay, the aerodrome meteorological office associated with the aerodrome shall provide or, if that is not practicable, arrange for the provision of a new briefing, consultation and/or flight documentation as necessary.

#### **11.6.33 Flight documentation**

11.6.33.1 Flight documentation to be made available shall comprise information listed under sub-regulation 11.6.31.3 a) (i) and (vi), b), c), e), f) and, if appropriate, g).

11.6.33.2 Whenever it becomes apparent that the meteorological information to be included in the flight documentation will differ materially from that made available for pre-flight planning and in-flight re-planning, the operator shall be advised immediately and, if practicable, be supplied with the revised information as agreed between the operator and the aerodrome meteorological office concerned.

11.6.33.3 Meteorological authority shall retain information supplied to flight crew members, either as printed copies or in computer files, for a period of at least 30 days from the date of issue. This information shall be made available, on request, for inquiries or investigations and, for these purposes, shall be retained until the inquiry or investigation is completed.

#### **11.6.34 Automated pre-flight information systems for briefing, consultation, flight planning and flight documentation**

11.6.34.1 Where meteorological authority uses automated pre-flight information systems to supply and display meteorological information to operators and flight crew members for self-briefing, flight planning and flight documentation purposes, the information supplied and displayed shall comply with the relevant provisions in sub-regulations 11.6.31 to 11.6.33 inclusive.

11.6.34.2 Where automated pre-flight information systems are used to provide for a harmonized, common point of access to meteorological information and AIS information by operators, flight crew members and other aeronautical personnel concerned, the meteorological authority shall remain responsible for the quality control and quality management of meteorological information provided by means of such systems in accordance with sub-regulation 11.6.2.

#### **11.6.35 Information for aircraft in flight**

11.6.35.1 Meteorological information for use by aircraft in flight shall be supplied by a meteorological office to its associated ATS unit and through D-VOLMET or VOLMET broadcasts as determined by regional air navigation agreement. Meteorological information for planning by the operator for aircraft in flight shall be supplied on request, as agreed between the meteorological authority or authorities and the operator concerned.

11.6.35.2 Meteorological information for use by aircraft in flight shall be supplied to ATS units in accordance with the specifications of Annex 3, Chapter 10.

11.6.35.3 Meteorological information shall be supplied through D-VOLMET or VOLMET broadcasts in accordance with the specifications of Annex 3, Chapter 11.

#### **11.6.36 Information for ATS units**

11.6.36.1 The meteorological authority shall designate a meteorological office to be associated with each ATS units. The associated meteorological office shall, after coordination with the ATS units, supply, or arrange for the supply of, up-to-date meteorological information to the units as necessary for the conduct of their functions.

11.6.36.2 If applicable, the associated meteorological office for a flight information centre or an area control centre shall be a meteorological watch office.

11.6.36.3 Any meteorological information requested by an ATS unit in connection with an aircraft emergency shall be supplied as rapidly as possible.

#### **11.6.37 Information for search and rescue services units**

11.6.37.1 Meteorological offices designated by the meteorological authority in accordance with regional air navigation agreement shall supply search and rescue services units with the meteorological information they require in a form established by mutual agreement. For that purpose, the designated meteorological office shall maintain liaison with the search and rescue services unit throughout a search and rescue operation.

#### **11.6.38 Information for AIS units**

11.6.38.1 The meteorological authority, in coordination with the [CAA] shall arrange for the supply of up-to-date meteorological information to relevant AIS units, as necessary, for the conduct of their functions.

#### **11.6.39 Requirements for communications**

11.6.39.1 Suitable telecommunications facilities shall be made available to permit aerodrome meteorological offices and, as necessary, aeronautical meteorological stations to supply the required

meteorological information to ATS units on the aerodromes for which those offices and stations are responsible, and in particular to aerodrome control towers, approach control units and the ATE stations serving these aerodromes.

11.6.39.2 Suitable telecommunications facilities shall be made available to permit meteorological watch offices to supply the required meteorological information to ATS and search and rescue services units in respect of the flight information regions, control areas and search and rescue regions for which those offices are responsible, and in particular to flight information centres, area control centres and rescue coordination centres and the associated ATE stations.

11.6.39.3 Suitable telecommunications facilities shall be made available to permit world area forecast centres to supply the required world area forecast system products to aerodrome meteorological offices, meteorological authorities and other users.

11.6.39.4 Telecommunications facilities between aerodrome meteorological offices and, as necessary, aeronautical meteorological stations and aerodrome control towers or approach control units shall permit communications by direct speech, the speed with which the communications can be established being such that the required points may normally be contacted within approximately 15 seconds.

11.6.39.5 Suitable telecommunications facilities shall be made available to permit meteorological offices to exchange operational meteorological information with other meteorological offices.

#### **11.6.40 Use of aeronautical fixed service communications and the public internet —meteorological bulletins**

11.6.40.1 Meteorological bulletins containing operational meteorological information to be transmitted via the aeronautical fixed service or the public Internet shall be originated by the appropriate meteorological office or aeronautical meteorological station.

#### **11.6.41 Use of aeronautical mobile service communications**

11.6.41.1 The content and format of meteorological information transmitted to aircraft and by aircraft shall be consistent with the provisions of this regulation.

#### **11.6.42 Use of aeronautical data link service —contents of D-VOLMET**

11.6.42.1 D-VOLMET shall contain current METAR and SPECI, together with trend forecasts where available, TAF and SIGMET, special air-reports not covered by a SIGMET, and where available, AIRMET.

#### **11.6.43 Use of aeronautical broadcasting service —contents of VOLMET broadcasts**

11.6.43.1 Continuous VOLMET broadcasts, normally on very high frequencies (VHF), shall contain current METAR and SPECI, together with trend forecasts where available.

11.6.43.2 Scheduled VOLMET broadcasts, normally on high frequencies (HF), shall contain current METAR and SPECI, together with trend forecasts where available and, where so determined by regional air navigation agreement, TAF and SIGMET.

— END —