KINGDOM OF CAMBODIA

STATE SECRETARIAT OF CIVIL AVIATION

CAMBODIA CIVIL AVIATION REGULATIONS (CCAR)

PART 18: AIR NAVIGATION SERVICES

SECTION VII: AERONAUTICAL METEOROLOGY SERVICES

(Issue: 03, Revision: 02)

MINISTER

Approved by: Dr MAO HAVANNALL

Effective Date: 28 November 2024

The previous regulation CCAR Part 18, Section VII: Aeronautical Meteorology Services (Issue: 03, Revision: 01) dated 03 August 2020 is hereby repealed.

KINGDOM OF CAMBODIA
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STATE SECRETARIAT OF CIVIL AVIATION

ENDORSEMENT

CCAR PART 18: AIR NAVIGATION SERVICES

SECTION VII: AERONAUTICAL METEOROLOGY SERVICES

(Issue: 03, Revision: 02)

This Regulation CCAR Part18, Section VII: Aeronautical Meteorology Services (Issue:03, Revision:02) is prepared and amended by Air Navigation Standard and Safety Department, and endorsed by Director General for Technical on...25..NOV...2024.....

Developed and amended by	Endorsed by
Ms. Tith Phoumith **Acting Director of Air Navigation Standard and Safety Department**	**H.E. Mr. Sarin Kunakor** **Director General for Technical**

This Regulation is subject to approval by the Minister in charge of the State Secretariat of Civil Aviation (SSCA) and is applicable on the date indicated in the approval page.

SECTION VII- AERONAUTICAL METEOROLOGY SERVICES (MET)

RECORD OF REVISION

Issue Number	Revision Number	Source(s)	Subject	Chapter Affected	Revised by	Effective Date
1	0	ICAO Annex 3 incorporating Amendment 1-75	First Version	All	ANSSD	18 Aug 2016
2	0	ICAO Annex 3 incorporating Amendment 1-76	Second Version	All	ANSSD	24 Oct 2017
3	0	ICAO Annex 3 incorporating Amendment 1-77	Third Version	All	ANSSD	16 Nov 2018
3	1	Change SSCA Requirement and Annex 3 incorporating Amendment 1-79	Change title of the Regulation -Delete Record of revision -Revise Page Record of Amendment -Add Amendment Detail and Page checklist -Revise Foreword -Chapter1: add definition and para 1.1.6 -Chapter 2: Revise Para 2.1.3, add wording para 2.1.4, revise Para 2.1.5, 2.2.3 add Para 2.6.1, Revise para 2.8.1, adding Para 2.8.2, 2.8.3 and 2.8.4. -Chapter 3 Revise Para 3.4.1 and add note, Revise Para 3.4.2 and Para 3.4.3, add Para 3.4.4, 3.8 and 3.8.1. -Chapter 4 delete Para 4.1.2 and 4.1.5, Para 4.3.2(b) and 4.4.2b) Delete wording -Chapter 5 Para 5.1.1 Revise; delete Para 5.5.1 b) and f). Para 5.8.1 b) Delete and add wordings -Chapter 9 Para 9.1.3 a)7) delete wording; Para 9.5.1 and 9.5.3 delete wording -Chapter 11 Para 11.5 delete -Revise and add para in Appendix 1, 2,3,4,5,6,8, 9 and 10 -Format Appendix 1-10	Chapter 1,2, 3, 4 ,5, 9, 11 and All APP 1-10	ANSSD	03 Aug 2020

3	2	Change SSCA Requirement and Annex 3 incorporating Amendment 1-81	-Revise Forward -revised record of revision -Deleted page checklist -Amendment Detail -Chapter1 Para 1.1.1; -Chapter 2 add new Para 2.2.10, Para 2.5.2, 2.5.4, 2.5.5, 2.5.6, new para 2.6.1, 2.6.2;2.6.3, 2.7, 2.8 ,2.9 and 2.10.5-2.10.9,2.11, 2.12, 2.13, 2.14 and 2.15. -Chapter 3 Para 3.4.1 -Chapter 4 page 4.1.1; 4.1.2;4.1.3;4.1.5; 4.1.6; 4.3.1;4.3.2;4.3.3; 4.4.2; 4.4.3; 4.5.; 4.5.3 ;4.7. -Chapter 5 5.1.1; 5.3.2; 5.3.3; 5.5.1; 5.6.1; 5.7.1; 5.8.1 and 5.9.1. -Chapter 6 6.1.1; 6.2.1 And 6.2.3. -Chapter 7 7.1.1; 7.1.5; 7.2.1;7.3;7.4.1 and 7.4.2. -Chapter 8 8.1.1. -Chapter 9 para 9.1.1; 9.1.3 7);9.1.4.; 9.2.5; 9.4.3; 9.5.1 and 9.5.3. -Chapter 10 10.1.1 -Chapter 11 11.1.1; 11.3.1; 11.1.10 and 11.5. -Appendix 2 para 1.1 ;2.1.2; 2.2.1; 3.1.1.; 4.1.1 and 5.1.1. -Appendix 6 para 1.1.6 ;1.1.7 and 1.1.8. -Appendix 10 para 4.-4.3.1 -Appendix 1-11 Change Format and numbering para and page.	Forward Record of Revision All Chapter and All APP 1-10	ANSSD	

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FOREWORD

State Secretariat of Civil Aviation (SSCA) is responsible under the Law on Civil Aviation of the Kingdom of Cambodia and Sub-decree 56 for issuing Cambodian Civil Aviation Regulations (CCAR), standards, requirements, notification, rules and orders to ensure conformity with current and timely national and International Standards. The CCAR is the means Air Navigation Standards and Safety Department (ANSSD) of SSCA uses to meet its responsibilities for promulgating aviation safety standards to ensure safety and effectiveness of air navigation services.

This CCAR Part 18 Section VII – Aeronautical Meteorology Service (MET) contains the standards, requirements and procedures pertaining to the provision of Meteorological Service. The standards and requirements in this regulation are based mainly on standards and recommended practices stipulated in Annex 3 (entitles "Meteorological Service for International Air Navigation") to the Convention on International Civil Aviation as in force and amended from time to time by the Council of the International Civil Aviation Organization (ICAO), other relevant ICAO documents, and with such modifications as may be determined by SSCA to be applicable in Cambodia.

Readers should forward advice of errors, inconsistencies or suggestions for improvement to this regulation to the address below:

Director of Air Navigation Services Standards and Safety Department

State Secretariat of Civil Aviation

#44 Phnom Penh International Airport Russian Federation Blvd,

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ABBREVIATION

SSCA	– State Secretariat of Civil Aviation
ANSSD	– Air Navigation Standards and Safety Department
ICAO	– International Civil Aviation Organization
WMO	– World Meteorological Organization
SARPs	– Standards and Recommended Practice
CCAR	– Cambodia Civil Aviation Regulation
ANS	– Air Navigation service
ATM	– Air Traffic Management
AIS	– Aeronautical Information Services
ATS	– Air Traffic Services
MET	– Meteorological
SAR	– Search and Rescue
RVR	– Runway Visual Range

CHAPTER–1 REQUIREMENT, EXEMPTION, DEFINITION AND TERMS USED WITH A LIMITED MEANING

1.1. Requirement and Exemption

1.1.1. Cambodia Civil Aviation Regulation (CCAR) Part 18 – Air Navigation Service on Section VII – Aeronautical Meteorology Service is issued with primary objective of ensuring that the MET Service provider maintains a high level of safety standard and is based mainly on compliance and in conjunction with ICAO Annexes and Documents. The Annexes and Document concerned are primarily:

(a) Annex 3: Meteorological Service for International Air Navigation

(b) Annex 10: Aeronautical Telecommunications, Volume II – Communications Procedures;

(c) Annex 11: Air Traffic Services (MET related issued only)

(d) Annex 12: Search and Rescue (MET related issued only)

(e) Annex 15: Aeronautical Information Services (MET related issues only)

(f) Annex 19: Safety Management

References are also made to a set of ICAO document and WMO including

(a) Doc. 4444: Air Traffic Management

(b) Doc. 8896: Manual of Aeronautical Meteorological Practice

(c) Doc. 9377: Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services

(d) Doc 9328: Manual on Runway Visual Range Observing and Reporting Practices

(e) Doc 9837: Manual on Automatic Meteorological Observing Systems at Aerodromes

(f) Doc.9734: Safety Oversight Manual;

(g) Doc. 9817: Manual on Low-Level Wind Shear;

(h) Doc. 9859: Safety Management Manual (SMM);

(i) ASIA/PACIFIC REGIONAL SIGMET GUIDE;

(j) WMO Technical Regulations on General Meteorological Standards and Recommended Practices (WMO No 49, Volume I).

1.1.2. Where there is a difference between a standard in this regulation and that of those ICAO Annexes and documents, the standard in this regulation shall prevail.

1.1.3. In this Regulation, standards are preceded by the word “shall”, whereas recommended practices are preceded by the word “should”. The MET Provider shall comply with all standards at all times and should endeavour to comply with all recommended practices. Recommended Practices and Notes are in italics and being indicated by the prefix Recommendation and Note respectively.

1.1.4. Exemption – when the Meteorological Service Provider is not able to comply with any standards specified or referenced in this regulation, Meteorological Service Provider shall apply to the SSCA for exemption or deviation from relevant standards. Application shall be submitted in writing supported with the reasons for such exemption or deviation including any safety assessment or other studies undertaken, and an indication of when compliance with the current standards can be expected.

1.1.5. Any exemption or deviation granted to Meteorological Service Provider shall also be recorded in the Meteorological Service Provider operations manual. The operations manual shall also contain the details of the exemption or deviation, such as the reason that the exemption or deviation was requested and limitations or conditions imposed.

1.1.6. The validity of any exemption is dependent on Meteorological Service Provider complying with any condition that specifies in the exemption as being necessary in the interests of safety of air navigation. The Meteorological Service Provider must comply with a condition specified in the exemption.

1.1.7. The MET service provider shall establish and implement a mechanism to review and mitigate any deficiencies identified by the ANS regulator. Where there are such deficiencies, the MET service provider must inform the ANS regulator immediately, and provide periodic updates on the actions taken by the MET service provider to address such deficiencies until they are eliminated or mitigated to a level acceptable by the ANS regulator.

1.2. Definition

When the following terms are used in the Standards and Recommended Practices for Meteorological Service for International Air Navigation, they have the following meanings:

Aerodrome. A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

Aerodrome climatological summary. Concise summary of specified meteorological elements at an aerodrome, based on statistical data.

Aerodrome climatological table. Table providing statistical data on the observed occurrence of one or more meteorological elements at an aerodrome.

Aerodrome control tower. A unit established to provide air traffic control service to aerodrome traffic.

Aerodrome elevation. The elevation of the highest point of the landing area.

Aerodrome meteorological office. An office designated to provide meteorological service for aerodromes serving international air navigation.

Aerodrome reference point. The designated geographical location of an aerodrome.

Aeronautical fixed service (AFS). A telecommunication service between specified fixed points provided primarily for the safety of air navigation and for the regular, efficient and economical operation of air services.

Aeronautical fixed telecommunication network (AFTN). A worldwide system of aeronautical fixed circuits provided, as part of the aeronautical fixed service, for the exchange of messages and/or digital data between aeronautical fixed stations having the same or compatible communications characteristics.

Aeronautical meteorological station. A station designated to make observations and meteorological reports for use in international air navigation.

Aeronautical mobile service (RR S1.32). A mobile service between aeronautical stations and aircraft stations, or between aircraft stations, in which survival craft stations may participate; emergency position-indicating radio beacon stations may also participate in this service on designated distress and emergency frequencies.

Aeronautical telecommunication station. A station in the aeronautical telecommunication service.

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

Aircraft observation. The evaluation of one or more meteorological elements made from an aircraft in flight.

AIRMET information. Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena which may affect the safety of low-level aircraft operations and which was not already included in the forecast issued for low-level flights in the flight information region concerned or sub-area thereof.

Air-report. A report from an aircraft in flight prepared in conformity with requirements for position, and operational and/or meteorological reporting.

Note. — Details of the AIREP form are given in the PANS-ATM (Doc 4444).

Air traffic services unit. A generic term meaning variously, air traffic control unit, flight information center or air traffic services reporting office.

Alternate aerodrome. An aerodrome to which an aircraft may proceed when it becomes either impossible or inadvisable to proceed to or to land at the aerodrome of intended landing where the necessary services and facilities are available, where aircraft performance requirements can be met and which is operational at the expected time of use. Alternate aerodromes include the following:

Take-off alternate. An alternate aerodrome at which an aircraft would be able to land should this become necessary shortly after take-off and it is not possible to use the aerodrome of departure.

En-route alternate. An alternate aerodrome at which an aircraft would be able to land in the event that a diversion becomes necessary while en route.

Destination alternates. An alternate aerodrome at which an aircraft would be able to land should it become either impossible or inadvisable to land at the aerodrome of intended landing.

Note. — The aerodrome from which a flight departs may also be an en-route or a destination alternate aerodrome for that flight.

Altitude. The vertical distance of a level, a point or an object considered as a point, measured from mean sea level (MSL).

Approach control unit. A unit established to provide air traffic control service to controlled flights arriving at, or departing from, one or more aerodromes.

Appropriate ATS authority. The relevant authority designated by the State responsible for providing air traffic services in the airspace concerned.

Area control center. A unit established to provide air traffic control service to controlled flights in control areas under its jurisdiction.

Area navigation (RNAV). A method of navigation which permits aircraft operations on any desired flight path within the coverage of ground- or space-based navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

Note. — Area navigation includes performance-based navigation as well as other operations that do not meet the definition of performance-based navigation.

Automatic dependent Surveillance-Contract (ADS-C). A means by which the terms of an ADS-C agreement will be exchanged between the ground system and the aircraft, via a data link, specifying under what conditions ADS-C reports would be initiated, and what data would be contained in the reports.

Note. — The abbreviated term "ADS contract" is commonly used to refer to ADS event contract, ADS demand contract, ADS periodic contract or an emergency mode.

Briefing. Oral commentary on existing and/or expected meteorological conditions.

Cloud of operational significance. A cloud with the height of cloud base below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater, or a cumulonimbus cloud or a towering cumulus cloud at any height.

Consultation. Discussion with a meteorologist or another qualified person of existing and/or expected meteorological conditions relating to flight operations; a discussion includes answers to questions.

Control area. A controlled airspace extending upwards from a specified limit above the earth.

Cruising level. A level maintained during a significant portion of a flight.

Elevation. The vertical distance of a point or a level, on or affixed to the surface of the earth, measured from mean sea level.

Extended range operation. Any flight by an aero plane with two turbine engines where the flight time at the one engine inoperative cruise speed (in ISA and still air conditions), from a point on the route to an adequate alternate aerodrome, is greater than the threshold time approved by the State of the Operator.

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

Flight documentation. Written or printed documents, including charts or forms, containing meteorological information for a flight.

Flight information center. A unit established to provide flight information service and alerting service.

Flight information region. An airspace of defined dimensions within which flight information service and alerting service are provided.

Flight level. A surface of constant atmospheric pressure which is related to a specific pressure datum, 1 013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals.

Note 1. — A pressure type altimeter calibrated in accordance with the Standard Atmosphere:

(a) *when set to a QNH altimeter setting, will indicate altitude;*
(b) *when set to a QFE altimeter setting, will indicate height above the QFE reference datum;*
(c) *when set to a pressure of 1 013.2 hPa, may be used to indicate flight levels.*

Note A2. — The terms "height" and "altitude", used in Note 1, indicate altimetric rather than geometric heights and altitudes.

Forecast. A statement of expected meteorological conditions for a specified time or period, and for a specified area or portion of airspace.

GAMET area forecast. An area forecast in abbreviated plain language for low-level flights for a flight information region or sub-area thereof, prepared by the meteorological office designated by the meteorological authority concerned and exchanged with meteorological offices in adjacent flight information regions, as agreed between the meteorological authorities concerned.

Grid point data in digital form. Computer processed meteorological data for a set of regularly spaced points on a chart, for transmission from a meteorological computer to another computer in a code form suitable for automated use.

Note. — In most cases, such data are transmitted on medium- or high-speed telecommunications channels.

Height. The vertical distance of a level, a point or an object considered as a point, measured from a specified datum.

Human Factors principles. Principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

ICAO meteorological information exchange model (IWXXM). A data model for representing aeronautical meteorological information.

International airways volcano watch (IAVW). International arrangements for monitoring and providing warnings to aircraft of volcanic ash in the atmosphere.

Note. — The IAVW is based on the cooperation of aviation and non-aviation operational units using information derived from observing sources and networks that are provided by States. The watch is coordinated by ICAO with the cooperation of other concerned international organizations.

Level. A generic term relating to the vertical position of an aircraft in flight and meaning variously height, altitude or flight level.

Meteorological authority. The authority providing or arranging for the provision of meteorological service for international air navigation on behalf of a Contracting State.

Meteorological bulletin. A text comprising meteorological information preceded by an appropriate heading.

Meteorological information. Meteorological report, analysis, forecast, and any other statement relating to existing or expected meteorological conditions.

Meteorological office. An office designated to provide meteorological service for international air navigation.

Meteorological watch office. An office designated to provide information concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations within its specified area of responsibility.

Meteorological report. A statement of observed meteorological conditions related to a specified time and location.

Meteorological satellite. An artificial Earth satellite making meteorological observations and transmitting these observations to Earth.

***Minimum sector altitude*.** The lowest altitude which may be used which will provide a minimum clearance of 300 m (1 000 ft) above all objects located in an area contained within a sector of a circle of 46 km (25 NM) radius centered on a radio aid to navigation.

***Navigation specification*.** A set of aircraft and flight crew requirements needed to support performance-based navigation operations within a defined airspace. There are two kinds of navigation specifications:

Required navigation performance (RNP) specification. A navigation specification based on area navigation that includes the requirement for performance monitoring and alerting, designated by the prefix RNP, e.g. RNP 4, RNP APCH.

Area navigation (RNAV) specification. A navigation specification based on area navigation that does not include the requirement for performance monitoring and alerting, designated by the prefix RNAV, e.g. RNAV 5, RNAV 1.

Note. — The Performance-based Navigation (PBN) Manual *(Doc 9613), Volume II, contains detailed guidance on*

Observation (meteorological). The evaluation of one or more meteorological elements.

Operational control. The exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of the safety of the aircraft and the regularity and efficiency of the flight.

Operational flight plan. The operator's plan for the safe conduct of the flight based on considerations of aero plane performance, other operating limitations and relevant expected conditions on the route to be followed and at the aerodromes concerned.

***Operational planning*.** The planning of flight operations by an operator.

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

Performance-based navigation (PBN). Area navigation based on performance requirement for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace.

Note. — Performance requirements are expressed in navigation specification (RNAV specification, RNP specification) in terms of accuracy, integrity, continuity, availability and functionality needed for the proposed operation in the context of a particular airspace concept.

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

Prevailing visibility. The greatest visibility value, observed in accordance with the definition of "visibility", which is reached within at least half the horizon circle or within at least half of the surface of the aerodrome. These areas could comprise contiguous or non-contiguous sectors.

Note. — This value may be assessed by human observation and/or instrumented systems. When instruments are installed, they are used to obtain the best estimate of the prevailing visibility.

Prognostic chart. A forecast of a specified meteorological element(s) for a specified time or period and a specified surface or portion of airspace, depicted graphically on a chart.

Quality assurance. Part of quality management focused on providing confidence that quality requirements will be fulfilled (ISO 9000*).

Quality control. Part of quality management focused on fulfilling quality requirements (ISO 9000*).

Quality management. Coordinated activities to direct and control an organization with regard to quality (ISO 9000*).

Asia and Pacific Regional (APAC) air navigation agreement. Agreement approved by the Council of ICAO normally on the advice of a Asia and Pacific Regional (APAC) air navigation meeting.

Reporting point. A specified geographical location in relation to which the position of an aircraft can be reported.

Rescue coordination center. A unit responsible for promoting efficient organization of search and rescue services and for coordinating the conduct of search and rescue operations within a search and rescue region.

Runway. A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.

Runway visual range (RVR). The range over which the pilot of an aircraft on the center line of a runway can see the runway surface markings or the lights delineating the runway or identifying its center line.

Search and rescue services unit. A generic term meaning, as the case may be, rescue coordination center, rescue sub center or alerting post.

SIGMET information. Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations.

Standard isobaric surface. An isobaric surface used on a worldwide basis for representing and analyzing the conditions in the atmosphere.

Threshold. The beginning of that portion of the runway usable for landing.

Touchdown zone. The portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway.

Tropical cyclone. Generic term for a non-frontal synoptic-scale cyclone originating over tropical or sub-tropical waters with organized convection and definite cyclonic surface wind circulation.

Tropical cyclone advisory center (TCAC). A meteorological center designated by regional air navigation agreement to provide advisory information to meteorological watch offices, world area forecast center and international OPMET databanks regarding the position, forecast direction and speed of movement, central pressure and maximum surface wind of tropical cyclones.

Upper-air chart. A meteorological chart relating to a specified upper-air surface or layer of the atmosphere.

Visibility. Visibility for aeronautical purposes is the greater of:

(a) the greatest distance at which a black object of suitable dimensions, situated near the ground, can be seen and recognized when observed against a bright background;

(b) the greatest distance at which lights in the vicinity of 1 000 candelas can be seen and identified against an unlit background.

Note. — The two distances have different values in air of a given extinction coefficient, and the latter b) varies with the background illumination. The former a) is represented by the meteorological optical range (MOR).

Space weather centre (SWXC)*.* A centre designated to monitor and provide advisory information on space weather phenomena expected to affect high-frequency radio communications, communications via satellite, GNSS-based navigation and surveillance system and/or pose a radiation risk to aircraft occupants.

Note. - A space weather centre is designated as global and/or regional.

State volcano observatory. A volcano observatory, designated by Asia and Pacific Regional (APAC) air navigation agreement, to monitor active or potentially active volcanoes within a State and to provide information on volcanic activity to its associated area control centre/flight information centre, meteorological watch office and volcanic ash advisory centre.

Volcanic ash advisory center (VAAC). A meteorological center designated by Asia and Pacific Regional (APAC) air navigation agreement to provide advisory information to meteorological watch offices, area control center, flight information center, world area forecast center and international OPMET databanks regarding the lateral and vertical extent and forecast movement of volcanic ash in the atmosphere following volcanic eruptions.

VOLMET. Meteorological information for aircraft in flight.

Data link-VOLMET (D-VOLMET). Provision of current aerodrome routine meteorological reports (METAR) and aerodrome special meteorological reports (SPECI), aerodrome forecasts (TAF), SIGMET, special air-reports not covered by a SIGMET and, where available, AIRMET via data link.

VOLMET broadcast. Provision, as appropriate, of current METAR, SPECI, TAF and SIGMET by means of continuous and repetitive voice broadcasts.

World area forecast center (WAFC). A meteorological center designated to prepare and issue significant weather forecasts and upper-air forecasts in digital form on a global basis direct to States using aeronautical fixed service internet-based service.

World area forecast system (WAFS). A worldwide system by which world area forecast center provide aeronautical meteorological en-route forecasts in uniform standardized formats.

1.3. Terms used with a limited meaning

For the purpose of this CCAR Part 18 Section VII, the following terms are used with a limited meaning as indicated below:

(a) to avoid confusion in respect of the term “service” between the meteorological service considered as an administrative entity and the service which is provided, “Meteorological authority” is used for the former and “service” for latter;

(b) “provide” is used solely in connection with the provision of service;

(c) “issue” is used solely in connection with the provision where the obligation specifically extends to sending out the information to a user;

(d) “Make available” is used solely in connection with cases where the obligation ends with making the information accessible to a user; and

(e) “supply” is used solely in connection with cases where either c) or d) applies.

CHAPTER–2 GENERAL PROVISIONS

2.1. Objective, determination, and provision of meteorological service

2.1.1. The objective of meteorological services for International Air Navigation shall be to contribute towards the safety, regularity and efficiency of international Air Navigation.

2.1.2. This objective shall be achieved by supplying the following users: operators, flight crew members, air traffic services 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.

2.1.3. This regulation prescribes the meteorological service to be provide by designated Meteorological Service Provider (MET Provider) to meet the needs of international air navigation. This meteorological service shall be made in accordance with the provisions of this Regulation (CCAR), ICAO Annex 3 and with due regard to Asia and Pacific Regional (APAC) air navigation agreements; it shall include the determination of the meteorological service to be provided for international air navigation over international waters and other areas which lie outside the territory of Cambodia.

2.1.4. Designated Meteorological Service Provider (MET Provider) shall provide meteorological service of international air navigation in accordance with the provisions of this CCAR part 18 section VII MET and Asia and Pacific Regional (APAC) Air Navigation agreement in this regard. Details of Meteorological Service Provider have been published in the AIP of Cambodia in General part 3.5.

Note. - Detail specification concerning presentation and content of the aeronautical information publication is provided in PANS-AIM (Doc 10066), Appendix 2.

2.1.5. Meteorological Service Provider shall comply with the requirements of the International Civil Aviation Organization (ICAO) and World Meteorological Organization (WMO) in respect of qualifications, competencies, education and training of meteorological personnel providing service for international air navigation, as stipulate in technical regulation (WMO *Publication No. 49),* Volume I–General Meteorological Standards and recommended Practices, Part VI-Education and Training meteorological personnel that providing aeronautical meteorological services to civil aviation in order to fulfill national and international responsibilities are required to be trained to the standards recognized by WMO.

Note. — WMO Publication 1083 Guide to the Implementation of Education and Training Standards in Meteorology and Hydrology, Volume I – Meteorology.

2.2. Supply, use quality management and interpretation of meteorological information

2.2.1. 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.

2.2.2. In order to meet the objective of meteorological service for international air navigation, Meteorological Service Provider 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 2.1.2.

2.2.3. The quality system established in accordance with 2.2.2 shall be in conformity with the International Organization for Standardization (ISO) 9000 series of quality assurance standards and shall be certified by an approved organization.

Note. - The Guidance on the establishment and implementation of a quality system is given in the ICAO Manual on the Quality Management System for the provision of Meteorological Service to International Air Navigation (Doc 9873).

2.2.4. Where applicable, 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 not be supplied to the users unless it is validated with the originator.

Note. Requirements concerning the geographical and spatial coverage, format and content, time and frequency of issuance and period of validity of meteorological information to be supplied to aeronautical users are given in Chapters 3, 4, 6, 7, 8, 9 and 10 and Appendices 2, 3, 5, 6, 7, 8 and 9 of this Regulation and the relevant Asia and Pacific Regional (APAC) air navigation plans.Guidance concerning the accuracy of measurement and observation, and accuracy of forecasts is given in Attachments A and B, respectively.

2.2.5. In regard to the exchange of meteorological information for operational purposes the quality system shall include verification and validation procedures and resources for monitoring adherence to the prescribed transmission schedules for individual messages and/or bulletins required to be exchanged, and the times of their filing for transmission. The quality system shall be capable of detecting excessive transit times of messages and bulletins received.

Note. - The requirements concerning the exchange of operational meteorological information are given in Chapter 11 and Appendix 10 in this regulation.

2.2.6. Demonstration of compliance of the quality system applied shall be by audit. If non-conformity of the system is identified, action shall be initiated to determine and correct the cause. All audit observations shall be evidence-based and properly documented.

2.2.7. Owing to the variability of meteorological elements in space and time, to limitations of observing techniques and to limitations caused by the definitions of some of the elements, the specific value of any of the elements given in a report shall be understood by the recipient to be the best approximation to the actual conditions at the time of observation.

Note. — Guidance on the operationally desirable accuracy of measurement or observation is given in Attachment A of this regulation and ICAO Annex 3 Attachment A.

2.2.8. Owing to the variability of meteorological elements in space and time, to limitations of forecasting techniques and to limitations caused by the definitions of some of the elements, the specific value of any of the elements given in a forecast shall be understood by the recipient to be the most probable value which the element is likely to assume during the period of the forecast. Similarly, when the time of occurrence or change of an element is given in a forecast, this time shall be understood to be the most probable time.
Note. — Guidance on the operationally desirable accuracy of forecasts is given in Attachment B this regulation and ICAO Annex 3 Attachment B.

2.2.9. The meteorological information supplied to the users listed in 2.1.2 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.
Note. - Guidance material on the application of Human Factors principles can be found in the ICAO Human Factors Training Manual (Doc 9683).

2.2.10. Meteorological Service Provider shall ensure that the meteorological information supplied to the users listed in 2.1.2 is provided through information services.

Note 1. — In the context of system-wide information management (SWIM), the notion of information service addresses machine-to-machine interaction in a service-oriented architecture.
Note 2.— Procedures on information services are contained in the Procedures for Air Navigation Services Information Management (PANS-IM, Doc 10199).
Note 3.— Guidance material on information services can be found in the Manual on System-wide Information Management Implementation (Doc 10203).

2.3. Notifications required from operators

2.3.1. An operator requiring meteorological service or changes in existing meteorological service shall notify, sufficiently in advance, the Meteorological Service Provider or the meteorological office(s) concerned. The minimum amount advance notice required shall be as agreed between the Meteorological Service Provider or meteorological office(s) and the operator concerned.

2.3.2. Meteorological Service Provider shall be notified by the operator requiring service 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 Service Provider (MET Provider).

2.3.3. The operator or a flight crew member shall ensure that, where required by the Meteorological Service Provider in consultation with users, the meteorological office concerned is notified:

(a) of flight schedules;

(b) when non-scheduled flight is to be operated; and

(c) when flights are delayed, advanced or cancelled.

2.3.4. When required, notification to the aerodrome meteorological office or the meteorological office concerned of individual flights shall contain the following information except that, in the case of scheduled flights, the requirement for some or all of this information may be waived as agreed between the meteorological office and the operator concerned:

(a) aerodrome of departure and estimated time of departure;

(b) destination and estimated time of arrival;

(c) route to be flown and estimated times of arrival at, and departure from, any intermediate aerodrome(s);

(d) alternate aerodromes needed to complete the operational flight plan and taken from the relevant list contained in the Asia and Pacific Regional (APAC) air navigation plan;

(e) cruising level;

(f) type of flight, whether under visual or instrument flight rules;

(g) type of meteorological information requested for a flight crew member, whether flight documentation and/or briefing or consultation; and

(h) time (s) at which briefing, consultation and/or flight documentation are required.

2.4. Safety Management System

2.4.1. The Meteorological Service Provider shall establish and implement a Safety Management system (SMS) in compliance with CCAR Part 19 –Aviation Safety which shall at least including, but not limited to:

(a) identify safety hazards;

(b) ensure the implementation of remedial action necessary to maintain agreed safety performance;

(c) provide for continuous monitoring and regular assessment of the safety performance; and

(d) aim at a continuous improvement of the overall performance of the safety management system.

2.5. Operations Manual and Standard Operating Procedure

2.5.1. The operations manual and standard operating procedure serve as a guidance for the whole operation of meteorological service which it is crucial to keep current and up to date that complies with the standard and requirement set forth in this regulation and its related documents. The Meteorological Service Provider shall review this at least annually with the standards requirement and amended whenever required by SSCA.

2.5.2. The Meteorological Service Provider shall submit operations manual and standard operating procedure or its amendment to ANS Regulator, SSCA for approval. If MET service provider is given a direction by SSCA to amend the manual, the MET provider shall comply with the direction. It shall be issued under the authority of the Meteorological Service Provider who will also control its distribution and ensure that it is made awareness to all meteorological related personnel.

2.5.3. The minimum information to be included in the operations manual and standard operating procedure shall oblige to demonstrate how the Meteorological Service Provider will comply with the requirements of this regulation and related standard.

2.5.4. The contents of information to be incorporated in the operations manual and standards operating procedure shall be including, but not limited to:

(a) A table contains based on the items in the manual, including the page number on which each item begins;

(b) An organization chart of the Meteorological Service Provider that shows the name and position of management and each personnel and job title indicate the position, department, unit, flow of work, type of employment; and the qualification, necessary background information, education, experience;

(c) Job description and responsibilities of operational personnel who are responsible for ensuring the compliance of the organization with this regulation which detail the duties to perform in order to achieve certain function of the position;

(d) A statement showing how the MET provider determines the number of operational staff;

(e) The standard required for the Meteorological Service Provider mention in this Regulation, ICAO Annex 3, ICAO DOC 8896 and other related document for MET Service.

(f) The operating procedure and guidance for personnel to perform their duties to be in lined with this regulation and the specific procedure of operation for certain aerodrome or each unit;

(g) A description of facilities and equipment used for providing aeronautical meteorological services;

(h) A copy of any agreement entered into by the provider in relation to the provision of any of the aeronautical meteorological services;

(i) A copy of the document that sets out the provider's quality management system include safety management;

(j) A description of the procedures that ensure that all equipment, including software, is operated in accordance with the manufacturer's operating instructions and manuals;

(k) A list of the aeronautical meteorological services that the provider provides, or proposes to provide including service type (e.g., aeronautical meteorological station service, aerodrome meteorological office service and/or meteorological watch office service) scope and/or location and operation hours;

(l) details of the procedures regarding the keeping of logbooks;

(m) A description of the provider's training program;

(n) A copy of the provider's protection and contingency plan; and

(o) 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.

2.5.5. MET service provider shall:

(a) keep the manual in a readily accessible form; and

(b) ensure that each member of its personnel who performs functions in connection with any aeronautical information service that it provides has ready access to the manual.

(c) ensure that the operations personnel are informed of amendments to the operations manual applying to their duties in a manner that enables their application as of their entry into force.

2.5.6. The MET service provider shall keep at least one complete approved and current copy in printed form of the operational manual and instruction at head office and one copy at each unit of the operation.

2.6. Meteorological Facilities, System and Equipment - Operation and Maintenance

2.6.1. In order to maintain the required level of performance, the MET Service Provider shall establish an overall operation and maintenance plan, which shall meet the following safety requirements as stipulated in ICAO Doc 4444:

(a) The MET facilities, system and equipment shall:

i. be tested for normal operation on a routine basis.;

ii. meet the required level of accuracy, reliability and availability through a combination of routine calibrations, testing and/or regular parts replacement, and timely resolution of system failures;

iii. provide for the timely and appropriate detection and warning of system failures and degradations.

iv. include documentation on the consequences of system, sub-system and equipment failures and degradations; and

v. include measures to control the probability of failures and degradations.

(b) Detailed records of systems and equipment serviceability shall be kept and periodically reviewed.

2.6.2. In addition to meet the safety requirements, the Meteorological Service Provider shall also establish an operation and maintenance plan for each facility. The plan shall include:

(a) A procedure for the periodic inspection of each facility to verify that it meets the operational and performance specification of that facility;

(b) The operation and maintenance instructions for each facility;

(c) An analysis of the number of personnel required to operate and maintain each facility taking into account the workload required;

(d) The corrective plan and procedures for each facility;

(e) The spare support plan for each facility.

2.6.3. MET service provider shall establish procedures to ensure that:

(a) each of the meteorological offices and facilities is provided with suitable power supplies and means to ensure appropriate continuity of service; and

(b) each of the remote weather sensing facilities is installed and maintained in a technically appropriate position to ensure that the facility provides an accurate representation of the local meteorological conditions.

2.7. System Fault Reports

2.7.1. Any fault discovered for critical meteorological system managed/maintained by the MET Service Provider shall be reported to the maintenance vendors or Maintenance Personnel; and details recorded in a fault report. In the context of this regulation, systems are considered critical if data generated are to be used directly for Air Traffic Service/Air-traffic management. An example of such system is the Meteorological Doppler Weather Radar which provides wind-shear and microburst alerts to Air-traffic controllers. Also, to be considered as critical systems are software applications/packages that feed data to air traffic service/air-traffic management systems.

2.7.2. The MET Service Provider shall be responsible for keeping records of all fault reports of critical systems which shall include:

(a) Date/Time fault is discovered;

(b) Description of the fault;

(c) Remedy action taken;

(d) Date/time fault is resolved.

Records of routine and ad hoc equipment servicing shall also be maintained.

2.8. Systems Review

2.8.1. The MET Service Provider shall submit to the ANSSD, SSCA a summary report for critical meteorological systems at least once every quarter, within one month of the end of the period. Where appropriate, calibration results shall also be included. The report shall include:

a) Total downtime for the month

b) Number of faults for the month

c) Detailed report of a fault if it causes the system to be down for more than 24 hours. This report shall be submitted to the ANSSD regulator, SSCA within 2 weeks from the time the system is first down. In more complex cases whereby input from external parties is needed, a preliminary report shall be submitted within 2 weeks from the time the system is first down and the full detailed report shall be submitted within 4 weeks from the time the system is first down.

2.9. System Commission and Upgrade Process

2.9.1. The MET Service Provider shall establish procedures to ensure that each new facility is commissioned to meet the specifications for that facility. The purposes of the procedure are to ensure that the system performance of the new facility has been validated by all the necessary tests and that the MET Service Provider, its maintenance contractors as well as the appropriate representatives of the user have accepted and are satisfied with the results of the tests.

2.9.2. The procedures shall include the documentation of all the tests conducted on the facility prior to the commissioning. The documentation shall also include the names and signatures of all persons who conduct or witness the tests, including representatives from the user of the facility as well as the maintenance contractor. The purpose of this process is to ensure that the introduction of new meteorological system or changes to existing meteorological systems will not compromise the quality and reliability in the provision of information for ensuring safety performance.

2.9.3. The MET Service Provider shall conduct pre-functional testing for all meteorological systems (including critical systems as well as software that are used to generate products for aeronautical MET) according to governing codes, regulations, manufacturer's recommendations and International SARPs.

2.9.4. Critical systems shall undergo a minimum test period of 2 months, while other systems/software shall undergo a minimum test period of at least 1 month.

2.9.5. The performance of the system shall be closely monitored during the testing period and all faults reported and the corrective actions taken shall be recorded.

2.9.6. Before the actual upgrade or commission of the system, the MET Service Provider shall submit an implementation and failure mitigation plan to the ANSSD, SSCA.

2.9.7. The report shall also include results of the pre-functional testing and all records of faults and corrective actions during the test period.

2.9.8. In any special circumstances whereby the minimum test period cannot be adhered to, the MET Service Provider shall submit a report detailing the justification for not adhering to the minimum test period.

2.10. Personnel Requirement

2.10.1. The Meteorological Service Provider shall employ sufficient number of competent personnel for the provision of meteorological service for international Air Navigation. It shall provide in the operation manual an analysis of the number of personnel required to provide the service taking into account the duties and workload required.

2.10.2. *MET service provider should develop policies and procedures to enable recruitment and retention of adequate Aeronautical Meteorological Personnel to ensure the provision of a Safe MET service operation and system.*

2.10.3. MET services provider shall document and define the method of determining staffing levels to ensure safe and efficient MET operations.

2.10.4. MET service provider shall plan the level of Aeronautical Meteorological Personnel requirements taking into account the following factors:

(a) rest days between shifts;
(b) limits on night shifts;
(c) interval after night shifts;
(d) leave and holidays requirements; and
(e) sick leave reserve.

2.10.5. Qualification and Competencies

2.10.5.1. MET service provider shall ensure that each person assigned duties as aeronautical meteorological personnel is competent and holds appropriate qualifications to perform the duties which they are assigned.

2.10.5.2. MET service provider shall ensure that each person assigned duties as aeronautical meteorological personnel has been:

(a) appropriately trained: and
(b) assessed as competent through a formal process by a person who is qualified.

2.10.5.3. MET service provider shall develop a periodic and comprehensive recurrent training program to ensure that each person assigned duties as Aeronautical Meteorological Personnel maintains the appropriate level of qualification.

2.10.5.4. The job description shall depict the job purpose, key responsibilities, and outcome to be achieved of each Aeronautical Meteorological Personnel. Initial and periodic assessments shall be established that require personnel to demonstrate the required competencies.

2.10.5.5. The Meteorological Service Provider shall establish procedures to ensure that all technical personnel possess the knowledge, skill and competencies required in the provision of aeronautical meteorological service and World Meteorological Organization as given in 2.1.5.

2.10.5.6. The competencies of Aeronautical Meteorological Forecaster (AMF) shall:

(a) analyses and monitor continually the weather situation;
(b) forecast aeronautical meteorological phenomena and parameters;
(c) warn of hazardous phenomena;
(d) ensure the quality of meteorological information and services; and
(e) communicate meteorological information to internal and external users.

2.10.5.7. The competencies of Aeronautical Meteorological Observer (AMOB) shall:

(a) monitor continually the weather situation;
(b) observe and record aeronautical meteorological phenomena and parameters;
(c) ensure the quality of system performance and of meteorological information; and
(d) communicate meteorology information to internal and external users.

2.11. Training

2.11.1. The Meteorological Service Provider shall develop the training policy and training package including:

(a) Training programme which details the training framework that compose of at least initial, specialize, on- the-job training and recurrent training with its frequency.
(b) Training plan for each personnel which compose the detail of the course, venue, duration, content and timeline.
(c) Training plan implementation and record of individual personnel identify the record keeping procedure and its system.

2.11.2. The Meteorological Service Provider shall conduct a yearly review of the training program and plan for each staff to identify any gaps in competency and changes in training requirement then prioritize the type of training required for the coming year.

2.11.3. MET service provider shall ensure that its aeronautical meteorological personnel undergo a suitable period of supervised on-the-job training (OJT) before being deployed for duties.

2.11.4. Aeronautical Meteorological Forecaster (AMF) and Aeronautical Meteorological Observer (AMOB) shall undergo on-the-job training for a period of at least 1 months as an aeronautical meteorological forecaster and Aeronautical Meteorological Observer. The on-the-job experience shall encompass situations where the trainee will be exposed to both hazardous and non-hazardous weather conditions.

2.11.5. For an experienced meteorological forecaster and meteorological observer from an alternative meteorological specialization, the on-the-job experience can be shortened to a period not more than 1 months.

2.11.6. MET service provider shall maintain individual training records including certificate for each of its Aeronautical Meteorological Personnel.

2.12. Documents and Records

2.12.1. The Meteorological Service Provider shall maintain all documents and records of operation and maintenance of the service which are necessary for safety oversight and quality management purposes. These documents and record shall include but not limited to:

(a) Copied of Civil Aviation Law, Cambodia Civil Aviation Regulation Part 18 ANS Section VII MET and related regulation and requirement;

(b) Copied of ICAO Annex 3 annex 10 and Annexes 15;

(c) Copies of ICAO Doc. 8896, 9328, 9377, 9817 and 9837;

(d) Copied of the parts of the AIP that are relevant to any Aeronautical Meteorological Services that it provides;

(e) All manuals and documents indicated in the Regulation - Aeronautical Meteorological Services (CCAR Part 18 Section VII MET);

(f) A copy of any instruction issued to its personnel in relation to the provision of its Aeronautical Meteorological Services;

(g) Manuals for equipment used by staff in the provision of Aeronautical Meteorological Services;

(h) other necessary documents concerned;

(i) The Meteorological Service Provider's Quality Manage and Safety management System;

(j) The Meteorological Service Provider's quality records (weather forecasts assessments) for an appropriate length of time;

(k) Record of malfunction/fault of critical safety facilities and equipment;

(l) Reports of queries on weather information for incidents/accidents that occurred in the airports. These are for risk assessment purposes;

(m) Record of job description, training programme and plan of each staff;

(n) Records of internal quality audit reports;

(o) Documents related to Audits conducted by ANSSD.

2.12.2. MET service provider shall ensure that relevant ICAO documents and other technical and regulatory publications are readily available to all MET technical staff.

2.12.3. *A technical library should be available, to include any method to ensure receipt, control and distribution of the necessary technical documentation. The library shall be kept and maintained to ensure the currency of the documentations.*

2.12.4. MET service provider shall ensure that the relevant MET data in the Cambodia Aeronautical Information Publication (AIP) are current and up-to-date.

2.13. Document Control

2.13.1. The MET Service Provider shall establish a process for the authorisation and amendment of these documents to ensure that they are updated all the time. The process shall ensure that:

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

2.13.2. Documents may be held as computer-based records provided that where paper copies of computer-based records are made, they are subjected to the same control as paper documents.

2.14. Retention period

2.14.1. MET service provider shall retain meteorological data and information:

(a) retain meteorological 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; and
(b) the meteorological information supplied to flight crew members shall be made available, on request, for inquiries or investigations and, for these purposes, shall be retained until the inquiry or investigation is completed.

2.14.2. MET service provider shall retain all records exclude subsection 2.14.1, at least five years.

2.15. Security and Contingency Plan

2.15.1. MET service provider shall develop the security program cover the following information:

(a) the procedure to be used for preventing and detecting intentional or unintentional damage to any system, equipment, software or data used for providing services;
(b) the procedure to be used for responding to a threat of intentional damage to a system, equipment, software or data;
(c) the procedure to be used for preventing unauthorized people from having access to working space, working area, any system, equipment, software or data used by MET service provider in providing services.

2.15.2. MET service provider shall establish a contingency plan that sets out the procedures to be followed if aeronautical meteorological services are interrupted.

2.15.3. A contingency plan shall describe in detail the actions that operational staffs are to follow to maintain aeronautical meteorological services in the event of the meteorological services system failure or non-availability of staffs, facilities or equipment which affects the provision of aeronautical meteorological services. The plan shall also cover procedures for the safe and orderly transition back to full-service provision.

2.15.4. The contingency plan shall include:

(a) the actions to be taken by personnel responsible for providing the service;
(b) possible alternative arrangements for providing the service; and
(c) arrangements for resuming normal provision of the service.

CHAPTER–3 GLOBAL SYSTEM, SUPPORTING CENTRE AND METEOROLOGICAL OFFICES

3.1. Objective of the world area forecast system

3.1.1. *Technical specifications and detailed criteria related to this chapter are given in this Regulation, Appendix 2* and ICAO Annex 3, Appendix 2.

3.1.2. The objective of the world area forecast system shall be to supply meteorological authorities and other users with global aeronautical meteorological en-route forecasts in digital form. This objective shall be achieved through a comprehensive, integrated, worldwide and, as far as practicable, uniform system, and in a cost-effective manner, taking full advantage of evolving technologies.

3.2. World area forecast centers

3.2.1. The standards in ICAO Annex Chapter 3.2 is not applicable to Cambodia. Cambodia is not providing a WAFC however, the Meteorological Service Provider shall be familiar with the roles and functions of WAFCs so as to be able to establish communication with them and use the products or services effectively.

3.3. Aerodrome meteorological offices

3.3.1. The Meteorological Service Provider 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.

3.3.2. At aerodrome, the Meteorological Service Provider shall carry out all or any 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 air traffic services unit, aeronautical information service unit and meteorological watch office as agreed between the meteorological, aeronautical information service and ATS authorities concerned.

3.3.3. The aerodromes for which landing forecasts are required shall be as determined by Asia and Pacific Regional (APAC) air navigation agreement.

3.3.4. For an aerodrome without meteorological office located at the aerodrome:

(a) the Meteorological Service Provider concerned shall designate one or more meteorological office(s) to supply meteorological information as required; and

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

3.4. Meteorological watch offices

3.4.1. MET Service Provider shall establish MET Watch Office (MWO) within each flight information region (FIR) for Meteorological services cover all the Flight Information Regions of Cambodia.

3.4.2. An Assigned Meteorological watch office (MWO) 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 air traffic services units;

(d) disseminate SIGMET information;

(e) when required by Asia and Pacific Regional (APAC) air navigation agreement,

i. prepare AIRMET information related to its area of responsibility;

ii. supply AIRMET information to associated air traffic services 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/FICs; as agreed between the meteorological and ATS authorities concerned, and to its associated VAAC as determined by Asia and Pacific Regional (APAC) 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/FICs; as agreed between the meteorological Service Provider and ATS provider concerned; and to aeronautical information services provider units; as agreed between the meteorological and appropriate civil aviation authorities (SSCA) concerned. The information shall comprise location; date and time of the release; and forecast trajectories of the radioactive materials.

3.4.3. The boundaries of the area over which meteorological watch is to be maintained by a meteorological watch office shall be coincident with the boundaries of Cambodia flight information region (FIR).

3.4.4. *An MWO should coordinate SIGMET with neighbouring MWO(s), especially when the en-route weather phenomenon extends or is expected to extend beyond the MWO's specified area of responsibility, in order to ensure harmonized SIGMET provision.*

Note. — Guidance on the bilateral or multilateral coordination between MWOs of Contracting States for the provision of SIGMET can be found in the Manual of Aeronautical Meteorological Practice (Doc 8896).

3.5. Volcanic ash advisory centers

3.5.1. The standards in ICAO Annex 3 Chapter 3.5 is not applicable to Cambodia as Cambodia is not providing a VAAC; however, the MET service provider shall be familiar with the roles and functions of VAACs so as to be able to establish communication with them and use the products or services effectively.

3.6. State volcano observatories

3.6.1. The standards in ICAO Annex 3 Chapter 3.6 is not applicable to Cambodia as Cambodia does not maintain any volcano observatories; However, the MET Service Provider shall have to be familiar with the roles/functions of volcano observatories in the region so as to be able to interact with them and use their products/services effectively.

3.7. Tropical cyclone advisory centers

3.7.1. The standards in ICAO Annex 3 Chapter 3.7 is not applicable to Cambodia as Cambodia is not providing a TCAC; however, the MET service provider shall be familiar with the roles and functions of TCACs so as to be able to establish communication with them and use the products or services effectively.

3.8. Space weather centers (SWXC)

3.8.1. The standards in ICAO Annex 3 Chapter 3.8 is not applicable to Cambodia as Cambodia is not providing a SWXC; however, the MET service provider shall be familiar with the roles and functions of SWXC so as to be able to establish communication with them and use the products or services effectively.

CHAPTER–4 METEOROLOGICAL OBSERVATIONS AND REPORTS

4.1. Aeronautical meteorological stations and observations

4.1.1. MET service provider shall provide meteorological observations and reports in accordance with technical specifications in this regulation, Appendix 3 and ICAO Annex 3, Appendix 3.

4.1.2. The Meteorological Service Provider shall establish, at aerodromes in Cambodia, 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.

Note. — Aeronautical meteorological stations may include sensors installed outside the aerodrome, where considered justified, by MET service provider to ensure the compliance of meteorological service for air navigation with the provisions of this Regulation.

4.1.3. *MET service provider should establish, or arrange for the establishment of, aeronautical meteorological stations on offshore structures or at other points of significance in support of helicopter operations to offshore structures, if required by Asia/Pacific air navigation agreement*

4.1.4. 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.

4.1.5. The Meteorological Service Provider 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.

Note. — Guidance on the inspection of aeronautical meteorological stations including the frequency of inspections is given in the Manual on Automatic Meteorological Observing Systems at Aerodromes (Doc 9837).

4.1.6. At aerodromes with runways intended for Category II and 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 takeoff operations. The design of integrated automatic systems shall observe Human Factors principles and include back-up procedures.

Note 1.— Categories of precision approach and landing operations are defined in Annex 6, Part I.

Note 2.— Guidance material on the application of Human Factors principles can be found in the Human Factors Training Manual (Doc 9683).

4.1.7. At aerodromes with Runway intended for Category I 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 procedures.

4.1.8. Where an integrated semi-automatic system is used for the dissemination/display of meteorological information, it shall be capable of accepting the manual insertion of data covering those meteorological elements which cannot be observed by automatic means.

4.1.9. 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.

4.2. Agreement between air traffic services (ATS) authorities and Meteorological Service Provider

4.2.1. An agreement between the Meteorological Service Provider and the appropriate ATS authority shall be established to cover, among other things:

(a) the provision in air traffic services 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 air traffic services personnel;

(d) Supplementary information, as necessary, made by air traffic services personnel to update or supplement the information supplied by the MET observer;

(e) meteorological information obtained from aircraft taking off or landing; and

(f) if available, meteorological information obtained from ground weather radar.

Note. — Guidance on the subject of coordination between ATS and aeronautical services are contained in the ICAO Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services (Doc 9377).

4.3. Routine observations and reports

4.3.1. At aerodromes, routine observations shall be made throughout the 24 hours of each day, unless otherwise agreed between the MET Provider, the appropriate ATS authority and the operator concerned. Such observations shall be made at intervals of one hour, or if so, determined by Asia and Pacific Regional (APAC) air navigation agreement and ASIA/PAC FASID (facilities and services implementation document), at intervals of one half-hour. At other aeronautical meteorological stations, such observations shall be made as determined by the Meteorological Service Provider taking into account the requirements of air traffic services units and aircraft operations.

4.3.2. 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).

Note. — Meteorological information used in ATIS (voice-ATIS and D-ATIS) is to be extracted from the local routine report, in accordance with CCAR Part 18 Section II Chapter 4.3.6.1 g).

4.3.3. At aerodromes that are not operational throughout 24 hours in accordance with 4.3.1, METAR shall be issued prior to the aerodrome resuming operations in accordance with Asia and Pacific Regional (APAC) air navigation agreement.

4.4. Special observations and reports

4.4.1. A list of criteria for special observations Meteorological Service Provider shall be established in consultation with the appropriate ATS authority, operators and others concerned.

4.4.2. 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.

Note. — Meteorological information used in ATIS (voice-ATIS and D-ATIS) is to be extracted from the local special report, in accordance with CCAR Part 18 Section II, 4.3.6.1 g).

4.4.3. At aerodromes that are not operational throughout 24 hours in accordance with 4.3.1, SPECI shall be issued following the resumption of the issuance of METAR, as necessary.

4.5. Contents of reports

4.5.1. Local routine reports, local special reports, 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).

Note. — The location indicators referred to under b) and their significations are published in Location Indicators (ICAO DOC 7910).

4.5.2. In addition to elements listed under 4.5.1 a) to k), local routine reports, local special reports, METAR and SPECI shall contain supplementary information to be placed after element k).

4.5.3. Optional elements included under supplementary information shall be included in METAR and SPECI in accordance with Asia and Pacific Regional (APAC) air navigation agreement.

4.6. Observing and reporting meteorological elements

4.6.1. Surface wind

4.6.1.1. 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.

4.6.1.2. When local routine and special reports are used for departing aircraft, the surface wind observations for this report shall be representative of condition along the runway; when local routine and special reports are used for arriving aircraft, the surface wind observations for this report shall be representative of touchdown zones.

4.6.1.3. For METAR and SPECI, the surface wind observations shall be representative of conditions above the whole runway where there is only one runway and the whole runway complex where there is more than one runway.

4.6.2. Visibility

4.6.2.1. The visibility as defined in Chapter 1 shall be measured or observed, and reported in meters or kilometers.

Note. — Guidance on the conversion of instrument readings into visibility is given in Attachment D, in this regulation.

4.6.2.2. When local routine and local special reports are used for departing aircraft, the visibility observations for these reports shall be representative of conditions along the runway; when local routine and special reports are used for arriving aircraft, the visibility observations for these reports shall be representative of the touchdown zone of the runway.

4.6.2.3. For METAR and SPECI, the visibility observations shall be representative of the aerodrome.

4.6.3. Runway visual range

Note. — Guidance on the subject of runway visual range is contained in the ICAO Manual of Runway Visual Range Observing and Reporting Practices (Doc 9328).

4.6.3.1. Runway visual range as defined in Chapter 1 shall be assessed on all runways intended for Category II and III instrument approach and landing operations

4.6.3.2. Runway visual range as defined in Chapter 1 shall be assessed on all runways intended for use during periods of reduced visibility, including:

(a) precision approach runways intended for Category I instrument approach and landing operations; and

(b) runways used for take -off and having high-intensity edge lights and/or center line lights.

Note. — Precision approach runways are defined in ICAO Annex 14, Volume I, Chapter 1, under "Instrument runway".

4.6.3.3. The runway visual range, assessed in accordance with 4.6.3.1 and 4.6.3.2 shall be reported in meters throughout periods when either the visibility or the runway visual range is less than 1500 m.

4.6.3.4. 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.

4.6.3.5. 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.

4.6.4. Present weather

4.6.4.1. 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), fog, freezing fog and thunderstorms (including thunderstorms in the vicinity).

4.6.4.2. For local routine and special reports, the present weather information shall be representative of conditions at the aerodrome.

4.6.4.3. For METAR and SPECI, the present weather information shall be representative of conditions at the aerodrome and, for certain specified present weather phenomena, in its vicinity.

4.6.5. Clouds

4.6.5.1. 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).

4.6.5.2. Cloud observations for local routine and special reports shall be representative of the runway threshold (s) in use.

4.6.5.3. Cloud observations for METAR and SPECI shall be representative of the aerodrome and its vicinity.

4.6.6. Air temperature and dew-point temperature

4.6.6.1. The air temperature and the dew-point temperature shall be measured and reported in degrees Celsius (^{O}C).

4.6.6.2. Observations of air temperature and dew-point temperature for local routine reports, local special reports and METAR and SPECI shall be representative of the whole runway complex.

4.6.7. Atmospheric pressure

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

4.6.8. Supplementary information

4.6.8.1. Observations made at aerodromes shall include the available supplementary information concerning significant meteorological conditions, particularly those in the approach and climb-out areas. Where practicable, the information should identify the location of the meteorological condition.

4.7. Reporting meteorological information from automatic observing systems

4.7.1. *METAR and SPECI from automatic observing systems should be used at aerodrome during non-operational hours, and during operational hours of the aerodrome should be determined by MET service provider in consultation with users based on the availability and efficient use of personnel.*

Note. — Guidance on the use of automatic meteorological observing systems is given in ICAO DOC 9837

4.7.2. Local routine and special reports from automatic observing systems should be used at aerodrome, and during operational hours of the aerodrome should be determined by MET service provider in consultation with users based on the availability and efficient use of personnel.

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

4.8. Observation and report of volcanic activity

4.8.1. (Reserved)

CHAPTER–5 AIRCRAFT OBSERVATIONS AND REPORTS

5.1. Obligations of States

5.1.1. MET service provider shall provide services related to aircraft observations and reports in accordance with technical specifications in this regulation, Appendix 4 and ICAO Annex 3, Appendix 4.

5.1.2. The air operator, air traffic services providers and MET service providers arrange, according to the provision of this chapter, for observations to be made by aircraft registered in Cambodia operating on international air routes and for the recording and reporting of these observations.

5.2. Types of aircraft observations

5.2.1. The following aircraft observations shall be made:

(a) routine aircraft observations during en-route and climb-out phases of the flight, and

(b) special and other non-routine aircraft observations during any phase of the flight.

5.3. Routine aircraft observations – designations

5.3.1. Where applicable, when air-ground data link is used and automatic dependent surveillance-contract (ADS-C) 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.

5.3.2. *Where applicable, for helicopter operations to and from aerodromes on offshore structures, routine observations should be made from helicopters at points and times as agreed between the meteorological authorities and the helicopter operators concerned*.

5.3.3. 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 5.3.1. The designation procedures shall be in accordance with Asia and Pacific Regional (APAC) air navigation agreement.

5.3.4. 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 5.3.1.

5.4. Routine aircraft observations – exemptions

5.4.1. Aircraft not equipped with air-ground data link shall be exempted from making routine aircraft observations.

5.5. Special aircraft observations

5.5.1. Special aircraft 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; or

Note. — Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.

(i) runway braking action encountered is not as good as reported.

In addition, in the case of transonic and supersonic flight:

(j) moderate turbulence; or
(k) hail; or
(l) cumulonimbus clouds.

5.6. Other non-routine aircraft observations

5.6.1. When other meteorological conditions not listed under 5.5 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.

Note. — Icing, turbulence and, to a large extent, wind shear are elements which, for the time being, cannot be satisfactorily observed from the ground and for which in most cases aircraft observations represent the only available evidence.

5.7. Reporting of aircraft observations during flight

5.7.1. 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 in according to ICAO DOC 4444, Appendix 1, MODEL AIREP SPECIAL.

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

5.7.3. Aircraft observations shall be reported as air-reports.

5.8. Relay of air-reports by air traffic services units (ATS)

5.8.1. The Meteorological Service Provider shall make arrangements with the appropriate ATS authority to ensure that on receipt by the ATS units 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 Fax or Email or data link communications, the air traffic services units relay them without delay to their associated meteorological watch office, the WAFCs and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services.

5.9. Recording and post-flight reporting of aircraft observations of volcanic activity

5.9.1. Special aircraft observations of pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud shouldl be recorded on the special air-report of volcanic activity form in according to ICAO DOC 4444, Appendix 1, MODEL VOLCANIC ACTIVITY REPORT (VAR): to be used for post-flight reporting. 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 concerned, could be affected by volcanic ash clouds.

CHAPTER–6 FORECASTS

6.1. Use of forecasts

6.1.1. MET service provider shall provide forecasts in accordance with technical specifications in this regulation, Appendix 5 and ICAO Annex 3, Appendix 5.

6.1.2. The issue of a new forecast by meteorological office, such as a routine aerodrome forecast, shall be understood to cancel automatically any forecast of the same type previously issued for the same place and for the same period of validity or part thereof.

6.2. Aerodrome forecasts

6.2.1. An aerodrome forecast shall be prepared in accordance with Asia and Pacific Regional (APAC) air navigation agreement by the aerodrome meteorological office designated by the meteorological Service Provider concerned.

Note. — The aerodromes for which aerodrome forecasts are to be prepared and the period of validity of these forecasts are listed in the relevant facilities and services implementation document (FASID).

6.2.2. 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.

6.2.3. 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; and
(k) expected significant changes to one or more of these elements during the period of validity.

Optional elements shall be included in TAF in accordance with Asia and Pacific Regional (APAC) air navigation agreement.

Note. — The visibility included in TAF refers to the forecast prevailing visibility.

6.2.4. 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.

Note. — Guidance on methods to keep TAF under continuous review is given in Chapter 3 of the Manual of Aeronautical Meteorological Practice (Doc 8896).

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

6.2.6. The period of validity of a routine TAF shall not 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.*

6.2.7. When issuing TAF, aerodrome meteorological offices shall ensure that no more than one TAF is valid at an aerodrome at any given time.

6.3. Landing forecasts

6.3.1. A landing forecast shall be prepared by the aerodrome meteorological office designated by the Meteorological Service Provider concerned as determined by Asia and Pacific Regional (APAC) 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.

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

6.3.3. 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 report, a local special report, 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.

6.4. Forecasts for take-off

6.4.1. A forecast for take-off shall be prepared by the meteorological office designated by the Meteorological Service Provider concerned as agreed between the meteorological authority and operators concerned.

6.4.2. Where applicable, a forecast for take-off shall refer to a specified period of time and shall contain information on expected conditions over the runway complex in regard to surface wind direction and speed and any variations thereof, temperature, pressure (QNH), and any other elements as agreed locally.

6.4.3. Where applicable, a forecast for take-off shall be supplied to operators and flight crew members on request within the 3 hours before the expected time of departure.

6.4.4. Where applicable, meteorological offices preparing forecasts for take-off shall keep the forecasts under continuous review and, when necessary, shall issue amendments promptly.

6.5. Area forecasts for low-level flights

6.5.1. 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 Service Provider in consultation with the users.

6.5.2. When the density of traffic operating below flight level 100 warrants the issuance of AIRMET information in accordance with 7.2.1, area forecasts for such operations shall be prepared in a format agreed between the Meteorological Service Provider 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.

6.5.3. 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 meteorological offices concerned not later than one hour prior to the beginning of their validity period.

CHAPTER–7 SIGMET and AIRMET INFORMATION, AERODROME WARNINGS AND WIND SHEAR WARNINGS AND ALERTS

7.1. SIGMET information

7.1.1. MET service provider shall provide SIGMET information in accordance with technical specifications in this regulation, Appendix 6 and ICAO Annex 3, Appendix 6.

7.1.2. 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 and other phenomena in the atmosphere that may affect the safety of aircraft operations, and of *the* development of those phenomena in time and space.

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

7.1.4. 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.

7.1.5. SIGMET messages concerning volcanic ash cloud and tropical cyclones shall be based on advisory information provided by VAACs and TCACs, respectively, designated by Asia and Pacific Regional (APAC) air navigation agreement.

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

7.1.7. 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.

7.2. AIRMET information

7.2.1. MET service provider shall provide AIRMET information in accordance with technical specifications in this regulation, Appendix 6 and ICAO Annex 3, Appendix 6.

7.2.2. AIRMET information shall be issued by a meteorological watch office in accordance with Asia and Pacific Regional (APAC) 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 issued in accordance with Chapter 6, Section 6.5 and which may affect the safety of low-level flights, and of the development of those phenomena in time and space.

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

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

7.3. Aerodrome warnings

7.3.1. MET service provider shall provide Aerodrome warnings in accordance with technical specifications in this regulation, Appendix 6 and ICAO Annex 3, Appendix 6.

7.3.2. 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.

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

7.4. Wind shear warnings and alerts

Note. — Guidance on the subject is contained in the Manual on Low-level Wind Shear (Doc 9817). Wind shear alerts are expected to complement wind shear warnings and together are intended to enhance situational awareness of wind shear.

7.4.1. MET service provider shall provide wind shear warnings in accordance with technical specifications in this regulation, Appendix 6 and ICAO Annex 3, Appendix 6.

7.4.2. Wind shear warnings shall be prepared by the aerodrome meteorological office designated by MET service provider for aerodromes where wind shear is considered a factor, in accordance with local arrangements with the appropriate air traffic services 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 1 600 ft (500 m) 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 1 600 ft (500 m) above runway level, then 1 600 ft (500 m) shall not be considered restrictive.

7.4.3. Wind shear warnings for arriving aircraft and/or departing aircraft shall be cancelled when aircraft reports and/or ground-based wind shear detection equipment indicate that wind shears no longer exist, or alternatively, after two hours' elapse time. The criteria for the cancellation of a wind shear warning shall be defined locally for each aerodrome, as agreed between the meteorological authority the appropriate ATS authority and the operators concerned.

7.4.4. 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.

7.4.5. Wind shear alerts shall be updated at least every minute. The wind shear alert shall be cancelled as soon as the headwind/tailwind change falls below 7.5 m/s (15 kt).

CHAPTER–8 AERONAUTICAL CLIMATOLOGICAL INFORMATION

8.1. General provisions

Note. — In cases where it is impracticable to meet the requirements for aeronautical climatological information on a national basis, the collection, processing and storage of observational data may be affected through computer facilities available for international use, and the responsibility for the preparation of the required aeronautical climatological information may be delegated as agreed between the meteorological authorities concerned.

8.1.1. MET service provider shall provide aeronautical climatological information in accordance with technical specifications in this regulation, Appendix 7 and ICAO Annex 3, Appendix 7.

8.1.2. 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 Service Provider and those users concerned.

8.1.3. Aeronautical climatological information shall be based on observations made over a period of at least five years and the period shall be indicated in the information supplied.

8.1.4. Climatological data related to sites for new aerodromes and to additional runways at existing aerodromes shall be collected starting as early as possible before the commissioning of those aerodromes or runways.

8.2. Aerodrome climatological tables

8.2.1. The Meteorological Service Provider shall make arrangements for collecting and retaining the necessary observational data and have the capability:

(a) to prepare aerodrome climatological tables for each regular and alternate international aerodrome within its territory; and

(b) to make available such climatological tables to an aeronautical user within a time period as agreed between the MET service provider and the user concerned.

8.3. Aerodrome climatological summaries

8.3.1. Where applicable, Aerodrome climatological summaries shall follow the procedures prescribed by the World Meteorological Organization. Where computer facilities are available to store, process and retrieve the information, the summaries shall be published or otherwise made available to aeronautical users on request. Where such computer facilities are not available, the summaries shall be prepared using the models specified by the World Meteorological Organization and shall be published and kept up to date as necessary.

8.4. Copies of meteorological observational data

8.4.1. Meteorological Service Provider 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.

CHAPTER–9 SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

9.1. General provision

9.1.1. Meteorological information shall be supplied to operators and flight crew members in accordance with technical specifications and detailed criteria related to this chapter are given in this regulation, Appendix 8 and ICAO Annex 3, Appendix 8 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

9.1.2. 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.

9.1.3. Meteorological information shall be supplied promptly to operators, flight information centres, area control centres, approach control units, communication stations and flight crew members shall be up to date and include the following information, as agreed between Meteorological Service Provider and the operators concerned:

(a) forecasts of:
   1) upper wind and upper-air temperature;
   2) upper-air humidity;
   3) geopotential altitude of flight levels;
   4) flight level and temperature of tropopause;
   5) direction, speed and flight level of maximum wind; and
   6) SIGWX phenomena; and
   7) Cumulonimbus clouds, icing and turbulence

Note 1. — Forecasts of upper-air humidity and geopotential altitude of flight levels are used only in automatic flight planning and need not be displayed.

Note 2. —Forecasts of cumulonimbus cloud, icing and turbulence are intended to be processed and, if necessary, visualized according to the specific thresholds relevant to user operations.

(b) METAR or SPECI (including trend forecasts as issued in accordance with Asia and Pacific Regional (APAC) 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;

Note. —Appropriate special air-reports will be those not already used in the preparation of SIGMET

(f) volcanic ash and tropical cyclone advisory information relevant to the whole route;
(g) as determine by 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;
(j) ground-based weather radar information; and
(k) Space weather advisory information relevant to the whole.

9.1.4. Forecasts listed under 9.1.3 a) 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 Service Provider and the operator concerned.

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

9.1.6. 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 this regulation, Appendix 8, Figures A8-1, A8-2 and A8-3.

9.1.7. When forecasts of upper wind and upper-air temperature listed under 9.1.3 a) 1) Are supplied in chart form, they shall be fixed time prognostic charts for flight levels as specified in Appendix 2, 1.2.2 a). When forecasts of SIGWX phenomena listed under 9.1.3 a) 6) are supplied in chart form, they shall be fixed time prognostic charts for an atmospheric layer limited by flight levels as specified in this regulation, Appendix 2, 1.3.2 and Appendix 5, 4.3.2.

9.1.8. 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.

9.1.9. When necessary, the meteorological authority of the State providing service for operators and flight crew members shall initiate coordinating action with the meteorological authorities of other States with a view to obtaining from them the reports and/or forecasts required.

9.1.10. Meteorological information shall be supplied to operators and flight crew members at the location to be determined by Meteorological Service Provider, after consultation with the operators concerned and at the time to be agreed 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 Cambodia. At an aerodrome without a meteorological office, arrangements for the supply of meteorological information shall be as agreed between the Meteorological Service Provider and the operator concerned.

9.2. Briefing, consultation and display

Note. — The requirements for the use of automated pre-flight information systems in providing briefing, consultation and display are given in 9.4.

9.2.1. 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, as agreed between the Meteorological Service Provider and the operator concerned, in lieu of flight documentation.

9.2.2. Meteorological information used for briefing, consultation and display shall include any or all of the information listed in 9.1.3.

9.2.3. If the 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.

9.2.4. The required briefing, consultation, display and/or flight documentation shall normally be provided by the 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 as agreed upon between the Meteorological Service Provider and the operator concerned. In exceptional circumstances, such as an undue delay, the 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.

9.2.5. *The flight crew member and/or other flight operations personnel for whom briefing, consultation and/or flight documentation has been requested should visit the aerodrome meteorological office at the time agreed upon between the aerodrome meteorological office and the operator concerned, Where local circumstances at an aerodrome make personal briefing or consultation impracticable, the meteorological office shall provide those services by telephone or other suitable telecommunications facilities to flight crew member or other flight operations personnel.*

9.3. Flight documentation

Note. — The requirements for the use of automated pre-flight information systems in providing flight documentation are given in 9.4.

9.3.1. Flight documentation to be made available shall comprise information listed under 9.1.3 a) 1) and 6), b), c), e), f) and, if appropriate, g). However, flight documentation for flights of two hours' duration or less, after a short stop or turnaround, shall be limited to the information operationally needed, as agreed between the Meteorological Service Provider and operator concerned, but in all cases the flight documentation shall at least comprise information on 9.1.3 b), c), e), f) and, if appropriate, g) and k).

9.3.2. 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 meteorological office concerned.

9.3.3. In cases where a need for amendment arises after the flight documentation has been supplied, and before take-off of the aircraft, the meteorological office shall issue the necessary amendment or updated information to the operator or to the local air traffic services unit, for transmission to the aircraft.

9.3.4. The Meteorological Service Provider 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.

9.4. Automated pre-flight information systems for briefing, consultation, flight planning and flight documentation

9.4.1. Where the Meteorological Service Provider 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 9.1 to 9.3 inclusive.

9.4.2. Where applicable, the MET Service Provider shall establish an agreement with the ATS Provider to provide automated pre-flight information systems as a harmonised, common point of access to meteorological information and aeronautical information services (AIS) information by operators, flight crew members and other aeronautical personnel concerned.

9.4.3. Where automated pre-flight information systems are used to provide for a harmonized, common point of access to meteorological information and aeronautical information services information by operators, flight crew members and other aeronautical personnel concerned, the Meteorological Service Provider concerned shall remain responsible for the quality control and quality management of meteorological information provided by means of such systems in accordance with Chapter 2, 2.2.2.

Note. — The meteorological and aeronautical information services information concerned is specified in sub section 9.1 to 9.3 and Appendix 8 and in the Procedures for Air Navigation Services — Aeronautical Information Management (PANS-AIM, Doc 10066), 5.5, respectively.

9.5. Information for aircraft in flight

9.5.1. Meteorological information for use by aircraft in flight shall be supplied by a meteorological office or meteorological watch office to its associated air traffic services unit and through D-VOLMET or VOLMET broadcasts as determined by Asia and Pacific Regional (APAC) air navigation agreement. Meteorological information for planning by the operator for aircraft in flight shall be supplied on request, as agreed between the Meteorological Service Provider or authorities and the operator concerned.

9.5.2. Meteorological information for use by aircraft in flight shall be supplied to air traffic services units in accordance with the specifications of Chapter 10 of this regulation.

9.5.3. Meteorological information shall be supplied through D-VOLMET or VOLMET broadcasts in accordance with the specifications of Chapter 11 of this regulation.

CHAPTER–10 INFORMATION FOR AIR TRAFFIC SRVICES, SEARCH AND RESCUES SERVICES AND AERONAUTICAL INFORMATION SERVICES

10.1. Information for air traffic services units

10.1.1. MET service provider shall provide information to Air Traffic Services, Search and Rescue Services and Aeronautical Information Services in accordance with technical specifications in regulation, Appendix 9 and ICAO Annex 3, Appendix 9.

10.1.2. The Meteorological Service Provider shall designate a meteorological office or meteorological watch office to be associated with each air traffic services unit. The associated meteorological office or meteorological watch office shall, after coordination with the air traffic services unit, supply, or arrange for the supply of, up-to-date meteorological information to the unit as necessary for the conduct of their functions.

10.1.3. The aerodrome meteorological office shall be associated with an aerodrome control tower or approach control unit for the provision of meteorological information.

10.1.4. A meteorological watch office shall be associated with a flight information centre or an area control centre for the provision of meteorological information.

10.1.5. Where, owing to local circumstances, it is convenient for the duties of an associated meteorological office or meteorological watch office to be shared between two or more aerodrome meteorological offices or meteorological watch offices, the division of responsibility should be determined by the Meteorological Service Provider in consultation with the appropriate ATS authority.

10.1.6. Any meteorological information requested by an air traffic services unit in connection with an aircraft emergency shall be supplied as rapidly as possible.

10.2. Information for search and rescue services units

10.2.1. Meteorological offices or meteorological watch offices designated by the Meteorological Service Provider in accordance with Asia and Pacific Regional (APAC) 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 or meteorological watch office shall maintain liaison with the search and rescue services unit throughout a search and rescue operation.

10.3. Information for aeronautical information services units

10.3.1. The Meteorological Service Provider, in coordination with the appropriate civil aviation authority, shall arrange for the supply of up to-date meteorological information to relevant aeronautical information services units, as necessary, for the conduct of their functions.

CHAPTER–11 REQUIREMENTS FOR AND USE OF COMMUNICATIONS

11.1. Requirements for communications

11.1.1. Technical specifications and detailed criteria related to Requirements for and Use of Communications are contained in this regulation, Appendix 10 and ICAO Annex 3, Appendix 10.

11.1.2. 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 air traffic services units on the aerodromes for which those offices and stations are responsible, and in particular to aerodrome control towers, approach control units and the aeronautical telecommunications stations serving these aerodromes.

11.1.3. Suitable telecommunications facilities shall be made available to permit meteorological watch offices to supply the required meteorological information to air traffic services 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 centers, area control centers and rescue coordination centers and the associated aeronautical telecommunications stations.

11.1.4. Suitable telecommunications facilities shall be made available to permit world area forecast centers to supply the required world area forecast system products to meteorological offices, Meteorological Service Provider and other users.

11.1.5. Telecommunications facilities between 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.

11.1.6. Where applicable, Telecommunications facilities between meteorological offices or meteorological watch offices and flight information centres, area control centres, rescue coordination centres and aeronautical telecommunications stations shall permit:

(a) 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; and

(b) printed communications, when a record is required by the recipients; the message transit time shall not exceed 5 minutes.

Note. — In 11.1.5 and 11.1.6, "approximately 15 seconds" refers to telephony communications involving switchboard operation and "5 minutes" refers to printed communications involving retransmission.

11.1.7. Where applicable, the telecommunications facilities required in accordance with 11.1.5 and 11.1.6 shall be supplemented, as and where necessary, by other forms of visual or audio communications, for example, closed-circuit television or separate information processing systems.

11.1.8. As agreed between the Meteorological Service Provider and the operators concerned, provision should be made to enable operators to establish suitable telecommunications facilities for obtaining meteorological information from aerodrome meteorological offices or other appropriate sources.

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

11.1.10. Where applicable, the telecommunications facilities used for the exchange of operational meteorological information shall be the aeronautical fixed service or, for the exchange of non-time critical operational meteorological information, the public internet, subject to availability, satisfactory operation a bilateral/multilateral and /or Asia/Pacific air navigation agreement.

Note 1. — Aeronautical fixed service Internet-based services, operated by the world area forecast centres, providing for global coverage are used to support the global exchanges of operational meteorological information.

Note 2. — Guidance material on non-time-critical operational meteorological information and relevant aspects of the public Internet is provided in the Guidelines on the Use of the Public Internet for Aeronautical Applications (Doc 9855)

11.2. Use of aeronautical fixed service communications and the public Internet-meteorological bulletins

11.2.1. 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.

Note. — Meteorological bulletins containing operational meteorological information authorized for transmission via the aeronautical fixed service are listed in Annex 10, Volume II, Chapter 4, together with the relevant priorities and priority indicators.

11.3. Use of aeronautical fixed service communications — world area forecast System products

11.3.1. Where applicable, world area forecast system products in digital form shall be transmitted using binary data communications techniques. The method and channels used for the dissemination of the products shall be as determined by Asia and Pacific Regional (APAC) air navigation agreement.

11.4. Use of aeronautical mobile service communications

11.4.1. The content and format of meteorological information transmitted to aircraft and by aircraft shall be consistent with the provisions of this regulation.

11.5. Use of aeronautical data link service —contents of D-VOLMET

11.5.1. D-VOLMET provided by service provider 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.

Note. — The requirement to provide METAR and SPECI may be met by the data link-flight information service (D-FIS) application entitled "Data link-aerodrome routine meteorological report (D-METAR) service"; the requirement to provide TAF may be met by the D-FIS application entitled "Data link-aerodrome forecast (D-TAF) service"; and the requirement to provide SIGMET and AIRMET messages may be met by the D-FIS application entitled "Data link-SIGMET (D-SIGMET) service". The details of these data link services are specified in the Manual of Air Traffic Services Data Link Applications (Doc 9694).

11.6. Use of aeronautical broadcasting service – contents of VOLMET broadcasts

11.6.1. Continuous VOLMET broadcasts, normally on very high frequencies (VHF), shall contain current METAR and SPECI, together with trend forecasts where available.

11.6.2. 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 Asia and Pacific Regional (APAC) air navigation agreement, TAF and SIGMET.

APPENDIX and ATTACHMENT

APPENDIX 1 FLIGHT DOCUMENTATION —MODEL CHARTS AND FORMS

(See Chapter 9 *of this regulation*)

MODEL A — OPMET information

MODEL IS — Upper wind and temperature chart for standard isobaric surface

Example 1. Arrows, feathers and pennants (Mercator projection)

Example 2. Arrows, feathers and pennants (Polar stereographic projection)

MODEL SWH — Significant weather chart (high level)

Example. Polar stereographic projection (showing the jet stream vertical extent)

MODEL SWM — Significant weather chart (medium level)

MODEL SWL — Significant weather chart (low level)

Example 1

Example 2

MODEL TCG — Tropical cyclone advisory information in graphical format

MODEL VAG — Volcanic ash advisory information in graphical format

MODEL STC — SIGMET for tropical cyclone in graphical format

MODEL SVA — SIGMET for volcanic ash in graphical format

MODEL SGE — SIGMET for phenomena other than tropical cyclone and volcanic ash in graphical format

MODEL SN — Sheet of notations used in flight documentation

OPMET INFORMATION **MODEL A**

ISSUED BY ..... METEOROLOGICAL OFFICE (DATE, TIME UTC) .....

INTENSITY

" – " (light); no indicator (moderate); " + " (heavy, or a tornado/waterspout in the case of funnel cloud(s)) are used to indicate the intensity of certain phenomena

DESCRIPTORS

MI – shallow	PR – partial	BL – blowing	TS – thunderstorm
BC – patches	DR – low drifting	SH – shower(s)	FZ – freezing (supercooled)

PRESENT WEATHER ABBREVIATIONS

DZ – drizzle	BR – mist	PO – dust/sand whirls (dust devils)
RA – rain	FG – fog	SQ – squall
SN – snow	FU – smoke	FC – funnel cloud(s) (tornado or waterspout)
SG – snow grains	VA – volcanic ash	
PL – ice pellets	DU – widespread dust	SS – sandstorm
GR – hail	SA – sand	DS – duststorm
GS – small hail and/or snow pellets	HZ – haze	

EXAMPLES

+SHRA – heavy shower of rain
FZDZ – moderate freezing drizzle
+TSSNGR – thunderstorm with heavy snow and hail
TSSN – thunderstorm with moderate snow
SNRA – moderate snow and rain

SELECTED ICAO LOCATION INDICATORS

CYUL	Montreal Pierre Elliot Trudeau/Intl	HECA	Cairo/Intl	OBBI	Bahrain Intl
EDDF	Frankfurt/Main	HKJK	Nairobi/Jomo Kenyatta	RJTT	Tokyo Intl
EGLL	London/Heathrow	KJFK	New York/John F. Kennedy Intl	SBGL	Rio de Janeiro/Galeão Intl
GMMC	Casablanca/Anfa	LFPG	Paris/Charles de Gaulle	YSSY	Sydney/Kingsford Smith Intl
		NZAA	Auckland Intl	ZBAA	Beijing/Capital

METAR CYUL 240700Z 27018G30KT 5000 SN FEW020 BKN045 M02/M07 Q0995=

METAR EDDF 240950Z 05015KT 9999 FEW025 04/M05 Q1018 NOSIG=

METAR LFPG 241000Z 07010KT 5000 SCT010 BKN040 02/M01 Q1014 NOSIG=

SPECI GMMC 220530Z 24006KT 5000 –TSGR BKN016TCU FEW020CB SCT026 08/07 Q1013=

TAF AMD NZAA 240855Z 2409/2506 24010KT 9999 FEW030 BECMG 2411/2413 VRB02KT 2000 HZ FM 242200 24010KT CAVOK=

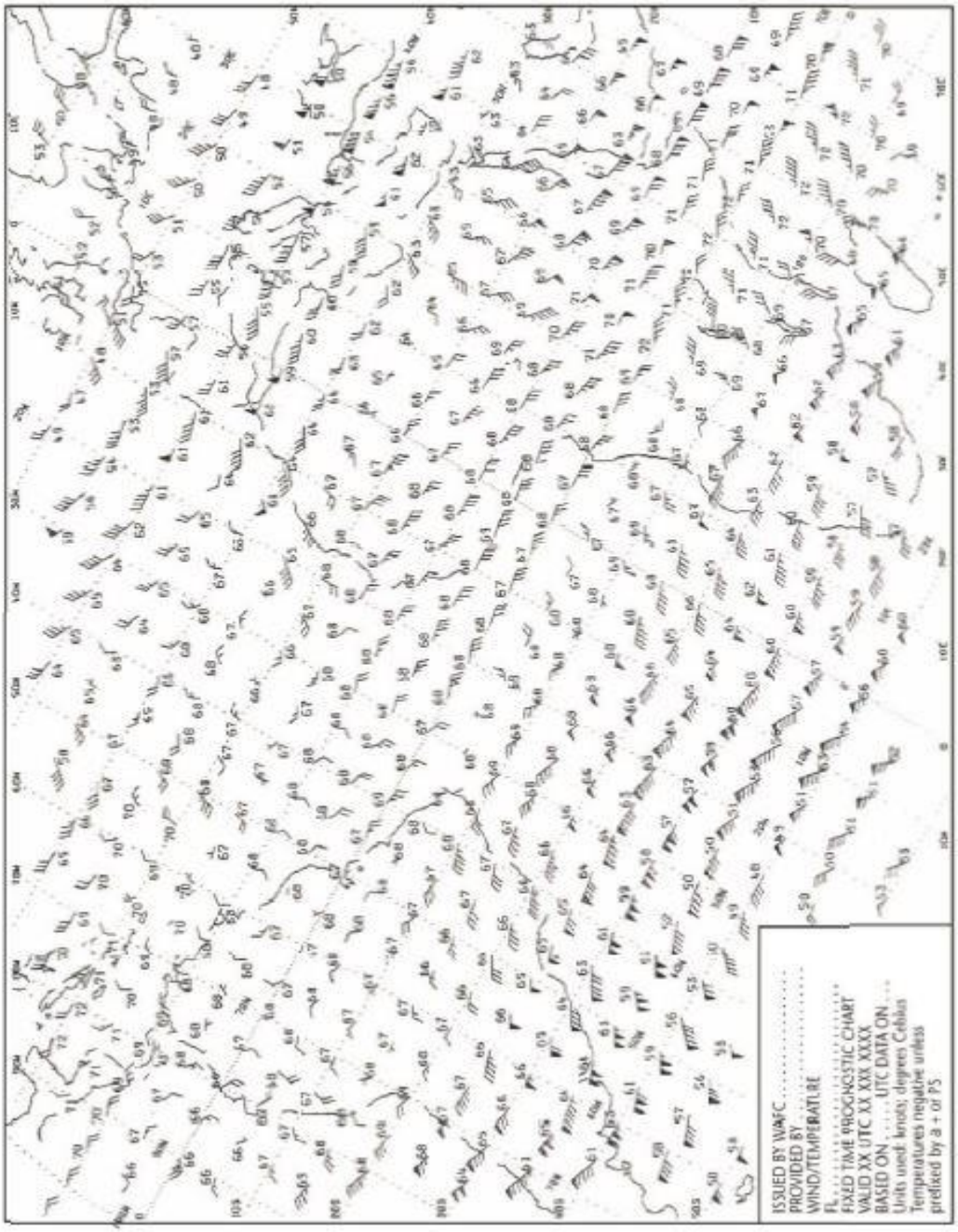
TAF ZBAA 240440Z 2406/2506 13004MPS 6000 NSC BECMG 2415/2416 2000 SN OVC040 TEMPO 2418/24211000 SN BECMG 2500/2501 32004MPS 3500 BR NSC BECMG 2503/2504 32010G20MPS CAVOK=

TAF YSSY 240443Z 2406/2506 05015KT 3000 BR SCT030 BECMG 2414/2416 33008KT FM 2422 04020KT CAVOK=

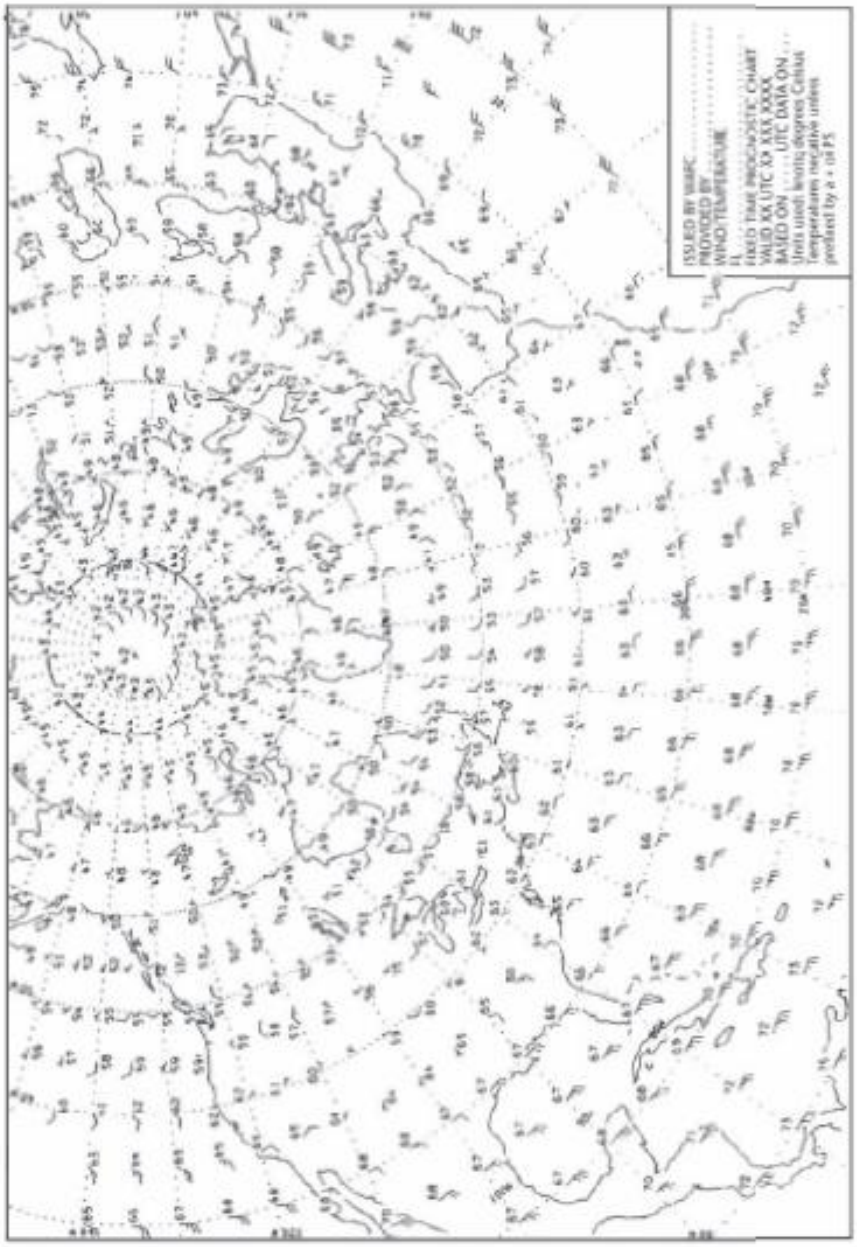
HECC SIGMET 2 VALID 240900/241200 HECA-

HECC CAIRO FIR SEV TURB OBS N OF N27 FL 390/440 MOV E 25KMH NC.

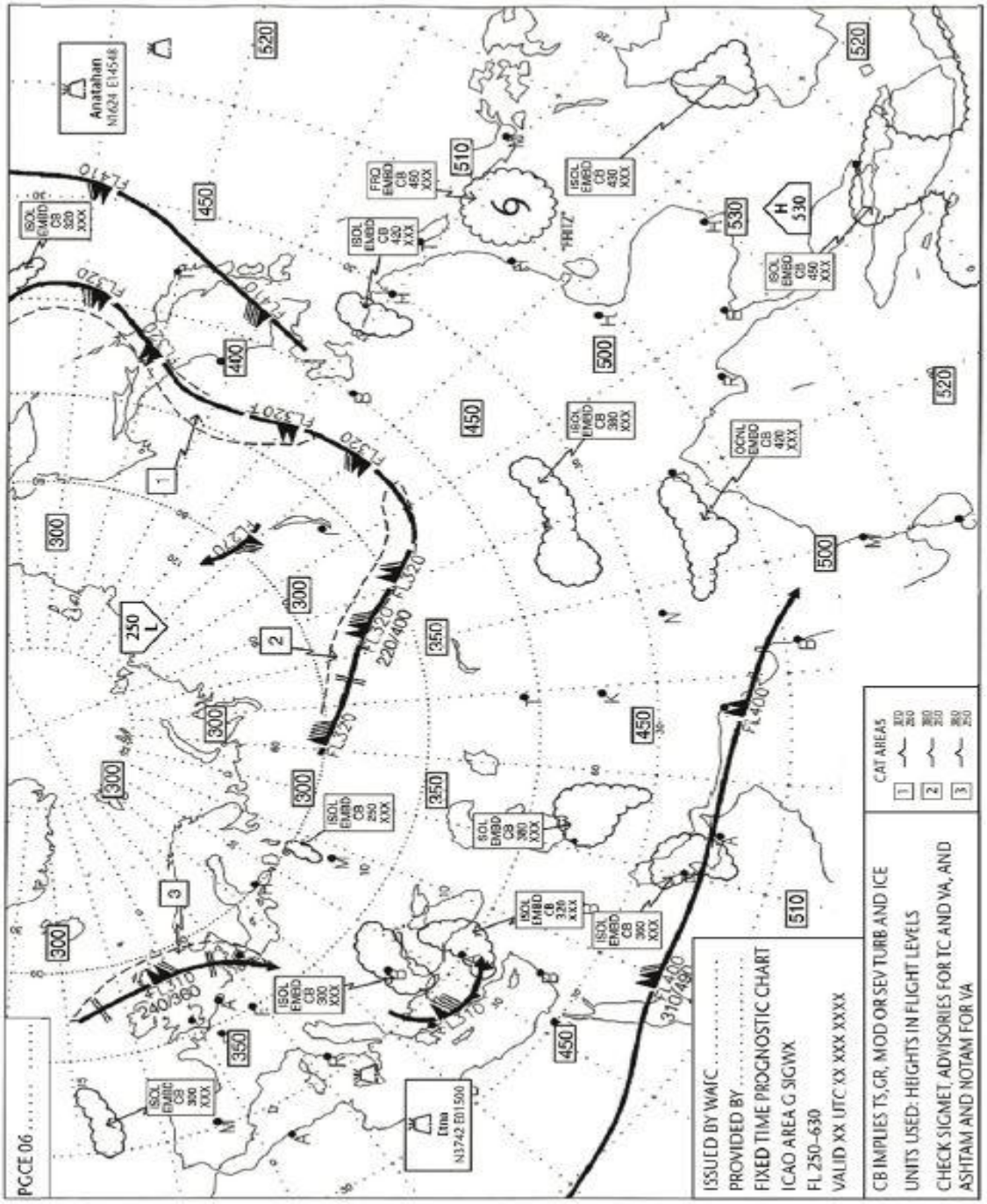
UPPER WIND AND UPPER-AIR TEMPERATURE CHART FOR STANDARD ISOBARIC SURFACE **MODEL IS**
Example 1. Arrows, feathers and pennants (Mercator projection)



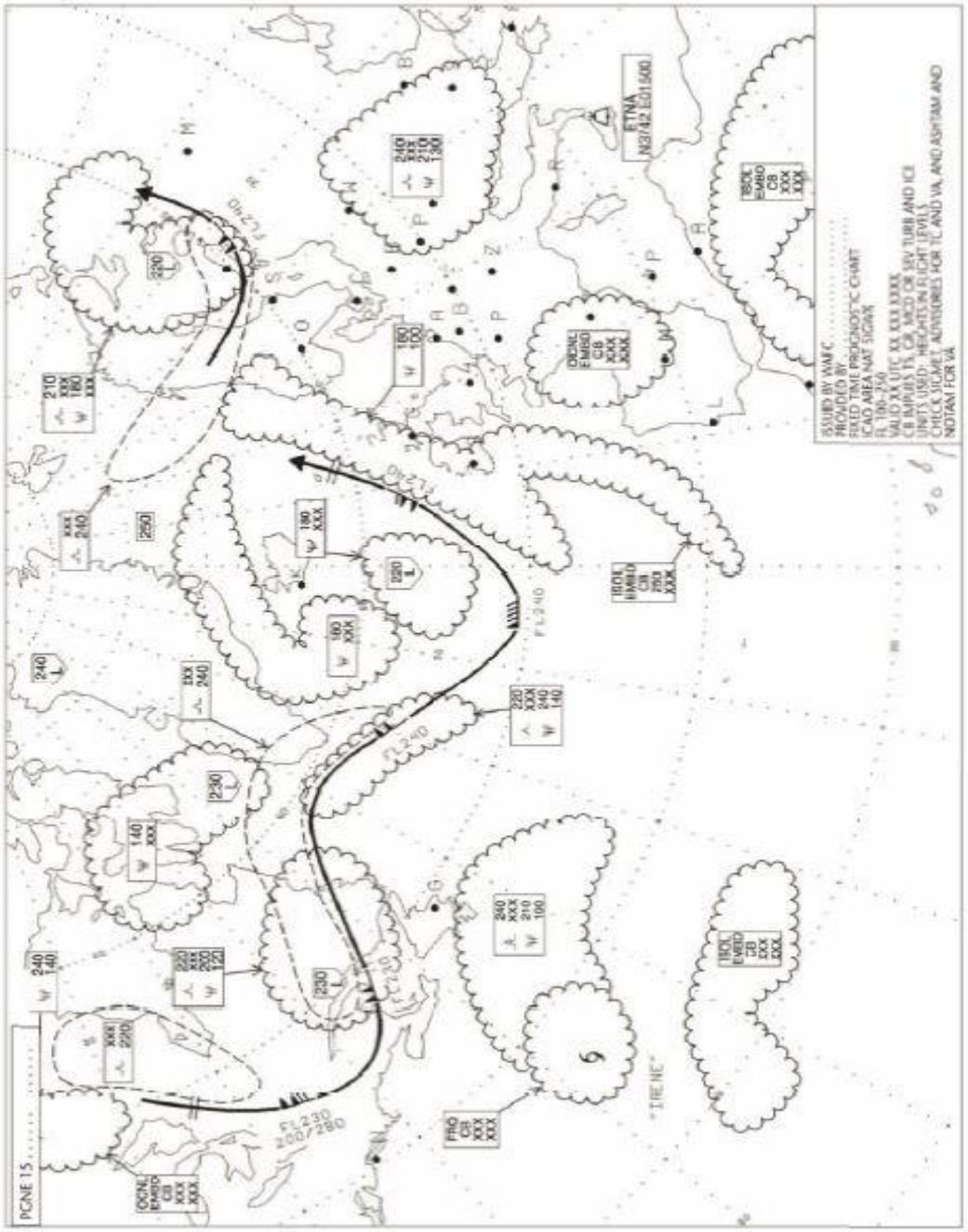
UPPER WIND AND UPPER-AIR TEMPERATURE CHART FOR STANDARD ISOBARIC SURFACE **MODEL I8**
Example 2. Arrows, feathers and pennants (Polar stereographic projection)



SIGNIFICANT WEATHER CHART (HIGH LEVEL) **MODEL SWH**
Example. Polar stereographic projection (showing the jet stream vertical extent)

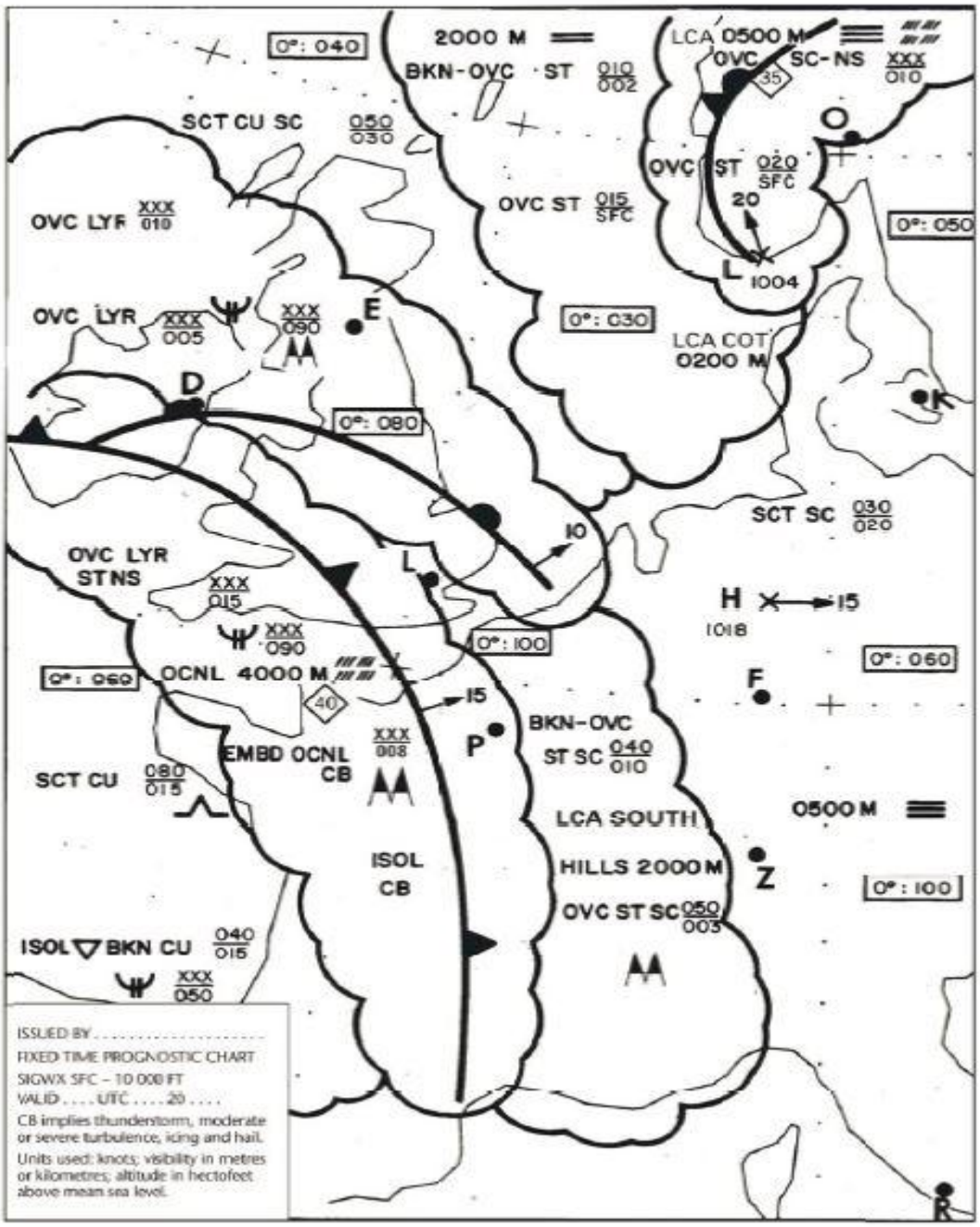


SIGNIFICANT WEATHER CHART (MEDIUM LEVEL) MODEL SWM



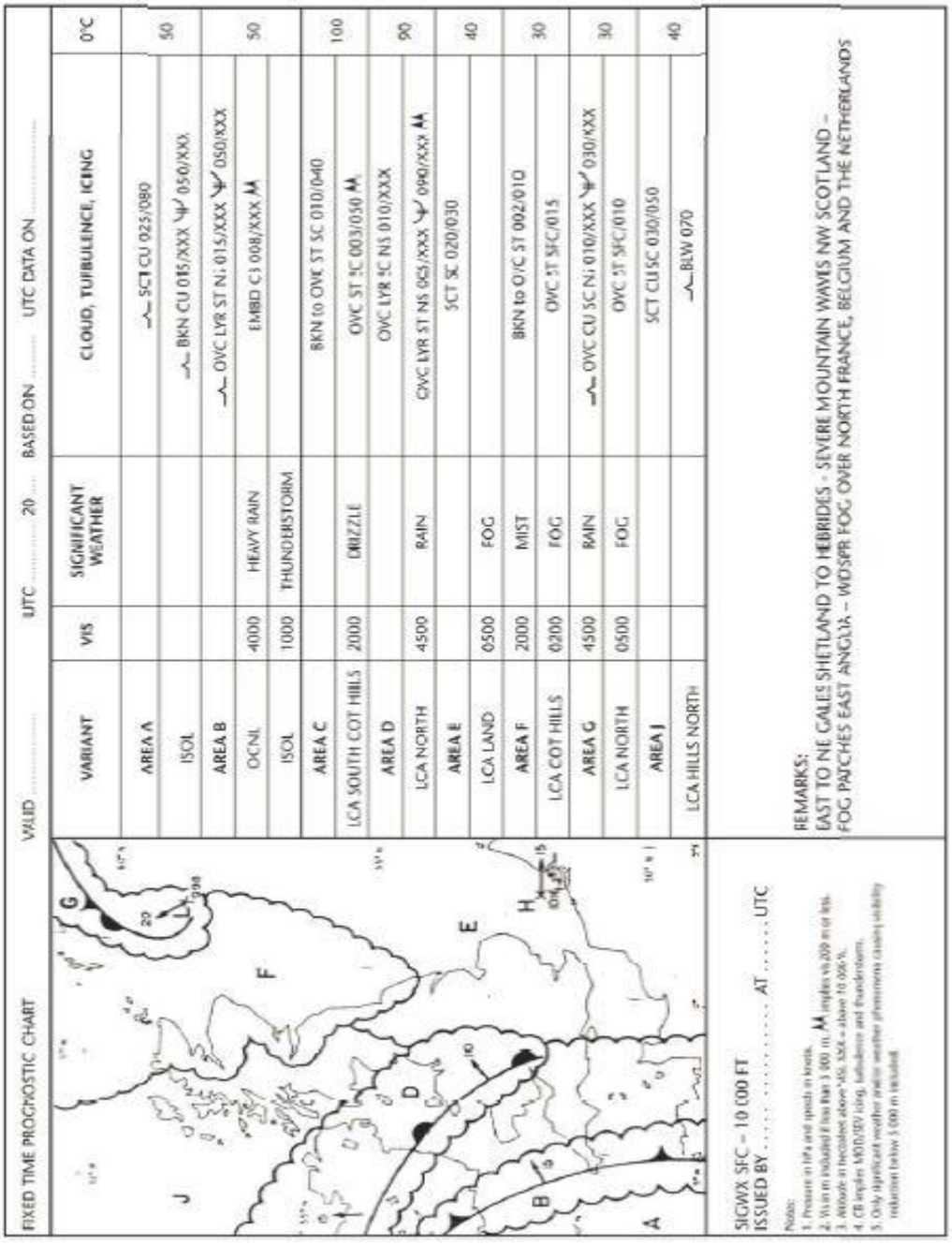
SIGNIFICANT WEATHER CHART (LOW LEVEL)
Example 1

MODEL SWL

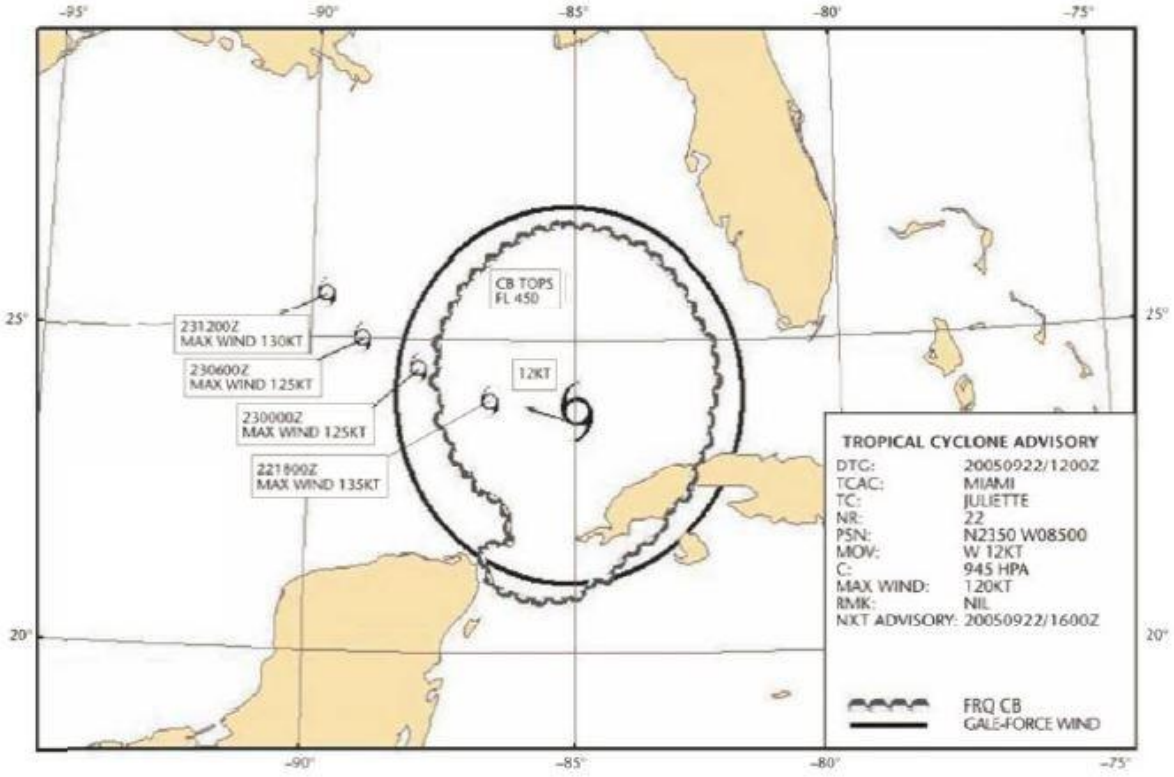


SIGNIFICANT WEATHER CHART (LOW LEVEL)
Example 2

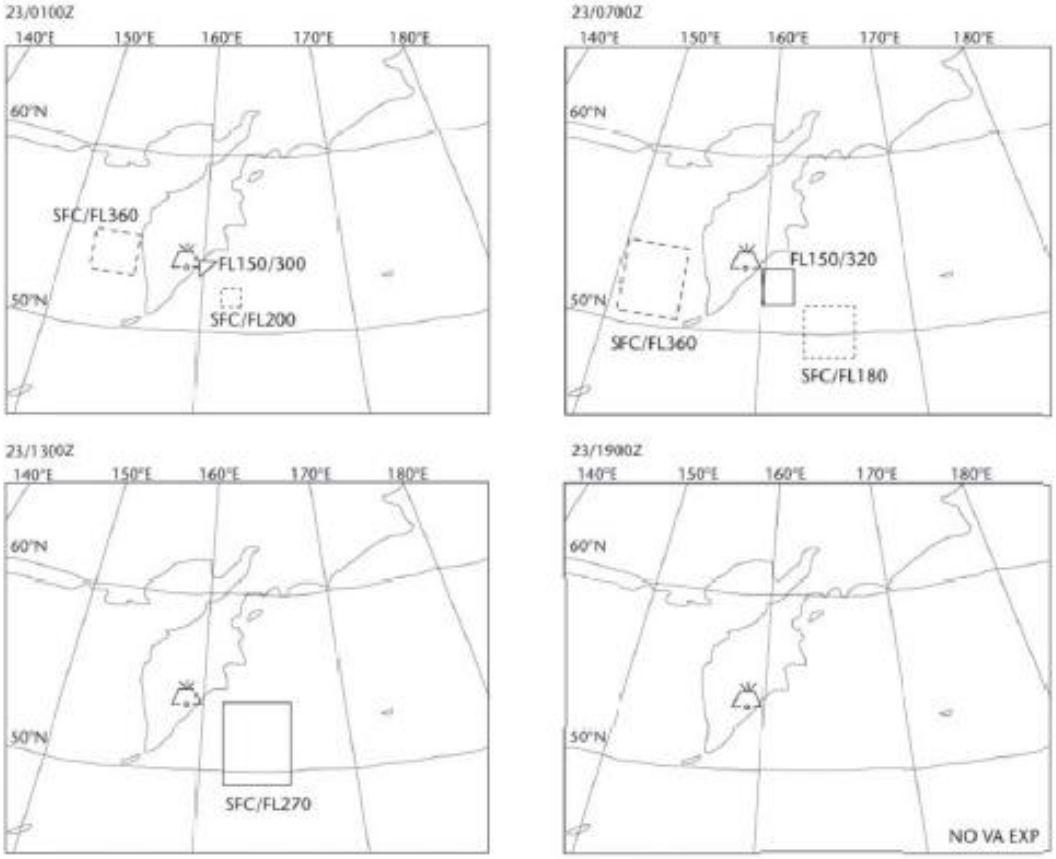
MODEL SWL



TROPICAL CYCLONE ADVISORY INFORMATION IN GRAPHICAL FORMAT MODEL TCG

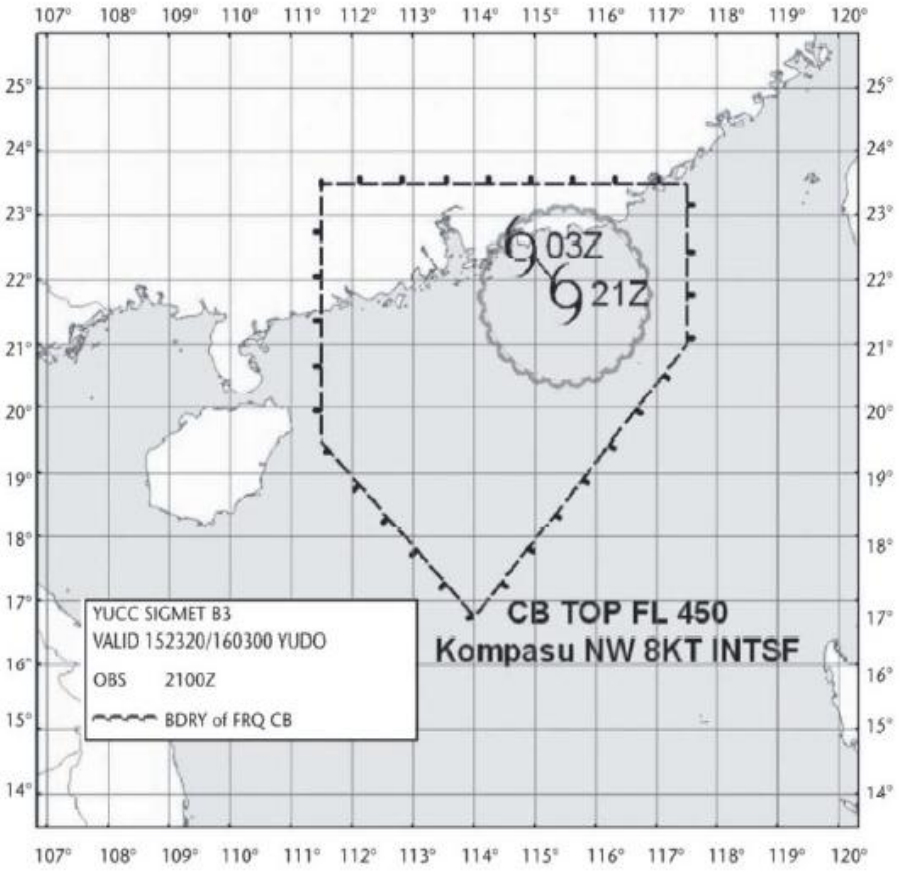


VOLCANIC ASH ADVISORY INFORMATION IN GRAPHICAL FORMAT **MODEL VAG**



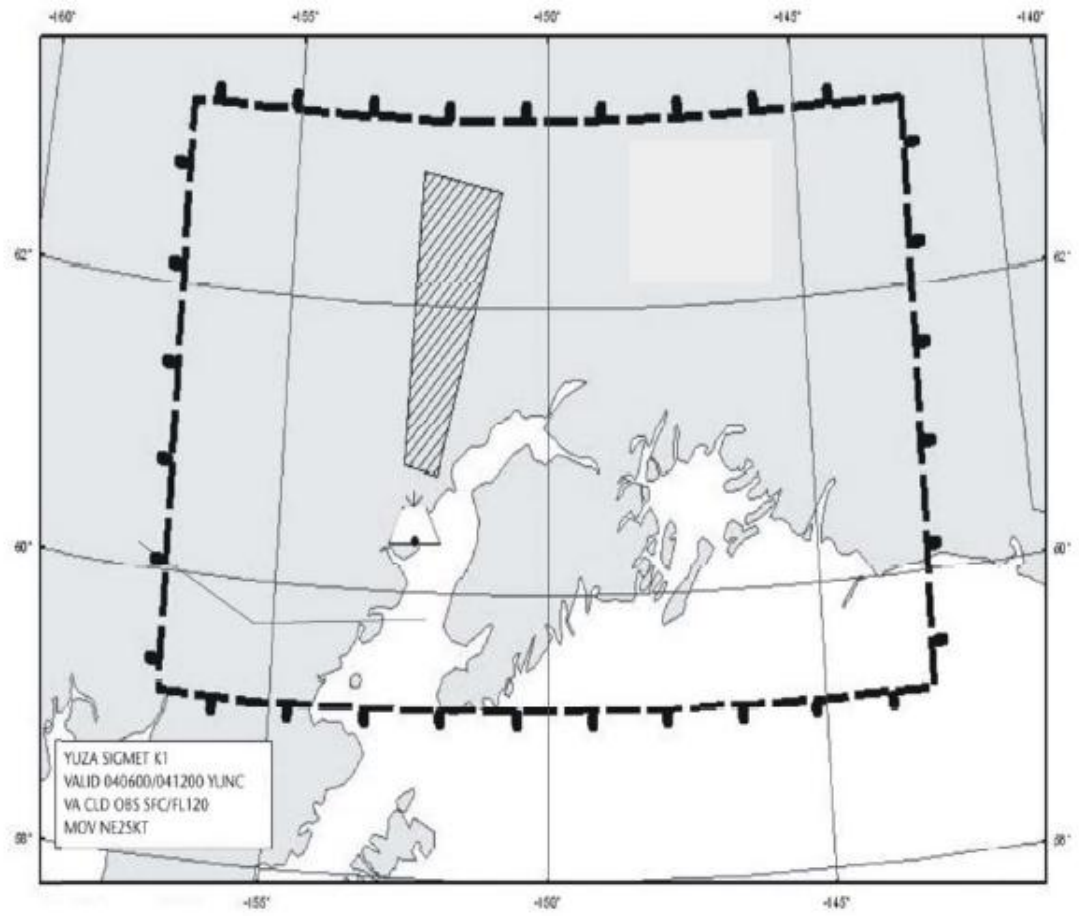
VOLCANIC ASH ADVISORY
DTG: 20080923/0130Z
VAAC: TOKYO
VOLCANO: KARYMSKY 1000-13
AREA: RUSSIAN FEDERATION
SUMMIT ELEV: 1536M
ADVISORY NR: 2008/4
INFO SOURCE: MTSAT-1R, KVERT KEMSD
AVIATION COLOUR CODE: RED
ERUPTION DETAILS: ERUPTED AT 20080923/0000Z FL300 REPORTED
RMK: LATEST REP FM KVERT (0120Z) INDICATES ERUPTION HAS CEASED
TWO DISPERSING VA CLD ARE EVIDENT ON SATELLITE IMAGERY
NXT ADVISORY: 20080923/0730Z

SIGMET FOR TROPICAL CYCLONE IN GRAPHICAL FORMAT MODEL STC



Note: Fictitious FIR.

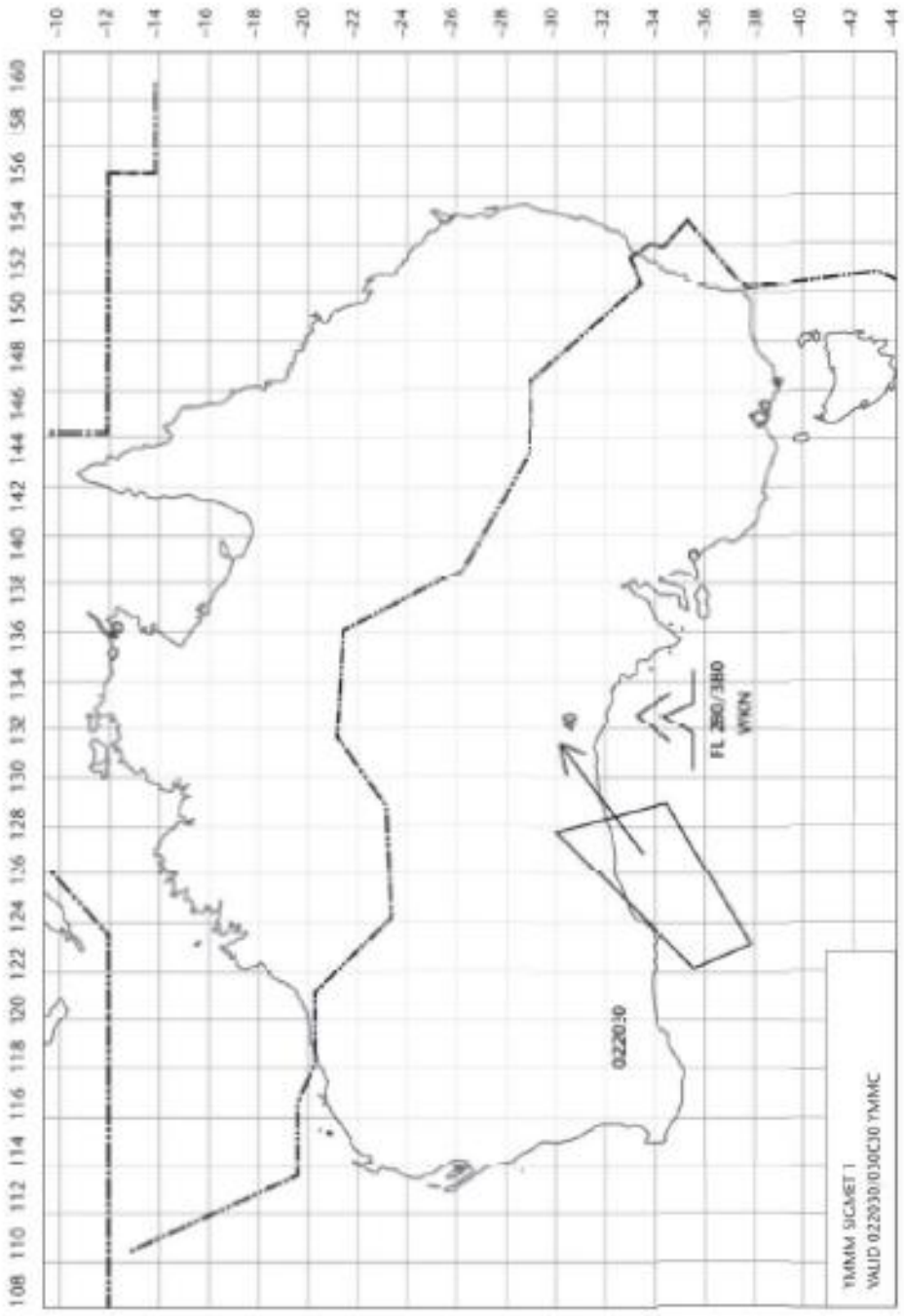
SIGMET FOR VOLCANIC ASH IN GRAPHICAL FORMAT MODEL SVA



Fictitious FIR.

SIGMET FOR PHENOMENA OTHER THAN TROPICAL CYCLONE AND VOLCANIC ASH IN GRAPHICAL FORMAT

MODEL SGE



SHEET OF NOTATIONS USED IN FLIGHT DOCUMENTATION **MODEL SN**

1. Symbols for significant weather

	Tropical cyclone	x	Drizzle
	Severe squall line*		Rain
	Moderate turbulence	*	Snow
	Severe turbulence		Shower(s) Hail
	Mountain waves		Widespread blowing snow
	Moderate aircraft icing		Severe sand or dust storm
	Severe aircraft icing		Widespread sandstorm or duststorm
	Widespread fog		Widespread haze
	Radioactive materials in the atmosphere**		Widespread mist
	Volcanic eruption***		Widespread smoke
	Mountain obscuration		Freezing precipitation****

* In-flight documentation for flights operating up to FL 100. This symbol refers to "squall line".

** The following information should be included in a separate text box on the chart: radioactive materials in the atmosphere symbol; latitude/longitude of release site; and (if known) the name of the site of the radioactive source. In addition, the legend of SIGWX charts on which a release of radiation is indicated should contain "CHECK SIGMET AND NOTAM FOR RDOACT CLD". The centre of the radioactive materials in the atmosphere symbol should be placed on significant weather charts at the latitude/longitude site of the radioactive source.

*** The following information should be included in a separate text box on the chart: volcanic eruption symbol; the name of the volcano (if known); and the latitude/longitude of the eruption.

In addition, the legend of SIGWX charts should indicate "CHECK SIGMET, ADVISORIES FOR TC AND VA, AND ASHTAM AND NOTAM FOR VA". The dot on the base of the volcanic eruption symbol should be placed on significant weather charts at the latitude/longitude site of the volcanic event.

**** This symbol does not refer to icing due to precipitation coming into contact with an aircraft which is at a very low temperature.

Note: Height indications between which phenomena are expected, top above base as per chart legend.

2. Fronts and convergence zones and other symbols used

	Cold front at the surface		Position, speed and level of maximum wind
	Warm front at the surface		Convergence line
	Occluded front at the surface		Freezing level
	Quasi-stationary front at the surface		Intertropical convergence zone
	Tropopause high		State of the sea
	Tropopause low		Sea-surface temperature
	Tropopause level		Widespread strong surface wind*

Wind arrows indicate the maximum wind in jet and the flight level at which it occurs. If the maximum wind speed is 60 m/s (120 kt) or more, the flight levels between which winds are greater than 40 m/s (80 kt) is placed below the maximum wind level. In the example, winds are greater than 40 m/s (80 kt) between FL 120 and FL 400.

The heavy line delineating the jet axis begins/ends at the points where a wind speed of 40 m/s (80 kt) is forecast.

‡ Symbol used whenever the height of the jet axis changes by +/- 2000 ft or the speed changes by +/- 20 kt.

* The symbol refers to widespread surface wind speeds exceeding 15 m/s (30 kt).

3. Abbreviations used to describe clouds

3.1 Type

CI	= Cirrus	AS	= Altostratus	ST	= Stratus
CC	= Cirrocumulus	NS	= Nimbostratus	CU	= Cumulus
CS	= Cirrostratus	SC	= Stratocumulus	CB	= Cumulonimbus
AC	= Altocumulus				

3.2 Amount

Clouds except CB

FEW	= few (1/8 to 2/8)	BKN	= broken (5/8 to 7/8)
SCT	= scattered (3/8 to 4/8)	OVC	= overcast (8/8)

CB only

ISOL	= individual CBs isolated)
OCNL	= well-separated CBs (occasional)
FRQ	= CBs with little or no separation (frequent)
EMBD	= CBs embedded in layers of other clouds or concealed by haze (embedded)

3.3 Heights

Heights are indicated on SWH and SWM charts in flight levels (FL), top over base. When XXX is used, tops or bases are outside the layer of the atmosphere to which the chart applies.

In SWL charts:

(a) Heights are indicated as altitudes above mean sea level;

(b) The abbreviation SFC is used to indicate ground level.

4. Depicting of lines and systems on specific charts

4.1 Models SWH and SWM – Significant weather charts (high and medium)

Scalloped line	= demarcation of areas of significant weather
Heavy broken line	= delineation of area of CAT
Heavy solid line interrupted by wind arrow and flight level	= position of jet stream axis with indication of wind direction, speed in kt or m/s and height in flight levels. The vertical extent of the jet stream is indicated (in flight levels), e.g. FL 270 accompanied by 240/290 indicates that the jet extends from FL 240 to FL 290.
Flight levels inside small rectangles	= height in flight levels of tropopause at spot locations, e.g. 340. Low and high points of the tropopause by symbols are indicated by the letters L or H, respectively, inside a pentagon with the height in flight levels. Display explicit FL for jet depths and tropopause heights even if outside forecast bounds.

4.2 Model SWL – Significant weather chart (low level)

X	= position of pressure centres given in hectopascals
L	= centre of low pressure
H	= centre of high pressure
Scalloped lines	= demarcation of area of significant weather
Dashed lines	= altitude of 0°C isotherm in feet (hectofeet) or metres. Note: 0°C level may also be indicated by FZLVL, i.e. 0°C level is at an altitude of 6000 ft.
Figures on arrows	= speed in kt or km/h of movement of frontal systems, depressions or anticyclones
Figure inside the state of the sea symbol	= total wave height in feet or metres
Figure inside the sea-surface temperature	= sea-surface temperature in °C
Figures inside the strong surface wind symbol	= wind in kt or m/s

4.3 Arrows, feathers and pennants

Arrows indicate direction. Number of pennants and/or feathers correspond to speed.

Example: 270°/115 kt (equivalent to 57.5 m/s)
Pennants correspond to 50 kt or 25 m/s
Feathers correspond to 10 kt or 5 m/s
Half-feathers correspond to 5 kt or 2.5 m/s

* A conversion factor of 1 to 2 is used.

APPENDIX 2. TECHNICAL SPECIFICATIONS RELATED TO WORLD AREA FORECAST SYSTEM AND METEOROLOGICAL OFFICES

(See Chapter 3 of this regulation)

1. WORLD AREA FORECAST SYSTEM

1.1. The Standard of ICAO in Appendix 2 Annex 3, the technical specifications related to world area forecast system required of the contracting states which have accepted responsibilities for providing a WAFC within the framework of the world area forecast system.

1.2. Cambodia is not a WAFC. However, the MET Service provider shall have to be familiar with the technical specifications so as to be able to interact with them and use its products/services effectively.

2. Aerodrome METEOROLOGICAL OFFICES

2.1 Use of WAFS products

2.1.1 Aerodrome meteorological offices shall use forecasts issued by the WAFCs in the preparation of flight documentation, 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.

2.1.2 In order to ensure uniformity and standardization of flight documentation, the WAFS GRIB and BUFR data and IWXXM data received, shall be decoded into standard WAFS charts in accordance with relevant provisions in this regulation and the meteorological content and identification of the originator of the WAFS forecasts shall not be amended.

2.2 Notification of WAFC concerning significant discrepancies

2.2.1 Aerodrome meteorological offices using WAFS BUFR or IWXXM data shall notify the WAFC concerned immediately if significant discrepancies are detected or reported in respect of WAFS SIGWX forecasts concerning:

(a) Icing, turbulence, cumulonimbus clouds that are obscured, frequent, embedded or occurring at a squall line, and sandstorms/dust storms; and

(b) volcanic eruptions or a release of radioactive materials into the atmosphere, of significance to aircraft operations.

2.2.2 The WAFC receiving the message shall acknowledge its receipt to the originator, together with a brief comment on the report and any action taken, using the same means of communication employed by the originator.
Note. — Guidance on reporting significant discrepancies is provided in the Manual of Aeronautical Meteorological Practice (Doc 8896).

3. VOLCANIC ASH ADVISORY CENTRES (VAAC)

3.1 Volcanic ash advisory information

3.1.1 This standard of ICAO in Appendix 2 of Annex 3 the technical specifications required of the contracting states which have accepted responsibilities for providing a VAAC within the framework of the world area forecast system.

3.1.2 Cambodia is not a VAAC; However, the Service Provider shall have to be familiar with the technical specifications of volcanic ash advisory information so as to be able to interact with VAACs and use its products/services effectively.

4. STATE VOLCANO OBSERVATORIES

4.1 Information from State volcano observatories

4.1.1 This standard of ICAO in Appendix 2 of Annex 3 the technical specification required of contracting states which maintain volcano observatories monitoring active volcanoes.

4.1.2 Cambodia does not maintain any volcano observatories. However, the MET Service Provider shall have to be familiar with the roles/functions of volcano observatories in the region so as to be able to interact with them and use its products/services affectively.

5. TROPICAL CYCLONE ADVISORY CENTRES (TCAC)

5.1 Tropical cyclone advisory information

5.1.1 This Standard of ICAO in Appendix 2 of Annex 3 the technical specifications of the products and services required of the contracting states which have accepted responsibilities for providing a TCAC within the framework of the world area forecast system.

5.1.2 Cambodia is not a TCAC. However, the MET Service Provider shall have to be familiar with the technical specifications of tropical cyclone advisory information so as to be able to interact with TCACs and use its products/services effectively.

Table A2-1. Template for advisory message for volcanic ash

Key: M = inclusion mandatory, part of every message;

O = inclusion optional;

C = inclusion conditional, included whenever applicable;

= = a double line indicates that the text following it should be placed on the subsequent line.

Note 1. — The ranges and resolutions for the numerical elements included in advisory messages for volcanic ash are shown in Appendix 6, Table A6-4.

Note 2. — The explanations for the abbreviations can be found in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes (PANS-ABC, Doc 8400).

Note 3. — Inclusion of a "colon" after each element heading is mandatory.

Note 4. — The numbers 1 to 19 are included only for clarity and they are not part of the advisory message, as shown in the example.

Element		Detailed Content	Template(S)	Example
1	Identification of the type of Message (M)	Type of message	VA ADVISORY	VA ADVISORY
2	Status indicator (c)	Indicator of test or exercise	Status TEST or EXER	STATUS: TEST STATUS: EXER
3	Time of Origin (M)	Year, month, day, time in UTC	DTG: nnnnnnnn/nnnnZ	DTG: 20080923/0130Z
4	Name of VAAC	Name of VAAC	VAAC: nnnnnnnnnnnn	VAAC: TOKYO

5	Name of volcano (M)	Name and IAVCEI2 number of volcanoes	VOLCANO: nnnnnnnnnnnnnnnnnnnn [nnnnnn] or UNKNOWN *or* UNNAMED	VOLCANO: KARYMSKY 1000-13 VOLCANO: UNNAMED
6	Location of volcano (M)	Location of volcano in degrees and minutes	PSN: Nnnnn *or* Snnnn Wnnnnn *or* Ennnnn *or* UNKNOWN	PSN: N5403 E15927 PSN: UNKNOWN
7	State *or* region (M)	State, *or* region if ash is not reported over a State	AREA: nnnnnnnnnnnnnnn	AREA: RUSSIA
8	Summit elevation (M)	Summit elevation in m (*or* ft)	SUMMIT ELEV: nnnnM (*or* nnnnnFT)	SUMMIT ELEV: 1536M
9	Advisory number (M)	Advisory number: year in full and message number (separate sequence for each volcano)	ADVISORY NR: nnnn/nnnn	ADVISORY NR: 2008/4
10	Information source (M)	Information source using free text	INFO SOURCE: Free text up to 32 characters	INFO SOURCE: MTSAT-1R KVERT KEMSD
11	Colour code (O)	Aviation colour code	AVIATION COLOUR RED *or* ORANGE *or* YELLOW *or* CODE: GREEN *or* UNKNOWN *or* NOT GIVEN *or* NIL	AVIATION RED COLOUR CODE:
12	Eruption details (M)	Eruption details (including date/time of eruption(s))	ERUPTION DETAILS: Free text up to 64 characters or UNKNOWN	ERUPTION ERUPTION AT DETAILS: 20080923/0000Z FL300 REPORTED
Element		Detailed Content	Template(S)	Example
13	Time of observation (or estimation) of ash (M)	Day and time (in UTC) of observation (or estimation) of volcanic ash	OBS (or EST) VA DTG: nn/nnnnZ	OBS VA DTG: 23/0100Z
14	Observed *or* estimated ash cloud (M)	Horizontal (in degrees and minutes) and vertical	OBS VA CLD *or* TOP FLnnn *or* SFC/FLnnn *or* EST VA CLD: FLnnn/nnn	OBS VA CLD: FL250/300 N5400 E15930 – N5400

		extent at the time of observation of the observed *or* estimated ash cloud *or*, if the base is unknown, the top of the observed *or* estimated ash cloud; Movement of the observed *or* estimated ash cloud	[nnKM WID LINE2 BTN (nnNM WID LINE BTN)] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn][– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]]3 or MOV N nnKMH (*or* KT) *or* MOV NE nnKMH (*or* KT) *or* MOV E nnKMH (*or* KT) *or* MOV SE nnKMH (*or* KT) *or* MOV S nnKMH (*or* KT) *or* MOV SW nnKMH (*or* KT) *or* MOV W nnKMH (*or* KT) *or* MOV NW nnKMH (*or* KT)4 *or* VA NOT IDENTIFIABLE FM SATELLITE DATA WIND FLnnn/nnn nnn/nn[n]MPS (*or* KT)4 *or* WIND FLnnn/nnn VRBnnMPS (*or* KT) *or* WIND SFC/FLnnn nnn/nn[n]MPS (*or* KT) *or* WIND SFC/FLnnn VRBnnMPS (*or* KT)	E16100 – N5300 E15945 MOV SE 20KT SFC/FL200 N5130 E16130 – N5130 E16230 – N5230 E16230 – N5230 E16130 MOV SE 15KT TOP FL240 MOV W 40KMH VA NOT IDENTIFIABLE FM SATELLITE DATA WIND FL050/070 180/12MPS
15	Forecast height and position of the ash clouds (+6 HR) (M)	Day and time (in UTC) (6 hours from the "Time of observation (or estimation) of ash" given in Item 12); Forecast height and position (in degrees and minutes) for each cloud mass for that fixed valid time	FCST VA CLD nn/nnnnZ +6 HR: SFC *or* FLnnn/[FL]nnn [nnKM WID LINE2 BTN (nnNM WID LINE BTN)] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn][– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]]3 or NO VA EXP or NOT AVBL or NOT PROVIDED	FCST VA CLD 23/0700Z +6 HR: FL250/350 N5130 E16030 – N5130 E16230 – N5330 E16230 – N5330 E16030 SFC/FL180 N4830 E16330 – N4830 E16630 – N5130 E16630 – N5130 E16330 NO VA EXP NOT AVBL NOT PROVIDED
Element		Detailed Content	Template(S)	Example

16	Forecast height and position of the ash clouds (+12 HR) (M)	Day and time (in UTC) (12 hours from the "Time of observation (or estimation) of ash" given in Item 12); Forecast height and position (in degrees and minutes) for each cloud mass for that fixed valid time	FCST VA CLD nn/nnnnZ +12 HR: SFC *or* FLnnn/[FL]nnn [nnKM WID LINE3 BTN (nnNM WID LINE BTN)] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn][– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]]4 or NO VA EXP or NOT AVBL or NOT PROVIDED	FCST VA CLD 23/1300Z +12 HR: SFC/FL270 N4830 E16130 – N4830 E16600 – N5300 E16600 – N5300 E16130 NO VA EXP NOT AVBL NOT PROVIDED
17	Forecast height and position of the ash clouds (+18 HR) (M)	Day and time (in UTC) (18 hours from the "Time of observation (or estimation) of ash" given in Item 12); Forecast height and position (in degrees and minutes) for each cloud mass for that fixed valid time	FCST VA CLD nn/nnnnZ +18 HR: SFC *or* FLnnn/[FL]nnn [nnKM WID LINE3 BTN (nnNM WID LINE BTN)] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn][– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]]5 or NO VA EXP or NOT AVBL or NOT PROVIDED	FCST VA CLD 23/1900Z +18 HR: NO VA EXP NOT AVBL NOT PROVIDED
18	Remarks (M)	Remarks, as necessary	RMK: Free text up to 256 characters or NIL	RMK: LATEST REP FM KVERT (0120Z)

				INDICATES ERUPTION HAS CEASED. TWO DISPERSING VA CLD ARE EVIDENT ON SATELLITE IMAGERY NIL
19	Next advisory (M)	Year, month, day and time in UTC	NXT ADVISORY: nnnnnnnn/nnnnZ or NO LATER THAN nnnnnnnn/nnnnZ *or* NO FURTHER ADVISORIES or WILL BE ISSUED BY nnnnnnnn/nnnnZ	NXT 20080923/0730Z ADVISORY: NO LATER THAN nnnnnnnn/nnnnZ NO FURTHER ADVISORIES WILL BE ISSUED BY nnnnnnnn/nnnn

Notes. —

1. *Used only when the message issued to indicate that a test or an exercise is taking place. When the word "TEST" or the abbreviation "EXER" is included, the message may contain information that should not be used operationally or will otherwise end immediately after the word "TEST".*
2. *International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI).*
3. *A straight line between two points drawn on a map in the Mercator projection or a straight line between two points which crosses lines of longitude at a constant angle.*
4. *Up to 4 selected layers.*
5. *If ash reported (e.g. AIREP) but not identifiable from satellite data.*

Example A2-1. Advisory message for volcanic ash

FVFE01 RJTD 230130
VA ADVISORY
DTG: 20080923/0130Z
VAAC: TOKYO
VOLCANO: KARYMSKY 1000-13
PSN: N5403 E15927
AREA: RUSSIA
SUMMIT ELEV: 1536M
ADVISORY NR: 2008/4
INFO SOURCE: MTSAT-1R KVERT KEMSD
AVIATION COLOUR CODE: RED
ERUPTION DETAILS: ERUPTION AT 20080923/0000Z FL300 REPORTED
OBS VA DTG: 23/0100Z
OBS VA CLD: FL250/300 N5400 E15930 – N5400 E16100 – N5300 E15945 MOV
SE 20KT SFC/FL200 N5130 E16130 – N5130 E16230 – N5230 E16230 – N5230 E16130
MOV SE 15KT
FCST VA CLD +6 HR: 23/0700Z FL250/350 N5130 E16030 – N5130 E16230 –
N5330 E16230 – N5330 E16030 SFC/FL180 N4830 E16330 – N4830 E16630 – N5130
E16630 – N5130 E16330
FCST VA CLD +12 HR: 23/1300Z SFC/FL270 N4830 E16130 – N4830 E16600 –
N5300 E16600 – N5300 E16130
FCST VA CLD +18 HR: 23/1900Z NO VA EXP

RMK: LATEST REP FM KVERT (0120Z) INDICATES ERUPTION HAS CEASED. TWO
DISPERSING VA CLD ARE EVIDENT ON SATELLITE IMAGERY
NXT ADVISORY: 20080923/0730Z

Table A2-2. Template for advisory message for tropical cyclones

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, included whenever applicable;
= = a double line indicates that the text following it should be placed on the subsequent line.

Note 1. — The ranges and resolutions for the numerical elements included in advisory messages for tropical cyclones are shown in Appendix 6, Table A6-4.

Note 2. — The explanations for the abbreviations can be found in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes (PANS-ABC, Doc 8400).

Note 3. — Inclusion of a "colon" after each element heading is mandatory.

Note 4. — The numbers 1 to 21 are included only for clarity and they are not part of the advisory message, as shown in the example.

Element		Detailed Content	Template(S)	Example
1	Identification of the type of Message (M)	Type of message	TC ADVISORY	TC ADVISORY
2	Status indicator ©	Indicator of test or exercise	Status TEST or EXER	STATUS: TEST STATUS: EXER

3	Time of origin (M)	Year, month, day and time in UTC of issue	DTG: nnnnnnnn/nnnnZ	DTG: 20040925/1900Z
4	Name of TCAC(M)	Name of TCAC (location indicator *or* full name)	TCAC: nnnn *or* nnnnnnnnnn	TCAC: YUFO2 TCAC: MIAMI
5	Name of tropical cyclone(M)	Name of tropical cyclone *or* "NN" for unnamed tropical cyclone	TC: nnnnnnnnnnnn *or* NN	TC: GLORIA
6	Advisory number(M)	Advisory number: Year in full and message number (separate sequence for each cyclone)	ADVISORY NR: nnnn/[n][n]nn	ADVISORY NR: 2004/13
7	Observed position of the centre (M)	Day and time (in UTC) and position of the centre of the tropical cyclone (in degrees and minutes)	OBS PSN: nn/nnnnZ Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	OBS PSN: 25/1800Z N2706 W07306
8	Observed CB cloud3 (C)	Location of CB cloud (Referring to latitude and longitude (in degrees and minutes) and vertical extent (flight levels)	CB: WI nnnKM9or nnnNM) of TC CENTRE Or WI4 Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – TOP [ABV or BLW] FLnnn	CB: WI 250NM of TC CENTRE TOP FL500
Element		Detailed Content	Template(S)	Example
9	Direction and speed of movement(M)	Direction and speed of movement given in sixteen compass points and km/h	MOV: N nnKMH (*or* KT) *or* NNE nnKMH (*or* KT) *or* NE nnKMH (*or* KT) *or* ENE nnKMH (*or* KT) *or* E nnKMH (*or* KT) *or* ESE	MOV: NW 20KMH

		(*or* kt), respectively, *or* stationary (< 2 km/h (1 kt))	nnKMH (*or* KT) *or* SE nnKMH (*or* KT) *or* SSE nnKMH (*or* KT) *or* S nnKMH (*or* KT) *or* SSW nnKMH (*or* KT) *or* SW nnKMH (*or* KT) *or* WSW nnKMH (*or* KT) *or* W nnKMH (*or* KT) *or* WNW nnKMH (*or* KT) *or* NW nnKMH (*or* KT) *or* NNW nnKMH (*or* KT) *or* SLW *or* STNR	
10	Central pressure(M)	Central pressure(M) Central pressure (in hPa	C: nnnHPA	C: 965HPA
11	Maximum surface wind(M) (M)	Maximum surface wind near the centre (mean over 10 minutes, in m/s (*or* kt))	MAX WIND:nn[n]MPS (*or* nn[n]KT)	MAX WIND:22MPS
12	Forecast of centre position (+6 HR) (M)	Day and time (in UTC) (6 hours from the "DTG" given in Item 2); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +6 HR: nn/nnnnZ Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	FCST PSN +6 HR: 25/2200Z N2748 W07350
13	Forecast of maximum surface wind (+6 HR) (M)	Forecast of maximum surface wind (6 hours' after the "DTG" given in Item 2)	FCST MAX nn[n]MPS WIND +6 HR: (*or* nn[n]KT)	FCST MAX 22MPS WIND +6 HR:
14	Forecast of centre position (+12 HR) (M)	Day and time (in UTC) (12 hours from the "DTG" given in Item 2); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +12 HR: nn/nnnnZ Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	FCST PSN +12 HR: 26/0400Z N2830 W07430

15	Forecast of maximum surface wind (+12 HR) (M)	Forecast of maximum surface wind (12 hours after the "DTG" given in Item 2)	FCST MAX WIND nn[n]MPS +12 HR: (*or* nn[n]KT)	FCST MAX WIND 22MPS +12 HR:
16	Forecast of centre position (+18 HR) (M)	Day and time (in UTC) (18 hours from the "DTG" given in Item 2); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +18 HR: nn/nnnnZ Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn	FCST PSN +18 HR: 26/1000Z N2852 W07500
17	Forecast of maximum surface wind (+18 HR) (M)	Forecast of maximum surface wind (18 hours after the "DTG" given in Item 2)	FCST MAX WIND nn[n]MPS +18 HR: (*or* nn[n]KT)	FCST MAX WIND 21MPS +18 HR:
18	Forecast of centre position (+24 HR) (M)	Day and time (in UTC) (24 hours from the "DTG" given in Item 2); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +24 HR: nn/nnnnZ Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	FCST PSN +24 HR: 26/1600Z N2912 W07530
19	Forecast of maximum surface wind (+24 HR) (M)	Forecast of maximum surface wind (24 hours after the "DTG" given in Item 2)	FCST MAX WIND nn[n]MPS +24 HR: (*or* nn[n]KT)	FCST MAX WIND 20MPS +24 HR:
20	Remarks (M)	Remarks, as necessary	RMK: Free text up to 256 characters or NIL	RMK: NIL
21	Expected time of issuance of next advisory (M)	Expected year, month, day and time (in UTC) of issuance of next advisory	NXT MSG: [BFR] nnnnnnnn/nnnnZ or NO MSG EXP	NXT MSG: 20040925/2000Z

Note. —

1. *Used only when the message issued to indicate that a test or an exercise is taking place. When the word "TEST" or the abbreviation "EXER" is included, the message may contain information that should not be used operationally or will otherwise end immediately after the word "TEST".*
2. *Fictitious location.*
3. *IN the case of CB clouds associated with a tropical cyclone covering more than one area within the area of responsibility, this element can be repeated, as necessary.*
4. *The number of coordinates should be kept to a minimum and should not normally exceed seven.*

Example A2-2. Advisory message for tropical cyclones

TC ADVISORY
DTG: 20040925/1900Z
TCAC: YUFO
TC: GLORIA
ADVISROY NR: 2004/13
OBS PSN: 25/1800Z N2706 W07306
CB: WI 250NM of TC CENTRE
C: 965HPA
MAX WIND: 22MPS
FCST PSN +6 HR: 25/2200Z N2748 W07350
FCST MAX WIND +6 HR: 22MPS
FCST PSN +12 HR: 26/0400Z N2830 W07430
FCST MAX WIND +12 HR: 22MPS
FCST PSN +18 HR: 26/1000Z N2852 W07500
FCST MAX WIND +18 HR: 21MPS
FCST PSN +24 HR: 26/1600Z N2912 W07530
FCST MAX WIND +24 HR: 20MPS
RMK: NIL
NXT MSG: 20040925/2000Z

APPENDIX 3. RELATED TO METEOROLOGICAL OBSERVATIONS AND REPORTS

(See Chapter 4 of this regulation)

1. GENERAL PROVISIONS RELATED TO METEOROLOGICAL OBSERVATIONS

1.1 The meteorological instruments used at an aerodrome shall be situated in such a way as to supply data which are representative of the area for which the measurements are required.

Note. — Specifications concerning the siting of equipment and installations on operational areas, aimed at reducing the hazard to aircraft to a minimum, are contained in Annex 14, Volume I, Chapter 9.

1.2 meteorological instruments at aeronautical meteorological stations shall be exposed, operated and maintained in accordance with the practices, procedures and specifications promulgated by the World Meteorological Organization.

1.3 the observers at an aerodrome shall be located, in so far as is practicable, so as to supply data which are representative of the area for which the observations are required.

1.4 where automated equipment forms part of an integrated semi-automatic observing system, displays of data which are made available to the local air traffic services units shall be a subset of and displayed parallel to those available in the local meteorological service unit. In those displays, each meteorological element should be annotated to identify, as appropriate, the locations for which the element is representative.

2. GENERAL CRITERIA RELATED TO METEOROLOGICAL REPORTS

2.1 Format of meteorological reports

2.1.1 Local routine and special reports shall be issued in abbreviated plain language, in accordance with the template shown in Table A3-1.

2.1.2 METAR and SPECI shall be issued in accordance with the template shown in Table A3-2 and disseminated in the METAR and SPECI code forms prescribed by the World Meteorological Organization (WMO).

Note. — The METAR and SPECI code forms are contained in WMO Publication No. 306, Manual on Codes, Volume I.1, Part A — Alphanumeric Codes.

2.1.3 METAR and SPECI shall be disseminated in digital form, in addition to the dissemination of the METAR and SPECI in accordance with 2.1.2.

2.1.4 METAR and SPECI if disseminated in digital form shall be formatted in accordance with a globally interoperable information exchange model and shall use extensible markup language (XML)/geography markup language (GML).

2.1.5 METAR and SPECI if disseminated in digital form shall be accompanied by the appropriate metadata.

Note. — Guidance on the information exchange model, XML/GML and the metadata profile is provided in the Manual on the Digital Exchange of Aeronautical Meteorological Information (Doc 10003).

2.2 Use of CAVOK

When the following conditions occur simultaneously at the time of observation:

(a) visibility, 10 km or more, and the lowest visibility is not reported;

Note 1. — In local routine and special reports, visibility refers to the value(s) to be reported in accordance with 4.2.4.2 and 4.2.4.3; in METAR and SPECI, visibility refers to the value(s) to be reported in accordance with 4.2.4.4.

Note 2. — The lowest visibility is reported in accordance with 4.2.4.4 a).

(b) no cloud of operational significance;

(c) no weather of significance to aviation as given in 4.4.2.3, 4.4.2.5 and 4.4.2.6; information on visibility, runway visual range, present weather and cloud amount, cloud type and height of cloud base shall be replaced in all meteorological reports by the term "CAVOK".

2.3 Criteria for issuance of local special reports and SPECI

2.3.1 The list of criteria for the issuance of local special reports shall include the following:

(a) those values which most closely correspond with the operating minima of the operators using the aerodrome;

(b) those values which satisfy other local requirements of the air traffic services units and of the operators;

(c) an increase in air temperature of 2°C or more from that given in the latest report, or an alternative threshold value as agreed between the meteorological authority, the appropriate ATS authority and the operators concerned;

(d) the available supplementary information concerning the occurrence of significant meteorological conditions in the approach and climb-out areas as given in Table A3-1;

(e) When noise abatement procedures are applied in accordance with the PANS-ATM (Doc 4444) and the variation from the mean surface wind speed (gusts) has changed by 2.5 m/s (5 kt) or more from that at the time of the latest report, the mean speed before and/or after the change being 7.5 m/s (15 kt) or more; and

(f) those values which constitute criteria for SPECI.

2.3.2 Where required in accordance with Chapter 4, 4.4.2 b), SPECI shall be issued whenever changes in accordance with the following criteria occur:

(a) when the mean surface wind direction has changed by 60° or more from that given in the latest report, the mean speed before and/or after the change being 5 m/s (10 kt) or more;

(b) when the mean surface wind speed has changed by 5 m/s (10 kt) or more from that given in the latest report;

(c) when the variation from the mean surface wind speed (gusts) has changed by 5 m/s (10 kt) or more from that at the time of the latest report, the mean speed before and/or after the change being 7.5 m/s (15 kt) or more;

(d) when the onset, cessation or change in intensity of any of the following weather phenomena occurs:

— freezing precipitation

— moderate or heavy precipitation (including showers thereof)

— thunderstorm (with precipitation);

(e) when the onset or cessation of any of the following weather phenomena occurs:
— freezing fog
— thunderstorm (without precipitation);

(f) when the amount of a cloud layer below 450 m (1 500 ft) changes:
1) from SCT or less to BKN or OVC; or

2) from BKN or OVC to SCT or less.

2.3.3 Where required in accordance with Chapter 4, 4.4.2 b), SPECI shall be issued whenever changes in accordance with the following criteria occur:

(a) when the wind changes through values of operational significance. The threshold values should be established by the meteorological authority in consultation with the appropriate ATS authority and operators concerned, taking into account changes in the wind which would:
1) require a change in runway(s) in use; and
2) indicate that the runway tailwind and crosswind components have changed through values representing the main operating limits for typical aircraft operating at the aerodrome;

(b) when the visibility is improving and changes to or passes through one or more of the following values, or when the visibility is deteriorating and passes through one or more of the following values:
1) 800, 1 500 or 3 000 m; and
2) 5 000 m, in cases where significant numbers of flights are operated in accordance with the visual flight rules; Note 1. — In local special reports, visibility refers to the value(s) to be reported in accordance with 4.2.4.2 and 4.2.4.3; in SPECI, visibility refers to the value(s) to be reported in accordance with 4.2.4.4.

Note 2. — Visibility refers to "prevailing visibility" except in the case where only the lowest visibility is reported in accordance with 4.2.4.4 b).

(c) when the runway visual range is improving and changes to or passes through one or more of the following values, or when the runway visual range is deteriorating and passes through one or more of the following values: 50, 175, 300, 550 or 800 m;

(d) when the onset, cessation or change in intensity of any of the following weather phenomena occurs:
— *duststorm*
— sandstorm
— funnel cloud (tornado or waterspout);

(e) when the onset or cessation of any of the following weather phenomena occurs:
— low drifting dust, sand or snow
— blowing dust, sand or snow
— squall;

(f) when the height of base of the lowest cloud layer of BKN or OVC extent is lifting and changes to or passes through one or more of the following values, or when the height of base of the lowest cloud layer of BKN or OVC extent is lowering and passes through one or more of the following values:
1) 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); and
2) 450 m (1 500 ft), in cases where significant numbers of flights are operated in accordance with the visual flight rules;

(g) when the sky is obscured and the vertical visibility is improving and changes to or passes through one or more of the following values, or when

the vertical visibility is deteriorating and passes through one or more of the following values: 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); and

(h) any other criteria based on local aerodrome operating minima, as agreed between the meteorological authority and the operators concerned.

Note. — Other criteria based on local aerodrome operating minima are to be considered in parallel with similar criteria for the inclusion of change groups and for the amendment of TAF developed in response to Appendix 5,1.3.2 j).

2.3.4 When a deterioration of one weather element is accompanied by an improvement in another element, a single SPECI shall be issued; it shall then be treated as a deterioration report.

3. DISSEMINATION OF METEOROLOGICAL REPORTS

3.1 METAR and SPECI

3.1.1 METAR and SPECI shall be disseminated to international OPMET databanks and the centres designated by Asia and Pacific Regional (APAC) air navigation agreement for the operation of aeronautical fixed service internet-based services systems, in accordance with Asia and Pacific Regional (APAC) air navigation agreement.

3.1.2 METAR and SPECI shall be disseminated to other aerodromes in accordance with Asia and Pacific Regional (APAC) air navigation agreement.

3.1.3 SPECI representing a deterioration in conditions shall be disseminated immediately after the observation. A SPECI representing a deterioration of one weather element and an improvement in another element shall be disseminated immediately after the observation.

3.1.4 A SPECI representing an improvement in conditions shall be disseminated only after the improvement has been maintained for 10 minutes; it shall be amended before dissemination, if necessary, to indicate the conditions prevailing at the end of that 10-minute period.

3.2 Local routine and special reports

3.2.1 Local routine reports shall be transmitted to local air traffic services units and shall be made available to the operators and to other users at the aerodrome.

3.2.2 Local special reports shall be transmitted to local air traffic services units as soon as the specified conditions occur. However, as agreed between the meteorological authority and the appropriate ATS authority concerned, they need not be issued in respect of:

(a) any element for which there is in the local air traffic services unit a display corresponding to the one in the meteorological station, and where arrangements are in force for the use of this display to update information included in local routine and special reports; and

(b) runway visual range, when all changes of one or more steps on the reporting scale in use are being reported to the local air traffic services unit by an observer on the aerodrome.

3.2.3 Local special reports shall also be made available to the operators and to other users at the aerodrome.

4. OBSERVING AND REPORTING OF METEOROLOGICAL ELEMENTS

Introductory Note. — Selected criteria applicable to meteorological information referred to under 4.1 to 4.8 for inclusion in aerodrome reports are given in tabular form at Attachment C.

4.1 Surface wind

4.1.1. Siting

4.1.1.1 Surface wind shall be observed at a height of 10 ± 1 m (30 ± 3 ft) above the ground.

4.1.1.2 Representative surface wind observations shall be obtained by the use of sensors appropriately sited. Sensors for surface wind observations for local routine and special reports should be sited to give the best practicable indication of conditions along the runway and touchdown zones. At aerodromes where topography or prevalent weather conditions cause significant differences in surface wind at various sections of the runway, additional sensors should be provided.

Note. — Since, in practice, the surface wind cannot be measured directly on the runway, surface wind observations for take-off and landing are expected to be the best practicable indication of the winds which an aircraft will encounter during take-off and landing.

4.1.2 Displays

4.1.2.1 Surface wind displays relating to each sensor shall be located in the meteorological station with corresponding displays in the appropriate air traffic services units. The displays in the meteorological station and in the air traffic services units shall relate to the same sensors, and where separate sensors are required as specified in 4.1.1.2, the displays shall be clearly marked to identify the runway and section of runway monitored by each sensor.

4.1.2.2 The mean values of, and significant variations in, the surface wind direction and speed for each sensor shall be derived and displayed by automated equipment.

4.1.3 Averaging

4.1.3.1 The averaging period for surface wind observations shall be:

a) 2 minutes for local routine and special reports and for wind displays in air traffic services units; and

b) 10 minutes for METAR and SPECI, except that when the 10-minute period includes a marked discontinuity in the wind direction and/or speed, only data occurring after the discontinuity shall be used for obtaining mean values; hence, the time interval in these circumstances shall be correspondingly reduced.

Note. — A marked discontinuity occurs when there is an abrupt and sustained change in wind direction of 30° or more, with a wind speed of 5 m/s (10 kt) before or after the change, or a change in wind speed of 5 m/s (10 kt) or more, lasting at least 2 minutes.

4.1.3.2 The averaging period for measuring variations from the mean wind speed (gusts) reported in accordance with 4.1.5.2 c) s be 3 seconds for local routine reports, local special reports, METAR, SPECI and for wind displays used for depicting variations from the mean wind speed (gusts) in air traffic services units.

4.1.4 Accuracy of measurement

4.1.4.1 The reported direction and speed of the mean surface wind, as well as variations from the mean surface wind, should meet the operationally desirable accuracy of measurement as given in Attachment A.

4.1.5 Reporting

4.1.5.1 In local routine and special reports and in METAR and SPECI, the surface wind direction and speed shall be reported in steps of 10 degrees true and 1 metre per second (or 1 knot), respectively. Any observed value that does not fit the reporting scale in use shall be rounded to the nearest step in the scale.

4.1.5.2 In local routine and special reports and in METAR and SPECI:

(a) the units of measurement used for the wind speed shall be indicated;

(b) variations from the mean wind direction during the past 10 minutes shall be reported as follows, if the total variation is 60° or more:

1) when the total variation is 60° or more and less than 180□ and the wind speed is 1.5 m/s (3 kt) or more, such directional variations shall be reported as the two extreme directions between which the surface wind has varied;

2) when the total variation is 60□ or more and less than 180□ and the wind speed is less than 1.5 m/s (3 kt), the wind direction shall be reported as variable with no mean wind direction; or

3) when the total variation is 180° or more, the wind direction shall be reported as variable with no mean wind direction;

(c) variations from the mean wind speed (gusts) during the past 10 minutes shall be reported when the maximum wind speed exceeds the mean speed by:

1) from 13 November 2014, 2.5 m/s (5 kt) or more in local routine and special reports when noise abatement procedures are applied in accordance with paragraph 7.2.7 of the PANS-ATM (Doc 4444); or

2) 5 m/s (10 kt) or more otherwise;

(d) when a wind speed of less than 0.5 m/s (1 kt) is reported, it shall be indicated as calm;

(e) when a wind speed of 50 m/s (100 kt) or more is reported, it shall be indicated to be more than 49 m/s (99 kt); and

(f) when the 10-minute period includes a marked discontinuity in the wind direction and/or speed, only variations from the mean wind direction and mean wind speed occurring since the discontinuity shall be reported.

Note. — See note under 4.1.3.1.

4.1.5.3 In local routine and special reports:

(a) if the surface wind is observed from more than one location along the runway, the locations for which these values are representative shall be indicated;

(b) when there is more than one runway in use and the surface wind related to these runways is observed, the available wind values for each runway shall be given, and the runways to which the values refer shall be reported;

(c) when variations from the mean wind direction are reported in accordance with 4.1.5.2 b) 2), the two extreme directions between which the surface wind has varied shall be reported; and

(d) when variations from the mean wind speed (gusts) are reported in accordance with 4.1.5.2 c), they shall be reported as the maximum and minimum values of the wind speed attained.

4.1.5.4 In METAR and SPECI, when variations from the mean wind speed (gusts) are reported in accordance with 4.1.5.2 c), the maximum value of the wind speed attained shall be reported.

4.2 Visibility

4.2.1 Siting

4.2.1.1 When instrumented systems are used for the measurement of visibility, the visibility shall be measured at a height of approximately 2.5 m (7.5 ft) above the runway.

4.2.1.2 When instrumented systems are used for the measurement of visibility, representative visibility observations shall be obtained by the use of sensors appropriately sited. Sensors for visibility observations for local routine and special reports should be sited to give the best practicable indications of visibility along the runway and touchdown zone.

4.2.2 Displays

4.2.2.1 When instrumented systems are used for the measurement of visibility, visibility displays relating to each sensor shall be located in the meteorological station with corresponding displays in the appropriate air traffic services units. The displays in the meteorological station and in the air traffic services units should relate to the same sensors, and where separate sensors are required as specified in 4.2.1, the displays should be clearly marked to identify the area, runway and section of runway, monitored by each sensor.

4.2.3 Averaging

4.2.3.1 When instrumented systems are used for the measurement of visibility, their output shall be updated at least every 60 seconds to permit provision of current representative values. The averaging period should be:

(a) 1 minute for local routine and special reports and for visibility displays in air traffic services units; and

(b) 10 minutes for METAR and SPECI, except that when the 10-minute period immediately preceding the observation includes a marked discontinuity in the visibility, only those values occurring after the discontinuity should be used for obtaining mean values.

Note. — A marked discontinuity occurs when there is an abrupt and sustained change in visibility, lasting at least 2 minutes, which reaches or passes through criteria for the issuance of SPECI reports given in 2.3.

4.2.4 Reporting

4.2.4.1 In local routine and special reports and in METAR and SPECI, the visibility shall be reported in steps of 50 m when the visibility is less than 800 m; in steps of 100 m, when it is 800 m or more but less than 5 km; in kilometre steps, when the visibility is 5 km or more but less than 10 km; and it shall be given as 10 km when the visibility is 10 km or more, except when the conditions for the use of CAVOK apply. Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.

Note. — Specifications concerning the use of CAVOK are given in 2.2.

4.2.4.2 In local routine and special reports, visibility along the runway(s) shall be reported together with the units of measurement used to indicate visibility.

4.2.4.3 In local routine and special reports, when instrumented systems are used for the measurement of visibility:

(a) if the visibility is observed from more than one location along the runway as specified in Chapter 4, 4.6.2.2, the values representative of the touchdown zone shall be reported first, followed, as necessary, by the values representative of the mid-point and stop-end of the runway, and the locations for which these values are representative should be indicated; and

(b) when there is more than one runway in use and the visibility is observed related to these runways, the available visibility values for each runway should be reported, and the runways to which the values refer should be indicated.

4.2.4.4 In METAR and SPECI, visibility should be reported as prevailing visibility, as defined in Chapter 1. When the visibility is not the same in different directions and

(a) when the lowest visibility is different from the prevailing visibility, and 1) less than 1 500 m or 2) less than 50 per cent of the prevailing visibility and less than 5 000 m; the lowest visibility observed shall also be reported and, when possible, its general direction in relation to the aerodrome reference point indicated by reference to one of the eight points of the compass. If the lowest visibility is observed in more than one direction, then the most operationally significant direction should be reported; and

(b) when the visibility is fluctuating rapidly, and the prevailing visibility cannot be determined, only the lowest visibility should be reported, with no indication of direction.

4.3 Runway visual range

4.3.1 Siting

4.3.1.1 Runway visual range shall be assessed at a height of approximately 2.5 m (7.5 ft) above the runway for instrumented systems or assessed at a height of approximately 5 m (15 ft) above the runway by a human observer.

4.3.1.2 Runway visual range shall be assessed at a lateral distance from the runway centre line of not more than 120 m. The site for observations to be representative of the touchdown zone should be located about 300 m along the runway from the threshold. The sites for observations to be representative of the mid-point and stop-end of the runway should be located at a distance of 1 000 to 1 500 m along the runway from the threshold and at a distance of about 300 m from the other end of the runway. The exact position of these sites and, if necessary, additional sites should be decided after considering aeronautical, meteorological and climatological factors such as long runways, swamps and other fog-prone areas.

4.3.2 Instrumented systems

Note. — Since accuracy can vary from one instrument design to another, performance characteristics are to be checked before selecting an instrument for assessing runway visual range. The calibration of a forward-scatter meter has to be traceable and verifiable to a transmissometer standard, the accuracy of which has been verified over the intended operational range. Guidance on the use of transmissometers and forward-scatter meters in instrumented runway visual range systems is given in the Manual of Runway Visual Range Observing and Reporting Practices *(Doc 9328).*

4.3.2.1 Instrumented systems based on transmissometers or forward-scatter meters shall be used to assess runway visual range on runways intended for Category II and III instrument approach and landing operations.

4.3.2.2 Instrumented systems based on transmissometers or forward-scatter meters shall be used to assess runway visual range on runways intended for Category I instrument approach and landing operations

4.3.3 Display

4.3.3.1 Where runway visual range is determined by instrumented systems, one display or more, if required, shall be located in the meteorological station with corresponding displays in the appropriate air traffic services units. The displays in the meteorological station and in the air traffic services units shall be related to the same sensors, and where separate sensors are required as specified in 4.3.1.2, the displays shall be clearly marked to identify the runway and section of runway monitored by each sensor.

4.3.3.2 Where runway visual range is determined by human observers, runway visual range should be reported to the appropriate local air traffic services units, whenever there is a change in the value to be reported in accordance with the reporting scale (except where the provisions of 3.2.2 a) or b) apply). The transmission of such reports should normally be completed within 15 seconds after the termination of the observation.

4.3.4 Averaging

4.3.4.1 Where instrumented systems are used for the assessment of runway visual range, their output shall be updated at least every 60 seconds to permit the provision of current, representative values. The averaging period for runway visual range values shall be:

(a) 1 minute for local routine and special reports and for runway visual range displays in air traffic services units; and

(b) 10 minutes for METAR and SPECI, except that when the 10-minute period immediately preceding the observation includes a marked discontinuity in runway visual range values, only those values occurring after the discontinuity shall be used for obtaining mean values.

Note. — A marked discontinuity occurs when there is an abrupt and sustained change in runway visual range, lasting at least 2 minutes, which reaches or passes through the values 800, 550, 300 and 175 m.

4.3.5 Runway light intensity

4.3.5.1 When instrumented systems are used for the assessment of runway visual range, computations shall be made separately for each available runway. Runway visual range should not be computed for a light intensity of Three (3) per cent (%) or less of the maximum light intensity available on a runway. For local routine and special reports, the light intensity to be used for the computation should be:

(a) *for a runway with the lights switched on, the light intensity actually in use on that runway; and*

(b) *for a runway with lights switched off (or at the lowest setting pending the resumption of operations), the optimum light intensity that would be appropriate for operational use in the prevailing conditions.*

4.3.5.2 In METAR and SPECI, the runway visual range shall be based on the maximum light intensity available on the runway.

Note. — Guidance on the conversion of instrumented readings into runway visual range is given at Attachment D.

4.3.6 Reporting

4.3.6.1 In local routine and special reports and in METAR and SPECI, the runway visual range shall be reported in steps of 25 m when the runway visual range is less than 400 m; in steps of 50 m when it is between 400 m and 800 m; and in steps of 100 m when the runway visual range is more than 800 m. Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.

4.3.6.2 Fifty metres shall be considered the lower limit and 2 000 metres the upper limit for runway visual range. Outside of these limits, local routine and special reports and METAR and SPECI should merely indicate that the runway visual range is less than 50 m or more than 2 000 m.

4.3.6.3 In local routine and special reports and in METAR and SPECI:

(a) when runway visual range is above the maximum value that can be determined by the system in use, it shall be reported using the abbreviation “ABV” in local routine and special reports and the abbreviation “P” in METAR and SPECI, followed by the maximum value that can be determined by the system; and

(b) when the runway visual range is below the minimum value that can be determined by the system in use, it shall be reported using the abbreviation “BLW” in local routine and special reports and the abbreviation “M” in METAR and SPECI, followed by the minimum value that can be determined by the system.

4.3.6.4 In local routine and special reports:

(a) the units of measurement used shall be included;

(b) if runway visual range is observed from only one location along the runway, i.e. the touchdown zone, it shall be included without any indication of location;

(c) if the runway visual range is observed from more than one location along the runway, the value representative of the touchdown zone shall be reported first, followed by the values representative of the mid-point and stop-end and the locations for which these values are representative shall be indicated; and

(d) when there is more than one runway in use, the available runway visual range values for each runway shall be reported and the runways to which the values refer shall be indicated.

4.3.6.5 *In METAR and SPECI:*

(a) only the value representative of the touchdown zone shall be reported and no indication of location on the runway shall be included; and

(b) where there is more than one runway available for landing, touchdown zone runway visual range values shall be included for all such runways, up to a maximum of four, and the runways to which the values refer shall be indicated.

4.3.6.6 in METAR and SPECI when instrumented systems are used for the assessment of runway visual range, the variations in runway visual range during the 10-minute period immediately preceding the observation shall be included if the runway visual range values during the 10-minute period have shown a distinct tendency, such that the mean during the first 5 minutes varies by 100 m or more from the mean during the second 5 minutes of the period. When the variation of the runway visual range values shows an upward or downward tendency, this shall be indicated by the abbreviation "U" or "D", respectively. In circumstances when actual fluctuations during the 10-minute period show no distinct tendency, this shall be indicated using the abbreviation "N". When indications of tendency are not available, no abbreviations shall be included.

4.4 Present weather

4.4.1 Siting

When instrumented systems are used for observing present weather phenomena listed under 4.4.2.3, 4.4.2.5 and 4.4.2.6, representative information shall be obtained by the use of sensors appropriately sited.

4.4.2 Reporting

4.4.2.1 In local routine and special reports, observed present weather phenomena shall be reported in terms of type and characteristics and qualified with respect to intensity, as appropriate.

4.4.2.2 In METAR and SPECI, observed present weather phenomena shall be reported in terms of type and characteristics and qualified with respect to intensity or proximity to the aerodrome, as appropriate.

4.4.2.3 In local routine and special reports and in METAR and SPECI, the following types of present weather phenomena shall be reported, using their respective abbreviations and relevant criteria, as appropriate:

a) *Precipitation*

Drizzle *DZ*

Rain *RA*

Hail *GR*

— *Reported when diameter of largest hailstones is 5 mm or more.*

Small hail and/or snow pellets *GS*

— *Reported when diameter of largest hailstones is less than 5 mm.*

b) *Obscurations (hydrometeors)* *FG*

Fog

— *Reported when visibility is less than 1 000 m, except when qualified by "MI", "BC", "PR" or "VC" (see 4.4.2.6 and 4.4.2.7).*

Mist *BR*

— *Reported when visibility is at least 1 000 m but not more than 5 000 m.*

c) Obscurations (lithometeors)

— *The following should be used only when the obscuration consists predominantly of lithometeors and the visibility is 5 000 m or less except "SA" when qualified by "DR" (see 4.4.2.6) and volcanic ash.*

Sand SA

Dust (widespread) *DU*

Haze HZ

Smoke *FU*

Volcanic ash *VA*

d) Other phenomena

Dust/sand whirls (dust devils) *PO*

Squall *SQ*

Funnel cloud (tornado or waterspout) *FC*

Duststorm *DS*

Sandstorm *SS*

4.4.2.4 In automated local routine and special reports and METAR and SPECI, in addition to the precipitation types listed under 4.4.2.3 a), the abbreviation UP shall be used for unidentified precipitation when the type of precipitation cannot be identified by the automatic observing system.

4.4.2.5 In local routine and special reports and in METAR and SPECI, the following characteristics of present weather phenomena, as necessary, shall be reported, using their respective abbreviations and relevant criteria, as appropriate:

Thunderstorm *TS*

— *Used to report a thunderstorm with precipitation in accordance with the templates shown in Tables A3-1 and A3-2. When thunder is heard or lightning is detected at the aerodrome during the 10-minute period preceding the time of observation but no precipitation is observed at the aerodrome, the abbreviation "TS" shall be used without qualification.*

Freezing *FZ*

— *Supercooled water droplets or precipitation, used with types of present weather phenomena in accordance with the templates shown in Tables A3-1 and A3-2.*

Note. — At aerodromes with human observers, lightning detection equipment may supplement human observations. For aerodromes with automatic observing systems, guidance on the use of lightning detection equipment intended for thunderstorm reporting is given in the Manual on Automatic Meteorological Observing Systems at Aerodromes *(Doc 9837).*

4.4.2.6 In local routine and special reports and in METAR and SPECI, the following characteristics of present weather phenomena, as necessary, shall be reported, using their respective abbreviations and relevant criteria, as appropriate:

Shower *SH*

— *Used to report showers in accordance with the templates shown in Tables A3-1 and A3-2. Showers observed in the vicinity of the aerodrome (see 4.4.2.7) should be reported as "VCSH" without qualification regarding type or intensity of precipitation.*

Blowing *BL*

— *Used in accordance with the templates shown in Tables A3-1 and A3-2 with types of present weather phenomena raised by the wind to a height of 2 m (6 ft) or more above the ground.*

Low drifting *DR*

— *Used in accordance with the templates shown in Tables A3-1 and A3-2 with types of present weather phenomena raised by the wind to less than 2 m (6 ft) above ground level.*

Shallow *MI*

— *Less than 2 m (6 ft) above ground level.*

Patches *BC*

— *Fog patches randomly covering the aerodrome.*

Partial *PR*

— *A substantial part of the aerodrome covered by fog while the remainder is clear.*

4.4.2.7 In automated local routine reports, local special reports, METAR and SPECI when showers (SH) referred to in 4.4.2.6 cannot be determined based upon a method that takes account of the presence of convective cloud, the precipitation shall not be characterized by SH.

4.4.2.8 In local routine and special reports and in METAR and SPECI, the relevant intensity or, as appropriate, the proximity to the aerodrome of the reported present weather phenomena shall be indicated as follows

	(local routine and special reports)	*(METAR and SPECI)*
Light	*FBL*	*—*
Moderate	*MOD*	*(no indication)*
Heavy	*HVY*	*+*

Used with types of present weather phenomena in accordance with the templates shown in Tables A3-1 and A3-2. Light intensity should be indicated only for precipitation.

Vicinity *VC*

— *Between approximately 8 and 16 km of the aerodrome reference point and used only in METAR and SPECI with present weather in accordance with the template shown in Table A3-2 when not reported under 4.4.2.5 and 4.4.2.6.*

4.4.2.9 In local routine and special reports and in METAR and SPECI:

a) one or more, up to a maximum of three, of the present weather abbreviations given in 4.4.2.3, 4.4.2.5 and 4.4.2.6 shall be used, as necessary, together with an indication, where appropriate, of the characteristics and intensity or proximity to the aerodrome, so as to convey a complete description of the present weather of significance to flight operations;

b) the indication of intensity or proximity, as appropriate, shall be reported first followed respectively by the characteristics and the type of weather phenomena; and

c) where two different types of weather are observed, they shall be reported in two separate groups, where the intensity or proximity indicator refers to the weather phenomenon which follows the indicator. However, different types of precipitation occurring at the time of observation shall be reported as one single group with the dominant type of precipitation reported first and preceded by only one intensity qualifier which refers to the intensity of the total precipitation.

4.4.2.10 In automated local routine and special reports and METAR and SPECI, the present weather shall be replaced by "//" when the present weather cannot be observed by the automatic observing system due to a temporary failure of the system/sensor.

4.5 Clouds

4.5.1 Siting

When instrumented systems are used for the measurement of the cloud amount and the height of cloud base, representative observations shall be obtained by the use of sensors appropriately sited. For local routine and special reports, in the case of aerodromes with precision approach runways, sensors for cloud amount and height of cloud base should be sited to give the best practicable indications of the height of cloud base and cloud amount at the middle marker site of the instrument landing system or, at aerodromes where a middle marker beacon is not used, at a distance of 900 to 1 200 m (3 000 to 4 000 ft) from the landing threshold at the approach end of the runway.

Note. — Specifications concerning the middle marker site of an instrument landing system are given in Annex 10, Volume I, Chapter 3 and at Attachment C, Table C-5.

4.5.2 Display

When automated equipment is used for the measurement of the height of cloud base, height of cloud base display(s) shall be located in the meteorological station with corresponding display(s) in the appropriate air traffic services units. The displays in the meteorological station and in the air traffic services units shall relate to the same sensor, and where separate sensors are required as specified in 4.5.1, the displays should clearly identify the area monitored by each sensor.

4.5.3 Reference level

The height of cloud base shall be reported above aerodrome elevation. When a precision approach runway is in use which has a threshold elevation 15 m (50 ft) or more below the aerodrome elevation, local arrangements shall be made in order that the height of cloud bases reported to arriving aircraft shall refer to the threshold elevation. In the case of reports from offshore structures, the height of cloud base shall be given above mean sea level.

4.5.4 Reporting

4.5.4.1 In local routine and special reports and in METAR and SPECI, the height of cloud base shall be reported in steps of 30 m (100 ft) up to 3 000 m (10 000 ft). Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.

4.5.4.2 At aerodromes where low-visibility procedures are established for approach and landing, as agreed between the meteorological authority and the appropriate ATS authority, in local routine and special reports the height of cloud base shall be reported in steps of 15 m (50 ft) up to and including 90 m (300 ft) and in steps of 30 m (100 ft) between 90 m (300 ft) and 3 000 m (10 000 ft), and the vertical visibility in steps of 15 m (50 ft) up to and including 90 m (300 ft) and in steps of 30 m (100 ft) between 90 m (300 ft) and 600 m (2 000 ft). Any observed value which does not fit the reporting scale shall be rounded down to the nearest lower step in the scale.

4.5.4.3 In local routine and special reports and in METAR and SPECI:

(a) cloud amount shall be reported using the abbreviations "FEW" (1 to 2 oktas), "SCT" (3 to 4 oktas), "BKN" (5 to 7 oktas) or "OVC" (8 oktas);

(b) cumulonimbus clouds and towering cumulus clouds shall be indicated as "CB" and "TCU", respectively;

(c) the vertical visibility shall be reported in steps of 30 m (100 ft) up to 600 m (2 000 ft);

(d) if there are no clouds of operational significance and no restriction on vertical visibility and the abbreviation "CAVOK" is not appropriate, the abbreviation "NSC" shall be used;

(e) when several layers or masses of cloud of operational significance are observed, their amount and height of cloud base shall be reported in increasing order of the height of cloud base, and in accordance with the following criteria:

1) the lowest layer or mass, regardless of amount to be reported as FEW, SCT, BKN or OVC as appropriate;

2) the next layer or mass, covering more than 2/8 to be reported as SCT, BKN or OVC as appropriate;

3) the next higher layer or mass, covering more than 4/8 to be reported as BKN or OVC as appropriate; and

4) cumulonimbus and/or towering cumulus clouds, whenever observed and not reported in 1) to 3);

(f) *when the cloud base is diffuse or ragged or fluctuating rapidly, the minimum height of cloud base, or cloud fragments, shall be reported; and*

(g) *when an individual layer (mass) of cloud is composed of cumulonimbus and towering cumulus clouds with a common cloud base, the type of cloud shall be reported as cumulonimbus only.*

Note. — Towering cumulus indicates cumulus congestus clouds of great vertical extent.

4.5.4.4 In local routine and special reports:

(a) the units of measurement used for the height of cloud base and vertical visibility shall be indicated; and

(b) when there is more than one runway in use and the heights of cloud bases are observed by instruments for these runways, the available heights of cloud bases for each runway shall be reported and the runways to which the values refer

shall be indicated.

4.5.4.5 In automated local routine and special reports and METAR and SPECI:

(a) when the cloud type cannot be observed by the automatic observing system, the cloud type in each cloud group shall be replaced by "///";

(b) when no clouds are detected by the automatic observing system, it shall be indicated by using the abbreviation "NCD";

(c) when cumulonimbus clouds or towering cumulus clouds are detected by the automatic observing system and the cloud amount and/or the height of cloud base cannot be observed, the cloud amount and/or the height of cloud base shall be replaced by "///"; and

(d) the vertical visibility shall be replaced by "///" when the sky is obscured and the value of the vertical visibility cannot be determined by the automatic observing system due to a temporary failure of the system/sensor.

4.6 Air temperature and dew-point temperature

4.6.1 Display

4.6.1.1 When automated equipment is used for the measurement of air temperature and dew-point temperature, air temperature and dew-point temperature displays *shall* be located in the meteorological station with corresponding displays in the appropriate air traffic services units. The displays in the meteorological station and in the air traffic services units shall relate to the same sensors.

4.6.2 Reporting

4.6.2.1 In local routine and special reports and in METAR and SPECI, the air temperature and the dew-point temperature shall be reported in steps of whole degrees Celsius. Any observed value which does not fit the reporting scale in use shall be rounded to the nearest whole degree Celsius, with observed values involving 0.5° rounded up to the next higher whole degree Celsius.

4.6.2.2 In local routine and special reports and in METAR and SPECI, a temperature below 0°C shall be identified.

4.7 Atmospheric pressure

4.7.1 Display

4.7.1.1 When automated equipment is used for the measurement of atmospheric pressure, QNH and, if required in accordance with 4.7.3.2 b), QFE displays relating to the barometer shall be located in the meteorological station with corresponding displays in the appropriate air traffic services units. When QFE values are displayed for more than one runway, as specified in 4.7.3.2 d), the displays shall be clearly marked to identify the runway to which the QFE value displayed refers.

4.7.2 Reference level

4.7.2.1 The reference level for the computation of QFE shall be the aerodrome elevation. For non-precision approach runways, the thresholds of which are 2 m (7 ft) or more below the aerodrome elevation, and for precision approach runways, the QFE, if required, should refer to the relevant threshold elevation.

4.7.3 Reporting

4.7.3.1 For local routine and special reports and in METAR and SPECI, QNH and QFE shall be computed in tenths of hectopascals and reported therein in steps of whole hectopascals, using four digits. Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower whole hectopascal.

4.7.3.2 In local routine and special reports:

(a) QNH shall be included;

(b) QFE shall be included if required by users or, if so agreed locally between the meteorological and air traffic services authorities and operators concerned, on a regular basis;

(c) the units of measurement used for QNH and QFE values shall be included; and

(d) if QFE values are required for more than one runway, the required QFE values for each runway shall be reported and the runways to which the values refer shall be indicated.

4.7.3.3 In METAR and SPECI, only QNH values shall be included.

4.8 Supplementary information

4.8.1 Reporting

4.8.1.1 in local routine and special reports and in METAR and SPECI, the following recent weather phenomena, i.e. weather phenomena observed at the aerodrome during the period since the last issued routine report or last hour, whichever is the shorter, but not at the time of observation, shall be reported, up to a maximum of three groups, in accordance with the templates shown in Tables A3-1 and A3-2, in the supplementary information:

— *freezing precipitation*

— *moderate or heavy precipitation (including showers thereof)*

— *blowing snow*

— *duststorm, sandstorm*

— *thunderstorm*

— *funnel cloud (tornado or water spout)*

— *volcanic ash*

Note. — The meteorological authority, in consultation with users, may agree not to provide recent weather information where SPECI are issued.

4.8.1.2 In local routine and special reports, the following significant meteorological conditions, or combinations thereof, shall be reported in supplementary information:

— *cumulonimbus clouds*	*CB*
— *thunderstorm*	*TS*
— *moderate or severe turbulence*	*MOD TURB, SEV TURB*
— *wind shear*	*WS*
— *hail*	*GR*

— *severe squall line*	*SEV SQL*
— *moderate or severe icing*	*MOD ICE, SEV ICE*
— *freezing precipitation*	*FZDZ, FZRA*
— *severe mountain waves*	*SEV MTW*
— *duststorm, sandstorm*	*DS, SS*
— *blowing snow*	*BLSN*
— *funnel cloud (tornado or water spout)*	*FC*

The location of the condition shall be indicated. Where necessary, additional information should be included using abbreviated plain language.

4.8.1.3 In automated local routine and special reports and METAR and SPECI, in addition to the recent weather phenomena listed under 4.8.1.1, recent unknown precipitation shall be reported in accordance with the template shown in Table A3-2 when the type of precipitation cannot be identified by the automatic observing system.

Note. — The meteorological authority, in consultation with users, may agree not to provide recent weather information where SPECI are issued.

4.8.1.4 In METAR and SPECI, where local circumstances so warrant, information on wind shear shall be added.

Note. — The local circumstances referred to in 4.8.1.4 include, but are not necessarily limited to, wind shear of a non- transitory nature such as might be associated with low-level temperature inversions or local topography.

4.8.1.5 In METAR and SPECI, the following information shall be included in the supplementary information, in accordance with Asia and Pacific Regional (APAC) air navigation agreement:

(a) information on sea-surface temperature, and the state of the sea or the significant wave height from aeronautical meteorological stations established on offshore structures in support of helicopter operations; and

(b) information on the state of the runway provided by the appropriate airport authority.

Note 1. — The state of the sea is specified in WMO Publication No. 306, Manual on Codes, Volume I.1, Part A — Alphanumeric Codes, Code Table 3700.

Note 2. — The state of the runway is specified in WMO Publication No. 306, Manual on Codes, Volume I.1, Part A — Alphanumeric Codes, Code Tables 0366, 0519, 0919 and 1079.

Table A3-1. Template for the local routine (MET REPORT) and local special (SPECIAL) reports

Key:

M = inclusion mandatory, part of every message;
C = inclusion conditional, dependent on meteorological conditions;
O = inclusion optional.
Note 1. — The ranges and resolutions for the numerical elements included in the local routine and special reports are shown in Table A3-4 of this appendix.

Note 2. — The explanations for the abbreviations can be found in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes *(PANS-ABC, Doc 840)*

Element as specified	*Detailed content*	*Template(s)*			*Examples*
Identification of the type of report (M)	Type of report	MET REPORT *or* SPECIAL			MET REPORT SPECIAL
Location indicator (M)	ICAO location indicator (M)	nnnn			YUDO1
Time of the observation (M)	Day and actual time of the observation in UTC	nnnnnnZ			221630Z
Identification of an automated report (C)	Automated report identifier (C)	AUTO			AUTO
Surface wind (M)	Name of the element (M)	WIND			WIND 240/4MPS (WIND 240/8KT) WIND RWY 18 TDZ 190/6MPS (WIND RWY 18 TDZ 190/12KT) WIND VRB1MPS WIND CALM (WIND VRB2KT) WIND VRB BTN 350/ AND 050/1MPS (WIND VRB BTN 350/ AND 050/2KT) WIND 270/ABV49MPS (WIND 270/ABV99KT) WIND 120/3MPS MAX9 MNM2 (WIND 120/6KT MAX18 MNM4) WIND 020/5MPS VRB BTN 350/ AND 070/ (WIND 020/10KT VRB BTN 350/ AND 070/) WIND RWY 14R MID 140/6MPS (WIND RWY 14R MID 140/12KT)
	Runway (O)2	RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			
	Runway section (O)3	TDZ			
	Wind direction (M)	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	*CALM*	
	Wind speed (M)	[ABV]n[n][n]MPS (*or* [ABV]n[n]KT)			
	Significant speed variations (C)4	MAX[ABV]nn[n] MNMn[n]			
	Significant directional variations (C)5	VRB BTN nnn/ AND nnn/	-		
	Runway section (O)3	MID			
	Wind direction (O)3	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	*CALM*	
	Wind speed (O)3	[ABV]n[n][n]MPS (*or* [ABV]n[n]KT)			
	Significant speed variations (C)4	MAX[ABV]nn[n] MNMn[n]			
	Significant directional variations (C)5	VRB BTN nnn/ AND nnn/	-		
	Runway section (O)3	END			
	Wind direction (O)3	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	*CALM*	
	Wind speed (O)3	[ABV]n[n][n]MPS (*or* [ABV]n[n]KT)			
	Significant speed variations (C)4	MAX[ABV]nn[n] MNMn[n]			
	Significant directional variations (C)5	VRB BTN nnn/ AND nnn/			

					WIND RWY 27 TDZ 240/8MPS MAX14 MNM5 END 250/7MPS (WIND RWY 27 TDZ 240/16KT MAX28 MNM10 END 250/14KT)
	Significant speed variations (C)4	MAX[ABV]nn[n] MNMn[n]			
	Significant directional variations (C)5	VRB BTN nnn/ AND nnn/	-		
Visibility (M)	Name of the element (M)	VIS		C A V O K	VIS 350M CAVOK VIS 7KM VIS 10KM VIS RWY 09 TDZ 800M END 1200M VIS RWY 18C TDZ 6KM RWY 27 TDZ 4000M
	Runway (O)2	RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			
	Runway section (O)3	TDZ			
	Visibility (M)	[n][n][n]M *or* n[n]KM			
	Runway section (O)3	MID			
	Visibility (O)3	[n][n][n]M *or* n[n]KM			
	Runway section (O)3	END			
	Visibility (O)3	[n][n][n]M *or* n[n]KM			
Runway visual range (C)6	Name of the element (M)	RVR			RVR RWY 32 400M RVR RWY 20 1600M RVR RWY 10L BLW 50M RVR RWY 14 ABV 2000M RVR RWY 10 BLW 150M RVR RWY 12 ABV 1200M RVR RWY 12 TDZ 1100M MID ABV 1400M RVR RWY 16 TDZ 600M MID 500M END 400M RVR RWY 26 500M RWY 20 800M
	Runway (C)7	RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			
	Runway section (C)8	TDZ			
	RVR (M)	[ABV *or* BLW] nn[n][n]M			
	Runway section (C)8	MID			
	RVR (C)8	[ABV *or* BLW] nn[n][n]M			
	Runway section (C)8	END			
	RVR (C)8	[ABV *or* BLW] nn[n][n]M			
Present weather (C)9, 10	Intensity of present weather (C)9	FBL *or* MOD *or* HVY	-		

	Characteristics and type of present weather (C)9,11	DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZUP12 *or* FC13 *or* FZRA *or* SHGR *or* SHGS *or* SHRA *or* SHSN *or* SHUP12 *or* TSGR *or* TSGS *or* TSRA *or* TSSN *or* TSUP12 *or* UP12	IC *or* FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* TS *or* BCFG *or* BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG or //12		MOD RA HZ HVY TSRA FG HVY DZ VA FBL SN MIFG HVY TSRASN FBL SNRA FBL DZ FG HVY SHSN BLSN HVY TSUP //
Cloud (M)14	Name of the element (M)	CLD				CLD NSC
	Runway (O)2	RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]				
	Cloud amount (M) *or* vertical visibility (O)9	FEW *or* SCT *or* BKN *or* OVC *or* ///12	OBSC	NSC *or* NCD12		CLD SCT 300M OVC 600M (CLD SCT 1000FT OVC 2000FT) CLD OBSC VER VIS 150M (CLD OBSC VER VIS 500FT) CLD BKN TCU 270M (CLD BKN TCU 900FT) CLD RWY 08R BKN 60M RWY 26 BKN 90M (CLD RWY 08R BKN 200FT RWY 26 BKN 300FT) CLD /// CB ///M (CLD /// CB ///FT) CLD /// CB 400M (CLD /// CB 1200FT) CLD NCD
	Cloud type (C)9	CB *or* TCU *or* ///12	—			
	Height of cloud base *or* the value of vertical visibility (C)9	n[n][n][n]M (*or* n[n[[n][n]FT) *or* ///M (*or* ///FT)12	[VER VIS n[n][n]M (*or* VER VIS n[n][n][n]FT)] or VER VIS ///M (*or* VER VIS ///FT)12			
Air temperature (M)	Name of the element (M)	T				T17 TMS08
	Air temperature (M)	[MS]nn				

Dew-point temperature (M)	Name of the element (M)	DP		DP15 DPMS18
	Dew-point temperature (M)	[MS]nn		
Pressure values (M)	Name of the element (M)	QNH		QNH 0995HPA QNH 1009HPA QNH 1022HPA QFE 1001HPA QNH 0987HPA QFE RWY 18 0956HPA RWY 24 0955HPA
	QNH (M)	nnnnHPA		
	Name of the element (O)	QFE		
	QFE (O)	[RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]] nnnnHPA [RWY nn[L] *or* RWY nn[C] *or* RWY nn[R] nnnnHPA]		
Supplementary information (C)9	Significant meteorological phenomena (C)9	CB *or* TS *or* MOD TURB *or* SEV TURB *or* WS *or* GR *or* SEV SQL *or* MOD ICE *or* SEV ICE *or* FZDZ *or* FZRA *or* SEV MTW *or* SS *or* DS *or* BLSN *or* FC15		FC IN APCH WS IN APCH 60M: WIND 360/13MPS WS RWY 12
	Location of the phenomena (C)9	IN APCH [n[n][n][n]M-WIND nnn/n[n]MPS] *or* IN CLIMB-OUT [n[n][n][n]M-WIND nnn/n[n]MPS] (IN APCH [n[n][n][n]FT-WIND nnn/n[n]KT] *or* IN CLIMB-OUT [n[n][n][n]FT-WIND nnn/n[n]KT]) *Or* RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]		REFZRA CB IN CLIMB-OUT RETSRA
	Recent weather (C)9, 10	REFZDZ *or* REFZRA *or* REDZ *or* RE[SH]RA *or* RERASN *or* RE[SH]SN *or* RESG *or* RESHGR *or* RESHGS *or* REBLSN *or* RESS *or* REDS *or* RETSRA *or* RETSSN *or* RETSGR *or* RETSGS *or* REFC *or* REPL or REUP12 *or* REFZUP12 *or* RETSUP12 *or* RESHUP12 *or* REVA *or* RETS		
Trend forecast (O)16	Name of the element (M)	TREND		TREND NOSIG TREND BECMG FEW 600M (TREND BECMG FEW 2000FT) TREND TEMPO 250/18 MPS MAX25 (TREND TEMPO 250/36KT MAX50)
	Change indicator (M)17	NOSIG	BECMG *or* TEMPO	
	Period of change (C)9		FMnnnn *and/or* TLnnnn Or ATnnnn	
	Wind (C)9		nnn/[ABV]n[n][n]MPS [MAX[ABV]nn[n]] (*or* nnn/[ABV]n[n]KT	

	Visibility (C)9		VIS n[n][n][n]M		C	

			or VIS n[n]KM			A V O K	TREND BECMG AT1800 VIS 10KM NSW TREND BECMG TL1700 VIS 800M FG TREND BECMG FM1030 TL1130 CAVOK TREND TEMPO TL1200 VIS 600M BECMG AT1230 VIS 8KM NSW CLD NSC TREND TEMPO FM0300 TL0430 MOD FZRA TREND BECMG FM1900 VIS 500M HVY SNRA TREND BECMG FM1100 MOD SN TEMPO FM1130 BLSN TREND BECMG AT1130 CLD OVC 300M (TREND BECMG AT1130 CLD OVC 1000FT) TREND TEMPO TL1530 HVY SHRA CLD BKN CB 360M (TREND TEMPO TL1530 HVY SHRA CLD BKN CB 1200FT)
	Weather phenomenon: intensity (C)9		FBL *or* MOD *or* HVY	—	NSW		
	Weather phenomenon: characteristics and type (C)9, 10, 11		DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* SHGR *or* SHGS *or* SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN	FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or* TS *or* BCFG *or* BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG			
	Name of the element (C)9		CLD				
	Cloud amount and vertical visibility (C)9,14		FEW *or* SCT *or* BKN *or* OVC	OBSC	NSC		
	Cloud type (C)9,14		CB *or* TCU	—			
	Height of cloud base *or* the value of vertical visibility (C)9,14		n[n][n][n]M (*or* n[n[[n][n]FT)	[VER VIS n[n][n]M (*or* VER VIS n[n][n][n]F T)]			

Notes.

1. *Fictitious location.*
2. *Optional values for one or more runways.*
3. *Optional values for one or more sections of the runway.*
4. *To be included in accordance with 4.1.5.2 c).*
5. *To be included in accordance with 4.1.5.2 b) 1).*
6. *To be included if visibility or runway visual range < 1 500 m.*
7. *To be included in accordance with 4.3.6.4 d).*
8. *To be included in accordance with 4.3.6.4 c).*
9. *To be included whenever applicable.*
10. *One or more, up to a maximum of three groups, in accordance with 4.4.2.8 a), 4.8.1.1 and Appendix 5, 2.2.4.3.*
11. *Precipitation types listed under 4.4.2.3 a) may be combined in accordance with 4.4.2.8 c) and Appendix 5, 2.2.4.1. Only moderate or heavy precipitation to be indicated in trend forecasts in accordance with Appendix 5, 2.2.4.1.*
12. *For automated reports only.*
13. *Heavy used to indicate tornado or waterspout; moderate used to indicate funnel cloud not reaching the ground.*
14. *Up to four cloud layers in accordance with 4.5.4.3 e).*
15. *Abbreviated plain language may be used in accordance with 4.8.1.2.*
16. *To be included in accordance with Chapter 6, 6.3.2.*
17. *Number of change indicators to be kept to a minimum in accordance with Appendix 5, 2.2.1, normally not exceeding three groups.*

Table A3-2. Template for METAR and SPECI

Key: M = inclusion mandatory, part of every message;

C = inclusion conditional, dependent on meteorological conditions or method of observation;

O = inclusion optional.

Note 1. — The ranges and resolutions for the numerical elements included in METAR and SPECI are shown in Table A3-5 of this appendix.

Note 2. — The explanations for the abbreviations can be found in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400)*.

Element as specified in Chapter 4	Detailed content	Template(s)	Examples
Identification of the type of report (M)	Type of report (M)	METAR, METAR COR, SPECI *or* SPECI COR	METAR METAR COR SPECI
Location indicator M)	ICAO location indicator (M)	nnnn	YUDO1
Time of the observation	Day and actual time of the	nnnnnnZ	221630Z

(M)	observation in UTC				
Identification of an automated report (C)[2]	Automated *or* missing report identifier (C)	AUTO *or* NIL			AUTO *or* NIL
END OF METAR IF THE REPORT IS MISSING.					
Surface wind (M)	Wind direction (M)	nnn	VRB		24004MPS VRB01MPS (24008KT) (VRB02KT) 19006MPS (19012KT) 00000MPS (00000KT) 140P149MPS (140P99KT) 12003G09MPS (12006G18KT) 24008G14MPS (24016G28KT) 02005MPS 350V070 (02010KT 350V070)
	Wind speed (M)	[P]nn[n]			
	Significant speed variations (C)3	G[P]nn[n]			
	Units of measurement (M)	MPS (*or* KT)			
	Significant directional variations (C)4	nnnVnnn	—		
Visibility (M)	Prevailing *or* minimum visibility (M)5	nnnn		C A V O K	0350 CAVOK 7000 9999 0800 2000 1200NW 6000 2800E 6000 2800
	Minimum visibility and direction of the minimum visibility (C)6	nnnn[N] *or* nnnn[NE] *or* nnnn[E] *or* nnnn[SE] *or* nnnn[S] *or* nnnn[SW] *or* nnnn[W] *or* nnnn[NW]			
Element as specified in Chapter 4	Detailed content	Template(s)			Examples
Runway visual range (C)7	Name of the element (M)	R			R32/0400 R12R/1700 R10/M0050 R14L/P2000 R16L/0650 R16C/0500 R16R/0450
	Runway (M)	nn[L]/*or* nn[C]/*or* nn[R]/			
	Runway visual range (M)	[P *or* M]nnnn			
	Runway visual range past	U, D *or* N			

	tendency (C)8					R17L/0450 R12/1100U R26/0550N R20/0800D R 12/0700
Present weather (C)2, 9	Intensity *or* proximity of present weather (C)10	– *or* +	—	VC		RA HZ VCFG +TSRA FG VCSH +DZ VA VCTS –SN MIFG VCBLSA +TSRASN –SNRA DZ FG +SHSN BLSN UP FZUP TSUP FZUP //
	Characteristics and type of present weather (M)11	DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* FZUP12 *or* FC13 or SHGR *or* SHGS *or* SHRA *or* SHSN *or* SHUP12*or* TSGR *or* TSGS *or* TSRA *or* TSSN *or* TSUP12 *or* UP12	FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* TS *or* BCFG *or* BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG	FG *or* PO *or* FC *or* DS *or* SS *or* TS *or* SH *or* BLSN *or* BLSA or BLDU *or* VA		
Cloud (M)14	Cloud amount and height of cloud base *or* vertical visibility (M)	FEWnnn *or* SCTnnn or BKNnnn *or* OVCnnn *or* FEW///12 or SCT///12 or BKN///12 or OVC///12 or //nnn/12 or//////12	VVnnn *or* VV///12	NSC *or* NCD12		FEW015 W005 OVC030 VV/// NSC SCT010 OVC020 BKN/// ///015 BKN009TCU NCD SCT008 BKN025CB BKN025///
	Cloud type (C)2	CB *or*	—			

		TCU *or* ///12				//////CB
Air and dew-point temperature (M)	Air and dew-point temperature (M)	[M]nn/[M]nn				17/10 02/M08 M01/M10
Pressure values (M)	Name of the element (M)	Q				Q0995 Q1009 Q1022 Q0987
	QNH (M)	nnnn				
Supplementary information (C)	Recent weather (C)2, 9	REFZDZ *or* REFZRA *or* REDZ *or* RE[SH]RA *or* RERASN *or* RE[SH]SN *or* RESG *or* RESHGR *or* RESHGS *or* REBLSN *or* RESS *or* REDS *or* RETSRA *or* RETSSN *or* RETSGR *or* RETSGS *or* RETS *or* REFC *or* REVA *or* REPL *or* REUP12 *or* REFZUP12 *or* RETSUP12 *or* RESHUP12				REFZRA RETSRA WS R03 WS ALL RWY WS R18C W15/S2 W12/H75
	Wind shear (C)2	WS Rnn[L] *or* WS Rnn[C] *or* WS Rnn[R] *or* WS ALL RWY				
Trend forecast (O)16	Change indicator (M)17	NOSIG	BECMG *or* TEMPO			NOSIG BECMG FEW020 TEMPO 25018G25MPS (TEMPO 25036G50KT) BECMG FM1030 TL1130 CAVOK BECMG TL1700 0800 FG BECMG AT1800 9000 NSW BECMG FM1900 0500 +SNRA BECMG FM1100 SN TEMPO FM1130 BLSN TEMPO FM0330 TL0430 FZRA
	Period of change (C)2		FMnnnn *and/or* TLnnnn *or* ATnnnn			
	Wind (C)2		nnn[P]nn[n][G[P]nn[n]]MPS (*or* nnn[P]nn[G[P]nn]KT)			
	Prevailing visibility (C)2		nnnn			C A V O K
	Weather phenomenon: intensity (C)10		– *or* +	—	N S W	
	Weather phenomenon: characteristics and type (C)2, 9, 11		DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* SHGR *or*	FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or*		

			SHGS *or* SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN	TS *or* BCFG *or* BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG			
	Cloud amount and height of cloud base *or* vertical visibility (C)2,14		FEWnnn *or* SCTnnn *or* BKNnnn *or* OVCnnn	VVnnn *or* VV///	N S C		TEMPO TL1200 0600 BECMG AT1200 8000 NSW NSC BECMG AT1130 OVC010
	Cloud type (C)2,14		CB or TCU	-			TEMPO TL1530 +SHRA BKN012CB

Notes.

1. *Fictitious location.*
2. *To be included whenever applicable.*
3. *To be included in accordance with 4.1.5.2 c).*
4. *To be included in accordance with 4.1.5.2 b) 1).*
5. *To be included in accordance with 4.2.4.4 b).*
6. *To be included in accordance with 4.2.4.4 a).*
7. *To be included if visibility or runway visual range < 1 500 m; for up to a maximum of four runways in accordance with 4.3.6.5 b).*
8. *To be included in accordance with 4.3.6.6.*
9. *One or more, up to a maximum of three groups, in accordance with 4.4.2.8 a), 4.8.1.1 and Appendix 5, 2.2.4.1.*
10. *To be included whenever applicable; no qualifier for moderate intensity in accordance with 4.4.2.7.*
11. *Precipitation types listed under 4.4.2.3 a) may be combined in accordance with 4.4.2.8 c) and Appendix 5, 2.2.4.1. Only moderate or heavy precipitation to be indicated in trend forecasts in accordance with Appendix 5, 2.2.4.1.*
12. *For automated reports only.*
13. *Heavy used to indicate tornado or waterspout; moderate (no qualifier) to indicate funnel cloud not reaching the ground.*
14. *Up to four cloud layers in accordance with 4.5.4.3 e).*
15. *To be included in accordance with 4.8.1.5 a).*

16. *To be included in accordance with 4.8.1.5 b).*
17. *To be included in accordance with Chapter 6, 6.3.2.*
18. *Number of change indicators to be kept to a minimum in accordance with Appendix 5, 2.2.1, normally not exceeding three groups.*

Table A3-3. Use of change indicators in trend forecasts

Change indicator	*Time indicator and period*	*Meaning*	
NOSIG	—	no significant changes are forecast	
BECMG	FMn1n1n1n1 TLn2n2n2n2	the change is forecast to	commence at n1n1n1n1 UTC and be completed by n2n2n2n2 UTC
	TLnnnn		commence at the beginning of the trend forecast period and be completed by nnnn UTC
	FMnnnn		commence at nnnn UTC and be completed by the end of the trend forecast period
	ATnnnn		occur at nnnn UTC (specified time)
	—		commence at the beginning of the trend forecast period and be completed by the end of the trend forecast period; *or* the time is uncertain
TEMPO	FMn1n1n1n1 TLn2n2n2n2	temporary fluctuations are forecast to	commence at n1n1n1n1 UTC and cease by n2n2n2n2 UTC
	TLnnnn		commence at the beginning of the trend forecast period and cease by nnnn UTC
	FMnnnn		commence at nnnn UTC and cease by the end of the trend forecast period
	—		commence at the beginning of the trend forecast period and cease by the end of the trend forecast period

Table A3-4. Ranges and resolutions for the numerical elements included in local reports

Element as specified in Chapter 4		Range	Resolution
Runway: (no units)		01 – 36	1
Wind direction:	°true	010 – 360	10
Wind speed:	MPS	1 – 99*	1
	KT	1 – 199*	1
Visibility:	M	0 – 750	50
	M	800 – 4 900	100
	KM	5 – 9	1
	KM	10 –	0 (fixed value: 10 KM)
Runway Visual Range:	M	0 – 375	25
	M	400 – 750	50
	M	800 – 2 000	100
Vertical visibility:	M	0 – 75**	15
	M	90 – 600	30
	FT	0 – 250**	50
	FT	300 – 2 000	100
Clouds: height of cloud base:	M	0 – 75**	15
	M	90 – 3 000	30
	FT	0 – 250**	50
	FT	300 – 10 000	100
Air temperature; Dew-point temperature: °C		–80 – +60	1
QNH; QFE:	hPa	0500 – 1 100	1

* There is no aeronautical requirement to report surface wind speeds of 50 m/s (100 kt) or more; however, provision has been made for reporting wind speeds up to 99 m/s (199 kt) for non-aeronautical purposes, as necessary.

** Under circumstances as specified in 4.5.4.2; otherwise, a resolution of 30 m (100 ft) is to be used.

Table A3-5. Ranges and resolutions for the numerical elements included in METAR and SPECI

Element as specified in Chapter 4	Range	Resolution
Runway: (no units)	01 – 36	1
Wind direction: °true	000 – 360	10
Wind speed: MPS	00 – 99*	1
KT	00 – 199*	1
Visibility: M	0000 – 0750	50
M	0800 – 4 900	100
M	5 000 – 9 000	1 000
M	10 000 –	0 (fixed value: 9 999)
Runway Visual Range: M	0000 – 0375	25
M	0400 – 0750	50
M	0800 – 2 000	100
Vertical visibility: 30's M (100's FT)	000 – 020	1
Clouds: height of cloud base: 30's M (100's FT)	000 – 100	1
Air temperature; Dew-point temperature: °C	–80 – +60	1
QNH: hPa	0850 – 1 100	1
* There is no aeronautical requirement to report surface wind speeds of 50 m/s (100 kt) or more; however, provision has been made for reporting wind speeds up to 99 m/s (199 kt) for non-aeronautical purposes, as necessary.		

Example A3-1. Local Routine report

a) Local routine report (same location and weather conditions as METAR):

MET REPORT YUDO 221630Z WIND 240/4MPS VIS 600M RVR RWY 12 TDZ 1000M MOD DZ FG CLD SCT 300M OVC
600M T17 DP16 QNH 1018HPA TREND BECMG TL1700 VIS 800M FG BECMG AT1800 VIS 10KM NSW

b) METAR for YUDO (Donlon/International) *:

METAR YUDO 221630Z 24004MPS 0600 R12/1000U DZ FG SCT010 OVC020 17/16 Q1018 BECMG TL1700 0800 FG BECMG AT1800 9999 NSW
Meaning of both reports:
Routine report for Donlon/International* issued on the 22nd of the month at 1630 UTC; surface wind direction 240 degrees; wind speed 4 metres per second; visibility (along the runway(s) in the local routine report; prevailing visibility in METAR) 600 metres; runway visual range representative of the touchdown zone for runway 12 is 1 000 metres and the runway visual range values have shown an upward tendency during previous 10 minutes (runway visual range tendency to be included in METAR only); and moderate drizzle and fog; scattered cloud at 300 metres; overcast at 600 metres; air temperature 17 degrees Celsius; dew-point temperature 16 degrees Celsius; QNH 1 018 hectopascals; trend during next 2 hours, visibility (along the runway(s) in the local routine report; prevailing visibility in METAR) becoming 800 metres in fog by 1700 UTC; at 1800 UTC visibility (along the runway(s) in the local routine report; prevailing visibility in METAR) becoming 10 kilometres or more and nil significant weather.

* Fictitious location

Note. — In this example, the primary units “metre per second” and “metre” were used for wind speed and height of cloud base, respectively. However, in accordance with Annex 5, the corresponding non-SI alternative units “knot” and “foot” may be used instead.

Example A3-2. Local Special report

Local special report (same location and weather conditions as SPECI):

SPECIAL YUDO 151115Z WIND 050/25KT MAX37 MNM10 VIS 1200M RVR RWY 05 ABV 1800M HVY TSRA CLD BKN CB 500FT T25 DP22 QNH 1018 HPA TREND TEMPO TL1200 VIS 600M BECMG AT1200 VIS 8KM NSW NSC

SPECI for YUDO (Donlon/International) *:
SPECI YUDO 151115Z 05025G37KT 3000 1200NE+TSRA BKN005CB 25/22 Q1008 TEMPO TL1200 0600 BECMG AT1200 8000 NSW NSC

Meaning of both reports:
Special report for Donlon/International* issued on the 15th of the month at 1115 UTC; surface wind direction 050 degrees; wind speed 25 knots gusting between 10 and 37 knots (minimum wind speed not to be included in SPECI) visibility 1 200 metres (along the runway(s) in the local special report); prevailing visibility 3 000 metres (in SPECI) with minimum visibility 1 200 metres to north east (directional variations to be included in SPECI only); runway visual range above 1 800 metres on runway 05 (runway visual range not required in SPECI with prevailing visibility of 3 000 metres); thunderstorm with heavy rain; broken cumulonimbus cloud at 500 feet; air temperature 25 degrees Celsius; dew-point temperature 22 degrees Celsius; QNH 1 018 hectopascals; trend during next 2 hours, visibility (along the runway(s) in the local special report; prevailing visibility in SPECI) temporarily 600 metres from 1115 to 1200, becoming at 1200 UTC visibility (along the runway(s) in the local special report; prevailing visibility in SPECI) 8 kilometres, thunderstorm ceases and nil significant weather and nil significant cloud.
* Fictitious location

Note.— In this example, the non-SI alternative units “knot” and “foot” were used for wind speed and height of cloud base, respectively. However, in accordance with Annex 5, the corresponding primary units “metres per second” and “metre” may be used instead.

Example A3-3: Volcanic activity report

VOLCANIC ACTIVITY REPORT YUSB* 231500 MT TROJEEN* VOLCANO N5605 W12652
ERUPTED 231445 LARGE ASH CLOUD EXTENDING TO APPROX 30000 FEET MOVING SW

Meaning:

Volcanic activity report issued by Siby/Bistock meteorological station at 1500 UTC on the 23rd of the month. Mt. Trojeen volcano 56 degrees 5 minutes north 126 degrees 52 minutes west erupted at 1445 UTC on the 23rd; a large ash cloud was observed extending to approximately 30 000 feet and moving in a south-westerly direction.

* Fictitious location

APPENDIX 4. TECHNICAL SPECIFICATIONS RELATED TO AIRCRAFT OBSERVATIONS AND REPORTS

(See Chapter 5 of this regulation)

1 CONTENTS OF AIR-REPORTS

1.1 Routine air-reports by air-ground data link

1.1.1 When air-ground data link is used and automatic dependent surveillance-contract (ADS-C) or SSR Mode S is being applied, the elements contained in routine air-reports shall be: Message type designator Aircraft identification

Data block 1
- Latitude
- Longitude
- Level
- Time

Data block 2
- Wind direction
- Wind speed
- Wind quality flag
- Air temperature
- Turbulence (if available)
- Humidity (if available)

Note. — When ADS-C or SSR Mode S is being applied, the requirements of routine air-reports may be met by the combination of the basic ADS-C/SSR Mode S data block (data block 1) and the meteorological information data block (data block 2), available from ADS-C or SSR Mode S reports. The ADS-C message format is specified in the PANS-ATM (Doc 4444), 4.11.4 and Chapter 13 and the SSR Mode S message format is specified in Annex 10, Volume III, Part I — Digital Data Communication Systems, Chapter 5.

1.1.2 When air-ground data link is used while ADS-C and SSR Mode S are not being applied, the elements contained in routine reports shall be in accordance with 1.3.

Message type designator

Section 1’ (Position information)
- Aircraft identification
- Position or latitude and longitude Time
- Flight level or altitude
- Next position and time over Ensuing significant point

Section 2 (Operational information)
- Estimated time of arrival
- Endurance

Section 3 (Meteorological information)
- Air temperature
- Wind direction
- Wind speed
- Turbulence
- Aircraft icing

Humidity (if available)

Note. — When air-ground data link is used while ADS-C and SSR Mode S are not being applied, the requirements of routine air-reports may be met by the controller-pilot data link communication (CPDLC) application entitled "Position report". The details of this data link application are specified in the Manual of Air Traffic Services Data Link Applications *(Doc 9694) and in Annex 10, Volume III, Part I.*

1.2 Special air-reports by air-ground data link

1.2.1 When air-ground data link is used, the elements contained in special air-reports shall be:

Message type designator
Aircraft identification
Data block 1
- Latitude
- Longitude
- Level
- Time

Data block 2
- Wind direction
- Wind quality flag
- Air temperature
- Turbulence (if available)
- Humidity (if available)

Data block 3
- Condition prompting the issuance of a special air-report (one condition to be selected from the list presented in Table A4-1).

Note 1. — The requirements of special air-reports may be met by the data link flight information service (D-FIS) application entitled "Special air-report service". The details of this data link application are specified in Doc 9694.

Note 2. — In the case of a special air-report of pre-eruption volcanic activity, volcanic eruption or volcanic ash cloud, additional requirements are indicated in 4.2.

1.3 Special air-reports by voice communications

1.3.1 When voice communications are used, the elements contained in special air-reports shall be: Message type designator

Section 1 (Position information)
- Aircraft identification
- Position or latitude and longitude Time
- Level or range of levels

Section 3 (Meteorological information)
- Condition prompting the issuance of a special air-report, to be selected from the list presented in Table A4-1.

Note 1. — Air-reports are considered routine by default. The message type designator for special air-reports is specified in the PANS-ATM (Doc 4444), Appendix 1.

Note 2. — In the case of a special air-report of pre-eruption volcanic activity, volcanic eruption or volcanic ash cloud, additional requirements are indicated in 4.2.

2 CRITERIA FOR REPORTING

2.1 General

2.1.1 When air-ground data link is used, the wind direction, wind speed, wind quality flag, air temperature, turbulence and humidity included in air-reports shall be reported in accordance with the following criteria.

2.2 Wind direction

2.2.1 The wind direction shall be reported in terms of degrees true, rounded to the nearest whole degree.

2.3 Wind speed

2.3.1 The wind speed shall be reported in metres per second or knots, rounded to the nearest 1 m/s (1 knot). The units of measurement used for the wind speed shall be indicated.

2.4 Wind quality flag

2.4.1 The wind quality flag shall be reported as 0 when the roll angle is less than 5 degrees and as 1 when the roll angle is 5 degrees or more.

2.5 Air temperature

2.5.1 The air temperature shall be reported to the nearest tenth of a degree Celsius.

2.6 Turbulence

2.6.1 The turbulence shall be reported in terms of the cube root of the eddy dissipation rate (EDR).

2.6.2 Routine air-reports

2.6.2.1 The turbulence shall be reported during the en-route phase of the flight and shall refer to the 15-minute period immediately preceding the observation. Both the average and peak value of turbulence, together with the time of occurrence of the peak value to the nearest minute, shall be observed. The average and peak values shall be reported in terms of the cube root of EDR. The time of occurrence of the peak value shall be reported as indicated in Table A4-2. The turbulence shall be reported during the climb-out phase for the first 10 minutes of the flight and shall refer to the 30-second period immediately preceding the observation. The peak value of turbulence shall be observed.

2.6.3 Interpretation of the turbulence report

2.6.3.1 Turbulence shall be considered:

(a) severe when the peak value of the cube root of EDR exceeds 0.7;
(b) moderate when the peak value of the cube root of EDR is above 0.4 and below or equal to 0.7;
(c) light when the peak value of the cube root of EDR is above 0.1 and below or equal to 0.4; and
(d) nil when the peak value of the cube root of EDR is below or equal to 0.1.

Note. — The EDR is an aircraft-independent measure of turbulence. However, the relationship between the EDR value and the perception of turbulence is a function of aircraft type, and the mass, altitude, configuration and airspeed of the aircraft. The EDR values given above describe the severity levels for a medium-sized transport aircraft under typical en-route conditions (i.e. altitude, airspeed and weight).

2.6.4 Special air-reports

2.6.4.1 Special air-reports on turbulence shall be made during any phase of the flight whenever the peak value of the cube root of EDR exceeds 0.4. The special air-report on turbulence shall be made with reference to the 1-minute period immediately preceding the observation. Both the average and peak value of turbulence shall be observed. The average and peak values shall be reported in terms of the cube root of EDR. Special air-reports shall be issued every minute until such time as the peak values of the cube root of EDR fall below 0.4.

2.7 Humidity

2.7.1. The humidity shall be reported as the relative humidity, rounded to the nearest whole per cent.

Note. — The ranges and resolutions for the meteorological elements included in air-reports are shown in Table A4-3.

3 EXCHANGE OF AIR-REPORTS

3.1 Responsibilities of the meteorological watch offices

3.1.1 The meteorological watch office shall transmit without delay the special air-reports received by voice communications to WAFCs or other meteorological offices in accordance with Asia and Pacific Regional (APAC) air navigation agreement.

3.1.2 The meteorological watch office shall transmit without delay special air-reports of pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud received to the associated VAACs.

3.1.3 When a special air-report is received at the meteorological watch office, but the forecaster considers that the phenomenon causing the report is not expected to persist and, therefore, does not warrant issuance of a SIGMET, the special air-report shall be disseminated in the same way that SIGMET messages are disseminated in accordance with Appendix 6, 1.2.1, i.e. to meteorological watch offices, WAFCs, and other meteorological offices in accordance with Asia and Pacific Regional (APAC) air navigation agreement.

Note. — The template used for special air-reports which are uplinked to aircraft in flight is in Appendix 6, Table A6-1B.

3.2 Responsibilities of world area forecast centres

3.2.1 Air-reports received at WAFCs shall be further disseminated as basic meteorological data.

3.3 Supplementary dissemination of air-reports

3.3.1 w*here supplementary dissemination of air-reports is required to satisfy special aeronautical or meteorological requirements, such dissemination* shall *be arranged and agreed between the meteorological authorities concerned.*

3.4 Format of air-reports

3.4.1 Air-reports shall be exchanged in the format in which they are received.

4 SPECIFIC PROVISIONS RELATED TO REPORTING WIND SHEAR AND VOLCANIC ASH

4.1 Reporting of wind shear

4.1.1 When reporting aircraft observations of wind shear encountered during the climb-out and approach phases of flight, the aircraft type shall be included.

4.1.2 Where wind shear conditions in the climb-out or approach phases of flight were reported or forecast but not encountered, the pilot-in-command shall advise the appropriate air traffic services unit as soon as practicable unless the pilot-in-command is aware that the appropriate air traffic services unit has already been so advised by a preceding aircraft.

4.2 Post-flight reporting of volcanic activity

Note. — The detailed instructions for recording and reporting volcanic activity observations are given in the PANS-ATM (Doc 4444), Appendix 1.

4.2.1 On arrival of a flight at an aerodrome, the completed report of volcanic activity shall be delivered by the operator or a flight crew member, without delay, to the aerodrome meteorological office, or if such office is not easily accessible to arriving flight crew members, the completed form shall be dealt with in accordance with local arrangements made by the meteorological authority and the operator.

4.2.2 The completed report of volcanic activity received by an aerodrome meteorological office shall be transmitted without delay to the meteorological watch office responsible for the provision of meteorological watch for the flight information region in which the volcanic activity was observed

Table A4-1: Template for the special air-report (downlink)

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional; included whenever available.

Note. — Message to be prompted by the pilot-in-command. Currently only the condition "SEV TURB" can be automated (see 2.6.3).

Element as specified in Chapter 5	*Detailed content*	*Template(s)*	*Examples*
Message type designator (M)	Type of air-report (M)	ARS	ARS
Aircraft identification (M)	Aircraft radiotelephony call sign (M)	nnnnnn	VA812
DATA BLOCK 1			
Latitude (M)	Latitude in degrees and minutes (M)	Nnnnn *or* Snnnn	S4506
Longitude (M)	Longitude in degrees and minutes (M)	Wnnnnn *or* Ennnnn	E01056
Level (M)	Flight level (M)	FLnnn *or* FLnnn to FLnnn	FL330 FL280 to FL310
Time (M)	Time of occurrence in hours and minutes (M)	OBS AT nnnnZ	OBS AT 1216Z
DATA BLOCK 2			
Wind direction (M)	Wind direction in degrees true (M)	nnn/	262/
Wind speed (M)	Wind speed in metres per second (*or* knots) (M)	nnnMPS (*or* nnnKT)	040MPS (080KT)
Wind quality flag (M)	Wind quality flag (M)	n	1

Air temperature (M)	Air temperature in tenths of degrees C (M)	T[M]nnn	T127 TM455
Turbulence (C)	Turbulence in hundredths of m2/3 s-1 and the time of occurrence of the peak	EDRnnn/nn	EDR064/08
Humidity (C)	Relative humidity in per cent (C)	RHnnn	RH054
DATA BLOCK 3			
Condition prompting the issuance of a special air-report (M)		SEV TURB [EDRnnn]2 *or* SEV ICE *or* SEV MTW *or* TS GR3 *or* TS3 *or* HVY SS4 *or* VA CLD [FL nnn/nnn] *or* VA5 [MT nnnnnnnnnnnnnnnnnnn] *or* MOD TURB [EDRnnn]*2 or* MOD ICE	SEV TURB EDR076 VA CLD FL050/100

Notes. —

1. *The time of occurrence to be reported in accordance with Table A4-2.*
2. *The turbulence to be reported in accordance with 2.6.3.*
3. *Obscured, embedded or widespread thunderstorms or thunderstorms in squall lines.*
4. *Duststorm or sandstorm.*
5. *Pre-eruption volcanic activity or a volcanic eruption.*

Table A4-2: Time of occurrence of the peak value to be reported

Peak value of turbulence during the one-minute period .... minutes prior to the observation	Value to be reported
0 – 1	0
1 – 2 2 – 3 … 13 – 14 14 – 15	1 2 … 13 14
No timing information available	15

Table A4-3: Ranges and resolutions for the meteorological elements included in air-reports

Element as specified in Chapter 5	Range	Resolution
Wind direction: °true	000 – 360	1
Wind speed: MPS KT	00 – 125 00 – 250	1 1
Wind quality flag: (index)*	0 – 1	1
Air temperature: °C	–80 – +60	0.1
Turbulence: routine air-report: m2/3 s-1 (time of occurrence) *	0 – 2 0 – 15	0.01 1
Turbulence: special air-report: m2/3 s-1	0 – 2	0.01
Humidity: %	0 – 100	1
* Non-dimensional		

APPENDIX 5. TECHNICAL SPECIFICATIONS RELATED TO FORECASTS

(See Chapter 6 of this regulation)

1 CRITERIA RELATED TO TAF

1.1 TAF format

1.1.1 TAF shall be issued in accordance with the template shown in Table A5-1 and disseminated in the TAF code form prescribed by the World Meteorological Organization.

Note. — The TAF code form is contained in WMO Publication No. 306, Manual on Codes*, Volume I.1, Part A — Alphanumeric Codes.*

1.1.2 TAF shall be disseminated in digital form, in addition to the dissemination of the TAF in accordance with 1.1.1.

1.1.3 TAF if disseminated in digital form shall be formatted in accordance with a globally interoperable information exchange model and shall use extensible markup language (XML)/geography markup language (GML).

1.1.4 TAF if disseminated in digital form shall be accompanied by the appropriate metadata.

Note. — Guidance on the information exchange model, XML/GML and the metadata profile is provided in the Manual on the Digital Exchange of Aeronautical Meteorological Information *(Doc 10003).*

1.2. Inclusion of meteorological elements in TAF

Note. — Guidance on operationally desirable accuracy of forecasts is given in Attachment B.

1.2.1 Surface wind

1.2.1.1 In forecasting surface wind, the expected prevailing direction shall be given. When it is not possible to forecast a prevailing surface wind direction due to its expected variability, for example, during light wind conditions (less than 1.5 m/s (3 kt)) or thunderstorms, the forecast wind direction shall be indicated as variable using “VRB”. When the wind is forecast to be less than 0.5 m/s (1 kt), the forecast wind speed shall be indicated as calm. When the forecast maximum speed (gust) exceeds the forecast mean wind speed by 5 m/s (10 kt) or more, the forecast maximum wind speed shall be indicated. When a wind speed of 50 m/s (100 kt) or more is forecast, it shall be indicated to be more than 49 m/s (99 kt).

1.2.2 Visibility

1.2.2.1 When the visibility is forecast to be less than 800 m, it shall be expressed in steps of 50 m; when it is forecast to be 800 m or more but less than 5 km, in steps of 100 m; 5 km or more but less than 10 km, in kilometre steps; and when it is forecast to be 10 km or more, it should be expressed as 10 km, except when conditions of CAVOK are forecast to apply. The prevailing visibility should be forecast. When visibility is forecast to vary in different directions and the prevailing visibility cannot be forecast, the lowest forecast visibility should be given.

1.2.3 Weather phenomena

1.2.3.1 One or more, up to a maximum of three, of the following weather phenomena or combinations thereof, together with their characteristics and, where appropriate, intensity, shall be forecast if they are expected to occur at the aerodrome:

- freezing precipitation
- freezing fog
- moderate or heavy precipitation (including showers thereof)
- low drifting dust, sand or snow
- blowing dust, sand or snow
- duststorm
- sandstorm
- thunderstorm (with or without precipitation)
- squall
- funnel cloud (tornado or waterspout)
- other weather phenomena given in Appendix 3, 4.4.2.3, as agreed between the Meteorological Service Provider with the appropriate ATS authority and operators concerned.

1.2.3.2 The expected end of occurrence of those phenomena shall be indicated by the abbreviation "NSW".

1.2.4 Cloud

1.2.4.1 Cloud amount shall be forecast using the abbreviations "FEW", "SCT", "BKN" or "OVC" as necessary. When it is expected that the sky will remain or become obscured and clouds cannot be forecast and information on vertical visibility is available at the aerodrome, the vertical visibility should be forecast in the form "VV" followed by the forecast value of the vertical visibility. When several layers or masses of cloud are forecast, their amount and height of base should be included in the following order:

(a) the lowest layer or mass regardless of amount, to be forecast as FEW, SCT, BKN or OVC as appropriate;

(b) the next layer or mass covering more than 2/8, to be forecast as SCT, BKN or OVC as appropriate;

(c) the next higher layer or mass covering more than 4/8, to be forecast as BKN or OVC as appropriate; and

(d) cumulonimbus clouds and/or towering cumulus clouds, whenever forecast and not already *included under a) to c).*

1.2.4.2 Cloud information shall be limited to cloud of operational significance; when no cloud of operational significance is forecast, and "CAVOK" is not appropriate, the abbreviation "NSC" shall be used.

1.2.5 Temperature

1.2.5.1 *When forecast temperatures are included in accordance with Asia and Pacific Regional (APAC) air navigation agreement, the maximum and minimum temperatures expected to occur during the period of validity of the TAF should be given, together with their corresponding times of occurrence.*

1.3 Use of change groups

Note. — Guidance on the use of change and time indicators in TAF is given in Table A5-2.

1.3.1 The criteria used for the inclusion of change groups in TAF or for the amendment of TAF shall be based on any of the following weather phenomena or combinations thereof being forecast to begin or end or change in intensity:

— freezing fog

— freezing precipitation

— moderate or heavy precipitation (including showers thereof)

— thunderstorm

— duststorm

— sandstorm.

1.3.2 The criteria used for the inclusion of change groups in TAF or for the amendment of TAF shall be based on the following order:

(a) when the mean surface wind direction is forecast to change by 60º or more, the mean speed before and/or after the change being 5 m/s (10 kt) or more;

(b) when the mean surface wind speed is forecast to change by 5 m/s (10 kt) or more;

(c) when the variation from the mean surface wind speed (gusts) is forecast to change by 5 m/s (10 kt) or more, the mean speed before and/or after the change being 7.5 m/s (15 kt) or more;

(d) when the surface wind is forecast to change through values of operational significance. The threshold values should be established by the meteorological authority in consultation with the appropriate ATS authority and operators concerned, taking into account changes in the wind which would:

1) require a change in runway(s) in use; and

2) indicate that the runway tailwind and crosswind components will change through values representing the main operating limits for typical aircraft operating at the aerodrome;

(e) when the visibility is forecast to improve and change to or pass through one or more of the following values, or when the visibility is forecast to deteriorate and pass through one or more of the following values:

1) 150, 350, 600, 800, 1 500 or 3 000 m; or

2) 5 000 m in cases where significant numbers of flights are operated in accordance with the visual flight rules;

(f) when any of the following weather phenomena or combinations thereof are forecast to begin or end:

— low drifting dust, sand or snow

— blowing dust, sand or snow

— squall

— funnel cloud (tornado or waterspout);

(g) when the height of base of the lowest layer or mass of cloud of BKN or OVC extent is forecast to lift and change to or pass through one or more of the following values, or when the height of the lowest layer or mass of cloud of BKN or OVC extent is forecast to lower and pass through one or more of the following values:

1) 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); or

2) 450 m (1 500 ft) in cases where significant numbers of flights are operated in accordance with the visual flight rules;

(h) when the amount of a layer or mass of cloud below 450 m (1 500 ft) is forecast to change:

1) from NSC, FEW or SCT to BKN or OVC; or

2) from BKN or OVC to NSC, FEW or SCT;

(i) when the vertical visibility is forecast to improve and change to or pass through one or more of the following values, or when the vertical visibility is forecast to deteriorate and pass through one or more of the following values: 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); and

(j) any other criteria based on local aerodrome operating minima, as agreed between the meteorological authority and the operators concerned.

Note. — Other criteria based on local aerodrome operating minima are to be considered in parallel with similar criteria for the issuance of SPECI developed in response to Appendix 3, 2.3.3 h).

1.3.3 When a change in any of the elements given in Chapter 6, 6.2.3 is required to be indicated in accordance with the criteria given in 1.3.2, the change indicators "BECMG" or "TEMPO" shall be used followed by the time period during which the change is expected to occur. The time period shall be indicated as the beginning and end of the period in whole hours UTC. Only those elements for which a significant change is expected shall be included following a change indicator. However, in the case of significant changes in respect of cloud, all cloud groups, including layers or masses not expected to change, shall be indicated.

1.3.4 The change indicator "BECMG" and the associated time group shall be used to describe changes where the meteorological conditions are expected to reach or pass through specified threshold values at a regular or irregular rate and at an unspecified time during the time period. The time period shall normally not exceed 2 hours but in any case, should not exceed 4 hours.

1.3.5 The change indicator "TEMPO" and the associated time group shall be used to describe expected frequent or infrequent temporary fluctuations in the meteorological conditions which reach or pass specified threshold values and last for a period of less than one hour in each instance and, in the aggregate, cover less than one-half of the forecast period during which the fluctuations are expected to occur. If the temporary fluctuation is expected to last one hour or longer, the change group "BECMG" shall be used in accordance with 1.3.4 or the validity *period should be subdivided in accordance with 1.3.6.*

1.3.6 Where one set of prevailing weather conditions is expected to change significantly and more or less completely to a different set of conditions, the period of validity should be subdivided into self-contained periods using the abbreviation "FM" followed immediately by a six-figure time group in days, hours and minutes UTC indicating the time the change is expected to occur. The subdivided period following the abbreviation "FM" should be self-contained and all forecast conditions given before the abbreviation should be superseded by those following the abbreviation.

1.4 Use of probability groups

1.4.1 The probability of occurrence of an alternative value of a forecast element or elements should be indicated, as necessary, by use of the abbreviation "PROB" followed by the probability in tens of per cent and the time period during which the alternative value(s) is (are) expected to apply. The probability information should be placed after the element or elements forecast and be followed by the alternative value of the element or elements. The probability of a forecast of temporary fluctuations in meteorological conditions should be indicated, as necessary, by use of the abbreviation "PROB" followed by the probability in tens of per cent, placed before the change indicator "TEMPO" and associated time group. A probability of an alternative value or change of less than 30 per cent should not be considered sufficiently significant to be indicated. A probability of an alternative value or change of 50 per cent or more, for aviation purposes, should not be considered a probability but instead should be indicated, as necessary, by use of the change indicators "BECMG" or "TEMPO" or by subdivision of the validity period using the abbreviation "FM". The probability group should not be used to qualify the change indicator "BECMG" nor the time indicator "FM".

1.5 Numbers of change and probability groups

1.5.1 The number of change and probability groups should be kept to a minimum and should not normally exceed five groups.

1.6 Dissemination of TAF

1.6.1 TAF and amendments thereto shall be disseminated to international OPMET databanks and the centres designated by Asia and Pacific Regional (APAC) air navigation agreement for the operation of aeronautical fixed service internet-based services, in accordance with Asia and Pacific Regional (APAC) air navigation agreement.

2 CRITERIA RELATED TO TREND FORECASTS

2.1 Format of trend forecasts

2.1.1 Trend forecasts shall be issued in accordance with the templates shown in Appendix 3, Tables A3-1 and A3-2. The units and scales used in the trend forecast shall be the same as those used in the report to which it is appended.

Note. — Examples of trend forecasts are given in Appendix 3.

2.2 Inclusion of meteorological elements in trend forecasts

2.2.1 General provisions

2.2.1.1 The trend forecast shall indicate significant changes in respect of one or more of the elements: surface wind, visibility, weather and clouds. Only those elements shall be included for which a significant change is expected. However, in the case of significant changes in respect of cloud, all cloud groups, including layers or masses not expected to change, shall be indicated. In the case of a significant change in visibility, the phenomenon causing the reduction of visibility shall also be indicated. When no change is expected to occur, this shall be indicated by the term "NOSIG".

2.2.2 Surface wind the trend forecast shall indicate changes in the surface wind which involve:

(a) a change in the mean wind direction of 60° or more, the mean speed before and/or after the change being 5 m/s (10 kt) or more;

(b) a change in mean wind speed of 5 m/s (10 kt) or more; and

(c) changes in the wind through values of operational significance. The threshold values shall be established by the meteorological authority in consultation with the appropriate ATS authority and operators concerned, taking into account changes in the wind which would:

1) require a change in runway(s) in use; and

2) indicate that the runway tailwind and crosswind components will change through values representing the main operating limits for typical aircraft operating at the aerodrome.

2.2.3 Visibility

2.2.3.1 When the visibility is expected to improve and change to or pass through one or more of the following values, or when the visibility is expected to deteriorate and pass through one or more of the following values: 150, 350, 600, 800, 1 500 or 3 000 m, the trend forecast shall indicate the change. When significant numbers of flights are conducted in accordance with the visual flight rules, the forecast shall additionally indicate changes to or passing through 5 000 m.

Note. — In trend forecasts appended to local routine and special reports, visibility refers to the forecast visibility along the runway(s); in trend forecasts appended to METAR and SPECI, visibility refers to the forecast prevailing visibility.

2.2.4 Weather phenomena

2.2.4.1 The trend forecast shall indicate the expected onset, cessation or change in intensity of one or more of the following weather phenomena or combinations thereof:

— freezing precipitation

— moderate or heavy precipitation (including showers thereof)

— thunderstorm (with precipitation)

— duststorm

— sandstorm

— other weather phenomena given in Appendix 3, 4.4.2.3, as agreed by the meteorological authority with the ATS authority and operators concerned.

2.2.4.2 The trend forecast shall indicate the expected onset or cessation of one or more of the following weather phenomena or combinations thereof:

— freezing fog

— low drifting dust, sand or snow

— blowing dust, sand or snow

— thunderstorm (without precipitation)

— squall

— funnel cloud (tornado or waterspout).

2.2.4.3 The total number of phenomena reported in 2.2.4.1 and 2.2.4.2 shall not exceed three.

2.2.4.4 The expected end of occurrence of the weather phenomena shall be indicated by the abbreviation “NSW”.

2.2.5 Clouds

2.2.5.1 When the height of the base of a cloud layer of BKN or OVC extent is expected to lift and change to or pass through one or more of the following values, or when the height of the base of a cloud layer of BKN or OVC extent is expected to lower and pass through one or more of the following values: 30, 60, 150, 300 and 450 m (100, 200, 500, 1 000 and 1 500 ft), the trend forecast shall indicate the change. When the height of the base of a cloud layer is below or is expected to fall below or rise above 450 m (1 500 ft), the trend forecast shall also indicate changes in cloud amount from FEW, or SCT increasing to BKN or OVC, or changes from BKN or OVC decreasing to FEW or SCT. When no clouds of operational significance are forecast and “CAVOK” is not appropriate, the abbreviation “NSC” shall be used.

2.2.6 Vertical visibility

2.2.6.1 When the sky is expected to remain or become obscured and vertical visibility observations are available at the aerodrome, and the vertical visibility is forecast to improve and change to or pass through one or more of the following values, or when the vertical visibility is forecast to deteriorate and pass through one or more of the following values: 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft), the trend forecast shall indicate the change.

2.2.7 Additional criteria

2.2.7.1 Criteria for the indication of changes based on local aerodrome operating minima, additional to those specified in 2.2.2 to 2.2.6, shall be used as agreed between the meteorological authority and the operator concerned.

2.3 Use of change groups

Note. —Guidance on the use of change indicators in trend forecasts is given in Appendix 3, Table A3-3.

2.3.1 When a change is expected to occur, the trend forecast shall begin with one of the change indicators “BECMG” or “TEMPO”.

2.3.2 The change indicator “BECMG” shall be used to describe forecast changes where the meteorological conditions are expected to reach or pass-through specified values at a regular or irregular rate. The period during which, or the time at which, the change is forecast to occur shall be indicated, using the abbreviations “FM”, “TL” or “AT”, as appropriate, each followed by a time group in hours and minutes. When the change is forecast to begin and end wholly within the trend forecast period, the beginning and end of the change shall be indicated by using the abbreviations “FM” and “TL”, respectively, with their associated time groups. When the change is forecast to commence at the beginning of the trend forecast period but be completed before the end of that period, the abbreviation “FM” and its associated time group shall be omitted and only “TL” and its associated time group shall be used. When the change is forecast to begin during the trend forecast period and be completed at the end of that period, the abbreviation “TL” and its associated time group shall be omitted and only “FM” and its associated time group shall be used. When the change is forecast to occur at a specified time during the trend forecast period, the abbreviation “AT” followed by its associated time group shall be used. When the change is forecast to commence at the beginning of the trend forecast period and be completed by the end of that period or when the

change is forecast to occur within the trend forecast period but the time is uncertain, the abbreviations "FM", "TL" or "AT" and their associated time groups shall be omitted and the change indicator "BECMG" shall be used alone. The change indicator "TEMPO" shall be used to describe forecast temporary fluctuations in the meteorological conditions which reach or pass specified values and last for a period of less than one hour in each instance and, in the aggregate, cover less than one-half of the period during which the fluctuations are forecast to occur. The period during which the temporary fluctuations are forecast to occur shall be indicated, using the abbreviations "FM" and/or "TL", as appropriate, each followed by a time group in hours and minutes. When the period of temporary fluctuations in the meteorological conditions is forecast to begin and end wholly within the trend forecast period, the beginning and end of the period of temporary fluctuations shall be indicated by using the abbreviations "FM" and "TL", respectively, with their associated time groups. When the period of temporary fluctuations is forecast to commence at the beginning of the trend forecast period but cease before the end of that period, the abbreviation "FM" and its associated time group shall be omitted and only "TL" and its associated time group shall be used. When the period of temporary fluctuations is forecast to begin during the trend forecast period and cease by the end of that period, the abbreviation "TL" and its associated time group shall be omitted and only "FM" and its associated time group shall be used. When the period of temporary fluctuations is forecast to commence at the beginning of the trend forecast period and cease by the end of that period, both abbreviations "FM" and "TL" and their associated time groups shall be omitted and the change indicator "TEMPO" shall be used alone.

2.4 Use of the probability indicator

2.4.1 The indicator "PROB" shall not be used in trend forecasts.

3 CRITERIA RELATED TO FORECASTS FOR TAKE-OFF

3.1 Format of forecasts for take-off

3.1.1 The format of the forecast shall be as agreed between the meteorological authority and the operator concerned. The order of the elements and the terminology, units and scales used in forecasts for take-off shall be the same as those used in reports for the same aerodrome.

3.2 Amendments to forecasts for take-off

3.2.1 the criteria for the issuance of amendments to forecasts for take-off for surface wind direction and speed, temperature and pressure and any other elements agreed locally shall be agreed between the meteorological authority and the operators concerned. The criteria should be consistent with the corresponding criteria for special reports established for the aerodrome in accordance with Appendix 3, 2.3.1.

4 CRITERIA RELATED TOAREA FORECASTS FOR LOW-LEVEL FLIGHTS

4.1 Format and content of GAMET area forecasts

4.1.1 When prepared in GAMET format, area forecasts shall contain two sections: Section I related to information on en-route weather phenomena hazardous to low-level flights, prepared in support of the issuance of AIRMET information, and Section II related to additional information required by low-level flights. The content and order of elements in a GAMET area forecast, when prepared, shall be in accordance with the template shown in Table A5-3. Additional elements in Section II shall be included in accordance with Asia and Pacific Regional (APAC) air navigation agreement. Elements which are already covered by a SIGMET message shall be omitted from GAMET area forecasts.

4.2 Amendments to GAMET area forecasts

4.2.1 When a weather phenomenon hazardous to low-level flights has been included in the GAMET area forecast and the phenomenon forecast does not occur, or is no longer forecast, a GAMET AMD shall be issued, amending only the weather element concerned.

Note. — Specifications regarding the issuance of AIRMET information amending the area forecast in respect of weather phenomena hazardous for low-level flights are given in Appendix 6.

4.3 Content of area forecasts for low-level flights in chart form

4.3.1 When chart form is used for area forecasts for low-level flights, the forecast of upper wind and upper-air temperature shall be issued for points separated by no more than 500 km (300 NM) and for at least the following altitudes: 600, 1 500 and 3 000 m (2 000, 5 000 and 10 000 ft), and 4 500 m (15 000 ft) in mountainous areas.

4.3.2 When chart form is used for area forecasts for low-level flights, the forecast of SIGWX phenomena shall be issued as low-level SIGWX forecast for flight levels up to 100 (or up to flight level 150 in mountainous areas, or higher, where necessary). Low-level SIGWX forecasts shall include the following items:

(a) the phenomena warranting the issuance of a SIGMET as given in Appendix 6 and which are expected to affect low-level flights; and

(b) the elements in area forecasts for low-level flights as given in Table A5-3 except elements concerning:

1) upper winds and temperatures; and

2) forecast QNH.

Note. — Guidance on the use of terms "ISOL", "OCNL" and "FRQ" referring to cumulonimbus and towering cumulus clouds, and thunderstorms is given in Appendix 6.

4.4 Exchange of area forecasts for low-level flights

4.4.1 Area forecasts for low-level flights prepared in support of the issuance of AIRMET information shall be exchanged between aerodrome meteorological offices and/or meteorological watch offices responsible for the issuance of flight documentation for low-level flights in the flight Information regions concerned.

Table A5-1. Template for TAF

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, dependent on meteorological conditions or method of observation;
O = inclusion optional.
Note 1. — The ranges and resolutions for the numerical elements included in TAF are shown in Table A5-4 of this appendix.
Note 2. — The explanations for the abbreviations can be found in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes (PANS-ABC, Doc 8400

Element as specified in Chapter 6	Detailed content	Template(s)			Examples
Identification of the type	Type of forecast (M)	TAF or TAF AMD or TAF COR			TAF TAF AMD
Location indicator (M)	ICAO location indicator (M)	nnnn			YUDO1
Time of issue of forecast	Day and time of issue of the forecast in UTC (M)	nnnnnnZ			160000Z
Identification of a missing forecast (C)	Missing forecast identifier (C)	NIL			NIL
END OF TAF IF THE FORECAST IS MISSING.					
Surface wind (M)	Wind direction (M)	nnn *or* VRB2			24004MPS; VRB01MPS (24008KT); (VRB02KT) 19005MPS (19010KT) 00000MPS (00000KT) 140P49MPS (140P99KT) 12003G09MPS (12006G18KT) 24008G14MPS (24016G28KT)
	Wind speed (M)	[P]nn[n]			
	Significant speed variations (C)3	G[P]nn[n]			
	Units of measurement (M)	MPS (*or* KT)			
Visibility (M)	Prevailing visibility (M)	nnnn		C A V O K	0350 CAVOK 7000 9000 9999
Weather (C)4, 5	Intensity of weather phenomena (C)6	– *or* +	—		
	Characteristics and type of weather phenomena (C)7	DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* SHGR *or*	FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or* TS *or* BCFG *or*		RA HZ +TSRA FG –FZDZ PRFG +TSRASN SNRA FG

		SHGS *or* SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN		BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG		
Cloud (M)8	Cloud amount and height of base or vertical visibility (M)	FEWnnn or SCTnnn *or* BKNnnn *or* OVCnnn	VVnnn or VV///	NSC		FEW010 VV005 OVC020 VV/// NSC SCT005 BKN012 SCT008 BKN025CB
	Cloud type (C)4	CB *or* TCU	—			
Temperature (O)9	Name of the element (M)	TX				TX25/1013Z TN09/1005Z TX05/2112Z TNM02/2103Z
	Maximum temperature (M)	[M]nn/				
	Day and time of occurrence of the maximum temperature (M)	nnnnZ				
	Name of the element (M)	TN				
	Minimum temperature (M)	[M]nn/				
	Day and time of occurrence of the minimum temperature (M)	nnnnZ				
Expected significant changes to one or more of the above elements during the period of validity (C)4, 10	Change or probability indicator (M)	PROB30 [TEMPO] *or* PROB40 [TEMPO] *or* BECMG *or* TEMPO *or* FM				TEMPO 0815/0818 25017G25MPS (TEMPO 0815/0818 25034G50KT) TEMPO 2212/2214 17006G13MPS 1000 TSRA SCT010CB BKN020
	Period of occurrence or change (M)	nnnn/nnnn or nnnnnn11				
	Wind (C)4	nnn[P]nn[n][G[P]nn[n]]MPS *or* VRBnnMPS (*or* nnn[P]nn[G[P]nn]KT or VRBnnKT)				
	Prevailing visibility (C)4	nnnn			C A	

	Weather phenomenon: intensity (C)6	– or +	—	NSW	V O K	(TEMPO 2212/2214 17012G26KT 1000 TSRA SCT010CB BKN020) BECMG 3010/3011 00000MPS 2400 OVC010 (BECMG 3010/3011 00000KT 2400 OVC010) PROB30 1412/1414 0800 FG BECMG 1412/1414 RA TEMPO 2503/2504 FZRA TEMPO 0612/0615 BLSN PROB40 TEMPO 2923/3001 0500 FG
	Weather phenomenon: characteristics and type (C)4, 7	DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* SHGR *or* SHGS *or*	IC *or* FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or* TS *or* BCFG *or* BLDU *or*			
		SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN	BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG			
	Cloud amount and height of base or vertical visibility (C)4	FEWnnn *or* SCTnnn *or* BKNnnn *or* OVCnnn	VVnnn or VV///	NSC		FM051230 15015KMH 9999 BKN020 (FM051230 15008KT 9999 BKN020) BECMG 1618/1620 8000 NSW NSC BECMG 2306/2308 SCT015CB BKN020
	Cloud type (C)4	CB *or* TCU	—			

Notes. —

1. *Fictitious location.*
2. *To be used in accordance with 1.2.1.*
3. *To be included in accordance with 1.2.1.*
4. *To be included whenever applicable.*
5. *One or more, up to a maximum of three, groups in accordance with 1.2.3.*
6. *To be included whenever applicable in accordance with 1.2.3. No qualifier for moderate intensity.*
7. *Weather phenomena to be included in accordance with 1.2.3.*
8. *Up to four cloud layers in accordance with 1.2.4.*
9. *To be included in accordance with 1.2.5, consisting of up to a maximum of four temperatures (two maximum temperatures and two minimum temperatures).*
10. *To be included in accordance with 1.3, 1.4 and 1.5.*
11. *To be used with FM only*

Table A5-2. Use of change and time indicators in TAF

Change or time indicator		*Time period*	*Meaning*	
FM		ndndnhnhnmnm	used to indicate a significant change in most weather elements occurring at ndnd day, nhnh hours and nmnm minutes (UTC); all the elements given before “FM” are to be included following “FM” (i.e. they are all superseded by those following the abbreviation)	
BECMG		nd1nd1nh1nh1/nd2nd2nh2nh2	the change is forecast to commence at nd1nd1 day and nh1nh1 hours (UTC) and be completed by nd2nd2 day and nh2nh2 hours (UTC); only those elements for which a change is forecast are to be given following “BECMG”; the time period nd1nd1nh1nh1/nd2nd2nh2nh2 should normally be less than 2 hours and in any case should not exceed 4 hours	
TEMPO		nd1nd1nh1nh1/nd2nd2nh2nh2	temporary fluctuations are forecast to commence at nd1nd1 day and nh1nh1 hours (UTC) and cease by nd2nd2 day and nh2nh2 hours (UTC); only those elements for which fluctuations are forecast are to be given following “TEMPO”; temporary fluctuations should not last more than one hour in each instance, and in the aggregate, cover less than half of the period nd1nd1nh1nh1/nd2nd2nh2nh2	
PROBnn	—	nd1nd1nh1nh1/nd2nd2nh2nh2	probability of occurrence (in %) of an alternative value of a forecast element or elements; nn = 30 or nn = 40 only; to be placed after the element(s) concerned	—
	TEMPO	nd1nd1nh1nh1/nd2nd2nh2nh2		probability of occurrence of temporary fluctuations

Table A5-3. Template for GAMET
(Reserved)

Table A5-4. Ranges and resolutions for the numerical elements included in TAF

Element as specified in Chapter 6	Range	Resolution
Wind direction: ° true	000 – 360	10
Wind speed: MPS	00 – 99*	1
KT	00 – 199*	1
Visibility: M	0000 – 0750	50
M	0800 – 4 900	100
M	5 000 – 9 000	1 000
M	10 000 –	0 (fixed value: 9 999)
Vertical visibility: 30's M (100's FT)	000 – 020	1
Cloud: height of cloud base: 30's M (100's FT)	000 – 100	1
Air temperature (maximum and minimum): °C	–80 – +60	1
* There is no aeronautical requirement to report surface wind speeds of 50 m/s (100 kt) or more; however, provision has been made for reporting wind speeds up to 99 m/s (199 kt) for non-aeronautical purposes, as necessary.		

Example A5-1: TAF

TAF for YUDO (Donlon/International) *:

TAF YUDO 151800Z 1600/1618 13005MPS 9000 BKN020 BECMG 1606/1608 SCT015CB BKN020 TEMPO 1608/1612 17006G12MPS 1000 TSRA SCT010CB BKN020 FM161230 15004MPS 9999 BKN020

Meaning of the forecast:

TAF for Donlon/International* issued on the 15th of the month at 1800 UTC valid from 0000 UTC to 1800 UTC on the 16th of the month; surface wind direction 130 degrees; wind speed 5 metres per second; visibility 9 kilometres, broken cloud at 600 metres; becoming between 0600 UTC and 0800 UTC on the 16th of the month, scattered cumulonimbus cloud at 450 metres and broken cloud at 600 metres; temporarily between 0800 UTC and 1200 UTC on the 16th of the month surface wind direction 170 degrees; wind speed 6 metres per second gusting to 12 metres per second; visibility 1 000 metres in a thunderstorm with moderate rain, scattered cumulonimbus cloud at 300 metres and broken cloud at 600 metres; from 1230 UTC on the 16th of the month surface wind direction 150 degrees; wind speed 4 metres per second; visibility 10 kilometres or more; and broken cloud at 600 metres.

Fictitious location

Note. — In this example, the primary units "metre per second" and "metre" were used for wind speed and height of cloud base, respectively. However, in accordance with Annex 5, the corresponding non-SI alternative units "knot" and "foot" may be used instead.

Example A5-2: Cancellation of TAF

Cancellation of TAF for YUDO (Donlon/International) *: TAF AMD YUDO 161500Z 1600/1618 CNL Meaning of the forecast: Amended TAF for Donlon/International* issued on the 16th of the month at 1500 UTC cancelling the previously issued TAF valid from 0000 UTC to 1800 UTC on the 16th of the month. * Fictitious location

Example A5-3: GAMET area forecast

(Reserved)

APPENDIX 6. TECHNICAL SPECIFICATIONS RELATED TO SIGMET AND AIRMET INFORMATION, AERODROME WARNINGS AND WIND SHEAR WARNINGS AND ALERTS

(See Chapter 7 of this regulation)

Note. — Data type designators to be used in abbreviated headings for SIGMET, AIRMET, tropical cyclone and volcanic ash advisory messages are given in WMO Publication No. 386, Manual on the Global Telecommunication System.

1 SPECIFICATIONS RELATED TO SIGMET INFORMATION

1.1 Format of SIGMET messages

1.1.1 The content and order of elements in a SIGMET message shall be in accordance with the template shown in Table A6-1 A.

1.1.2 Messages containing SIGMET information shall be identified as: "SIGMET".

1.1.3 The sequence number referred to in the template in Table A6-1A shall correspond with the number of SIGMET messages issued for the flight information region since 0001 UTC on the day concerned. The meteorological watch offices whose area of responsibility encompasses more than one FIR and/or CTA shall issue separate SIGMET messages for each FIR and/or CTA within their area of responsibility.

1.1.4 In accordance with the template in Table A6-1A, only one of the following phenomena shall be included in a SIGMET message, using the abbreviations as indicated below:

At cruising levels (irrespective of altitude): thunderstorm

— obscured	OBSC TS
— embedded	EMBD TS
— frequent	FRQ TS
— squall line	SQL TS
— obscured with hail	OBSC TSGR
— embedded with hail	EMBD TSGR
— frequent, with hail	FRQ TSGR
— squall line with hail	SQL TSGR
tropical cyclone	
— tropical cyclone with 10-minute mean surface wind speed of 17 m/s (34 kt) or more	TC (+ cyclone name)
turbulence	
— severe turbulence	SEV TURB
icing	
— severe icing	SEV ICE
— severe icing due to freezing rain	SEV ICE (FZRA)
wave mountain	
— severe mountain wave	SEV MTW
duststorm	
— heavy duststorm	HVY DS
sandstorm	
— heavy sandstorm	HVY SS
volcanic ash	
— volcanic ash	VA (+ volcano name, if known)
radioactive cloud	RDOACT CLD

1.1.5 SIGMET information shall not contain unnecessary descriptive material. In describing the weather phenomena for which the SIGMET is issued, no descriptive material additional to that given in 1.1.4 shall be included. SIGMET information concerning thunderstorms or a tropical cyclone shall not include references to associated turbulence and icing.

1.1.6 Meteorological Watch Offices (MWO) in a position to do so shall issue SIGMET information in IWXXM GML form, in addition to the issuance of this SIGMET information in abbreviated plain language in accordance with 1.1.1.

Note. — The technical specifications for IWXXM are contained in the Manual on Codes (WMONo. 306), Volume I.3, Part D — Representation Derived from Data Models. Guidance on the implementation of IWXXM is provided in the Manual on the ICAO Meteorological Information Exchange Model (IWXXM) (Doc 10003).

1.1.7 SIGMET, when issued in graphical format, should be as specified in Appendix 1 including the use of applicable symbols and/or abbreviations.

1.2 Dissemination of SIGMET messages

1.2.1 SIGMET messages shall be disseminated to meteorological watch offices, WAFCs and to other meteorological offices in accordance with Asia and Pacific Regional (APAC) air navigation agreement. SIGMET messages for volcanic ash shall also be disseminated to VAACs.

1.2.2 SIGMET messages shall be disseminated to international OPMET databanks and the centres designated by Asia and Pacific Regional (APAC) air navigation agreement for the operation of aeronautical fixed service internet-based services, in accordance with Asia and Pacific Regional (APAC) air navigation agreement.

2 SPECIFICATIONS RELATED TO AIRMET INFORMATION

2.1 Format of AIRMET messages

2.1.1 The content and order of elements in an AIRMET message shall be in accordance with the template shown in Table A6-1A.

2.1.2 The sequence number referred to in the template in Table A6-1A shall correspond with the number of AIRMET messages issued for the flight information region since 0001 UTC on the day concerned. The meteorological watch offices whose area of responsibility encompasses more than one FIR and/or CTA shall issue separate AIRMET messages for each FIR and/or CTA within its area of responsibility.

2.1.3 The flight information region shall be divided in sub-areas, as necessary.

2.1.4 In accordance with the template in Table A6-1A, only one of the following phenomena shall be included in an AIRMET message, using the abbreviations as indicated below:

At cruising levels below flight level 100 (or below flight level 150 in mountainous areas, or higher, where necessary):

— surface wind speed	
– widespread mean surface wind speed above 15 m/s (30 kt)	SFC WSPD (+ wind speed, direction and units)
— surface visibility	
– widespread areas affected by reduction of visibility to less than 5 000 m, including the weather phenomena causing the reduction of visibility	SFC VIS (+ visibility) (+ one of the following weather phenomenon or combinations thereof: BR, DS, DU, DZ, FC, FG, FU, GR, GS, HZ, PL ,PO, RA, SA, SG, SN, SQ, SS or VA)

— thunderstorms
  – isolated thunderstorm without hail — ISOL TS
  – occasional thunderstorms without hail — OCNL TS
  – isolated thunderstorms with hail — ISOL TSGR
  – occasional thunderstorms with hail — OCNL TSGR
— mountain obscuration
  – mountains obscured — MT OBSC
— cloud
  – widespread areas of broken or overcast cloud with height of base less than 300 m (1 000 ft) above ground level:
    – broken — BKN CLD (+ height of the base and top and units)
    – overcast — OVC CLD (+ height of the base and top and units)
  – cumulonimbus clouds which are:
    – isolated — ISOL CB
    – occasional — OCNL CB
    – frequent — FRQ CB
  – towering cumulus clouds which are:
    – isolated — ISOL TCU
    – occasional — OCNL TCU
    – frequent — FRQ TCU
— icing
  – moderate icing (except for icing in convective clouds) — MOD ICE
— turbulence
  – moderate turbulence (except for turbulence in convective clouds) — MOD TURB
— mountain wave
  – moderate mountain wave — MOD MTW

2.1.5 AIRMET information shall not contain unnecessary descriptive material. In describing the weather phenomena for which the AIRMET is issued, no descriptive material additional to that given in 2.1.4 shall be included. AIRMET information concerning thunderstorms or cumulonimbus clouds shall not include references to associated turbulence and icing.

Note. — The specifications for SIGMET information which is also applicable to low-level flights are given in 1.1.4.

2.2 Dissemination of AIRMET messages

2.2.1 AIRMET messages shall be disseminated to meteorological watch offices in adjacent flight information regions and to other meteorological watch offices or aerodrome meteorological offices, as agreed by the meteorological authorities concerned.

2.2.2 AIRMET messages shall be transmitted to international operational meteorological databanks and the centres designated by Asia and Pacific Regional (APAC) air navigation agreement for the operation of aeronautical fixed service satellite distribution systems, in accordance with Asia and Pacific Regional (APAC) air navigation agreement.

3 SPECIFICATIONS RELATED TO SPECIAL AIR-REPORTS

Note. — This appendix deals with the uplink of special air-reports. The general specifications related to special air- reports are in Appendix 4.

3.1 Special air-reports should be uplinkeded for 60 minutes after their issuance.

3.2 Information on wind and temperature included in automated special air-reports shall not be uplinked to other aircraft in flight.

4 DETAILED CRITERIA RELATED TO SIGMET AND AIRMET MESSAGES AND SPECIAL AIR-REPORTS (UPLINK)

4.1 Identification of the flight information region (FIR)

4.1 In cases where the airspace is divided into a flight information region (FIR) and an upper flight information region (UIR), the SIGMET shall be identified by the location indicator of the air traffic services unit serving the FIR.

Note. — The SIGMET message applies to the whole airspace within the lateral limits of the FIR, i.e. to the FIR and to the UIR. The particular areas and/or flight levels affected by the meteorological phenomena causing the issuance of the SIGMET are given in the text of the message.

4.2 Criteria related to phenomena included in SIGMET and AIRMET messages and special air-reports (uplink)

4.2.1 a*n area of thunderstorms and cumulonimbus clouds* shall *be considered:*

(a) *obscured (OBSC) if it is obscured by haze or smoke or cannot be readily seen due to darkness;*

(b) *embedded (EMBD) if it is embedded within cloud layers and cannot be readily recognize*

(c) *isolated (ISOL) if it consists of individual features which affect, or are forecast to affect, an area with a maximum spatial coverage less than 50 per cent of the area concerned (at a fixed time or during the period of validity); and*

(d) *occasional (OCNL) if it consists of well-separated features which affect, or are forecast to affect, an area with a maximum spatial coverage between 50 and 75 per cent of the area concerned (at a fixed time or during the period of validity).*

4.2.2 An area of thunderstorms shall be considered frequent (FRQ) if within that area there is little or no separation between adjacent thunderstorms with a maximum spatial coverage greater than 75 per cent of the area affected, or forecast to be affected, by the phenomenon (at a fixed time or during the period of validity).

4.2.3 Squall line (SQL) shall indicate a thunderstorm along a line with little or no space between individual clouds.

4.2.4 Hail (GR) shall be used as a further description of the thunderstorm, as necessary.

4.2.5 Severe and moderate turbulence (TURB) shall refer only to: low-level turbulence associated with strong surface winds; rotor streaming; or turbulence whether in cloud or not in cloud (CAT). Turbulence should not be used in connection with convective clouds.

4.2.6 Turbulence shall be considered:

(a) severe whenever the peak value of the cube root of EDR exceeds 0.7; and

(b) moderate whenever the peak value of the cube root of EDR is above 0.4 and below or equal to 0.7.

4.2.7 Severe and moderate icing (ICE) shall refer to icing in other than convective clouds. Freezing rain (FZRA) should refer to severe icing conditions caused by freezing rain.

4.2.8 A mountain wave (MTW) shall be considered:

(a) *severe whenever an accompanying downdraft of 3.0 m/s (600 ft/min) or more and/or severe turbulence is observed or forecast; and*

(b) *moderate whenever an accompanying downdraft of 1.75–3.0 m/s (350–600 ft/min) and/or moderate turbulence is observed or forecast.*

4.2.9 Sandstorm/duststorm shall be considered:

(a) *heavy whenever the visibility is below 200 m and the sky is obscured; and*

(b) *moderate whenever the visibility is:*

1) below 200 m and the sky is not obscured; or

2) between 200 m and 600 m.

5 SPECIFICATIONS RELATED TO AERODROME WARNINGS

5.1 Format and dissemination of aerodrome warnings

5.1.1 The aerodrome warnings shall be issued in accordance with the template in Table A6-2 where required by operators or aerodrome services, and shall be disseminated in accordance with local arrangements to those concerned.

5.1.2 The sequence number referred to in the template in Table A6-2 shall correspond with the number of aerodrome warnings issued for the aerodrome since 0001 UTC on the day concerned.

5.1.3 In accordance with the template in Table A6-2, aerodrome warnings shall relate to the occurrence or expected occurrence of one or more of the following phenomena:

— *tropical cyclone (to be included if the 10-minute mean surface wind speed at the aerodrome is expected to be 17 m/s (34 kt) or more)*

— *thunderstorm*

— *hail*

— *snow (including the expected or observed snow accumulation)*

— *freezing precipitation*

— *hoar frost or rime*

— *sandstorm*

— *duststorm*

— *rising sand or dust*

— *strong surface wind and gusts*

— *squall*

— *frost*

— *volcanic ash*

— *tsunami*

— *volcanic ash deposition*

— *other phenomena as agreed locally*

Note. — Aerodrome warnings related to the occurrence or expected occurrence of tsunami are not required where a national public safety plan for tsunami is integrated with the "at risk" aerodrome concerned.

5.1.4 The use of text additional to the abbreviations listed in the template in Table A6-2 shall be kept to a minimum. The additional text shall be prepared in abbreviated plain language using approved ICAO abbreviations and numerical values. If no ICAO approved abbreviations are available, English plain language text shall be used.

5.2 Quantitative criteria for aerodrome warnings

5.2.1 When quantitative criteria are necessary for the issue of aerodrome warnings covering, for example, the expected maximum wind speed or the expected total snowfall, the criteria shall be as agreed between the aerodrome meteorological office and the users concerned.

6 SPECIFICATIONS RELATED TO WIND SHEAR WARNINGS

6.1 Detection of wind shear

6.1.1 Evidence of the existence of wind shear shall be derived from:

(a) ground-based, wind shear remote-sensing equipment, for example, Doppler radar;

(b) ground-based, wind shear detection equipment, for example, a system of surface wind and/or pressure sensors located in an array monitoring a specific runway or runways and associated approach and departure paths;

(c) aircraft observations during the climb-out or approach phases of flight to be made in accordance with Chapter 5; or

(d) other meteorological information, for example, from appropriate sensors located on existing masts or towers in the vicinity of the aerodrome or nearby areas of high ground.

Note.

— *Wind shear conditions are normally associated with the following phenomena:*
— *thunderstorms, microbursts, funnel cloud (tornado or waterspout), and gust fronts*
— *frontal surfaces*
— *strong surface winds coupled with local topography*
— *sea breeze fronts*
— *mountain waves (including low-level rotors in the terminal area)*
— *low-level temperature inversions.*

6.2 Format and dissemination of wind shear warnings and alerts

Note. — Information on wind shear is also to be included as supplementary information in local routine reports, local special reports, METAR and SPECI in accordance with the templates in Appendix 3, Tables A3-1 and A3-2.

6.2.1 The wind shear warnings shall be issued in accordance with the template in Table A6-3 and shall be disseminated in accordance with local arrangements to those concerned.

6.2.2 The sequence number referred to in the template in Table A6-3 shall correspond with the number of wind shear warnings issued for the aerodrome since 0001 UTC on the day concerned

6.2.3 The use of text additional to the abbreviations listed in the template in Table A6-3 shall be kept to a minimum. The additional text should be prepared in abbreviated plain language using approved ICAO abbreviations and numerical values. If no ICAO approved abbreviations are available, English plain language text shall be used.

6.2.4 When an aircraft report is used to prepare a wind shear warning, or to confirm a warning previously issued, the corresponding aircraft report, including the aircraft type, should be disseminated unchanged in accordance with local arrangements to those concerned.

Note 1. — Following reported encounters by both arriving and departing aircraft, two different wind shear warnings may exist: one for arriving aircraft and one for departing aircraft.

Note 2. — Specifications for reporting the intensity of wind shear are still undergoing development. It is recognized, however, that pilots, when reporting wind shear, may use the qualifying terms "moderate", "strong" or "severe", based to a large extent on their subjective assessment of the intensity of the wind shear encountered.

6.2.5 The wind shear alerts shall be disseminated from automated, ground-based, wind shear remote-sensing or detection equipment in accordance with local arrangements to those concerned.

6.2.6 Where microbursts are observed, reported by pilots or detected by ground-based, wind shear detection or remote-sensing equipment, the wind shear warning and wind shear alert should include a specific reference to microburst.

6.2.7 Where information from ground-based, wind shear detection or remote-sensing equipment is used to prepare a wind shear alert, the alert shall, if practicable, relate to specific sections of the runway and distances along the approach path or take-off path as agreed between the meteorological authority, the appropriate ATS authority and the operators concerned.

Table A6-1A. Template for SIGMET messages

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, included whenever applicable;
= = a double line indicates that the text following it should be placed on the subsequent line.

Note 1. — The ranges and resolutions for the numerical elements included in SIGMET messages are shown in Table A6-4 of this appendix.

Note 2. — In accordance with 1.1.5 and 2.1.5, severe or moderate icing and severe or moderate turbulence (SEV ICE, MOD ICE, SEV TURB, MOD TURB) associated with thunderstorms, cumulonimbus clouds or tropical cyclones should be included.

Element	Detailed content	SIGMET template	(Reserved)	SIGMET messages examples
Location indicator of FIR/CTA (M)1	ICAO location indicator of the ATS unit serving the FIR or CTA to which the SIGMET/AIRMET refers	nnnn		YUCC2 YUDD2
Identification (M)	Message identification and sequence number3	SIGMET [n][n]n		SIGMET 1 SIGMET 01 SIGMET A01

Element	Detailed content	SIGMET template	(Reserved)	SIGMET messages examples
Validity period (M)	Day-time groups indicating the period of validity in UTC	VALID nnnnnn/nnnnnn		VALID 010000/010400 VALID 221215/221600 VALID 101520/101800 VALID 251600/252200 VALID 152000/160000 VALID 192300/200300
Location indicator of MWO (M)	Location indicator of MWO originating the message with a separating hyphen	nnnn–		YUDO–2 YUSO–2
Name of the FIR/CTA	Location indicator and name of the FIR/CTA4 for which the SIGMET is issued	nnnn nnnnnnnnnn FIR or UIR *or* *FIR/UIR* *or* nnnn nnnnnnnnnn CTA		YUCC AMSWELL FIR2 YUDD SHANLON FIR/UIR2 YUDD SHANLON CTA2
IF THE SIGMET MESSAGE IS TO BE CANCELLED, SEE DETAILS AT THE END OF THE TEMPLATE				
STATUS indicator (C)5	Indicator of test or exercise	TEST or EXER		TEST EXER
Phenomenon (M)6	Description of phenomenon causing the issuance of SIGMET	OBSC7 TS[GR8] EMBD9 TS[GR8] FRQ10 TS[GR8] SQL11 TS[GR8] TC nnnnnnnnnn PSN Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] CB *or* TC NN12 PSN Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] CB SEV TURB13 SEV ICE14 SEV ICE (FZRA)14		OBSC TS OBSC TSGR EMBD TS EMBD TSGR FRQ TS FRQ TSGR SQL TS SQL TSGR TC GLORIA PSN N10 W060 CB TC NN PSN S2030 E06030 CB SEV TURB SEV ICE SEV ICE(FZRA) SEV MTW HVY DS

		SEV MTW15 HVY DS HVY SS [VA ERUPTION] [MT] [nnnnnnnnnn] [PSN Nnn[nn] *or* Snn[nn] Ennn[nn] or Wnnn[nn]] VA CLD RDOACT CLD		HVY SS VA ERUPTION MT ASHVAL2 PSN S15 E073 VA CLD RDOACT CLD
Observed or forecast phenomenon (M)	Indication whether the information is observed and expected to continue, *or* forecast	OBS [AT nnnnZ] or FCST [AT nnnnZ]		OBS OBS AT 1210Z FCST FCST AT 1815Z
Location (C)20	Location (referring to latitude and longitude (in degrees and minutes)	Nnn[nn] Wnnn[nn] *or* Nnn[nn] Ennn[nn] *or* Snn[nn] Wnnn[nn] *or* Snn[nn] Ennn[nn] or N OF Nnn[nn] *or* S OF Nnn[nn] *or* N OF Snn[nn] *or* S OF Snn[nn] *or* [AND] W OF Wnnn[nn] *or* E OF Wnnn[nn] *or* W OF Ennn[nn] *or* E OF Ennn[nn] or N OF Nnn[nn] or N OF Snn[nn] AND S OF Nnn[nn] or S OF Snn[nn] or E OF Ennn[nn] or W OF Wnnn[nn] or W OF Ennn[nn] AND E OF Wnnn[nn] or N OF LINE21 or NE OF LINE21 or E OF LINE21 or SE OF LINE21 or S OF LINE21 or SW OF LINE21 or W OF LINE21 or NW OF LINE21Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [–		N48 E010 N2020 W07005 S60 W160 S0530 E16530 N OF N50 S OF N5430 N OF S10 S OF S4530 W OF W155 W OF E15540 E OF W45 E OF E09015 N OF N1515 AND W OF E13530 S OF N45 AND N OF N40 N OF LINE S2520 W11510 – S2520 W12010 SW OF LINE N50 W005 – N60 W020 SW OF LINE N50 W020 – N45 E010 AND NE OF LINE N45 W020 – N40 E010 WI N6030 E02550 – N6055 E02500 –

		Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [AND N OF LINE21 or NE OF LINE21 or E OF LINE21 or SE OF LINE21 or S OF LINE21 or SW OF LINE21 or W OF LINE21 or NW OF LINE21 Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]]] or WI21,22 Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – [Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] or APRX nnKM WID LINE21 BTN (or nnNM WID LINE21 BTN) Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] or ENTIRE UIR or	N6050 E02630 – N6030 E02550 APRX 50KM WID LINE BTN N64 W017 – N60 W010 – N57 E010 ENTIRE FIR ENTIRE FIR/UIR ENTIRE CTA WI 400KM OF TC CENTRE WI 250NM OF TC CENTRE

		ENTIRE FIR or ENTIRE FIR/UIR or ENTIRE CTA Or23 WI nnKM 9or nnNM) OF Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]	
Level (C)20,29	Flight level or altitude	[SFC/]FLnnn *or* [SFC/][n]nnnnM (*or* [SFC/]nnnnFT) *or* FLnnn/nnn *or* TOP FLnnn *or* [TOP] ABV FLnnn or [TOP]ABV[n]nnnnFT) [nnnn/]nnnnM (or [[n]nnnn/][n]nnnnFT) or [nnnnM/]FLnnn (or [[n]nnnnFT/]FLnnn) or 23 TOP [ABV or BLW] FLnnn	FL180 SFC/FL070 SFC/3000M SFC/10000FT FL050/080 TOP FL390 ABV FL250 TOP ABV FL100 ABV 7000FT TOP ABV 9000FT TOP ABV 10000FT 3000M 2000/3000M 8000FT 6000/12000FT 2000M/FL150 10000FT/FL250 TOP FL500 TOP ABV FL500 TOP BLW FL450
Movement *or* expected movement (C)20,24	Movement *or* expected movement (direction and speed) with reference to one of the sixteen points of compass, *or* stationary	MOV N [nnKMH] *or* MOV NNE [nnKMH] *or* MOV NE [nnKMH] *or* MOV ENE [nnKMH] *or* MOV E [nnKMH] *or* MOV ESE [nnKMH] *or* MOV SE [nnKMH] *or* MOV SSE [nnKMH] *or* MOV S [nnKMH] *or* MOV SSW [nnKMH] *or* MOV SW [nnKMH] *or* MOV WSW [nnKMH] *or* MOV W [nnKMH] *or* MOV WNW [nnKMH] *or* MOV NW [nnKMH] *or* MOV NNW [nnKMH] (*or* MOV N [nnKT] *or* MOV NNE [nnKT] *or*	MOV SE MOV NNW MOV E 40KMH (MOV E 20KT) MOV WSW 20KT STNR

		MOV NE [nnKT] *or* MOV ENE [nnKT] *or* MOV E [nnKT] *or* MOV ESE [nnKT] *or* MOV SE [nnKT] *or* MOV SSE [nnKT] *or* MOV S [nnKT] *or* MOV SSW [nnKT] *or* MOV SW [nnKT] *or* MOV WSW [nnKT] *or* MOV W [nnKT] *or* MOV WNW [nnKT] *or* MOV NW [nnKT] *or* MOV NNW [nnKT]) *or* STNR		
Changes in intensity (C)20	Expected changes in intensity	INTSF *or* WKN *or* NC		INSTF WKN NC
Forecast time (C) 24	Indication of the forecast time of phenomenon	FCST AT nnnnZ		FCST AT 2200Z
TC forecast position (C)23	Forecast position of TC centre at the end of the validity period of the SIGMET message	TC CNETRE PSN Nnn[nn] Or Snn[nn] Wnnn[nn] or Ennn[nn]		TC CENTRE PSN N1030 E1600015
Forecast position (C)20,24,25	Forecast position of phenomenon at the end of the validity period of the SIGMET message	FCST nnnnZ TC CENTRE Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] *or* FCST nnnnZ VA CLD APRX [nnKM WID LINE25 BTN (nnNM WID LINE BTN)] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] [– Nnn[nn] *or* Snn[nn]	—	N30 W170 N OF N30 S OF S50 AND W OF E170 S OF N46 AND N OF N39 NE OF LINE N35 W020 – N45 W040 SW OF LINE N48 W020 – N43 E010 AND NE OF LINE N43 W020 – N38 E010 WI N20 W090 – N05 W090 – N10 W100 – N20 W100 – N20 W090 APRX 50KM WID LINE BTN N64 W017 – N57

		Wnnn[nn] *or* Ennn[nn]] [– Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] [AND]26 *or* FCST nnnnZ ENTIRE FIR24 *or* FCST nnnnZ ENTIRE CTA24 *or* FCST nnnnZ NO VA EXP Wnnn[nn] *or* Nnn[nn] Ennn[nn] *or* Snn[nn] Wnnn[nn] *or* Snn[nn] Ennn[nn] *or* N OF Nnn[nn] *or* S OF Nnn[nn] *or* N OF Snn[nn] *or* S OF Snn[nn] [AND] W OF Wnnn[nn] *or* E OF Wnnn[nn] *or* W OF Ennn[nn] *or* E OF Ennn[nn] *or* N OF Nnn[nn] or N OF Snn[nn] AND S OF Nnn[nn] or S OF Snn[nn] or W OF Wnnn[nn] or W OF Ennn[nn] AND E OF Wnnn[nn] or E OF Ennn[nn] or N OF LINE21 or NE OF LINE21 or E OF LINE21 or		W005 – N55 E010 – N55 E030 ENTIRE FIR ENTIRE UIR ENTIRE FIR/UIR ENTIRE CTA NO VA EXP WI 30KM OF N6030 E02550

		SE OF LINE21 or S OF LINE21 or SW OF LINE21 or W OF LINE21 or NW OF LINE21 Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – N[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]		
		or WI27 Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [AND N OF LINE21 or NE OF LINE21 or E OF LINE21 or SE OF LINE21 or S OF LINE21 or SW OF LINE21 or W OF LINE21 or NW OF LINE21 Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn [nn] Wnnn[nn] or Ennn[nn] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]]] or WI21,22 Nnn[nn] or Snn[nn] Wnnn[nn] or		

		Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] Or APRX nnKM WID LINE21 BTN (nnNM WID LINE21 BTN) Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] Or ENTIRE FIR Or ENTIRE UIR ENTIRE FIR/UIR Or ENTIRE CTA or[26] NO VA EXP Or[29] WI nnKM (or nnNM) OF Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]		

Repetition of elements (C)27	Repetition of elements included in a SIGMET message for volcanic ash cloud or tropical cyclone	[AND]24		AND
Or				
Cancellation of SIGMET (C)28	Cancellation of SIGMET referring to its identification	CNL SIGMET [n][n]n nnnnnn/nnnnnn Or22 CNL SIGMET [n][n]n nnnnnn/nnnnnn [VA MOV TO nnnn FIR]	—	CNL SIGMET 2 101200/101600 CNL SIGMET A13 251030/251430 VA MOV TO YUDO FIR2

Notes. —

1. *See 4.1.*
2. *Fictitious location.*
3. *In accordance with 1.1.3 and 2.1.2.*
4. *See 2.1.3.*
5. *Used only when the message issued to indicate that a test or an exercise is taking place. When the word "TEST" or the abbreviation "EXER" is included, the message may contain information that should not be used operationally or will otherwise end immediately after the word "TEST".*
6. *In accordance with 1.1.4 and 2.1.4.*
7. *In accordance with 4.2.1 a).*
8. *In accordance with 4.2.4.*
9. *In accordance with 4.2.1 b).*
10. *In accordance with 4.2.2.*
11. *In accordance with 4.2.3.*
12. *Used for unnamed tropical cyclones.*
13. *In accordance with 4.2.5 and 4.2.6.*
14. *In accordance with 4.2.7.*
15. *In accordance with 4.2.8.*
16. *In accordance with 2.1.4.*
17. *In accordance with 4.2.1 c).*
18. *In accordance with 4.2.1 d).*
19. *The use of cumulonimbus (CB), and towering cumulus (TCU), is restricted to AIRMETs in accordance with 2.1.4.*
20. *In the case of the volcanic ash cloud or cumulonimbus clouds associated with a tropical cyclone covering more than one area within the FIR, these elements can be repeated, as necessary.*
21. *A straight line is to be used between two points drawn on a map in the Mercator projection or between two points which crosses lines of longitude at a constant angle.*
22. *The number of coordinates should be kept to a minimum and should not normally exceed seven.*
23. *Only for SIGMET messages for tropical cyclones.*
24. *The elements 'Forecast Time' and 'Forecast Position' are not to be used in conjunction with the element 'Movement or Expected Movement'.*
25. *The levels of the phenomena remain fixed throughout the forecast period.*
26. *Only for SIGMET messages for volcanic ash.*
27. *To be used for two volcanic ash clouds or two centres of tropical cyclones simultaneously affecting the FIR concerned.*
28. *End of the message (as the SIGMET/AIRMET message is being cancelled).*
29. *Only for SIGMET messages for radioactive cloud. When detailed information on the release is not available, a radius of up to 30 km (or 16 nautical miles) from the source may be applied; and a vertical extent from surface (SFC) to the upper limit of the flight information region/upper flight information region (FIR/UIR) or control area (CTA) is to be applied.*

Table A6-1B. Template for special air-reports (uplink)

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, included whenever applicable;
= = a double line indicates that the text following it should be placed on the subsequent line.

Note. — The ranges and resolutions for the numerical elements included in special air-reports are shown in Table A6-4 of this appendix.

Element	*Detailed Content*	*Template [1,2]*	*Examples*
Identification (M)	Message identification	ARS	ARS
Aircraft identification (M)	Aircraft radiotelephony call sign	nnnnnn	nnnnnn VA8123
Phenomenon (M)	Description of observed phenomenon causing the issuance of the special air-report4	TS TSGR SEV TURB SEV ICE SEV MTW HVY SS VA CLD VA [MT nnnnnnnnnn] MOD TURB MOD ICE	TS TSGR SEV TURB SEV ICE SEV MTW HVY SS VA CLD VA VA MT ASHVAL5 MOD TURB MOD ICE
Observation time (M)	Time of observation of observed phenomenon	OBS AT nnnnZ	OBS AT 1210Z
Location (C)	Location (referring to latitude and longitude (in degrees and minutes)) of observed phenomenon	NnnnnWnnnnn or NnnnnEnnnnn or SnnnnWnnnnn or SnnnnEnnnnn	N2020W07005 S4812E01036
Level (C)	Flight level or altitude of observed phenomenon	FLnnn or FLnnn/nnn or nnnnM (or [n]nnnnFT)	FL390 FL180/210 3000M 12000FT

Notes. —

1. *No wind and temperature to be uplinked to other aircraft in flight in accordance with 3.2.*
2. *See 3.1.*
3. *Fictitious call sign.*
4. *In the case of special air-report for volcanic ash cloud, the vertical extent (if observed) and name of the volcano (if known) can be used.*
5. *Fictitious location.*

Table A6-2. Template for aerodrome warnings

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, included whenever applicable.

Note 1. — The ranges and resolutions for the numerical elements included in aerodrome warnings are shown in Table A6-4 of this appendix.

Note 2. — The explanations for the abbreviations can be found in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400).*

Element	Detailed content	Template(s)	Examples
Location indicator of the aerodrome (M)	Location indicator of the aerodrome	nnnn	YUCC[1]
Identification of the type of message (M)	Type of message and sequence number	AD WRNG [n]n	AD WRNG 2
validity period (M)	Day and time of validity period in UTC	VALID nnnnnn/nnnnnn	VALID 211230/211530
IF THE AERODROME WARNING IS TO BE CANCELLED, SEE DETAILS AT THE END OF THE TEMPLATE.			
Phenomenon (M)	Description of phenomenon causing the issuance of the aerodrome warning	TC3 nnnnnnnnnn *or* [HVY] TS *or* GR *or* [HVY] DS *or* SA *or* DU *or* SFC WSPD nn[n]MPS MAX nn[n] (SFC WSPD nn[n]KT MAX nn[n]) *or* SFC WIND nnn/nn[n]MPS MAX nn[n] (SFC WIND nnn/nn[n]KT MAX nn[n]) or SQ *or* TSUNAMI *or* VA [DEPO] *or* TOX CHEM or Free text up to 32 characters 5	TC ANDREW HVY SN 25CM SFC WSPD 20MPS MAX 30 VA TSUNAMI
Observed or forecast phenomenon (M)	Indication whether the information is observed and expected to continue, *or* forecast	OBS [AT nnnnZ] *or* FCST	OBS AT 1200Z OBS
Changes in intensity (C)	Expected changes in intensity	INTSF *or* WKN *or* NC	WKN

OR			
Cancellation of aerodrome warning[6]	Cancellation of aerodrome warning referring to its identification	CNL AD WRNG [n]n nnnnnn/nnnnnn	CNL AD WRNG 2 211230/2115306

Notes. —

(a) *Fictitious location.*

(b) *One phenomenon or a combination thereof, in accordance with 5.1.3.*

(c) *In accordance with 5.1.3.*

(d) *Hoar frost or rime in accordance with 5.1.3.*

(e) *In accordance with 5.1.4.*

(f) *End of the message (as the aerodrome warning is being cancelled).*

Table A6-3. Template for wind shear warnings

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, included whenever applicable.

Note 1. — The ranges and resolutions for the numerical elements included in wind shear warnings are shown in Table A6-4 of this appendix.

Note 2. — The explanations for the abbreviations can be found in the PANS-ABC (Doc 8400).

Element	Detailed content	Template(s)	Examples
Location indicator of the aerodrome (M)	Location indicator of the aerodrome	nnnn	YUCC1
Identification of the type of message (M)	Type of message and sequence number	WS WRNG [n]n	WS WRNG 1
Time of origin and validity period (M)	Day and time of issue and, where applicable, validity period in UTC	nnnnnn [VALID TL nnnnnn] *or* [VALID nnnnnn/nnnnnn]	211230 VALID TL 211330 221200 VALID 221215/221315
IF THE WIND SHEAR WARNING IS TO BE CANCELLED, SEE DETAILS AT THE END OF THE TEMPLATE.			
Phenomenon (M)	Identification of the phenomenon and its location	[MOD] *or* [SEV] WS IN APCH *or* [MOD] *or* [SEV] WS [APCH] RWYnnn Or [MOD] *or* [SEV] WS IN CLIMB-OUT Or [MOD] *or* [SEV] WS CLIMB-OUT RWYnnn *or* MBST IN APCH *or* MBST [APCH] RWYnnn or MBST IN CLIMB-OUT *or*	WS APCH RWY12 MOD WS RWY34 WS IN CLIMB-OUT MBST APCH RWY26 MBST IN CLIMB-OUT

		MBST CLIMB-OUT RWYnnn	
Observed, reported or forecast phenomenon (M)	Identification whether the phenomenon is observed or reported and expected to continue or forecast	REP AT nnnn nnnnnnnn *or* OBS [AT nnnn] *or* FCST	REP AT 1510 B747 OBS AT 1205 FCST
Details of the phenomenon (C)2	Description of phenomenon causing the issuance of the wind shearwarning	SFC WIND: nnn/nnMPS (*or* nnn/nnKT) nnnM (nnnFT)-WIND: nnn/nnMPS (*or* nnn/nnKT) Or nnKMH (*or* nnKT) LOSS nnKM (*or* nnNM) FNA RWYnn or nnKMH (*or* nnKT) GAIN nnKM (*or* nnNM) FNA RWYnn	SFC WIND: 320/5MPS 60M-WIND: 360/13MPS (SFC WIND: 320/10KT 200FT-WIND: 360/26KT) 60KMH LOSS 4KM FNA RWY13 (30KT LOSS 2NM FNA RWY13)
OR			
Cancellation of wind shear warning3	Cancellation of wind shear warning referring to its identification	CNL WS WRNG [n]n nnnnnn/nnnnnn	CNL WS WRNG 1211230/2113303

Notes. —

1. *Fictitious location.*
2. *Additional provisions in 6.2.3.*
3. *End of the message (as the wind shear warning is being cancelled).*

Table A6-4. Ranges and resolutions for the numerical elements included in volcanic ash and tropical cyclone advisory messages, SIGMET/AIRMET messages and aerodrome and wind shear warnings

Element as specified in Appendices 2 and 6	*Range*	*Resolution*
Summit elevation: M FT	000 – 8 100 000 – 27 000	1 1
Advisory number: for VA (index)* for TC (index)*	000 – 2 000 00 – 99	1 1
Maximum surface wind: MPS	00 – 99	1

KT	00 – 199	1
Central pressure: hPa	850 – 1 050	1
Surface wind speed: MPS KT	15 – 49 30 – 99	1 1
Surface visibility: M M	0000 – 0750 0800 – 5 000	50 100
Cloud: height of base: M M	000 – 300 000 – 1 000	30 100
Cloud: height of top: M M FT FT	000 – 2 970 3 000 – 20 000 000 – 9 900 10 000 – 60 000	30 300 100 1 000
Latitudes: (degrees) ° ' (minutes)	00 – 90 00 – 60	1 1
Longitudes: (degrees) ° ' (minutes)	000 – 180 00 – 60	1 1
Flight levels:	000 – 650	10
Movement: KMH KT	0 – 300 0 – 150	10 5
* Non-dimensional		

Example A6-1. SIGMET and AIRMET message
and the corresponding cancellations

SIGMET	Cancellation of SIGMET
YUDD SIGMET 2 VALID 101200/101600 YUSO – YUDD SHANLON FIR/UIR OBSC TS FCST S OF N54 AND E OF W012 TOP FL390 MOV E 20KT WKN	YUDD SIGMET 3 VALID 101345/101600 YUSO – YUDD SHANLON FIR/UIR CNL SIGMET 2 101200/101600
AIRMET	**Cancellation of AIRMET**
YUDD AIRMET 1 VALID 151520/151800 YUSO – YUDD SHANLON FIR ISOL TS OBS N OF S50 TOP ABV FL100 STNR WKN	YUDD AIRMET 2 VALID 151650/151800 YUSO – YUDD SHANLON FIR CNL AIRMET 1 151520/151800

Example A6-2. SIGMET message for tropical cyclone

YUCC SIGMET 3 VALID 251600/252200 YUDO –
YUCC AMSWELL FIR TC GLORIA PSN N2706 W07306 CB OBS AT 1600Z WI 250NM OF TC CENTRE TOP
FL500 NC FCST AT 2200Z TC CENTRE PSN N2740 W07345

Meaning:

The third SIGMET message issued for the AMSWELL* flight information region (identified by YUCC Amswell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC; the message is valid from 1600 UTC to 2200 UTC on the 25th of the month; tropical cyclone Gloria at 27 degrees 6 minutes north and 73 degrees 6 minutes west; cumulonimbus was observed at 1600 UTC within 250 nautical miles of the centre of the tropical cyclone with top at flight level 500; no changes in intensity are expected; at 2200 UTC the centre of the tropical cyclone is forecast to be located at 27 degrees 40 minutes north and 73 degrees 45 minutes west.

* Fictitious location

Example A6-3. SIGMET message for volcanic ash

YUDD SIGMET 2 VALID 211100/211700 YUSO –
YUDD SHANLON FIR/UIR VA ERUPTION MT ASHVAL PSN S1500 E07348 VA CLD OBS AT 1100Z APRX
50KM WID LINE BTN S1500 E07348 – S1530 E07642 FL310/450 INTSF FCST AT 1700Z APRX 50KM WID
LINE BTN S1506 E07500 – S1518 E08112 – S1712 E08330

Meaning:

The second SIGMET message issued for the SHANLON* flight information region (identified by YUDD Shanlon area control centre/upper flight information region) by the Shanlon/International* meteorological watch office(YUSO) since 0001 UTC; the message is valid from 1100 UTC to 1700 UTC on the 21st of the month; volcanic ash eruption of Mount Ashval* located at 15 degrees south and 73 degrees 48 minutes east; volcanic ash cloud observed at 1100 UTC in an approximatly 50 km wide line between 15 degrees south and 73 degrees 48 minutes east, and 15 degrees 30 minutes south and 76 degrees 42 minutes east; between flight levels 310 and 450, intensifying at 1700 UTC the volcanic ash cloud is forecast to be located in an approximate 50 km wide line between 15 degrees 6 minutes south and 75 degrees east, 15 degrees 18 minutes south and 81 degrees 12 minutes east, and 17 degrees 12 minutes south and 83 degrees 30 minutes east.

* Fictitious location

Example A6-4. SIGMET message for radioactive cloud

YUCC SIGMET 2 VALID 201200/201600 YUDO –
YUCC AMSWELL FIR RDOACT CLD OBS AT 1155Z WI S5000 W14000 – S5000 W13800 – S5200 W13800 –
S5200 W14000 – S5000 W14000 SFC/FL100 WKN FCST AT 1600Z WI S5200 W14000 – S5200 W13800 – S5300 W13800 – S5300 W14000 – S5200 W14000

Meaning:

The second SIGMET message issued for the AMSWELL* flight information region (identified by YUCC
Amswell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC; the message is valid from 1200 UTC to 1600 UTC on the 20th of the month; radioactive cloud was observed at 1155 UTC within an area bounded by 50 degrees 0 minutes south 140 degrees 0 minutes west to 50 degrees 0 minutes south 138 degrees 0 minutes west to 52 degrees 0 minutes south 138 degrees 0 minutes west to 52 degrees 0 minutes south 140 degrees 0 minutes west to 50 degrees 0 minutes south 140 degrees 0 minutes west and between the surface and flight level 100; the radioactive cloud is expected to weaken in intensity; at 1600 UTC the radioactive cloud is forecast to be located within an area bounded by 52 degrees 0 minutes south 140 degrees 0 minutes west to 52 degrees 0 minutes south 138 degrees 0 minutes west to 53 degrees 0 minutes south 138 degrees 0 minutes west to 53 degrees 0 minutes south 140 degrees 0 minutes west to 52 degrees 0 minutes
south 140 degrees 0 minutes west.

* Fictitious location

Example A6-5. SIGMET message for severe turbulence

YUCC SIGMET 5 VALID 221215/221600 YUDO –
YUCC AMSWELL FIR SEV TURB OBS AT 1210Z N2020 W07005 FL250 INTSF FCST AT 1600Z S OF N2020
AND E OF W06950

Meaning:

The fifth SIGMET message issued for the AMSWELL* flight information region (identified by YUCC Amswell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC; the message is valid from 1215 UTC to 1600 UTC on the 22nd of the month; severe turbulence was observed at 1210 UTC 20 degrees 20 minutes north and 70 degrees 5 minutes west at flight level 250; the turbulence is expected to strengthen in intensity; at 1600 UTC the severe turbulence is forecast to be located south of 20 degrees 20 minutes north and east of 69 degrees 50 minutes west.

* Fictitious location

Example A6-6. AIRMET message for moderate mountain wave

YUCC AIRMET 2 VALID 221215/221600 YUDO –
YUCC AMSWELL FIR MOD MTW OBS AT 1205Z N48 E010 FL080 STNR NC

Meaning:

The second AIRMET message issued for the AMSWELL* flight information region (identified by YUCC Amswell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC; the message is valid from 1215 UTC to 1600 UTC on the 22nd of the month; moderate mountain wave was observed at 1205 UTC at 48 degrees north and 10 degrees east at flight level 080; the mountain wave is expected to remain stationary and not to undergo any changes in intensity.

* Fictitious location

APPENDIX 7. TECHNICAL SPECIFICATIONS RELATED TO AERONAUTICAL CLIMATOLOGICAL INFORMATION

(See Chapter 8 of this regulation)

1 PROCESSING OF AERONAUTICAL CLIMATOLOGICAL INFORMATION

1.1 Meteorological observations for regular and alternate aerodromes shall be collected, processed and stored in a form suitable for the preparation of aerodrome climatological information.

2 EXCHANGE OF AERONAUTICAL CLIMATOLOGICAL INFORMATION

2.1 Aeronautical climatological information shall be exchanged on request between meteorological authorities. Operators and other aeronautical users desiring such information should normally apply to the meteorological authority responsible for its preparation.

3 CONTENT OF AERONAUTICAL CLIMATOLOGICAL INFORMATION

3.1 Aerodrome climatological tables

3.1.1 An aerodrome climatological table shall give as applicable:

(a) *mean values and variations therefrom, including maximum and minimum values, of meteorological elements (for example, of air temperature); and/or*

(b) *the frequency of occurrence of present weather phenomena affecting flight operations at the aerodrome (for example, of sandstorms); and/or*

(c) *the frequency of occurrence of specified values of one, or of a combination of two or more, elements (for example, of a combination of low visibility and low cloud).*

3.1.2 An Aerodrome climatological tables shall include information required for the preparation of aerodrome climatological summaries in accordance with 3.2

3.2 An Aerodrome climatological summaries

3.2.1 aerodrome climatological summaries shall cover:

(a) *frequencies of the occurrence of runway visual range/visibility and/or height of the base of the lowest cloud layer of BKN or OVC extent below specified values at specified times;*

(b) *frequencies of visibility below specified values at specified times;*

(c) *frequencies of the height of the base of the lowest cloud layer of BKN or OVC extent below specified values at specified times;*

(d) *frequencies of occurrence of concurrent wind direction and speed within specified ranges;*

(e) *frequencies of surface temperature in specified ranges of 5°C at specified times; and*

(f) *mean values and variations therefrom, including maximum and minimum values of meteorological elements required for operational planning purposes, including take-off performance calculations.*

Note. — Models of climatological summaries related to a) to e) are given in WMO Publication No. 49, Technical Regulations, Volume II, C.3.2.

APPENDIX 8. TECHNICAL SPECIFICATIONS RELATED TO SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

(See Chapter 9, in section VII of this CCAR)

Note. — Specifications related to flight documentation (including the model charts and forms) are given in Appendix 1.

1 MEANS OF SUPPLY AND FORMAT OF METEOROLOGICAL INFORMATION

1.1 Meteorological information shall be supplied to operators and flight crew members by one or more of the following, as agreed between the meteorological authority and the operator concerned, and with the order shown below not implying priorities:

(a) written or printed material, including specified charts and forms;

(b) data in digital form;

(c) briefing;

(d) consultation;

(e) display; or

(f) *in lieu of a) to e), by means of an automated pre-flight information system providing self-briefing and flight documentation facilities while retaining access by operators and aircrew members to consultation, as necessary, with the aerodrome meteorological office, in accordance with 5.1.*

1.2 The meteorological authority, in consultation with the operator, shall determine:

(a) *the type and format of meteorological information to be supplied; and*

(b) *methods and means of supplying that information.*

1.3 On request by the operator, the meteorological information supplied for flight planning shall include data for the determination of the lowest usable flight level.

2 SPECIFICATIONS RELATED TO INFORMATION FOR PRE-FLIGHT PLANNING AND IN-FLIGHT REPLANNING

2.1 Format of upper-air gridded information

2.1.1 Upper-air gridded information supplied by WAFCs for pre-flight and in-flight replanning shall be in the GRIB code form.

Note. — The GRIB code form is contained in WMO Publication No. 306, Manual on Codes*, Volume I.2, Part B — Binary Codes.*

2.2 Format of information on significant weather

2.2.1 Information on significant weather supplied by WAFCs for pre-flight and in-flight replanning shall be in the BUFR code form.

Note. — The BUFR code form is contained in WMO Publication No. 306, Manual on Codes, *Volume I.2, Part B — Binary Codes.*

2.3 Specific needs of helicopter operations

2.3.1 Meteorological information for pre-flight planning and in-flight replanning by operators of helicopters flying to offshore structures should include data covering the layers from sea level to flight level 100. Particular mention should be made of the expected surface visibility, the amount, type (where available), base and tops of cloud below flight level 100, sea state and sea-surface temperature, mean sea-level pressure, and the occurrence and expected occurrence of turbulence and icing, as determined by Asia and Pacific Regional (APAC) air navigation agreement.

3 SPECIFICATIONS RELATED TO BRIEFING AND CONSULTATION

3.1 Information required to be displayed

3.1.1 The material displayed shall be readily accessible to the flight crew members or other flight operations personnel concerned.

4 SPECIFICATIONS RELATED TO FLIGHT DOCUMENTATION

4.1 Presentation of information

4.1.1 The flight documentation related to forecasts of upper wind and upper-air temperature and SIGWX phenomena shall be presented in the form of charts. For low-level flights, alternatively, GAMET area forecasts shall be used.

Note. — Models of charts and forms for use in the preparation of flight documentation are given in Appendix 1. These models and methods for their completion are developed by the World Meteorological Organization on the basis of relevant operational requirements stated by the International Civil Aviation Organization.

4.1.2 The flight documentation related to concatenated route-specific upper wind and upper-air temperature forecasts shall be provided as agreed between the meteorological authority and the operator concerned.

Note. — Guidance on the design, formulation and use of concatenated charts is given in the Manual of Aeronautical Meteorological Practice *(Doc 8896).*

4.1.3 METAR and SPECI (including trend forecasts as issued in accordance with Asia and Pacific Regional (APAC) air navigation agreement), TAF, GAMET, SIGMET, AIRMET and volcanic ash and tropical cyclone advisory information shall be presented in accordance with the templates in Appendices 1, 2, 3, 5 and 6, respectively. Such meteorological information received from other meteorological offices shall be included in flight documentation without change.

Note. — Examples of the form of presentation of METAR/SPECI and TAF are given in Appendix 1.

4.1.4 *The location indicators and the abbreviations used should be explained in the flight documentation.*

4.1.5 *The forms and the legend of charts included in flight documentation should be printed in English, French, Russian or Spanish. Where appropriate, approved abbreviations should be used. The units employed for each element should be indicated; they should be in accordance with CCAR Part 5 Unit of Measurement.*

4.2 Charts in flight documentation

4.2.1 Characteristics of charts

4.2.1.1 Charts included in flight documentation should have a high standard of clarity and legibility and should have the following physical characteristics:

(a) *for convenience, the largest size of charts should be about 42 × 30 cm (standard size A3) and the smallest size should be about 21 × 30 cm (standard size A4). The choice between these sizes should depend on the route lengths and the amount of detail that needs to be given in the charts as agreed between the meteorological authorities and the users concerned;*

(b) *major geographical features, such as coastlines, major rivers and lakes should be depicted in a way that makes them easily recognizable;*

(c) *for charts prepared by computer, meteorological data should take preference over basic chart information, the former cancelling the latter wherever they overlap;*

(d) *major aerodromes should be shown as a dot and identified by the first letter of the name of the city the aerodrome serves as given in Table AOP of the relevant Asia and Pacific Regional (APAC) air navigation plan;*

(e) *a geographical grid should be shown with meridians and parallels represented by dotted lines at each 10° latitude and longitude; dots should be spaced one degree apart;*

(f) *latitude and longitude values should be indicated at various points throughout the charts (i.e. not only at the edges); and*

(g) *labels on the charts for flight documentation should be clear and simple and should present the name of the world area forecast centre or, for non-WAFS products, the originating centre, the type of chart, date and valid time and, if necessary, the types of units used in an unambiguous way.*

4.2.1.2 Meteorological information included in flight documentation shall be represented as follows:

(a) winds on charts shall be depicted by arrows with feathers and shaded pennants on a sufficiently dense grid;

(b) temperatures shall be depicted by figures on a sufficiently dense grid;

(c) wind and temperature data selected from the data sets received from a world area forecast centre shall be depicted in a sufficiently dense latitude/longitude grid; and

(d) wind arrows shall take precedence over temperatures and either shall take precedence over chart background.

4.2.1.3 For short-haul flights, charts should be prepared covering limited areas at a scale of 1:15 × 10^6 as required.

4.2.2 Set of charts to be provided

4.2.2.1 The minimum number of charts for flights between flight level 250 and flight level 630 shall include a high-level SIGWX chart (flight level 250 to flight level 630) and a forecast 250 hPa wind and temperature chart. The actual charts provided for pre-flight and in-flight planning and for flight documentation shall be as agreed between meteorological authorities and users concerned.

4.2.2.2 Charts to be provided 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.

4.2.3 Height indications in flight documentation, height indications shall be given as follows:

(a) all references to en-route meteorological conditions, such as height indications of upper winds, turbulence or bases and tops of clouds, shall preferably be expressed in flight levels; they may also be expressed in pressure, altitude or, for low-level flights, height above ground level; and

(b) all references to aerodrome meteorological conditions, such as height indications of the bases of clouds, shall be expressed in height above the aerodrome elevation.

4.3 Specifications related to low-level flights

4.3.1 In chart form

4.3.1.1 Where the forecasts are supplied in chart form, flight documentation for low-level flights, including those in accordance with the visual flight rules, operating up to flight level 100 (or up to flight level 150 in mountainous areas or higher, where necessary), should contain the following as appropriate to the flight:

(a) *information from relevant SIGMET and AIRMET messages;*
(b) *upper wind and upper-air temperature charts as given in Appendix 5, 4.3.1; and*
(c) *significant weather charts as given in Appendix 5, 4.3.2.*

4.3.2 In abbreviated plain language

4.3.2.1 Where the forecasts are not supplied in chart form, flight documentation for low-level flights, including those in accordance with the visual flight rules, operating up to flight level 100 (up to flight level 150 in mountainous areas or higher, where necessary), should contain the following information as appropriate to the flight:

(a) *SIGMET and AIRMET information; and*
(b) *GAMET area forecasts.*

Note. — An example of the GAMET area forecast is given in Appendix 5.

5 SPECIFICATIONS RELATED TO AUTOMATED PRE-FLIGHT INFORMATION SYSTEMS FOR BRIEFING, CONSULTATION, FLIGHT PLANNING AND FLIGHT DOCUMENTATION

5.1 Access to the systems

5.1.1 Automated pre-flight information systems providing self-briefing facilities shall provide for access by operators and flight crew members to consultation, as necessary, with an aerodrome meteorological office by telephone or other suitable telecommunications means.

5.2 Detailed specifications of the systems

5.2.1 Automated pre-flight information systems for the supply of meteorological information for self- briefing, pre-flight planning and flight documentation shall:

(a) provide for the continuous and timely updating of the system database and monitoring of the validity and integrity of the meteorological information stored;

(b) permit access to the system by operators and flight crew members and also by other aeronautical users concerned through suitable telecommunications means;

(c) use access and interrogation procedures based on abbreviated plain language and, as appropriate, ICAO location indicators, and aeronautical meteorological code data-type designators prescribed by the WMO, or based on a menu-driven user interface, or other appropriate mechanisms as agreed between the meteorological authority and the operators concerned; and

(d) provide for rapid response to a user request for information.

Note. — ICAO abbreviations and codes and location indicators are given respectively in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes (PANS-ABC, Doc 8400) and Location Indicators (Doc 7910). Aeronautical meteorological code data-type designators are given in the WMO Publication No. 386, Manual on the Global Telecommunication System.

6 SPECIFICATIONS RELATED TO INFORMATION FOR AIRCRAFT IN FLIGHT

6.1 Supply of information requested by an aircraft in flight

6.1.1 If an aircraft in flight requests meteorological information, the aerodrome meteorological office or meteorological watch office which receives the request should arrange to supply the information with the assistance, if necessary, of another aerodrome meteorological office or meteorological watch office.

6.2 Information for in-flight planning by the operator

6.2.1 meteorological information for planning by the operator for aircraft in flight should be supplied during the period of the flight and should normally consist of any or all of the following:

(a) *METAR and SPECI (including trend forecasts as issued in accordance with Asia and Pacific Regional (APAC) air navigation agreement);*

(b) *TAF and amended TAF;*

(c) *SIGMET and AIRMET information and special air-reports relevant to the flight, unless the latter have been the subject of a SIGMET message;*

(d) *upper wind and upper-air temperature information;*

(e) *volcanic ash and tropical cyclone advisory information relevant to the flight; and*

(f) *other meteorological information in alphanumeric or graphical form as agreed between the meteorological*

Note. — Guidance on the display of graphical information in the cockpit is provided in Doc 8896authority and the operator concerned.

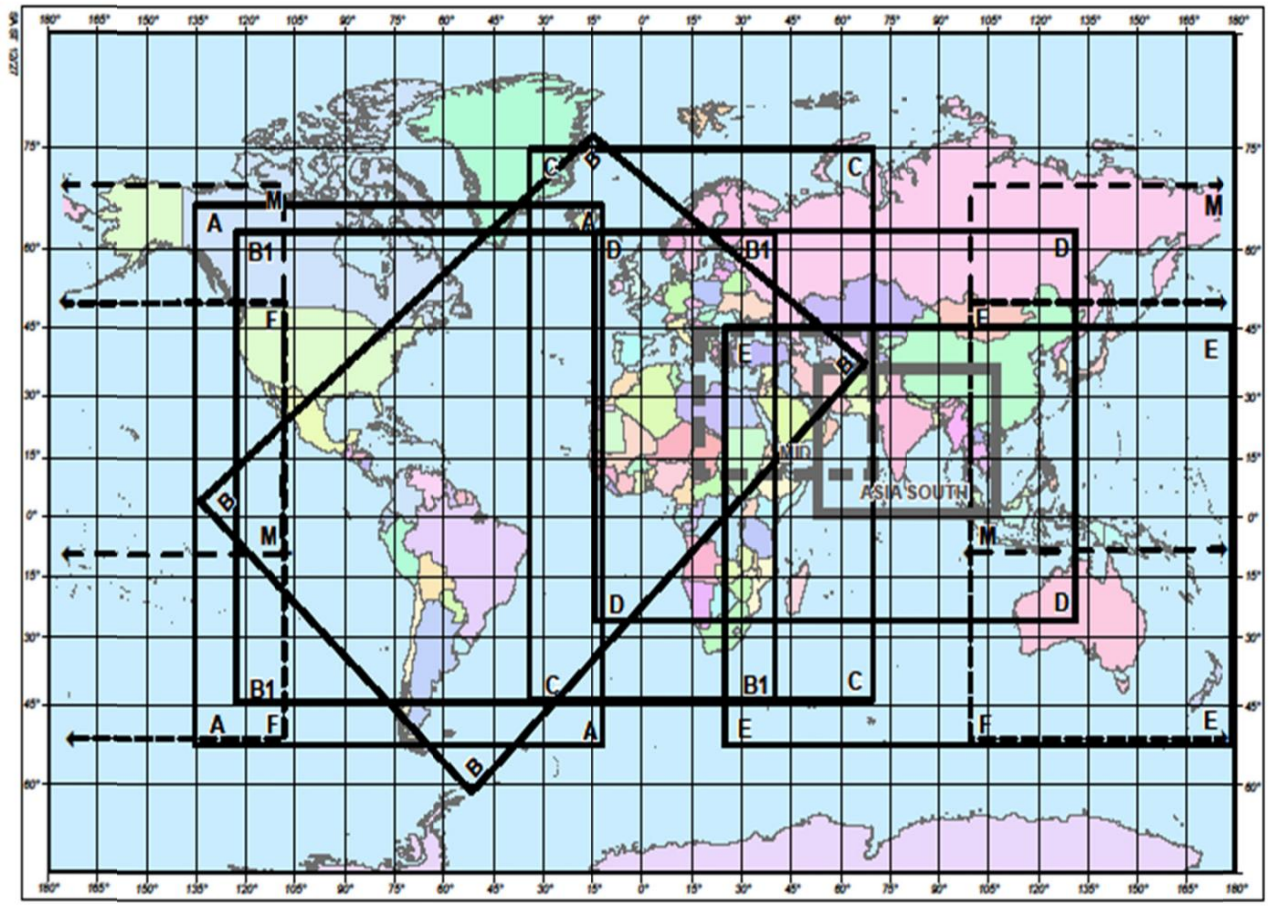
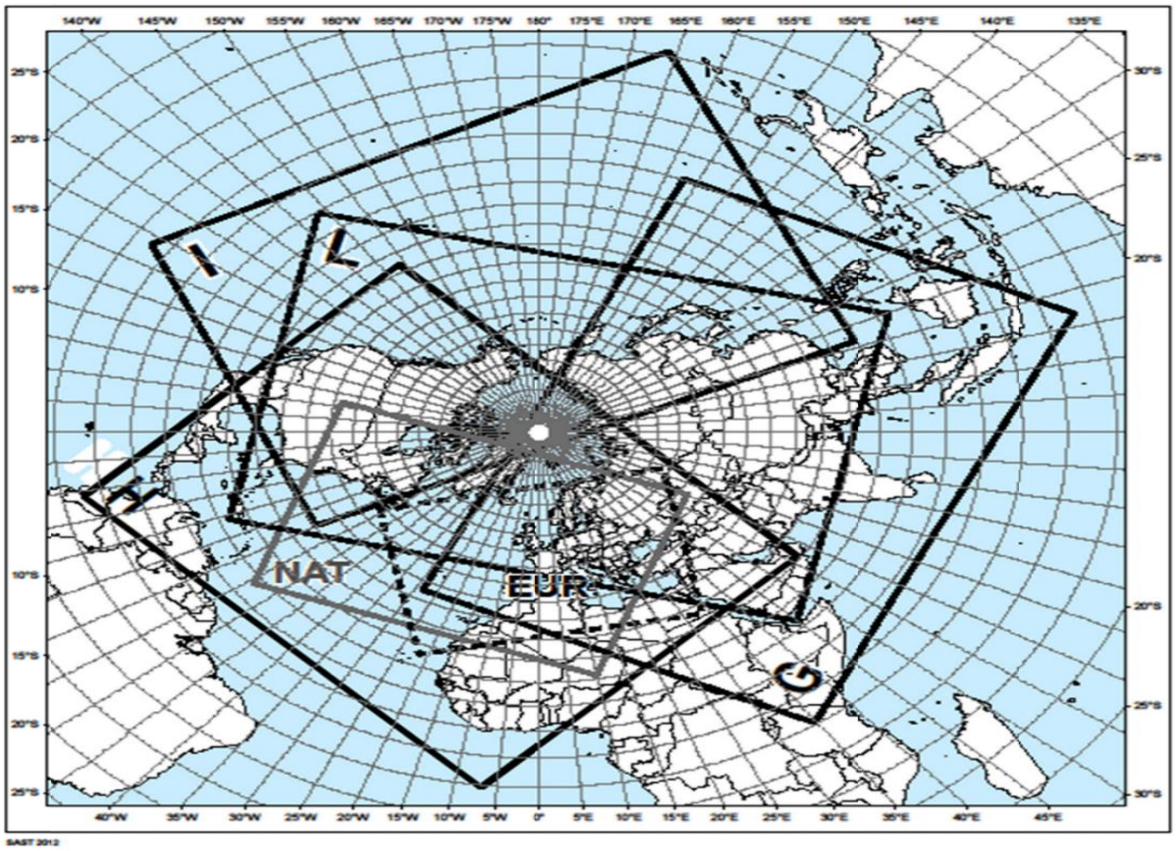


CHART	LATITUDE	LONGITUDE	CHART	LATITUDE	LONGITUDE
A	N6700	W13724	D	N6300	W01500
A	N6700	W01236	D	N6300	E13200
A	S5400	W01236	D	S2700	E13200
A	S5400	W13724	D	S2700	W01500
ASIA	N3600	E05300	E	N4455	E02446
ASIA	N3600	E10800	E	N4455	E18000
ASIA	0000	E10800	E	S5355	E18000
ASIA	0000	E05300	E	S5355	E02446
B	N0304	W13557	F	N5000	E10000
B	N7644	W01545	F	N5000	W11000
B	N3707	E06732	F	S5242	W11000
B	S6217	W05240	F	S5242	E10000
B1	N6242	W12500	M	N7000	E10000
B1	N6242	E04000	M	N7000	W11000
B1	S4530	E04000	M	S1000	W11000
B1	S4530	W12500	M	S1000	E10000
C	N7500	W03500	MID	N4400	E01700
C	N7500	E07000	MID	N4400	E07000
C	S4500	E07000	MID	N1000	E07000
C	S4500	W03500	MID	N1000	E01700

Figure A8-1. Fixed areas of coverage of WAFS forecasts in chart form — Mercator projection

6.2.2



CHAR	LATITUD	LONGITU	CHAR	LATITUD	LONGITUDE
EUR	N4633	W05634	I	N1912	E11130
EUR	N5842	E06824	I	N3330	W06012
EUR	N2621	E03325	I	N0126	W12327
EUR	N2123	W02136	I	S0647	E16601
G	N3552	W02822	L	N1205	E11449
G	N1341	E15711	L	N1518	E04500
G	S0916	E10651	L	N2020	W06900
G	S0048	E03447	L	N1413	W14338
H	N3127	W14836	NAT	N4439	W10143
H	N2411	E05645	NAT	N5042	E06017
H	S0127	W00651	NAT	N1938	E00957
H	N0133	W07902	NAT	N1711	W05406

Figure A8-2. Fixed areas of coverage of WAFS forecasts in chart form — Polar stereographic projection (northern hemisphere)

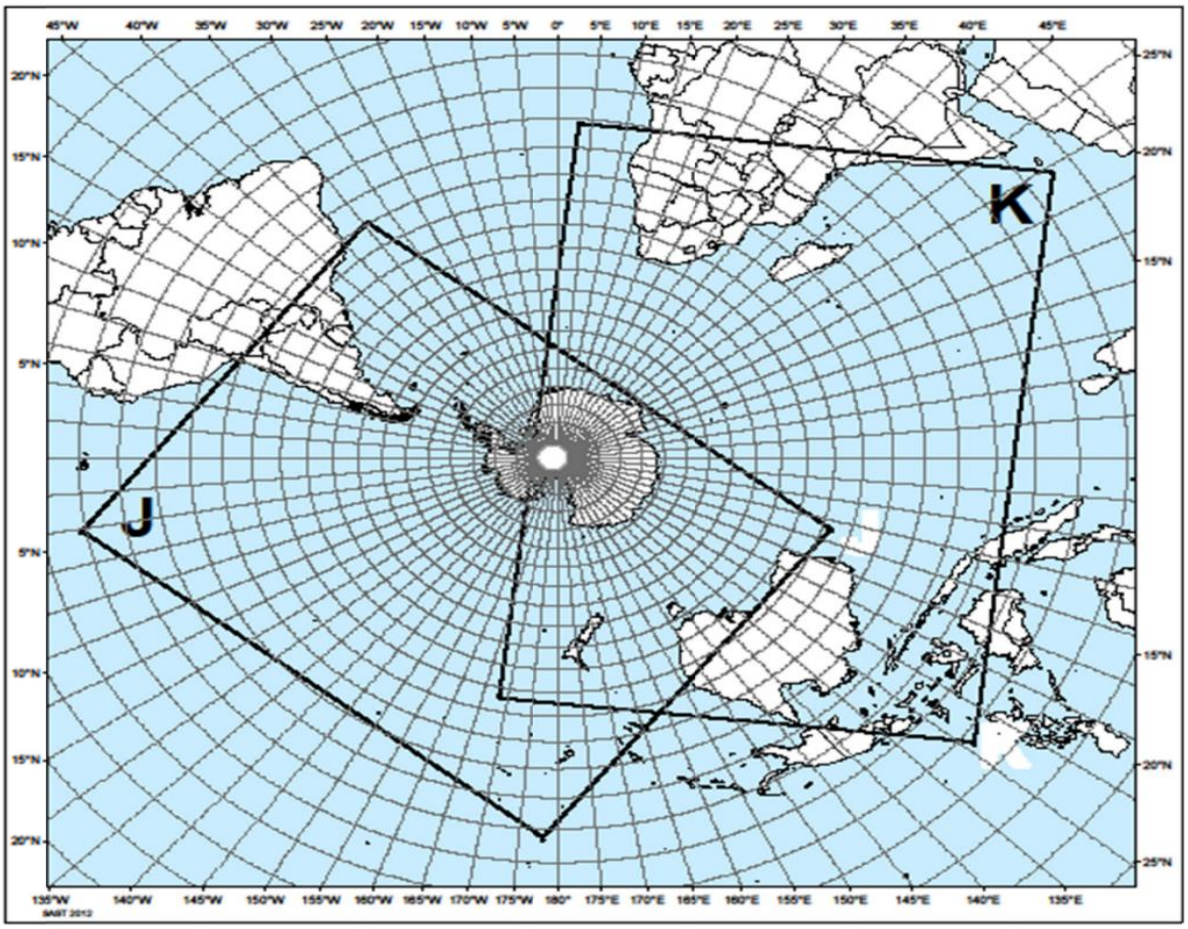


CHART	LATITUDE	LONGITUDE
J	S0318	W17812
J	N0037	W10032
J	S2000	W03400
J	S2806	E10717
K	N1255	E05549
K	N0642	E12905
K	S2744	W16841
K	S1105	E00317

Figure A8-3. Fixed areas of coverage of WAFS forecasts in chart form — Polar stereographic projection (southern hemisphere)

APPENDIX 9. TECHNICAL SPECIFICATIONS RELATED TO INFORMATION FOR AIR TRAFFIC SERVICES, SEARCH AND RESCUE SERVICES AND AERONAUTICAL INFORMATION SERVICES

(See Chapter 10 of this regulation)

1 INFORMATION TO BE PROVIDED FOR AIR TRAFFIC SERVICES UNITS

1.1 List of information for the aerodrome control tower

1.1.1 The following meteorological information shall be supplied, as necessary, to an aerodrome control tower by its associated aerodrome meteorological office:

(a) local routine reports, local special reports, METAR, SPECI, TAF, trend forecasts and amendments thereto, for the aerodrome concerned;

(b) SIGMET and AIRMET information, wind shear warnings and alerts and aerodrome warnings;

(c) any additional meteorological information agreed upon locally, such as forecasts of surface wind for the determination of possible runway changes;

(d) information received on volcanic ash cloud, for which a SIGMET has not already been issued, as agreed between the meteorological and ATS authorities concerned; and

(e) information received on pre-eruption volcanic activity and/or a volcanic eruption as agreed between the meteoro- logical and ATS authorities concerned.

1.2 List of information for the approach control unit

1.2.1 The following meteorological information shall be supplied, as necessary, to an approach control unit by its associated aerodrome meteorological office:

(a) local routine reports, local special reports, METAR, SPECI, TAF, trend forecasts and amendments thereto, for the aerodrome(s) with which the approach control unit is concerned;

(b) SIGMET and AIRMET information, wind shear warnings and alerts and appropriate special air-reports for the airspace with which the approach control unit is concerned and aerodrome warnings;

(c) any additional meteorological information agreed upon locally;

(d) information received on volcanic ash cloud, for which a SIGMET has not already been issued, as agreed between the meteorological and ATS authorities concerned; and

(e) information received on pre-eruption volcanic activity and/or a volcanic eruption as agreed between the meteoro- logical and ATS authorities concerned.

1.3 List of information for the area control centre and flight information centre

1.3.1 The following meteorological information shall be supplied, as necessary, to an area control centre or a flight information centre by its associated meteorological watch office:

(a) METAR and SPECI, including current pressure data for aerodromes and other locations, TAF and trend forecasts and amendments thereto, covering the flight information region or the control area and, if required by the flight information centre or area control centre, covering aerodromes in neighbouring flight information regions, as determined by Asia and Pacific Regional (APAC) air navigation agreement;

(b) forecasts of upper winds, upper-air temperatures and significant en-route weather phenomena and amendments thereto, particularly those which are likely to make operation under visual flight rules impracticable, SIGMET and AIRMET information and appropriate special air-reports for the flight information region or control area and, if determined by Asia and Pacific Regional (APAC) air navigation agreement and required by the flight information centre or area control centre, for neighbouring flight information regions;

(c) any other meteorological information required by the flight information centre or area control centre to meet requests from aircraft in flight; if the information requested is not available in the associated meteorological watch office, that office shall request the assistance of another meteorological office in supplying it;

(d) information received on volcanic ash cloud, for which a SIGMET has not already been issued, as agreed between the meteorological and ATS authorities concerned;

(e) information received concerning the release of radioactive material into the atmosphere, as agreed between the meteorological and ATS authorities concerned;

(f) tropical cyclone advisory information issued by a TCAC in its area of responsibility;

(g) volcanic ash advisory information issued by a VAAC in its area of responsibility; and

(h) information received on pre-eruption volcanic activity and/or a volcanic eruption as agreed between the meteoro- logical and ATS authorities concerned.

1.4 Supply of information to aeronautical telecommunications stations

1.4.1 Where necessary for flight information purposes, current meteorological reports and forecasts shall be supplied to designated aeronautical telecommunication stations. A copy of such information shall be forwarded, if required, to the flight information centre or the area control centre.

1.5 Format of information

1.5.1 local routine and special reports, METAR and SPECI, TAF, trend forecasts, SIGMET and AIRMET information, upper wind and upper-air temperature forecasts and amendments thereto should be supplied to air traffic services units in the form in which they are prepared, disseminated to other aerodrome meteorological offices or meteorological watch offices, or received from other aerodrome meteorological offices or meteorological watch offices, unless otherwise agreed locally.

1.5.2 When computer-processed upper-air data for grid points are made available to air traffic services units in digital form for use by air traffic services computers, the contents, format and transmission arrangements should be as agreed between the meteorological authority and the appropriate ATS authority concerned. The data should normally be supplied as soon as is practicable after the processing of the forecasts has been completed.

2 INFORMATION TO BE PROVIDED FOR SEARCH AND RESCUE SERVICES UNITS

2.1 List of information

2.1.1 Information to be supplied to rescue coordination centres shall include the meteorological conditions that existed in the last known position of a missing aircraft and along the intended route of that aircraft with particular reference to:

(a) significant en-route weather phenomena;

(b) cloud amount and type, particularly cumulonimbus; height indications of bases and tops;

(c) visibility and phenomena reducing visibility;

(d) surface wind and upper wind;

(e) state of ground, in particular, any snow cover or flooding;

(f) sea-surface temperature, state of the sea, ice cover if any and ocean currents, if relevant to the search area; and

(g) sea-level pressure data.

2.2 Information to be provided on request

2.2.1 on request from the rescue coordination centre, the designated aerodrome meteorological office or meteorological watch office should arrange to obtain details of the flight documentation which was supplied to the missing aircraft, together with any amendments to the forecast which were transmitted to the aircraft in flight.

2.2.2 To facilitate search and rescue operations, the designated aerodrome meteorological office or meteorological watch office should, on request, supply:

(a) complete and detailed information on the current and forecast meteorological conditions in the search area; and

(b) current and forecast conditions en-route, covering flights by search aircraft from and returning to the aerodrome from which the search is being conducted.

2.2.3 on request from the rescue coordination centre, the designated aerodrome meteorological office or meteorological watch office should supply or arrange for the supply of meteorological information required by ships undertaking search and rescue operations.

3 INFORMATION TO BE PROVIDED FOR AERONAUTICAL INFORMATION SERVICES UNITS

3.1 List of information

3.1.1 The following information shall be supplied, as necessary, to an aeronautical information services unit:

(a) information on meteorological service for international air navigation, intended for inclusion in the aeronautical information publication(s) concerned;

(b) information necessary for the preparation of NOTAM or ASHTAM including, in particular, information on:

1) the establishment, withdrawal and significant changes in operation of aeronautical meteorological services. This information is required to be provided to the aeronautical information services unit sufficiently in advance of the effective date to permit issuance of NOTAM in compliance with CCAR 18 (15, 5.1.1 and 5.1.1.1);

2) the occurrence of volcanic activity; and

Note. — The specific information required is given in Chapter 3, 3.3.2 and Chapter 4, 4.8.

3) release of radioactive materials into the atmosphere, as agreed between the meteorological and appropriate civil aviation authorities concerned; and

Note. — The specific information required is given in Chapter 3, 3.4.2 g).

(c) information necessary for the preparation of aeronautical information circulars including, in particular, information on:

1) expected important changes in aeronautical meteorological procedures, services and facilities provided; and

2) effect of certain weather phenomena on aircraft operations.

APPENDIX 10. TECHNICAL SPECIFICATIONS RELATED TO REQUIREMENTS FOR AND USE OF COMMUNICATIONS

(See Chapter 11 of this regulation)

1 SPECIFIC REQUIREMENTS FOR COMMUNICATIONS

1.1 Required transit times of meteorological information

1.1.1 AFTN messages and bulletins containing operational meteorological information shall achieve transit times of less than 5 minutes, unless otherwise determined to be lower by Asia and Pacific Regional (APAC) air navigation agreement.

1.2 Grid point data for ATS and operators

1.2.1 when upper-air data for grid points in digital form are made available for use by air traffic services computers, the transmission arrangements shall be as agreed between the meteorological authority and the appropriate ATS authority concerned.

1.2.2 when upper-air data for grid points in digital form are made available to operators for flight planning by computer, the transmission arrangements should be as agreed between the WAFC concerned, the meteorological authority and the operators concerned.

2 USE OF AERONAUTICAL FIXED SERVICE COMMUNICATIONS AND THE PUBLIC INTERNET

2.1 Meteorological bulletins in alphanumeric format

2.1.1 Composition of bulletins

2.1.1.1 whenever possible, exchanges of operational meteorological information shall be made in consolidated bulletins of the same types of meteorological information.

2.1.2 Filing times of bulletins

2.1.2.1 meteorological bulletins required for scheduled transmissions shall be filed regularly and at the prescribed scheduled times. METAR shall be filed for transmission not later than 5 minutes after the actual time of observation. TAF should be filed for transmission not earlier than one hour prior to the beginning of their validity period.

2.1.3 Heading of bulletins

2.1.3.1 Meteorological bulletins containing operational meteorological information to be transmitted via the aeronautical fixed service or the public Internet shall contain a heading consisting of:

(a) an identifier of four letters and two figures;

(b) the ICAO four-letter location indicator corresponding to the geographical location of the meteorological office originating or compiling the meteorological bulletin;

(c) a day-time group; and

(d) if required, a three-letter indicator.

Note 1. — Detailed specifications on format and contents of the heading are given in WMO Publication No. 386, Manual on the Global Telecommunication System, Volume I and are reproduced in the Manual of Aeronautical Meteorological Practice (Doc 8896).

Note 2. — ICAO location indicators are listed in Location Indicators (Doc 7910).

2.1.4 Structure of bulletins

Meteorological bulletins containing operational meteorological information to be transmitted via the AFTN shall be encapsulated in the text part of the AFTN message format.

2.2 World area forecast system products

2.2.1 Telecommunications for the supply of WAFS products

2.2.1.1 The telecommunications facilities used for the supply of world area forecast system products should be the aeronautical fixed service or the public Internet.

2.2.2 Quality requirements for charts

2.2.2.1 *where world area forecast system products are disseminated in chart form, the quality of the charts received should be such as to permit reproduction in a sufficiently legible form for flight planning and documentation. Charts received should be legible over 95 per cent of their area.*

2.2.3 Quality requirements for transmissions

2.2.3.1 *transmissions should be such as to ensure that their interruption should not exceed 10 minutes during any period of 6 hours.*

2.2.4 Heading of bulletins containing WAFS products

2.2.4.1 Meteorological bulletins containing WAFS products in digital form to be transmitted via aeronautical fixed service or the public Internet shall contain a heading as given in 2.1.3.

3 USE OF AERONAUTICAL MOBILE SERVICE COMMUNICATIONS

3.1 Content and format of meteorological messages

3.1.1 The content and format of reports, forecasts and SIGMET information transmitted to aircraft shall be consistent with the provisions of Chapters 4, 6 and 7 of this regulation.

3.1.2 The content and format of air-reports transmitted by aircraft shall be consistent with the provisions of Chapter 5 of this regulation and the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444), Appendix 1.

3.2 Content and format of meteorological bulletins

3.2.1 The substance of a meteorological bulletin transmitted via the aeronautical mobile service shall remain unchanged from that contained in the bulletin as originated.

4 USE OF AERONAUTICAL DATA LINK SERVICE — D-VOLMET

4.1 Detailed content of meteorological information available for D-VOLMET

4.1.1 The aerodromes for which METAR, SPECI and TAF are to be available for uplink to aircraft in flight shall be determined by Asia and Pacific Regional (APAC) air navigation agreement.

4.1.2 The flight information regions for which SIGMET and AIRMET messages are to be available for uplink to aircraft in flight shall be determined by Asia and Pacific Regional (APAC) air navigation agreement.

4.2 Criteria related to information to be available for D-VOLMET

4.2.1 the latest available METAR, SPECI and TAF, and valid SIGMET and AIRMET shall be used for uplink to aircraft in flight.

4.2.2 TAF included in the D-VOLMET shall be amended as necessary to ensure that a forecast, when made available for uplink to aircraft in flight, reflects the latest opinion of the aerodrome meteorological office concerned.

4.2.3 If no SIGMET message is valid for a flight information region, an indication of "NIL SIGMET" shall be included in the D-VOLMET.

4.3 Format of information to be available for D-VOLMET

4.3.1 The content and format of reports, forecasts and SIGMET and AIRMET information included in D-VOLMET shall be consistent with the provisions of Chapters 4, 6 and 7 of this regulation.

5 USE OF AERONAUTICAL BROADCASTING SERVICE — VOLMET BROADCASTS

5.1 Detailed content of meteorological

5.1.1 The aerodromes for which METAR, SPECI and TAF are to be included in VOLMET broadcasts, the sequence in which they are to be transmitted and the broadcast time shall be determined by Asia and Pacific Regional (APAC) air navigation agreement.

5.1.2 The flight information regions for which SIGMET messages are to be included in scheduled VOLMET broadcasts shall be determined by Asia and Pacific Regional (APAC) air navigation agreement. Where this is done, the SIGMET message shall be transmitted at the beginning of the broadcast or of a five-minute time block.

5.2 Criteria related to information to be included in VOLMET broadcasts

5.2.1 when a report has not arrived from an aerodrome in time for a broadcast, the latest available report shall be included in the broadcast, together with the time of observation.

5.2.2 TAF included in scheduled VOLMET broadcasts shall be amended as necessary to ensure that a forecast, when transmitted, reflects the latest opinion of the aerodrome meteorological office concerned.

5.2.3 where SIGMET messages are included in scheduled VOLMET broadcasts, an indication of "NIL SIGMET" shall be transmitted if no SIGMET message is valid for the flight information regions concerned.

5.3 Format of information to be included in VOLMET broadcasts

5.3.1 The content and format of reports, forecasts and SIGMET information included in VOLMET broadcasts shall be consistent with the provisions of Chapters 4, 6 and 7 of this Regulation.

5.3.2 *VOLMET broadcasts should use standard radiotelephony phraseologies.*

Note. — Guidance on the standard radiotelephony phraseologies to be used in VOLMET broadcasts is given in the Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services (Doc 9377), Appendix 1

ATTACHMENTS:

ATTACHMENT A: Operationally Desirable Accuracy of Measurement or Observation

Note. — The guidance contained in this table relates to Chapter 2 – Supply, use quality management and interpretation of meteorological information, in particular to 2.2.7, and Chapter 4 — Meteorological observations and reports.

Element to be observed	Operationally desirable accuracy of measurement or observation*
Mean surface wind	Direction: ± 10°
	Speed: ± 0.5 m/s (1 kt) up to 5 m/s (10 kt)
	± 10% above 5 m/s (10 kt)
Variations from the mean surface wind	± 1 m/s (2 kt), in terms of longitudinal and lateral components
Visibility	± 50 m up to 600 m
	± 10% between 600 m and 1 500 m
	± 20% above 1 500 m
Runway visual range	± 10 m up to 400 m
	± 25 m between 400 m and 800 m
	± 10% above 800 m
Cloud amount	± 1 okta
Cloud height	± 10 m (33 ft) up to 100 m (330 ft)
	± 10% above 100 m (330 ft)
Air temperature and dew-point temperature	± 1°C
Pressure value (QNH, QFE)	± 0.5 hPa

* The operationally desirable accuracy is not intended as an operational requirement; it is to be understood asa goal that has been expressed by the operators.

Note. — Guidance on the uncertainties of measurement or observation can be found in WMO Publication No. 8

— Guide to Meteorological Instruments and Methods of Observation.

ATTACHMENT B: OPERATIONALLY Desirable Accuracy of Forecasts

Note 1. — The guidance contained in this table relates to Chapter 2 – Supply, use quality management and interpretation of meteorological information, in particular to 2.2.8 and Chapter 6 — Forecast.

Note 2. — If the accuracy of the forecasts remains within the operationally desirable range shown in the second column, for the percentage of cases indicated in the third column, the effect of forecast errors is not considered serious in comparison with the effects of navigational errors and of other operational uncertainties.

Element to be forecast	Operationally desirable accuracy of forecasts	Minimum percentage Of cases within range
TAF		
Wind direction	± 20°	80% of cases
Wind speed	± 2.5 m/s (5 kt)	80% of cases
Visibility	± 200 m up to 800 m ± 30% between 800 m and 10 km	80% of cases
Precipitation	Occurrence or non-occurrence	80% of cases
Cloud amount	One category below 450 m (1 500 ft) Occurrence or non-occurrence of BKN or OVC between 450 m (1 500 ft) and 3 000 m (10 000 ft)	70% of cases
Cloud height	± 30 m (100 ft) up to 300 m (1 000 ft) ± 30% between 300 m (1 000 ft) and 3 000 m (10 000 ft)	70% of cases
Air temperature	± 1°C	70% of cases
TREND FORECAST		
Wind direction	± 20°	90% of cases
Visibility	± 2.5 m/s (5 kt) ± 200 m up to 800 m ± 30% between 800 m and 10 km	90% of cases
Precipitation	Occurrence or non-occurrence	90% of cases
Cloud amount	One category below 450 m (1 500 ft) Occurrence or non-occurrence of BKN or OVC between 450 m (1 500 ft) and 3 000 m (10 000 ft)	90% of cases
Cloud height	± 30 m (100 ft) up to 300 m (1 000 ft) ± 30% between 300 m (1 000 ft) and 3 000 m (10 000 ft)	90% of cases
FORECAST FOR TAKE-OFF		
Wind direction	± 20°	90% of cases
Wind speed	± 2.5 m/s (5 kt) up to 12.5 m/s (25 kt)	90% of cases
Air temperature	± 1°C	90% of cases
Pressure value (QNH)	± 1 hPa	90% of cases
AREA, FLIGHT AND ROUTE FORECASTS		
Upper-air temperature	± 2°C (Mean for 900 km (500 NM)	90% of cases
Relative humidity	± 20%	90% of cases
Upper wind	± 5 m/s (10 kt) (Modulus of vector difference for 900 km (500 NM)	90% of cases
Significant en-route weather phenomena and cloud	Occurrence or non-occurrence Location: ± 100 km (60 NM) Vertical extent: ± 300 m (1 000 ft) Flight level of tropopause: ± 300 m (1 000 ft) Max wind level: ± 300 m (1 000 ft)	80% of cases 70% of cases 70% of cases 80% of cases 80% of cases

ATTACHMENT C: Selected Criteria Applicable to aerodrome Reports

(The guidance in this table relate to chapter 4 and appendix3 of this regulatoin)

	Surface wind				Visibility (VIS)			Runway visual range[1] (A, B, C (OBS TIME) –10 –5 (Time, MIN))		Present weather	Cloud				Temperature	Pressure (QNH, QFE)		Supplementary information
	Directional variations[3]			Speed variations[3]	Directional variations[4]			Past tendency[1]			Layers reported if coverage							
	≥ 60° and < 180°		≥ 180°		Special cases: Minimum VIS ◻ prevailing VIS			$R_{5(AB)}$ ◻ $R_{5(BC)}$			Amount			Type[2]				
Specifications	Mean speed				Minimum VIS < 1 500 m or < 0.5 × prevailing VIS	VIS fluctuating and prevailing VIS cannot be determined					Lowest layer	Next layer >	Next higher layer >	CB[2] or TCU	Identification	Parameters reported	Updated if changes > agreed magnitude	Parameter to be included
	< 1.5 m/s (3 kt)	≥ 1.5 m/s (3 kt)		Exceeding the mean speed by ≥ 5 m/s (10 kt)	General rule			< 100 m	◻ 100 m									
Local routine and special report	2/10 min[7] VRB +2 Extreme Conditions[8]	2/10 min[7] Mean +2 Extreme Conditions[8]	2 min VRB (no Extremes)[8]	10 min[8] Minimum and Maximum speed	1 min VIS along the Runway(s)	N/A	N/A	1 min N/A[9]		No general criteria applicable to all the WX phenomena (for specific criteria, see Appendix 3, 4.4.2)	Always	2/8	4/8	Always	CB TCU	QNH QFE[10]	Yes	All[11]
METAR/ SPECI	10 min VRB (no extremes)	10 min mean + 2 extreme directions	10 min VRB (no extremes)	10 min[8] Maximum speed[8]	10 min Prevailing VIS	Prevailing VIS and minimum VIS + direction	Minimum VIS	10 min ↄ tendency served ("N")	Upward ("U") or downward ("D")		Always	2/8	4/8	Always	CB TCU	QNH	No	Recent WX of operational significance and wind shear[12]
								No tendency available, the tendency is to be omitted										
Relevant reporting scales for all messages	Direction in three figures rounded off to the nearest 10 degrees (degrees 1 – 4 down, degrees 5 – 9 up)			Speed in 1 m/s or 1 kt Speed < 0.5 m/s (1 kt) indicated as CALM	If VIS < 800 m : 50 m; 800 m ≤ VIS < 5 000 m : 100 m; 5 000 m ≤ VIS < 10 km : 1 km; VIS ≥ 10 km : None, given as 10 km or covered under CAVOK	Step applicable		If RVR < 400 m : 25 m; 400 m ≤ RVR ≤ 800 m : 50 m; 800 m < RVR < 2 000 m : 100 m[13]	Step applicable	N/A	If Base ≤ 3 000 m (10 000 ft) (Reference level: Aerodrome elevation[14] or mean sea level for offshore structures)			Step applicable : 30 m (100 ft)	Rounded off to whole degrees: up for decimal 5	In whole hPa[15] rounding down for decimals 1 – 9		N/A

1. Let R 5(AB)= 5-minute mean runway visual range value during period AB and R 5(BC) = 5-minute mean runway visual range value during period BC.
2. CB (cumulonimbus) and TCU (towering cumulus = cumulus congestus of great vertical extent) if not already indicated as one of the other layers

Notes.—

a. Considered for the past 10 minutes (exception: if the 10-minute period includes a marked discontinuity (i.e. runway visual range changes or passes 175, 300, 550 or 800 m, lasting ≥ 2 minutes), only data after the discontinuity to be used). A simple diagrammatic convention is used to illustrate those parts of the 10-minute period prior to the observation relevant to runway visual range criteria, i.e. AB, BC and AC.

b. 2. Layer composed of CB and TCU *with a common base* should be reported as "CB".

c. 3. Considered for the past 10 minutes (exception: if the 10-minute period includes a *marked discontinuity* (i.e. the direction changes ≥ 30° with a speed ≥ 5 m/s *or* the speed changes ≥ 5 m/s lasting ≥ 2 minutes), only data after the discontinuity to be used).

d. If several directions, the most operationally significant direction used.

e. Let R 5(AB)= 5-minute mean runway visual range value during period AB and R 5(BC) = 5- minute mean runway visual range value during period BC.

f. 6. CB (cumulonimbus) and TCU (towering cumulus = cumulus congestus of great vertical extent) if not already indicated as one of the other layers.

g. Time averaging, for mean values and, if applicable, referring period for extreme values, indicated in the upper left-hand corner.

h. According to the WMO *Manual on Codes* (WMO-No. 306), Volume I.1, Part A —Alphanumeric Codes, paragraph 15.5.5, "it is recommended that the wind measuring systems should be such that peak gusts should represent a three-second average".

i. N/A = not applicable.

j. QFE is to be included if required. Reference elevation for QFE should be aerodrome elevation except for precision approach runways, and non-precision approach runways with threshold ≥ 2 m (7 ft) below or above aerodrome elevation, where the reference level should be the relevant threshold elevation.

k. As listed in Appendix 3, 4.8.

l. Also sea-surface temperature, and state of the sea or the significant wave height from offshore structures in accordance with Asia and Pacific Regional (APAC) air navigation agreement.

m. Report if RVR and/or VIS < 1 500 m, limits for assessments 50 and 2 000 m.

n. For landing at aerodromes with precision approach runways and with the threshold elevation ≥ 15 m below the aerodrome elevation, the *threshold elevation* to be used as a reference.

o. Measured in 0.1 hPa.

ATTACHMENT D: Conversion of Instrumented Reading into Runway Visual Range and Visibility

(See appendix 3, 4.3.5 of this regulation)

The conversion of instrumented readings into runway visual range and visibility is based on Koschmieder's Law or Allard's Law, depending on whether the pilot can be expected to obtain main visual guidance from the runway and its markings or from the runway lights. In the interest of standardization in runway visual range assessments, this Attachment provides guidance on the use and application of the main conversion factors to be used in these computations.

In Koschmieder's Law one of the factors to be taken into account is the pilot contrast threshold. The agreed constant to be used for this is 0.05 (dimensionless).

In Allard's Law the corresponding factor is the illumination threshold. This is not a constant, but a continuous function dependent on the background luminance. The agreed relationship to be used in instrumented systems with continuous adjustment of the illumination threshold by a background luminance sensor is shown by the curve in Figure D-1. The use of a continuous function which approximates the step function such as displayed in Figure D-1 is preferred, due to its higher accuracy, to the stepped relationship described in paragraph 4.

In instrumented systems without continuous adjustment of the illumination threshold, the use of four equally spaced illumination threshold values with agreed corresponding back-ground luminance ranges is convenient but will reduce accuracy. The four values are shown in Figure D-1 in the form of a step function; they are tabulated in Table D-1 for greater clarity.

Note 1. — Information and guidance material on the runway lights to be used for assessment of runway visual range are contained in the Manual of Runway Visual Range Observing and Reporting Practices (Doc 9328).

Note 2. — In accordance with the definition of visibility for aeronautical purposes, the intensity of lights to be used for the assessment of visibility is in the vicinity of 1 000 cd.

Table D-1. Illumination threshold steps

Condition	Illumination threshold (lx)	Background luminance (cd/m2)
Night	8×10^{-7}	≤ 50
Intermediate	10^{-5}	51 – 999
Normal day	10^{-4}	1000 – 12000
Bright day (sunlit fog)	10^{-3}	> 12000

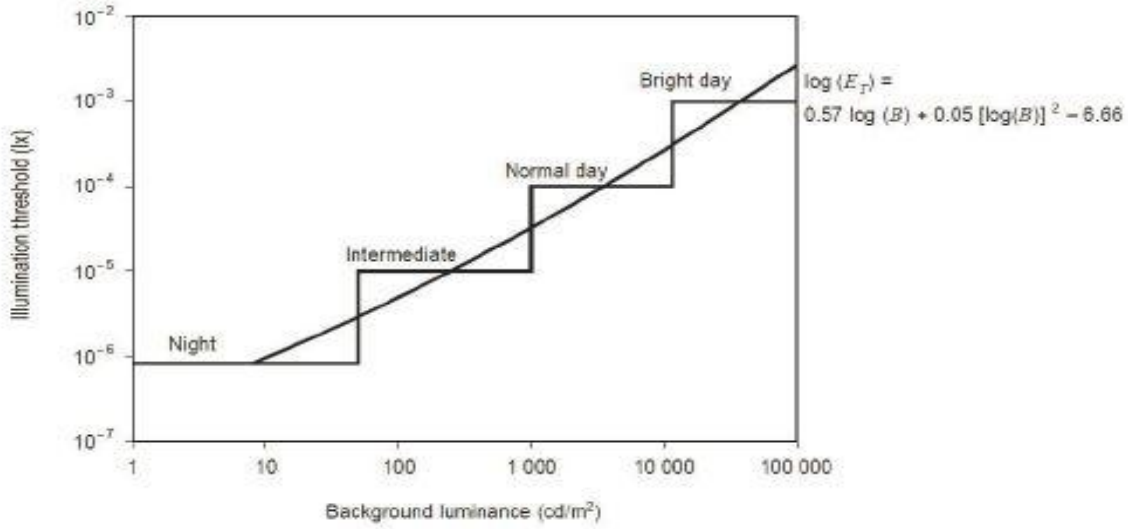


Figure D-1. Relationship between the illumination threshold E_T (lx) and background luminance B (cd/m^2)