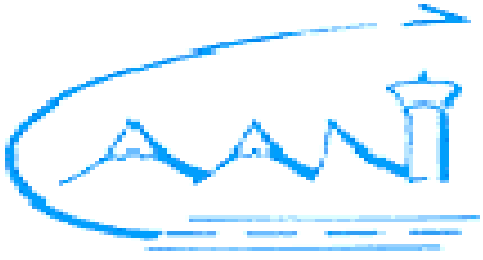

Civil Aviation Requirements For Meteorological Service for International Air Navigation

CAR — 3

First Edition - July, 2017

Civil Aviation Authority of Nepal

Amendments

Amendments and Corrigenda to these "Meteorological Service for International Air Navigation" are regularly issued by Director General of CAA, Nepal. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

Amendments			
No	Date of Issue	Date Entered	Entered by
1	March, 2019	-	ANSSSD

Corrigenda			
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TABLE OF CONTENTS

PART II. APPENDICES AND ATTACHMENTS

APPENDICES

ATTACHMENTS

FOREWORD

Article 28 (Air navigation facilities and standard systems) of the Convention on International Civil Aviation requires CAA Nepal to provide, in its territory, airports, radio services, meteorological services and other air navigation services to facilitate international air navigation, in accordance with the standards and recommended practices established from time to time, pursuant to this Convention. Under Article 37 (Adoption of international Standards and Procedures) of the Convention, CAA Nepal undertakes to collaborate in securing the highest practicable degree of uniformity in regulations, standards, procedures, and organization in relation to aircraft, personnel, airways and auxiliary services in all matters in which such uniformity will facilitate and improve air navigation. To this end the International Civil Aviation Organization adopts and amends from time to time, as may be necessary, international standards and recommended practices and procedures dealing with air traffic service practices.

In above respect, ICAO Annex-3 provides the Standards pertaining to the meteorological service for international air navigation which are required to be adopted by the contracting states.

This Civil Aviation Requirement for Meteorological Service for International Air Navigation, First Edition 2017, "CAR-3" has been enacted by Civil Aviation Authority of Nepal, **pursuant to Clause -5 Sub-Clause "Pha" and Clause- 35 of Civil Aviation Authority of Nepal Act, 2053 (1996) and Rule-82, Schedule-3 of Civil Aviation Regulation, 2058 (2002),** in accordance with the Standard and Recommended Practices of CAR -3 "Meteorological Service for International Air Navigation" to the Convention of International Civil Aviation for safety, regularity and efficiency of Civil Aviation in Nepal.

All earlier national legislations still stand valid as a part of Civil Aviation requirements for practical purposes.

…….

(Director General)

Civil Aviation Authority of Nepal

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

PART I CORE SARPs

CHAPTER 1. DEFINITIONS

Note.— The designation (RR) in these definitions indicates a definition which has been extracted from the Radio Regulations of the International Telecommunication Union (ITU) (see Handbook on Radio Frequency Spectrum Requirements for Civil Aviation including Statement of Approved ICAO Policies *(Doc 9718)).*

1.1 Definitions

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 centre 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 alternate. 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 centre (ACC). 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 expectedmeteorological conditions relating to flight operations; a discussion includes answers to questions.

Control area (CTA). 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 aeroplane 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 centre (FIC). A unit established to provide flight information service and alerting service. ***Flight information region (FIR).*** 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 2.— 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 sonetworks that 000000are 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 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.

Meteorological watch office (MWO). 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.

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 centred 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 navigation specifications.*

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 aeroplane 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. The person, organization or enterprise engaged in or offering to engage in an aircraft operation. ***Performance-based navigation (PBN).*** Area navigation based on performance requirements 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*).

* ISO Standard 9000 — Quality Management Systems — Fundamentals and Vocabulary.

Regional air navigation agreement. Agreement approved by the Council of ICAO normally on the advice of a regional air navigation meeting.

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

Rescue coordination centre. 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 centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

Search and rescue services unit. A generic term meaning, as the case may be, rescue coordination centre, rescue subcentre 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 analysing the conditions in the atmosphere.

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 systems and/or pose a radiation risk to aircraft occupants.

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

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 centre (TCAC). A meteorological centre designated by regional air navigation agreement to provide advisory information to meteorological watch offices, world area forecast centres 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).

Volcanic ash advisory centre (VAAC). A meteorological centre designated by regional air navigation agreement to provide advisory information to meteorological watch offices, area control centres, flight information centres, world area forecast centres 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 centre (WAFC). A meteorological centre designated to prepare and issue significant weather forecasts and upper-air forecasts in digital form on a global basis direct to States using the aeronautical fixed service Internet-based services.

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

1.2 Terms used with a limited meaning

For the purpose of this CAR, 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 the latter;

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

c) “issue” is used solely in connection with cases 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 service 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 Meteorological service to be provided for international air navigation over Nepalese territory shall be made in accordance with the provisions of this CAR and with due regard to regional air navigation agreement. It also includes the meteorological service to be provided for international air navigation over international waters and other areas which lie outside Nepalese territory

2.1.4 CAA Nepal shall designate the Department of Hydrology and Meteorology (DHM) to provide or to arrange for the provision of meteorological service for international air navigation on its behalf. Details of the meteorological authority so designated shall be included in the State aeronautical information publication, in accordance with CAR 15, Chapter 5.

Note.— Detailed specifications concerning presentation and contents of the aeronautical information publication is provided in PANS-AIM (Doc 10066), Appendix 2.

2.1.5 CAA Nepal shall ensure that the designated meteorological authority complies with the requirements of the World Meteorological Organization (WMO) in respect of qualifications, and competencies, education and training of meteorological personnel providing service for international air navigation.

Note.— Requirements concerning the qualifications, competencies, education and training of meteorological personnel in aeronautical meteorology are given in the Technical Regulations *(WMO-No. 49), Volume I* — General Meteorological Standards and Recommended Practices, Part V — Qualifications and Competencies of Personnel Involved in the Provision of Meteorological (Weather and Climate) and Hydrological Services, Part VI — Education and Training of Meteorological Personnel, and Appendix A — Basic Instruction Packages.

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 DHM 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 when 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 ISO 9000 series of quality assurance standards provide a basic framework for the development of a quality assurance programme. The details of a successful programme are to be formulated by each State and in most cases are unique to the State organization. Guidance on the establishment and implementation of a quality system is given in the Manual on the Quality Management System for the Provision of Meteorological Service for International Air Navigation *(Doc 9873).*

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

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 CAR and the relevant regional air navigation plans. Guidance concerning the accuracy of measurement and observation, and accuracy of forecasts is given in Attachments A and B, respectively, to this CAR.

2.2.5 In regard to the exchange of meteorological information for operational purposes, the quality system when established 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.— Requirements concerning the exchange of operational meteorological information are given in Chapter 11 and Appendix 10 of this CAR..

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 evidenced 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 of the actual conditions at the time of observation.

Note.— Guidance on the operationally desirable accuracy of measurement or observation is given intheAttachment 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 theAttachment 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, as specified in the following chapters.

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

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, DHM or its regional/aerodrome office concerned. The minimum amount of advance notice required shall be as agreed between DHM or its aerodrome office and the operator concerned.

2.3.2 DHM 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 DHM.

2.3.3 The operator or a flight crew member shall ensure that, where requiredbyDHMin consultation with users, the aerodrome meteorological office concerned is notified:

a) of flight schedules;

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

2.3.4 The notification to the aerodrome meteorological office 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 aerodrome 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

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.

CHAPTER 3. GLOBAL SYSTEM SUPPORTING CENTRES AND METEOROLOGICAL OFFICES

3.1Distribution of World Area Forecast System Product

3.1.1 DHM has the responsibility to disseminate the WAFS products for the forecasts in digital or printed form as agreed of:

1) upper wind;

2) upper-air temperature and humidity;

3) geopotential altitude of flight levels;

4) flight level and temperature of tropopause;

5) direction, speed and flight level of maximum wind;

6) cumulonimbus clouds;

7) icing; and

8) turbulence;

9) significant weather (SIGWX) phenomena (including information on volcanic eruption);

3.2 Aerodrome meteorological offices

3.2.1 DHM 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.

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

a) prepare and/or obtain forecasts and other relevant information for flights with which it is concerned; the extent of its responsibilities to prepare forecasts shall be related to the local availability and use of en-route and aerodrome forecast material received from other offices;

b) prepare and/or obtain forecasts of local meteorological conditions;

c) maintain a continuous survey of meteorological conditions over the aerodromes for which it is designated to prepare forecasts;

d) provide briefing, consultation and flight documentation to flight crew members and/or other flight operations personnel;

e) supply other meteorological information to aeronautical users;

f) display the available meteorological information;

g) exchange meteorological information with other aerodrome meteorological offices; and

h) supply information received on pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud, to its associated air traffic services unit, aeronautical information service unit and meteorological watch office (MWO) as agreed between the meteorological, aeronautical information service and ATS authorities concerned.

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

3.3 Meteorological watch office(s)

3.3.1.DHM shall establish Meteorological Watch Office(MWO) for providing aeronautical meteorological services as mentioned in 3.3.2 to the air traffic services units within the Nepalese flight information region (FIR) or control areas (CTAs) as per the LOA between appropriate MET authority and ATS authority.

3.3.2 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) 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 area control centre (ACC), as agreed between the meteorological and ATS authorities concerned, and to its associated VAAC as determined by regional air navigation agreement; and

3.3.3 The boundaries of the area over which meteorological watch is to be maintained by an MWO shall be coincident with the boundaries of an FIR or a CTA or a combination of FIRs and/or CTAs.

3.4 Meteorological watch offices

3.4.1 A Contracting State, having accepted the responsibility for providing air traffic services within a flight information region (FIR) or a control area (CTA), shall establish, in accordance with regional air navigation agreement, one or more MWOs, or arrange for another Contracting State to do so.

Note.— Guidance on the bilateral or multilateral arrangements between Contracting States for the provision of meteorological watch office services, including for cooperation and delegation, can be found in the Manual of Aeronautical Meteorological Practice (Doc 8896).

CHAPTER 4. METEOROLOGICAL OBSERVATIONS AND REPORTS

Note.— Technical specifications and detailed criteria related to this chapter are given in Appendix 3.

4.1 Aeronautical meteorological stations and observations

4.1.1 DHM shall establish aeronautical meteorological stations at aerodromes, as required by CAAN. 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 the DHM to ensure the compliance of meteorological service for international air navigation with the provisions of this CAR.

4.1.2 Aeronautical meteorological stations shall make routine observations at fixed intervals. At aerodromes, the routine observations shall be supplemented by special observations whenever specified changes occur in respect of surface wind, visibility, runway visual range, present weather, clouds and/or air temperature.

4.13 DHM shall arrange for its aeronautical meteorological stations to be inspected as part of quality assurance 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).*

4.1.4 At aerodromes with runways intended for Category II 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 FOR- .

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

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

4.2 Agreement between meteorological authorities and air traffic services authorities

An agreement between the meteorological authority 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) as and where necessary, supplementary visual observations (for example, of meteorological phenomena of operational significance in the climb-out and approach areas) if and when made by air traffic services personnel to update or supplement the information supplied by the meteorological station;

e) meteorological information obtained from aircraft taking off or landing (for example, on wind shear); and

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

Note.— Guidance on the subject of coordination between ATS and aeronautical meteorological services is contained in the 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 Meteorological office, the appropriate ATS unit and the operator concerned. Such observations shall be made at intervals of one hour or, if so agreed between concerned authorities, at intervals of one half-hour. At other aeronautical meteorological stations, such observations shall be made as determined by the meteorological office 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) METAR

Note.— Meteorological information used in ATIS (voice-ATIS and D-ATIS) is to be extracted from the METAR, in accordance with CAR 11, 4.3.4.1 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 as agreed between Meteorological office and ATS unit.

4.4 Special observations and reports

4.4.1 A list of criteria for special observations shall be established by the meteorological office, in consultation with the appropriate ATS unit, operators and others concerned.

4.4.2 Reports of special observations shall be issued as:

a)SPECI

Note.— Meteorological information used in ATIS (voice-ATIS and D-ATIS) is to be extracted from the SPECI, in accordance with CAR 11, 4.3.4.1 g).

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

4.5 Contents of reports

4.5.1 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 *(Doc 7910).*

4.5.2 In addition to elements listed under 4.5.1 a) to k), 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 as per agreement between meteorological office and ATS unit.

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 **Reserve**.

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 metres or kilometres.

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

4.6.2.2 **Reserve**.

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 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 instrument approach and landing operations.

4.6.3.2 **Reserve**

4.6.3.3 The runway visual range, assessed in accordance with 4.6.3.1, shall be reported in metres throughout periods when either the visibility or the runway visual range is less than 1 500 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; and

b) the touchdown zone and the mid-point of the runway intended for Category II 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), haze, mist, fog, freezing fog and thunderstorms (including thunderstorms in the vicinity).

4.6.4.2 **Reserve**

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 **Reserve**

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.

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

4.6.7 Atmospheric pressure

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

4.6.8 Supplementary information

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 shall be used in a position to do so during non-operational hours of the aerodrome, and during operational hours of the aerodrome as determined by the meteorological authority 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 Doc 9837.

4.7.2 **Reserve**.

4.7.3 METAR and SPECI from automatic observing systems shall be identified with the word “AUTO”.

4.8 Observations and reports of volcanic activity

Reserve.

CHAPTER 5. AIRCRAFT OBSERVATIONS AND REPORTS

Note.— Technical specifications and detailed criteria related to this chapter are given in Appendix 4.

5.1 Obligations of States

CAAN shall arrange in coordination with DHM for special observations to be made by aircraft operating within Kathmandu FIR and for the recording and reporting of these observations.

5.2 Types of aircraft observations

The following are the types of aircraft observations:

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

b) specialand non-routine aircraft observations during any phase of the flight.

5.3 Routine aircraft observations — designation

Reserve

5.4 Routine aircraft observations — exemptions

Reserve

5.5 Special aircraft observations

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

a) moderate or severe turbulence; or

b) moderate or severe icing; or

c) severe mountain wave; or

d) thunderstorms, without hail, that are obscured, embedded, widespread or in squall lines; or

e) thunderstorms, with hail, that are obscured, embedded, widespread or in squall lines; or

f) heavy dust-storm or heavy sandstorm

5.6 Other non-routine aircraft observations

When other meteorological conditions not listed under 5.5, e.g. wind shear, 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 air traffic services 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 Special aircraft observations during flight

5.7.1 Special and other non-routine aircraft observations during flight shall be reported by voice communications.

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

5.7.3SpecialAircraft observations shall be reported as air-reports.

5.8 Relay of special air-reports by air traffic services units

The CAAN shall make arrangements to ensure that, on receipt by the air traffic services units of special air-reports by voice communications, the air traffic services units relay them without delay to their associated meteorological watch office.

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

Reserve

CHAPTER 6. FORECASTS

Note.— Technical specifications and detailed criteria related to this chapter are given in Appendix 5.

6.1 Use of forecasts

The issue of a new forecast by an aerodrome 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 preparedby the aerodrome meteorological office designated by the DHM.

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.

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,

hen 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 be not less than 6 hours and not more than 30 hours. Routine TAF valid for less than 12 hours shall be issued every 3 hours and those valid for 12 to 30 hours should be issued every 6 hours.

6.2.7 When issuing TAF, aerodrome meteorological offices shall ensure that not 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 DHMon request of local users to meet their requirements 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, 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 aerodrome meteorological office designated by the DHM as agreed between the DHM and the operators concerned.

6.4.2 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 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 Aerodrome 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

Reserve

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

Note.— Technical specifications and detailed criteria related to this chapter are given in Appendix 6.

7.1 SIGMET information

7.1.1 SIGMET information shall be issued by a meteorological watch office and shall give a concise description in abbreviated plain language 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, and of the development of those phenomena in time and space.

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

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

7.1.4 Reserve

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

7.1.6 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, 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 shall be updated at least every 6 hours.

7.2 AIRMET Information

Reserve

7.3 Aerodrome warnings

7.3.1 Aerodrome warnings shall be issued by the aerodrome meteorological office designated by DHM concerned 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.

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

7.4Wind Shear Warning and Alerts

Reserve

CHAPTER 8. AERONAUTICAL CLIMATOLOGICAL INFORMATION

Note.—Technical specifications and detailed criteria related to this chapter are given in Appendix 7.

8.1 General provisions

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

Note.— Climatological data required for aerodrome planning purposes are set out in CAR 14, Part I, 3.1.4 and Attachment A.

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

8.1.3 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

DHM 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 meteorological authority and the user concerned.

8.3 Aerodrome climatological summaries

Aerodrome climatological summaries shall follow the procedures prescribed by the World Meteorological Organization (WMO). 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 WMO and shall be published and kept up to date as necessary.

8.4 Copies of meteorological observational data

DHM , on request and to the extent practicable, shall make available to any other 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

Note.— Technical specifications and detailed criteria related to this chapter are given in Appendix 8.

9.1 General provisions

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

a) pre-flight planning by operators;

b) in-flight re-planning by operators using centralized operational control of flight operations;

c) use by flight crew members before departure; and

d) aircraft in flight.

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 supplied to operators and flight crew members shall be up to date and include the following information, on request as agreed between DHM and operator 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;

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 clouds, 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 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 advisory information relevant to the whole route;

g) aerodrome warnings for the local aerodrome;

h) meteorological satellite images; and

i) ground-based weather radar information.; and

j) space weather advisory information relevant to the whole route when available.

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 DHM 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 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 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, DHM 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 DHM after consultation with the operators concerned and at the time 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 the State concerned. At an aerodrome without an aerodrome meteorological office at the aerodrome, arrangements for the supply of meteorological information shall be as agreed between the meteorological authority 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 DHM 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 theaerodrome 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 aerodrome meteorological office associated with the aerodrome of departure. At an aerodrome where these services are not available, arrangements to meet the requirements of flight crew members shall be as agreed between DHM and the operator concerned. In exceptional circumstances, such as an undue delay, the aerodrome meteorological office associated with the aerodrome shall provide or, if that is not practicable, arrange for the provision of a new briefing, consultation and/or flight documentation as necessary.

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

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) and k). 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 DHM and the operator concerned, but in all cases it 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 aerodrome 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 aerodrome meteorological office shall, as agreed locally, 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 authority shall retain information supplied to flight crew members, either as printed copies or in computer files, for a period of at least 30 days from the date of issue. This information shall be made available, on request, for inquiries or investigations and, for these purposes, shall be retained until the inquiry or investigation is completed.

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

Reserve

9.5 Information for aircraft in flight

Reserve

CHAPTER 10. INFORMATION FOR AIR TRAFFIC SERVICES, SEARCH AND RESCUE SERVICES AND AERONAUTICAL INFORMATION SERVICES

Note.— Technical specifications and detailed criteria related to this chapter are given in Appendix 9.

10.1 Information for air traffic services units

10.1.1 DHM shall designate an aerodrome meteorological office or meteorological watch office to be associated with each air traffic services unit. The associated aerodrome 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 its functions.

10.1.2 An aerodrome meteorological office shall be associated with an aerodrome control tower/approach control unit for the provision of meteorological information.

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

10.1.4Reserve

10.1.5 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

Aerodrome meteorological offices or meteorological watch offices designated by the DHM supply search and rescue services units with the meteorological information they require in a form established by mutual agreement. For that purpose, the designated aerodrome 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

DHM, in coordination with the CAAN, shall arrange for the supply of upto-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

Note 1.— Technical specifications and detailed criteria related to this chapter are given in Appendix 10.

Note 2.— It is recognized that it is for CAA Nepal to decide upon its own internal organization and responsibility for implementing the telecommunications facilities referred to in this chapter.

11.1 Requirements for communications

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

11.1.2 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 centres, area control centres and rescue coordination centres and the associated aeronautical telecommunications stations.

11.1.3 Reserve

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

11.1.5 Telecommunications facilities between aerodrome 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 should not exceed 5 minutes.

Note.— In 11.1.4 and 11.1.5, "approximately 15 seconds" refers to telephony communications involving switchboard operation and "5 minutes" refers to printed communications involving retransmission.

11.1.6 Reserve

11.1.7 As agreed between the DHM and the operators concerned, provision shall be made to enable operators to establish suitable telecommunications facilities for obtaining meteorological information from aerodrome meteorological offices or other appropriate sources.

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

11.1.9 The telecommunication facilities used for the exchange of operational meteorological information shall be aeronautical fixed service.

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 communication-- meteorological bulletins

Meteorological bulletins containing operational Meteorological information to be transmitted via the aeronautical fixed service shall be originated by appropriately meteorological office or aeronautical meteorological station.

Note : Meteorological bulletins containing operational meteorological information authorized for transmission via the aeronautical fixed service are listed in CAR 10 vol II chapter 4 together with relevant priorities and priorities indicators.

11.3 Use of aeronautical fixed service communication- world area forecast system product

Reserve

11.4 Use of aeronautical mobile service communications

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

11.5 Use of Aeronautical Datalink Service

Reserve

11.6 Use of Aeronautical Broadcast Service- contents of VOLMET broadcast

Reserve

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

PART II APPENDICES AND ATTACHMENTS

APPENDIX 1. FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

(See Chapter 9 of this CAR.)

MODEL A	OPMET information
MODEL IS	Upper wind and upper-air 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 SN	Sheet of notations used in flight documentation

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

SELECTED ICAO LOCATION INDICATORS

VNKT	Kathmandu/Intl	VHHH	Hong Kong	VIDP	Delhi/Intl
VECC	Calcutta/Intl	ZPPP	Kunming	OTBD	Doha
VGZR	Dhaka/Intl	ZGGG	Ghanzou	OMDB	Dubai
VYYY	Yangon/Intl	ZUUU	Chendu	OMSJ	Sharjah
VTBD	Bangkok/Intl	ZULS	Lasha	OOMS	Muscat
WMKK	Kwalalumpur	RKSI	Incheon	OMAA	Abu Dhabi
WSSS	Singapore/Intl	ZBAA	Beijing	LTBA	Istanbul

METAR VTBD 270630Z 32007KT 280V010 9999 FEW020 30/25 Q1004 NOSIG=

METARWSSS 270630Z 16008KT 9999 -SHRA FEW010 FEW016TCU SCT050 BKN160 26/24 Q1007 NOSIG=

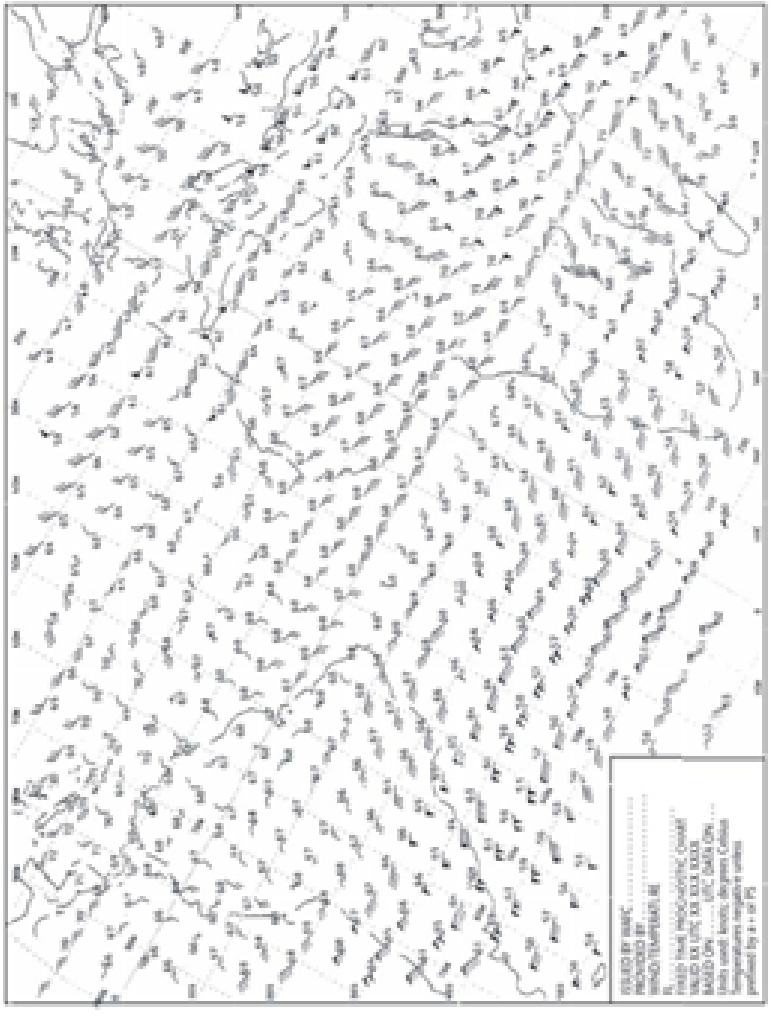
SPECI VNKT 270632Z 24006KT 190V300 6000 3000N –RA FEW008 FEW025CB SCT030 BKN100 22/21 Q1011 NOSIG =

TAF VECC 270500Z 2706/2812 15008KT 4000 HZ SCT018 SCT100 TEMPO 2708/2712 1500 TSRA SCT015 FEW025CB BKN090 BECMG 2718/2720 21006KT 2800 HZ BECMG 2802/2804 14007KT 3500 HZ TEMPO 2806/2810 1500 TSRA SCT015 FEW025CB BKN090=

TAF OMSJ 270504Z 2706/2812 16008KT 8000 NSC=

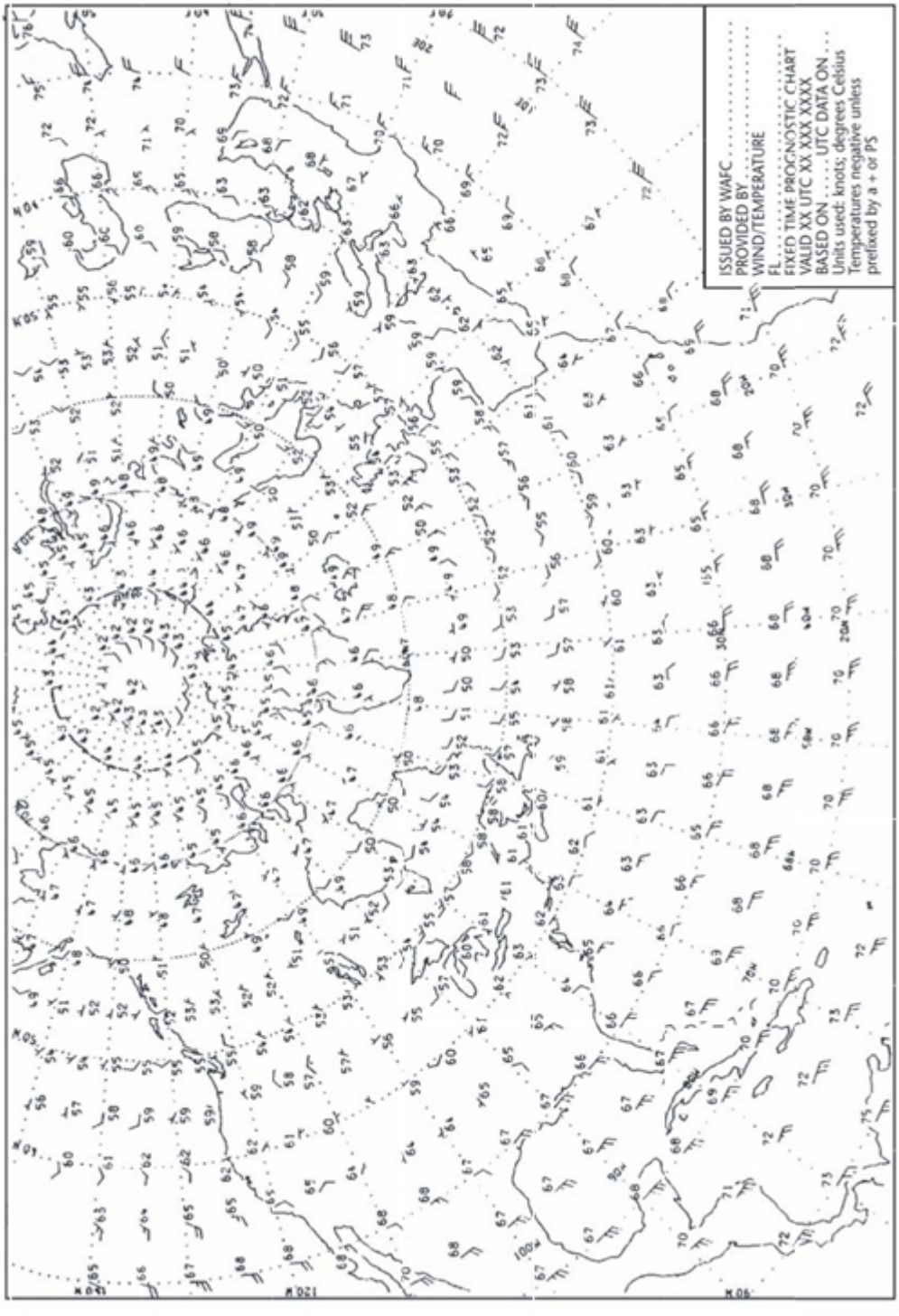
SIGMET VNSM KATHMANDU FIR EMBD CB OBS E OF E85.2 STNR WKN=

UPPER WIND AND UPPER-AIR TEMPERATURE CHART FOR STANDARD ISOBARIC SURFACE MODEL I8
Example 1. Arrows, feathers and pennants (Mercator projection)

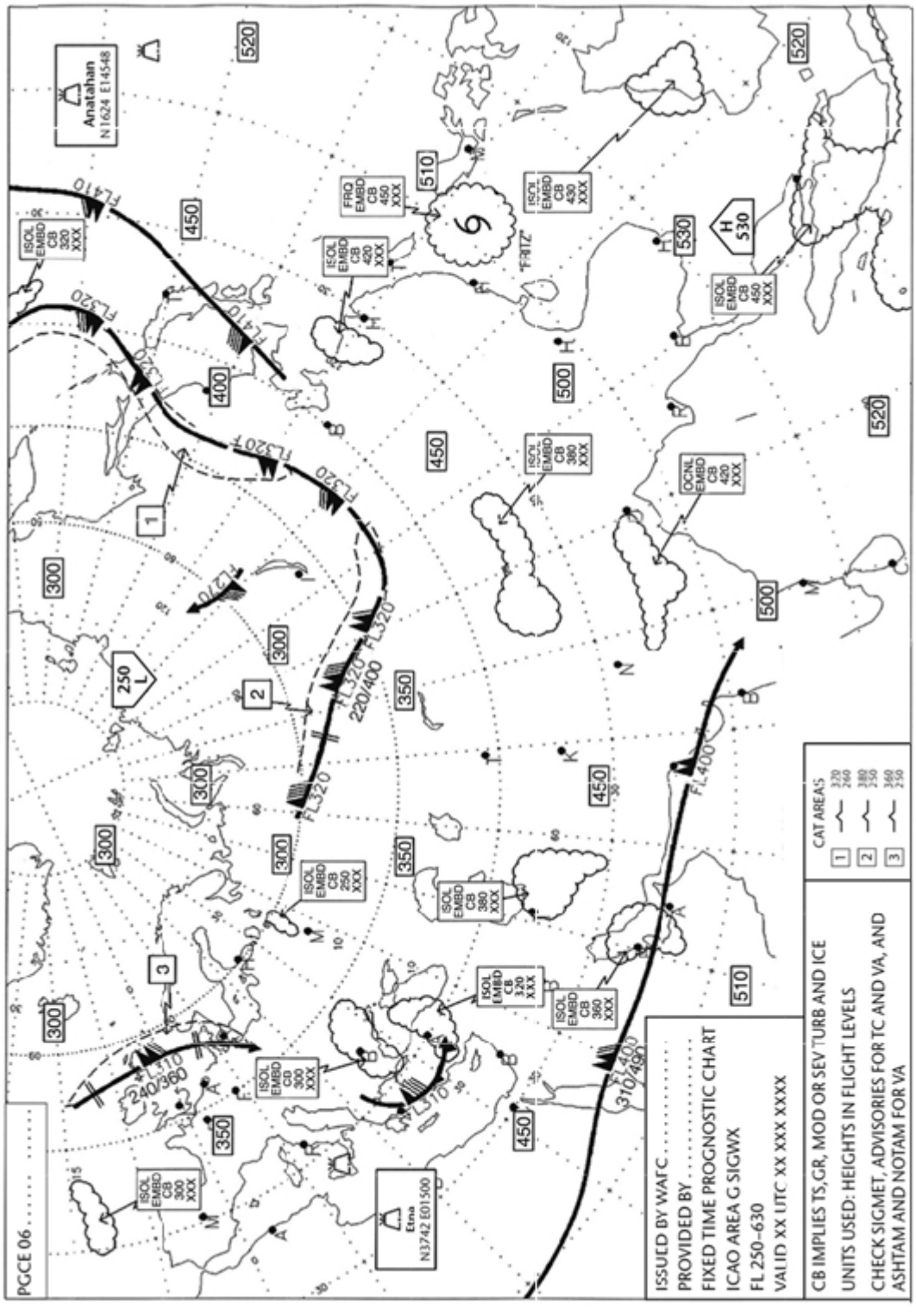


UPPER WIND AND UPMODEL ISPER-AIR TEMPERATURE CHART FOR STANDARD ISOBARIC SURFACEMODEL IS

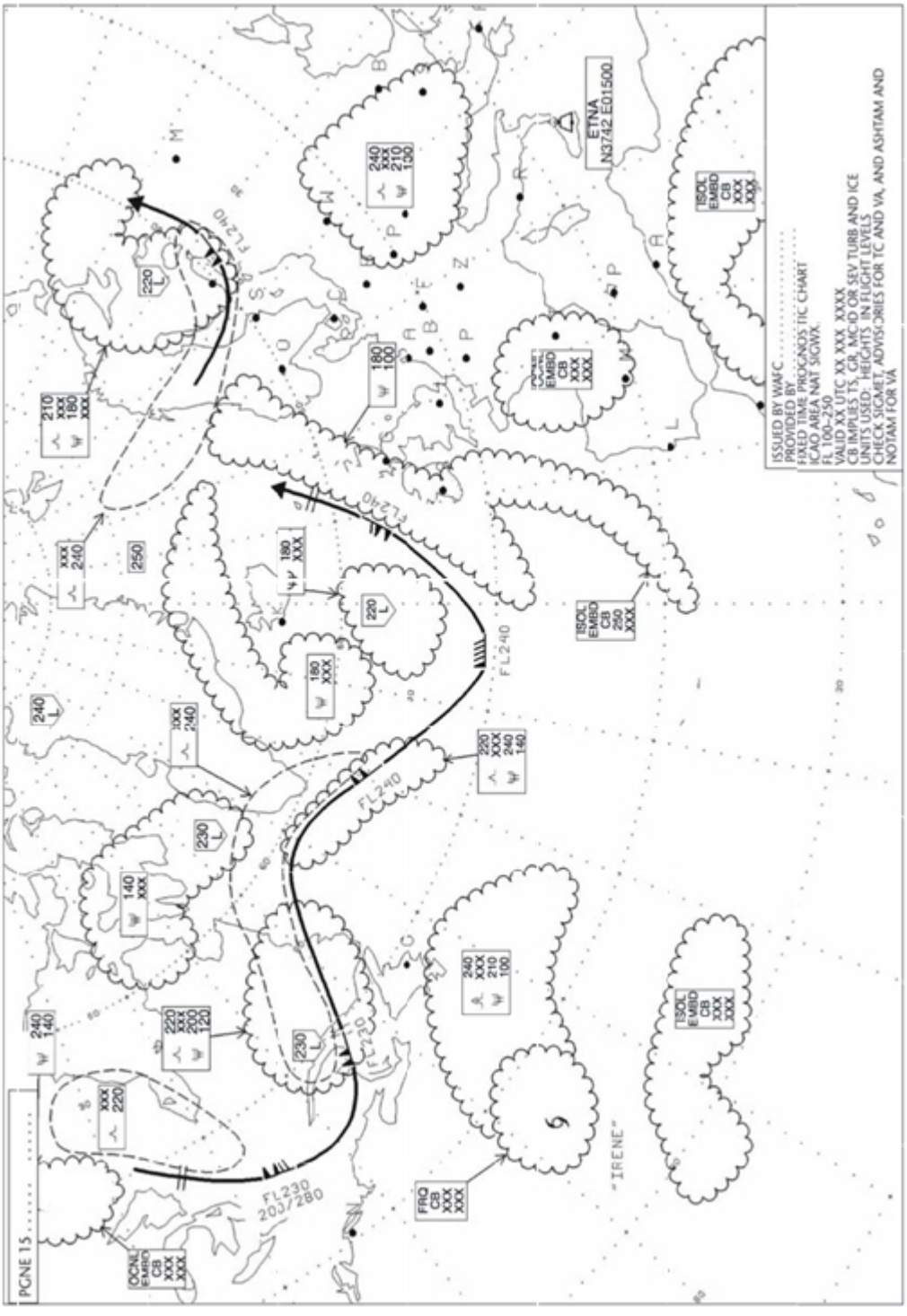
Example 2Arrows, feathers and pennants (Polar stereographic projection



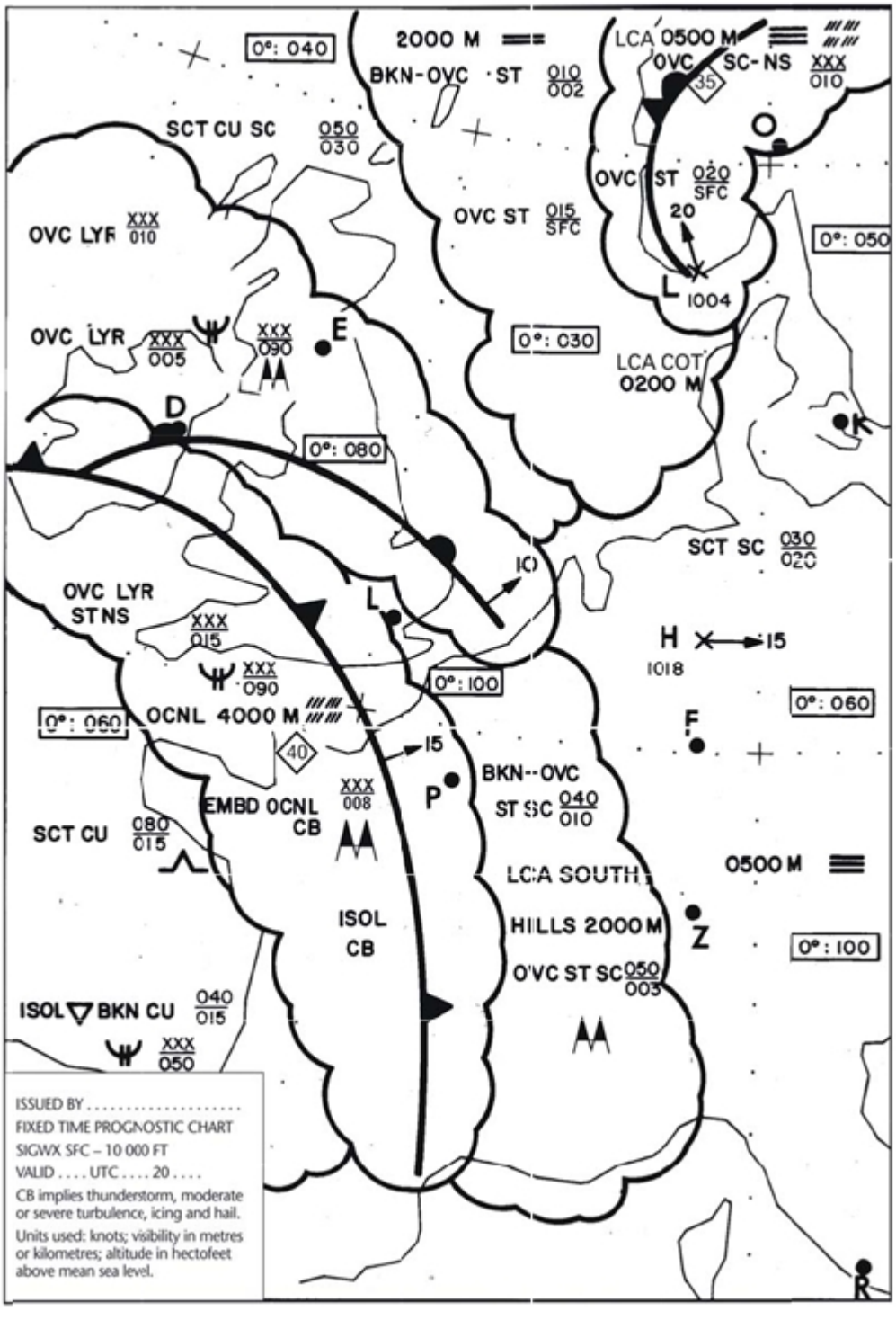
SIGNIFICANT WEATHER CHART (HIGH LEVEL)MODEL SWH
Example. Polar stereographic projection (showing the jestream vertical extent)



SIGNIFICANT WEATHER CHART (MEDIUM LEVEL) **MODEL SWM**



SIGNIFICANT WEATHER CHART (LOW LEVEL) **MODEL SWL**
Example 1



SIGNIFICANT WEATHER CHART (LOW LEVEL)
Example 2

MODEL SWL

FIXED TIME PROGNOSTIC CHART VALID ..... UTC ..... 20 ..... BASED ON ..... UTC DATA ON .....

VARIANT	VIS	SIGNIFICANT WEATHER	CLOUD, TURBULENCE, ICING	0°C
AREA A			SCT CU 025/080	50
ISOL			BKN CU 015/XXX ⅄ 050/XXX	
AREA B			OVC LYR ST NS 015/XXX ⅄ 050/XXX	50
OCNL	4000	HEAVY RAIN	EMBD CB 008/XXX ▲▲	
ISOL	1000	THUNDERSTORM		
AREA C			BKN to OVC ST SC 010/040	100
LCA SOUTH COT HILLS	2000	DRIZZLE	OVC ST SC 003/050 ▲▲	
AREA D			OVC LYR SC NS 010/XXX	90
LCA NORTH	4500	RAIN	OVC LYR ST NS 005/XXX ⅄ 090/XXX ▲▲	
AREA E			SCT SC 020/030	40
LCA LAND	0500	FOG		
AREA F	2000	MIST	BKN to OVC ST 002/010	30
LCA COT HILLS	0200	FOG	OVC ST SFC/015	
AREA G	4500	RAIN	OVC CU SC NS 010/XXX ⅄ 030/XXX	30
LCA NORTH	0500	FOG	OVC ST SFC/010	
AREA J			SCT CU SC 030/050	40
LCA HILLS NORTH			BLW 070	

SIGWX SFC – 10 000 FT
ISSUED BY ..... AT ..... UTC

Notes:
1. Pressure in hPa and speeds in knots.
2. Vis in m included if less than 5 000 m. ▲▲ implies vis 200 m or less.
3. Altitude in hectofeet above MSL XXX = above 10 000 ft.
4. CB implies MOD/SEV icing, turbulence and thunderstorm.
5. Only significant weather and/or weather phenomena causing visibility reduction below 5 000 m included.

REMARKS:
EAST TO NE GALES SHETLAND TO HEBRIDES - SEVERE MOUNTAIN WAVES NW SCOTLAND –
FOG PATCHES EAST ANGLIA – WDSPR FOG OVER NORTH FRANCE, BELGIUM AND THE NETHERLANDS

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

1. Symbols for significant weather

	Tropical cyclone		Drizzle
	Severe squall line*		Rain
	Moderate turbulence		Snow
	Severe turbulence		Shower Hail
	Mountain waves		Widespread blowing snow
	Moderate aircraft icing		Severe sand or dust haze
	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	FL 270	Position, speed and level of maximum wind
	Warm front at the surface		Convergence line
	Occluded front at the surface	0°:100	Freezing level
	Quasi-stationary front at the surface		Intertropical concergence zone
H 490	Tropopause high	10	State of the sea
270 L	Tropopause low	18	Sea-surface temperature
380	Tropopause level	40	Widespread strong surface wind*

FL 320 220/400 FL 310

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 220 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 +/–3000 ft or the speed changes by +/–20 kt

* This 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 topography 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 height 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 0°:060, 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 GLOBAL SYSTEMS SUPPORTING CENTRES AND METEOROLOGICAL OFFICES

(See Chapter 3 of this CAR.)

1. AERODROME METEOROLOGICAL OFFICES

1.1 Use of world area forecast system (WAFS) products

1.1.1 Aerodrome meteorological offices shall use WAFS 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.

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

1.2 Notification of WAFC concerning significant discrepancies

Aerodrome meteorological offices using WAFS BUFR 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/duststorms; and

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

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).*

2.VOLCANIC ASH ADVISORY CENTRES

Reserve

3.STATE VOLCANO OBSERVATORIES

Reserve

APPENDIX 3. TECHNICAL SPECIFICATIONS RELATED TO METEOROLOGICAL OBSERVATIONS AND REPORTS

(See Chapter 4 of this CAR.)

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 CAR 14, Part 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 (WMO).

1.3 The observers at an aerodrome should 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.

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 WMO.

Note.— The METAR and SPECI code forms are contained in the Manual on Codes *(WMO-No. 306), Volume I.1,*

Part A — Alphanumeric Codes

2.1.3 As of 5 November 2020, METAR and SPECI shall be disseminated in IWXXM GML form in addition to the dissemination of the METAR and SPECI in accordance with 2.1.2.

Note.— The technical specifications for IWXXM are contained in the Manual on Codes (WMO-No. 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).

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 SPECI

2.3.1 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.

2.3.2 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. VOLCANIC ASH ADVISORY CENTRES

3.1 Volcanic Ash Advisory Information

Reserve

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, as far as practicable.

4.1.1.2 Representative surface wind observations shall be obtained by the use of sensors appropriately sited.

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.

4.1.3 Averaging

4.1.3.1 The averaging period for surface wind observations shall be:

a) 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.

4.1.4 Accuracy of measurement

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 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 which does not fit the reporting scale in use shall be rounded to the nearest step in the scale.

4.1.5.2 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) 2.5 m/s (5 kt) or more in local routine and special reports when noise abatement procedures are applied in accordance with 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.

4.1.5.4 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

Reserve

4.3 RVR

Need to keep 4.3.1.1 and 4.3.1.2

4.4 Air temperature and dew-point temperature

4.4.1 Display

When automated equipment is used for the measurement of air temperature and dew-point temperature, air temperature and dew-point temperature displays shoall 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.

4.4.2 Reporting

4.4.2.1 In local routine reports, local special reports, 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.

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

4.5 Atmospheric pressure

4.5.1 Display

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.

4.5.2 Reference level

The reference level for the computation of QFE should be the aerodrome elevation. For non-precision approach runways,.

4.5.3 Reporting

4.5.3.1 For 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.

a) QNH shall be included;

b) QFE shall be included if required by users or as agreed between the meteorological authority, the appropriate ATS
authority and the 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.

4.6 Supplementary information

Reserve

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 8400).*

Element as specified in Chapter 4	*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			YUDO[1]
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)
	Runway (O)[2]	RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			
	Runway section (O)[2]	TDZ			WIND RWY 18 TDZ 190/8MPS (WIND RWY 18 TDZ 190/12KT)
	Wind direction (M)	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	C A L M	WIND VRB1MPS WIND CALM (WIND VRB2KT)
	Wind speed (M)	[ABV]n[n][n]MPS (*or* [ABV]n[n]KT)			WIND VRB BTN 350/ AND 050/1MPS (WIND VRB BTN 350/ AND 050/2KT)
	Significant speed variations (C)[4]	MAX[ABV]nn[n] MNMn[n]			WIND 270/ABV49MPS (WIND 270/ABV99KT)
	Significant directional variations (C)[5]	VRB BTN nnn/ AND nnn/	—		WIND 120/3MPS MAX9 MNM2 (WIND 120/6KT MAX18 MNM4)
	Runway section (O)[2]	MID			WIND 020/5MPS VRB BTN 350/ AND 070/ (WIND 020/10KT VRB BTN 350/ AND 070/)
	Wind direction (O)[2]	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	C A L M	WIND RWY 14R MID 140/6MPS (WIND RWY 14R MID 140/12KT)
	Wind speed (O)[2]	[ABV]n[n][n]MPS (*or* [ABV]n[n]KT)			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/	—		
	Runway section (O)[2]	END			
	Wind direction (O)[2]	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	C A L M	
	Wind speed (O)[2]	[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/	—		

Notes.—

1. Fictitious location

2. Optional values for one or more runways.

Element as specified in Chapter 4	*Detailed content*	*Template(s)*				*Examples*
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][n]M *or* n[n]KM				
	Runway section (O)[3]	MID				
	Visibility (O)[3]	n[n][n][n]M *or* n[n]KM				
	Runway section (O)[3]	END				
	Visibility (O)[3]	n[n][n][n]M *or* n[n]KM				
Runway visual range (C)[4]	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				
	Runway visual range (M)	[ABV *or* BLW] nn[n][n]M				
	Runway section (C)[8]	MID				
	Runway visual range (C)[8]	[ABV *or* BLW] nn[n][n]M				
	Runway section (C)[8]	END				
	Runway visual range (C)[8]	[ABV *or* BLW] nn[n][n]M				
Present weather (C)[A,10]	Intensity of present weather (C)[9]	FBL *or* MOD *or* HVY	—			
	Characteristics and type of present weather (C)[A,11]	DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZUP[12] *or* FC[13] *or* FZRA *or* SHGR *or* SHGS *or* SHRA *or* SHSN *or* SHUP[12] *or* TSGR *or* TSGS *or* TSRA *or* TSSN *or* TSUP[12] *or* UP[12]	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 HVY TSRA HVY DZ FBL SN HZ FG VA MIFG HVY TSRASN FBL SNRA FBL DZ FG HVY SHSN BLSN HVY TSUP //
Cloud (M)[14]	Name of the element (M)	CLD				CLD NSC 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)
	Runway (O)[2]	RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]				
	Cloud amount (M) *or* vertical visibility (O)[5]	FEW *or* SCT *or* BKN *or* OVC *or* ///[12]	OBSC	NSC *or* NCD[12]		
	Cloud type (C)[6]	CB *or* TCU *or* ///[12]	—			

Element as specified in Chapter 4	*Detailed content*	*Template(s)*				*Examples*
	Height of cloud base or the value of vertical visibility (C)[9]	n[n][n]M (or n[n][n]FT) or ///M (or ///FT)[12]	[VER VIS n[n][n]M (or VER VIS n[n][n]FT)] or VER VIS ///M (or VER VIS ///FT)[12]			CLD /// CB 400M (CLD /// CB 1200FT) CLD NCD
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 FC[15]				FC IN APCH WS IN APCH 60M-WIND 360/13MPS WS RWY 12 REFZRA CB IN CLIMB-OUT RETSRA
	Location of the phenomena (C)[9]	IN APCH [n[n][n]M-WIND nnn/n[n]MPS] or IN CLIMB-OUT [n[n][n]M-WIND nnn/n[n]MPS] (IN APCH [n[n][n]FT-WIND nnn/n[n]KT] or IN CLIMB-OUT [n[n][n]FT-WIND nnn/n[n]KT]) or RWY nn[L] or RWY nn[C] or RWY nn[R]					
	Recent weather (C)[9,16]	REFZDZ or REFZRA or REDZ or RE[SH]RA 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 REUP[12] or REFZUP[12] or RETSUP[12] or RESHUP[12] 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) 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
	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 [MAX[ABV]nn])			
	Visibility (C)[9]		VIS n[n][n]M or VIS n[n]KM			CAVOK
	Weather phenomenon: intensity (C)[9]		FBL or MOD or HVY	–	NSW	

Element as specified in Chapter 4	*Detailed content*	*Template(s)*				*Examples*
	Weather phenomenon: characteristics and type (C)[9, 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		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)
	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]FT)]		

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 4.4.2.9 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 4.4.2.9 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 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			YUDO[1]	
Time of the observation (M)	Day and actual time of the observation in UTC (M)	nnnnnnZ			221630Z	
Identification of an automated or missing report (C)[2]	Automated or missing report identifier (C)	AUTO or NIL			AUTO NIL	
END OF METAR IF THE REPORT IS MISSING.						
Surface wind (M)	Wind direction (M)	nnn	VRB		24004MPS (24008KT) 19006MPS (19012KT) 00000MPS (00000KT) 140P49MPS (140P99KT)	VRB01MPS (VRB02KT)
	Wind speed (M)	[P]nn[n]				
	Significant speed variations (C)[3]	G[P]nn[n]			12003G09MPS (12006G18KT) 24008G14MPS (24016G28KT)	
	Units of measurement (M)	MPS (or KT)				
	Significant directional variations (C)[4]	nnnVnnn	–		02005MPS 350V070 (02010KT 350V070)	
Visibility (M)	Prevailing or minimum visibility (M)[5]	nnnn		C A V O K	0350 7000 9999 0800	CAVOK
	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]			2000 1200NW 6000 2800E 6000 2800	
Runway visual range (C)[7]	Name of the element (M)	R			R32/0400 R12R/1700 R10/M0050 R14L/P2000	
	Runway (M)	nn[L]/or nn[C]/or nn[R]/				
	Runway visual range (M)	[P or M]nnnn			R16L/0650 R16C/0500 R16R/0450 R17L/0450	
	Runway visual range past tendency (C)[8]	U, D or N			R12/1100U R26/0550N R20/0800D R12/0700	

Element as specified in Chapter 4	*Detailed content*	*Template(s)*				*Examples*		
Present weather (C)[2, 9]	Intensity or proximity of present weather (C)[10]	- or +	—	VC				
	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 FZUP[12] or FC[13] or SHGR or SHGS or SHRA or SHSN or SHUP[12] or TSGR or TSGS or TSRA or TSSN or TSUP[12] or UP[12]	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]	FG or PO or FC or DS or SS or TS or SH or BLSN or BLSA or BLDU or VA		RA +TSRA +DZ -SN +TSRASN -SNRA DZ FG +SHSN BLSN UP FZUP TSUP FZUP //	HZ FG VA MIFG	VCFG VCSH VCTS VCBLSA
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 NCD[12]		FEW015 OVC030 SCT010 OVC020 BKN///	VV005 VV/// ///015	NSC
	Cloud type (C)[2]	CB or TCU or ///[12]	—			BKN009TCU SCT008 BKN025CB ///CB	NCD BKN025///	
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 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 RELIP[12] or REFZUP[12] or RETSUP[12] or RESHUP[12]				REFZRA RETSRA		
	Wind shear (C)[2]	WS Rnn[L] or WS Rnn[C] or WS Rnn[R] or WS ALL RWY				WS R03 WS ALL RWY WS R18C		
	Sea-surface temperature and state of the sea or significant wave height (C)[15]	W[M]nn/Sn or W[M]nn/Hn[n][n]				W15/S2 W12/H75		

Element as specified in Chapter 4	*Detailed content*		*Template(s)*					*Examples*
	State of the runway (C)[4]	Runway designator (M)	R nn[L]/ *or* Rnn[C]/ *or* Rnn[R]/			R/SNOCLO		R99/421594 R/SNOCLO R14L/CLRD//
		Runway deposits (M)	*n or* /		CLRD//			
		Extent of runway contamination (M)	*n or* /					
		Depth of deposit (M)	*nn or* //					
		Friction coefficient *or* braking action (M)	*nn or* //					
Trend forecast (O)[7]	Change indicator (M)[8]		NOSIG	BECMG *or* TEMPO				NOSIG BECMG FEW020
	Period of change (C)[2]			FMnnnn and/or TLnnnn *or* ATnnnn				TEMPO 25018G25MPS (TEMPO 25036G50KT) BECMG FM1030 TL1130 CAVOK
	Wind (C)[2]			nnn[P]nn[n][G[P]nn[n]]MPS (*or* nnn[P]nn[G[P]nn]KT)				BECMG TL1700 0800 FG
	Prevailing visibility (C)[2]			nnnn			C A V O K	BECMG AT1800 9000 NSW
	Weather phenomenon: intensity (C)[10]			- *or* +	—	NSW		BECMG FM1900 0500 +SNRA
	Weather phenomenon: characteristics and type (C)[5, 6, 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			BECMG FM1100 SN TEMPO FM1130 BLSN TEMPO FM0330 TL0430 FZRA TEMPO TL1200 0600 BECMG AT1200 8000 NSW NSC BECMG AT1130 OVC010 TEMPO TL1530 +SHRA BKN012CB
	Cloud amount and height of cloud base *or* vertical visibility (C)[5, 12]			FEWnnn *or* SCTnnn *or* BKNnnn *or* OVCnnn	VVnnn *or* VV///	NSC		
	Cloud type (C)[5, 12]			CB *or* TCU	—			

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 4.4.2.9 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 4.4.2.8.
11. Precipitation types listed under 4.4.2.3 a) may be combined in accordance with 4.4.2.9 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	FM$n_1n_1n_1n_1$ TL$n_2n_2n_2n_2$	the change is forecast to	commence at $n_1n_1n_1n_1$ UTC and be completed by $n_2n_2n_2n_2$ 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)
	—		a) commence at the beginning of the trend forecast period and be completed by the end of the trend forecast period; *or* b) the time is uncertain
TEMPO	FM$n_1n_1n_1n_1$ TL$n_2n_2n_2n_2$	temporary fluctuations are forecast to	commence at $n_1n_1n_1n_1$ UTC and cease by $n_2n_2n_2n_2$ 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 KT		00 – 99* 00 – 199*	1 1
Visibility: M MMM		0000 – 0750 0800 – 4 900 5 000 – 9 000 10 000 –	50 100 1 000 0 (fixed value: 9 999)
Runway visual range: M MM		0000 – 0375 0400 – 0750 0800 – 2 000	25 50 100
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
Sea-surface temperature: °C		–10 – +40	1
State of the sea: (no units)		0 – 9	1
Significant wave height: M		0 – 999	0.1
State of the runway	Runway designator: (no units)	01 – 36; 88; 99	1
	Runway deposits: (no units)	0 – 9	1
	Extent of runway contamination: (no units)	1; 2; 5; 9	—
	Depth of deposit: (no units)	00 – 90; 92 – 99	1
	Friction coefficient/braking action: (no units)	00 – 95; 99	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 Routine Report

a) Local routine report (same location and weather conditions as METAR):

METAR VNKT 270620Z 25008KT 220V280 5000 RA FEW010 FEW025CB SCT030 BKN100 23/21 Q1010 NOSIG

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 CAR 5, the corresponding non-SI alternative units "knot" and "foot" may be used instead.

Example A3-2. Special report

a) SPECI for VNKT(Kathmandu/International):

SPECI VNKT 270632Z 24006KT 190V300 6000 3000N –RA FEW008 FEW025CB SCT030 BKN100 22/21 Q1011 NOSIG

Meaning of both reports:

Routine report for Kathmandu/International issued on the 27th of the month at 0632UTC; surface wind direction 240 degrees; wind speed 3metres per second; wind direction varies between 190 to 300 degree; prevailing visibility 6000metres but only 3000 metres in north direction; light rain; few cloud at 240metres; cumulonimbus cloud at 750 metres; Scattered cloud at 900 metres; Broken cloud at 3000 metres; air temperature 22 degrees Celsius; dew-point temperature 21 degrees Celsius; QNH 1011hectopascals; and nil significant weather.

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.

APPENDIX 4. TECHNICAL SPECIFICATIONS RELATED TO AIRCRAFT OBSERVATIONS AND REPORTS

(See Chapter 5 of this CAR.)

1. CONTENTS OF AIR-REPORTS

1.1 Special air-reports by voice communications

1.1.1 When air-ground data link is used and automatic dependent surveillance — (ADS-C) or SSR Mode S is beingapplied, 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 CAR 10, Volume III, Part I, 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:

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 CAR 10, Volume III, Part I.*

1.2 Special air-reports by voice communications

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 thePANS-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. EXCHANGE OF AIR-REPORTS

2.1 Responsibilities of the meteorological watch offices

2.1.1 The meteorological watch office shall transmit without delay the special air-reports received by voice communications to the world area forecast centres (WAFCs) and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services.

2.1.2 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 volcanic ash advisory centres.

2.1.3 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.

Note.— The template used for special air-reports which are uplinked to aircraft in flight is in Appendix 6, Table A6-1B.

APPENDIX 5. TECHNICAL SPECIFICATIONS RELATED TO FORECASTS

(See Chapter 6 of this CAR.)

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 (WMO).

Note.— The TAF code form is contained in the Manual on Codes *(WMO-No. 306), Volume I.1, Part A —* Alphanumeric Codes.

1.1.2 As of 5 November 2020, TAF should be disseminated in IWXXM GML form in addition to the disseminaton of the TAF in accordance with 1.1.1.

Note.— The technical specifications for IWXXM are contained in the Manual on Codes (WMO-No. 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).

1.2 Inclusion of meteorological elements in TAF

Note.— Guidance on operationally desirable accuracy of forecasts is given in Attachment B.

1.2.1 Surface wind

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

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 shall be given.

1.2.3 Weather phenomena

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 DHM, the appropriate ATS authority and the operators concerned.

The expected end of occurrence of those phenomena shall be indicated by the abbreviation “NSW”.

1.2.4 Cloud

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 shall 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 shall 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).

Cloud information should be limited to cloud of operational significance; when no cloud of operational significance is forecast, and “CAVOK” is not appropriate, the abbreviation “NSC” should be used.

1.2.5 Temperature

Reserve

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)
. 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:

. 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 shall be established by DHM in consultation with the appropriate ATS authority and the 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 DHM 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 should 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 should normally not exceed 2 hours but in any case should not exceed 4 hours.

1.3.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 shall 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 shall be superseded by those following the abbreviation.

. 1.4 Use of probability groups

. The probability of occurrence of an alternative value of a forecast element or elements shall 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 shall 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 shall 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 shall 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, shall not be considered a probability but instead shall 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 shall not be used to qualify the change indicator “BECMG” nor the time indicator “FM”.

1.5 Numbers of change and probability groups

The number of change and probability groups shall be kept to a minimum and should not normally exceed five groups.

1.6 Dissemination of TAF

TAF and amendments thereto shall be disseminated to international OPMET databanks and the centres mentioned in OPMET databanks documents.

2. CRITERIA RELATED TO TREND FORECASTS

2.1 Format of trend forecasts

Trend forecasts shall be issued in accordance with the templates shown in Appendix 3, Table 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

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 the 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 of typical aircraft operating at the aerodrome.

2.2.3 Visibility

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 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)
. thunderstorm (with precipitation)
. duststorm
. sandstorm

— other weather phenomena given in Appendix 3, 4.4.2.3, as agreed between DHM, the appropriate ATS authority and the 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

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

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

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.

2.3.3 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

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

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

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 DHM and the operators concerned.

4. CRITERIA RELATED TO AREA FORECASTS FOR LOW-LEVEL FLIGHTS

Reserve

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 of forecast (M)	Type of forecast (M)	TAF *or* TAF AMD *or* TAF COR	TAF TAF AMD
Location indicator (M)	ICAO location indicator (M)	nnnn	YUDO[1]
Time of issue of forecast (M)	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.			

Element as specified in Chapter 6	*Detailed content*	*Template(s)*				*Examples*	
Days and period of validity of forecast (M)	Days and period of the validity of the forecast in UTC (M)	nnnn/nnnn				0812/0918	
Identification of a cancelled forecast (C)	Cancelled forecast identifier (C)	CNL				CNL	
END OF TAF IF THE FORECAST IS CANCELLED.							
Surface wind (M)	Wind direction (M)	nnn *or* VRB[2]				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			CAVOK	0350 7000 9000 9999	CAVOK
Weather (C)[4, 5]	Intensity of weather phenomena (C)[6]	– *or* +		—		RA +TSRA –FZDZ PRFG +TSRASN SNRA FG	HZ FG
	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* 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			
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 OVC020 NSC SCT005 BKN012 SCT008 BKN025CB	VV005 VV///
	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)
	Period of occurrence *or* change (M)	nnnn/nnnn*or* nnnnnn[11]			TEMPO 2212/2214 17006G13MPS 1000 TSRA SCT010CB BKN020 (TEMPO 2212/2214 17012G26KT 1000 TSRA SCT010CB BKN020)
	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		CAVOK	
	Weather phenomenon: intensity (C)[6]	- *or* +	—	NSW	BECMG 3010/3011 00000MPS 2400 OVC010 (BECMG 3010/3011 00000KT 2400 OVC010)
	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* 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		PROB30 1412/1414 0800 FG BECMG 1412/1414 RA TEMPO 2503/2504 FZRA TEMPO 0612/0615 BLSN PROB40 TEMPO 2923/3001 0500 FG
	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		$n_dn_dn_hn_hn_mn_m$	used to indicate a significant change in most weather elements occurring at n_dn_d day, n_hn_h hours and n_mn_m 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		$n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$	the change is forecast to commence at $n_{d1}n_{d1}$ day and $n_{h1}n_{h1}$ hours (UTC) and be completed by $n_{d2}n_{d2}$ day and $n_{h2}n_{h2}$ hours (UTC); only those elements for which a change is forecast are to be given following "BECMG"; the time period $n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$ should normally be less than 2 hours and in any case should not exceed 4 hours	
TEMPO		$n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$	temporary fluctuations are forecast to commence at $n_{d1}n_{d1}$ day and $n_{h1}n_{h1}$ hours (UTC) and cease by $n_{d2}n_{d2}$ day and $n_{h2}n_{h2}$ 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 $n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$	
PROBnn	—	$n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$	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	$n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$		probability of occurrence of temporary fluctuations

Table A5-3. 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 KT	00 - 99* 00 - 199*	1 1
Visibility:	M M M M	0000 - 0750 0800 - 4 900 5 000 - 9 000 10 000 -	50 100 1 000 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.

Section II:	
pressure systems:	at 0600 UTC low pressure of 1 004 hectopascals at 51.5 degrees north 10.0 degrees east, expected to move north-eastwards at 25 knots and to weaken;
winds and temperatures:	at 2 000 feet above ground level at 55 degrees north 10 degrees west wind direction 270 degrees, wind speed 18 metres per second, temperature plus 3 degrees Celsius; at 5 000 feet above ground level at 55 degrees north 10 degrees west wind direction 250 degrees, wind speed 20 metres per second, temperature minus 2 degrees Celsius; at 10 000 feet above ground level at 55 degrees north 10 degrees west wind direction 240 degrees, wind speed 22 metres per second, temperature minus 11 degrees Celsius;
clouds:	broken stratocumulus, base 2 500 feet, top 8 000 feet above ground level; 3
freezing level:	000 feet above ground level;
minimum QNH:	1 004 hectopascals;
sea:	surface temperature 15 degrees Celsius; and state of the sea 5 metres;
volcanic ash:	nil.

* Fictitious location

APPENDIX 6. TECHNICAL SPECIFICATIONS RELATED TO SIGMET AND AIRMET INFORMATION, AERODROME WARNINGS AND WIND SHEAR WARNINGS AND ALERTS

(See Chapter 7 of this CAR.)

Note.— Data type designators to be used in abbreviated headings for SIGMET, AIRMET, tropical cyclone and volcanic ash advisory messages are given in the Manual on the Global Telecommunication System *(WMO-No. 386).*

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 A6-1A.

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 (FIR) since 0001 UTC on the day concerned. The meteorological watch offices whose area of responsibility encompasses more than one FIR and/or control area (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

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 shall not include references to associated turbulence and icing.

1.1.6 As of 5 November 2020, SIGMET information shall be disseminated in IWXXM GML form in addition to the dissemination of SIGMET information in accordance with 1.1.1.

Note.— The technical specifications for IWXXM are contained in the Manual on Codes (WMO-No. 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).

1.2 Dissemination of SIGMET messages

1.2.1 SIGMET messages shall be disseminated to meteorological watch offices, WAFCs and to other meteorological offices

1.2.2 SIGMET messages shall be disseminated to international OPMET databanks.

2. SPECIFICATIONS RELATED TO AERODROME WARNINGS

2.1 Format and dissemination of aerodrome warnings

2.1.1 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.

2.1.2 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.

2.1.3 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*:*

. thunderstorm
. hail
. snow (including the expected or observed snow accumulation)
. freezing precipitation
.
. duststorm
. rising or dust
. strong surface wind and gusts
. squall
. frost
. toxic chemicals — other phenomena as agreed locally.

.

2.1.4 Until 4 November 2020, Meteorological offices should issue AIRMET information should be disseminated in digital IWXXM GML form, in addition to the issuance dissemination of this AIRMET information in abbreviated plain language in accordance with 2.1.1.

2.1.5 As of 5 November 2020, AIRMET information shall be disseminated in IWXXM GML form in addition to the dissemination of AIRMET information in accordance with 2.1.1.

Note.— The technical specifications for IWXXM are contained in the Manual on Codes (WMO-No. 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).

2.2 Quantitative criteria for aerodrome warnings

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 used shall be as agreed between the aerodrome meteorological office and the users concerned.

Table A6-1A. Template for SIGMET and AIRMET messages

Element	*Detailed content*	*SIGMET template*	*AIRMET template*	*SIGMET message examples*	*AIRMET message 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		YUCC[2] YUDD[2]	
Identification (M)	Message identification and sequence number[3]	SIGMET [n][n]n	AIRMET [n][n]n	SIGMET 1 SIGMET 01 SIGMET A01	AIRMET 9 AIRMET 19 AIRMET B19
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 (M)	Location indicator and name of the FIR/CTA[4] for which the SIGMET/AIRMET is issued	nnnn nnnnnnnnnn FIR~~[/UIR]~~ *or* UIR *or* FIR/UIR *or* nnnn nnnnnnnnnn CTA	nnnn nnnnnnnnnn FIR[/n]	YUCC AMSWELL FIR[2] YUDD SHANLON[2] FIR/UIR[2] UIR FIR/UIR YUDD SHANLON CTA[2]	YUCC AMSWELL FIR/2[2] YUDD SHANLON FIR[2]
IF THE SIGMET OR AIRMET 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 *or* EXER	TEST EXER	TEST EXER
Phenomenon (M)[5][6]	Description of phenomenon causing the issuance of SIGMET/AIRMET	OBSC[6][7] TS[GR[7][8]] EMBD[8][9] TS[GR[7][8]] FRQ[9][10] TS[GR[7][8]] SQL[10][11] TS[GR[7][8]] TC nnnnnnnnnn PSN Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] CB *or* TC NN[11][12] PSN Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] CB SEV TURB[12][13] SEV ICE[13][14] SEV ICE (FZRA)[13][14] SEV MTW[14][15] HVY DS HVY SS [VA ERUPTION] [MT nnnnnnnnnn] [PSN Nnn[nn] *or* Snn[nn] Ennn[nn] *or* Wnnn[nn]] VA CLD RDOACT CLD	SFC WIND nnn/nn[n]MPS (*or* SFC WIND nnn/nn[n]KT) SFC VIS [n][n]nnM (nn)[15][16] ISOL[16][17] TS[GR[7][8]] OCNL[17][18] TS[GR[7][8]] MT OBSC BKN CLD nnn/[ABV] [n]nnnM (*or* BKN CLD [n]nnn/[ABV] [n]nnnnFT) *or* BKN CLD SFC/[ABV] [n]nnnM (*or* BKN CLD SFC/[ABV][n]nnnnFT) OVC CLD nnn/[ABV] [n]nnnM (*or* OVC CLD [n]nnn/[ABV] [n]nnnnFT) *or* OVC CLD SFC/[ABV] [n]nnnM (*or* OVC CLD SFC/[ABV][n]nnnnFT)	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 HVY SS VA ERUPTION MT ASHVAL[2] PSN S15 E073 VA CLD RDOACT CLD	SFC WIND 040/40MPS SFC WIND 310/20KT SFC VIS 1500M (BR) ISOL TS ISOL TSGR OCNL TS OCNL TSGR MT OBSC BKN CLD 120/900M BKN CLD 400/3000FT BKN CLD 1000/5000FT BKN CLD SFC/3000M BKN CLD SFC/ABV 10000FT OVC CLD 270/ABV3000M OVC CLD 900/ABV10000FT OVC CLD 1000/5000FT OVC CLD SFC/3000M OVC CLD SFC/ABV 10000FT ISOL CB

Element	*Detailed content*	*SIGMET template* *AIRMET template*	*SIGMET message examples*	*AIRMET message examples*
		ISOL[1617] CB[1819] OCNL[1718] CB[1819] FRQ[910] CB[1819] ISOL[1617] TCU[1819] OCNL[1718] TCU[1819] FRQ[910] TCU[1819] MOD TURB[1213] MOD ICE[1314] MOD MTW[1415]		OCNL CB FRQ CB ISOL TCU OCNL TCU FRQ TCU MOD TURB MOD ICE MOD MTW
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)[1920]	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] [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 LINE[2021] *or* NE OF LINE[2021] *or* E OF LINE[2021] *or* SE OF LINE[2021] *or* S OF LINE[2021] *or* SW OF LINE[2021] *or* W OF LINE[2021] *or* NW OF LINE[2021] 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 LINE[2021] *or* NE OF LINE[2021] *or* E OF LINE[2021] *or* SE OF LINE[2021] *or* S OF LINE[2021] *or* SW OF LINE[2021] *or* W OF LINE[2021] *or* NW OF LINE[2021] 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* WI[2021, 2122] 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 LINE[2021] BTN (*or* nnNM WID LINE[2021]	N2020 W07005 N48 E010 S60 W160 S0530 E16530 N OF N50 S OF N5430 N OF S10 S OF S4530 W OF W155 E OF W45 W OF E15540 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 – N6050 E02630 – N6030 E02550 APRX 50KM WID LINE BTN N64 W017 – N60 W010 – N57 E010 ENTIRE FIR ENTIRE UIR ENTIRE FIR/UIR ENTIRE CTA WI 400KM OF TC CENTRE WI 250NM OF TC CENTRE	

Element	*Detailed content*	*SIGMET template*	*AIRMET template*	*SIGMET message examples*	*AIRMET message examples*
		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[~~/]UIR *or* ENTIRE FIR *or* ENTIRE FIR/UIR *or* ENTIRE CTA *or*[22][23] WI nnnKM (*or* nnnNM) OF TC CENTRE *or*[29] WI nnKM (*or* nnNM) OF Nnn[nn] *or* Snn[nn] Wnnn[nn] or Ennn[nn]		WI 30KM OF N6030 E02550[†]	
Level (C)[19][20, 29]	Flight level *or* altitude[23]	[SFC/]FLnnn *or* [SFC/]nnnnM (*or* [SFC/][n]nnnnFT) *or* FLnnn/nnn *or* TOP FLnnn *or* [TOP] ABV FLnnn *or* (or [TOP] ABV [n]nnnnFT) [nnnn/]nnnnM (*or* [[n]nnnn/][n]nnnnFT) *or* [nnnnM/]FLnnn (*or* [[n]nnnnFT/]FLnnn) *or*[22][23] TOP [ABV *or* BLW] FLnnn		FL180 SFC/FL070 SFC/3000M SFC/10000FT FL050/080 TOP FL390 ABV FL250 TOP ABV FL100 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)[19][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 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])		MOV SE MOV NNW MOV E 40KMH MOV E 20KT MOV WSW 20KT STNR	

Element	*Detailed content*	*SIGMET template*	*AIRMET template*	*SIGMET message examples*	*AIRMET message examples*
		or STNR			
Changes in intensity (C) [1920]	Expected changes in intensity	INTSF *or* WKN *or* NC		INTSF 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 CENTRE PSN Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	—	TC CENTRE PSN N1030 E1600015	—
Forecast position (C) [1920, 24, 25]	Forecast position of phenomenon at the end of the validity period of the SIGMET message	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] [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 LINE[2021] *or* NE OF LINE[2021] *or* E OF LINE[2021] *or* SE OF LINE[2021] *or* S OF LINE[2021] *or* SW OF LINE[2021] *or* W OF LINE[2021] *or* NW OF LINE[2021] 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 LINE[2021] *or* NE OF LINE[2021] *or*	—	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 W005 – N55 E010 – N55 E030 ENTIRE FIR ENTIRE UIR ENTIRE FIR/UIR ENTIRE CTA ~~TC CENTRE PSN N2740 W07345~~ NO VA EXP WI 30KM OF N6030 E02550 †	—

Applicable 7 November 2019

Element	*Detailed content*	*SIGMET template*	*AIRMET template*	*SIGMET message*	*AIRMET message*
		E OF LINE[2021] *or* SE OF LINE[2021] *or* S OF LINE[2021] *or* SW OF LINE[2021] *or* W OF LINE[2021] *or* NW OF LINE[2021] 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* WI[2021, 2122] 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 LINE[2021] BTN (nnNM WID LINE[2021] 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~~[/UIR~~] *or* ENTIRE UIR *or* ENTIRE FIR/UIR *or* ENTIRE CTA *or*[22] ~~TC CENTRE PSN~~ ~~Nnn[nn]~~ ~~*or* Snn[nn]~~ ~~Wnnn[nn] *or*~~ ~~Ennn[nn~~] *or*[26] NO VA EXP *or*[29] WI nnKM (*or* nnNM) OF Nnn[nn] *or* Snn[nn] Wnnn[nn] or Ennn[nn]			

Element	*Detailed content*	*SIGMET template*	*AIRMET template*	*SIGMET message examples*	*AIRMET message examples*
Repetition of elements (C)[27]	Repetition of elements included in a SIGMET message for volcanic ash cloud or tropical cyclone	[AND][27]	—	AND	—

OR

Cancellation of SIGMET/ AIRMET (C)[28]	Cancellation of SIGMET/AIRMET referring to its identification	CNL SIGMET [n][n]n nnnnnn/nnnnnn *or*[26] CNL SIGMET [n][n]n nnnnnn/nnnnnn VA MOV TO nnnn FIR	CNL AIRMET [n][n]n nnnnnn/nnnnnn	CNL SIGMET 2 101200/101600 CNL SIGMET A13 251030/251430 VA MOV TO YUDO FIR[2]	CNL AIRMET 05 151520/151800

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".
   [Applicable 7 November 2019]
6. In accordance with 1.1.4 and 2.1.
7. In accordance with 1.1.4 and 2.1.4.
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 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 kilometres (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. [Applicable 7 November, 2019)

Table A6-3. Ranges and Resolution for the numerical elements included in SIGMET and aerodrome and wind shear warnings

Reserve

APPENDIX 7. TECHNICAL SPECIFICATIONS RELATED TO AERONAUTICAL CLIMATOLOGICAL INFORMATION

(See Chapter 8 of this CAR.)

1. PROCESSING OF AERONAUTICAL CLIMATOLOGICAL INFORMATION

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

Recommendation.—*Aeronautical climatological information shall be exchanged on request between meteorological authorities. Operators and other aeronautical users desiring such information shall 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 Aerodrome climatological tables shall include information required for the preparation of aerodrome climatological summaries in accordance with 3.2.

3.2 Aerodrome climatological summaries

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 ofBKN 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 the Technical Regulations (WMO-No. 49), Volume II — Meteorological Service for International Air Navigation, Part III.

APPENDIX 8. TECHNICAL SPECIFICATIONS RELATED TO SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

(See Chapter 9 of this CAR.)

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 DHM 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;

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.

2. SPECIFICATIONS RELATED TO INFORMATION FOR PRE-FLIGHT PLANNING AND IN-FLIGHT REPLANNING

2.1 Format of upper-air gridded information

Upper-air gridded information supplied by the world area forecast centres (WAFCs) for pre-flight and in-flight replanning shall be in the GRIB code form.

Note.— The GRIB code form is contained in the Manual on Codes *(WMO-No. 306), Volume I.2, Part B* — Binary Codes.

2.2 Format of information on significant weather

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 the Manual on Codes *(WMO-No. 306), Volume I.2, Part B* — Binary Codes.

3. SPECIFICATIONS RELATED TO FLIGHT DOCUMENTATION

3.1 Presentation of information

3.1.1 The flight documentation related to forecasts of upper wind and upper-air temperature and SIGWX phenomena shall be presented in the form of charts..

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 (WMO) on the basis of relevant operational requirements stated by ICAO

3.1.2 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..

3.13 METAR and SPECI (including trend forecasts) TAF, , SIGMET, and volcanic ash and tropical cyclone advisory information shall be presented in accordance with the templates in Appendices 1, 3, 5 and 6. 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.

3.1.4*The location indicators and the abbreviations used shall be explained in the flight documentation.*

3.1.5The forms and the legend of charts included in flight documentation shall be printed in English. Where appropriate, approved abbreviations shall be used. The units employed for each element shall be indicated; they shall be in accordance with CAR 5.

3.2 Charts in flight documentation

3.2.1 Characteristics of charts

3.2.1.1 Charts included in flight documentation shall have a high standard of clarity and legibility and shall have the following physical characteristics:

a) For convenience, the size of charts shall be about21 × 30 cm (standard size A4).

b) for charts prepared by computer, meteorological data should take preference over basic chart information, the former cancelling the latter wherever they overlap;

c) latitude and longitude values should be indicated at various points throughout the charts (i.e. not only at the edges); and

d) 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-world area forecast system (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.

3.2.1.2 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 forecase centre shall be depicted in a sufficiently dense latitude/longitude grid

3.2.2 Set of charts to be provided

3.2.2.1 The minimum number of charts provided for pre-flight and in-flight planning and for flight documentation shall be as agreed between DHM and users concerned.

3.2.2.2 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 DHM and the operator concerned.

3.2.3 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. abbreviations should be used. The units employed for each element should be indicated; they should be in accordance with CAR 5.

4. SPECIFICATIONS RELATED TO FLIGHT DOCUMENTATION

4.1 Presentation of information

METAR and SPECI (including trend forecasts as issued in accordance with regional air navigation agreement), TAF, GAMET, SIGMET, and AIRMET, volcanic ash, tropical cyclone and space weather advisory information shall be presented in accordance with the templates in Appendices 1, 2, 3, 5 and 6. Such meteorological information received from other meteorological offices shall be included in flight documentation without change.

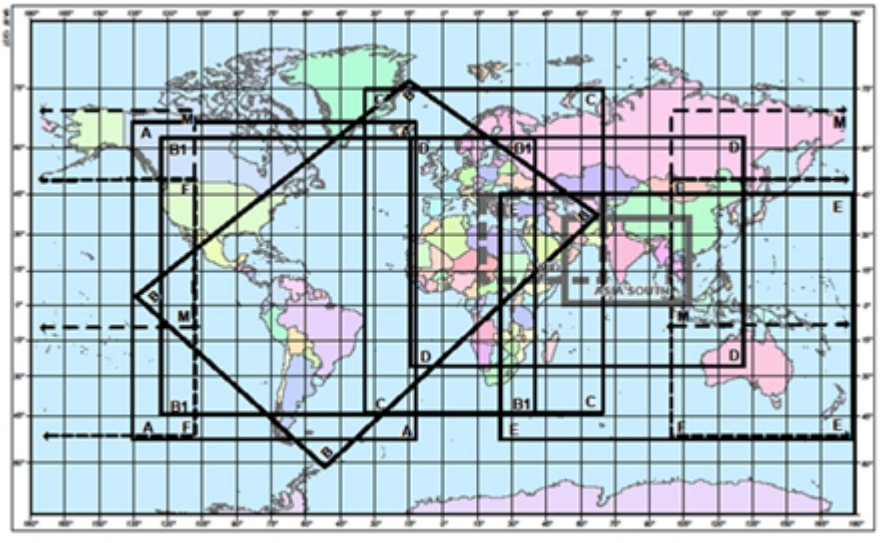


CHART	LATITUDE LONGITUDE	LONGITUDE	CHART	LATITUDE	
A	N6700	W13724	D	N6300	W01500
A	N6700	W01236	D	N6300	E13200
A	S5400	W01236	D	S2700	E13200
A	S5400	W13724	D	S2700	W01500
ASIA	N3600	E05300	E	N4455	E02446
ASIA	N3600	E10800	E	N4455	E18000
ASIA	0000	E10800	E	S5355	E18000
ASIA	0000	E05300	E	S5355	E02446
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

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Mercator projection

APPENDIX 9. TECHNICAL SPECIFICATIONS RELATED TO INFORMATION FOR AIR TRAFFIC SERVICES, SEARCH AND RESCUE SERVICES AND AERONAUTICAL INFORMATION SERVICES

(See Chapter 10 of this CAR.)

1. INFORMATION TO BE PROVIDED FOR AIR TRAFFIC SERVICES UNITS

1.1 List of information for the aerodrome control tower

The following meteorological information shall be supplied, as necessary, to an aerodrome control tower by its associated aerodrome meteorological office:

a) METAR, SPECI, TAF, trend forecasts and amendments thereto, for the aerodrome concerned;

b) SIGMET information, 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 meteorological and ATS authorities concerned.

1.2 List of information for the approach control unit

The following meteorological information shall be supplied, as necessary, to an approach control unit by its associated aerodrome meteorological office:

a) METAR, SPECI, TAF, trend forecasts and amendments thereto, for the aerodrome(s) with which the approach control unit is concerned;

b) SIGMET information, 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

1.3 List of information for the area control centre

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 (FIR) or the control area (CTA) and, if required by the area control centre (ACC).

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 .

c) any other meteorological information required by ACC to meet requests from aircraft in flight; if the information requested is not available in the associated meteorological watch office (MWO), 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 DHM and ATS authorities concerned;

e) information received on pre-eruption volcanic activity and/or a volcanic eruption as agreed between the DHM and ATS authorities concerned.

1.4 Supply of information to aeronautical telecommunications stations

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 ACC.

1.5 Format of information

1.5.1 METAR, SPECI, TAF, trend forecasts, SIGMET and, upper wind and upper-air temperature forecasts and amendments thereto shall be supplied to air traffic services units in the form in which they are prepared, disseminated to other aerodrome meteorological offices or MWOs, or received from other aerodrome meteorological offices or MWOs, unless otherwise agreed locally.

2. INFORMATION TO BE PROVIDED FOR SEARCH AND RESCUE SERVICES UNITS

2.1 List of information

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-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 shall 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 officeshall, 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.

3. INFORMATION TO BE PROVIDED FOR AERONAUTICAL INFORMATION SERVICES UNITS

3.1 List of information

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;

*Note.— Details of this information are given in PANS-A*IM, Appendix 3, Part I, GEN 3.5 and Part 3, AD 2.2, 2.11, 3.2 and 3.11.

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 CAR 15, 3.2.2 and 3.2.3.

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 CAR.)

1. SPECIFIC REQUIREMENTS FOR COMMUNICATIONS

1.1 Required transit times of meteorological information

AHMS messages containing operational meteorological information shall achieve transit times of less than 5 minutes.

2. USE OF AERONAUTICAL FIXED SERVICE COMMUNICATIONS

2.1 World area forecast system (WAFS) products

2.1.1 Telecommunications for the supply of WAFS products

The telecommunications facilities used for the supply of WAFS products shall be the aeronautical fixed service

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 CAR.

3.1.2 The content and format of air-reports transmitted by aircraft shall be consistent with the provisions of Chapter 5 of this CAR and the *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444), Appendix 1.

4 Reserve

ATTACHMENT A. OPERATIONALLY DESIRABLE ACCURACY OF MEASUREMENT OR OBSERVATION

Note.— The guidance contained in this table relates to Chapter 2, 2.2 — Supply, use, quality management and interpretation of meteorological information, in particular to 2.2.7, and Chapter 4 — Meteorological observations and reports.

*Operationally desirable accuracy Element to be observed 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 Cloud height	± 1 okta ± 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 as a goal that has been expressed by the operators.

Note.—
Guidance on the uncertainties of measurement or observation can be found in the Guide to Meteorological Instruments and Methods of Observation *(WMO-No. 8).*

ATTACHMENT B. OPERATIONALLY DESIRABLE ACCURACY OF FORECASTS

Note 1.— The guidance contained in this table relates to Chapter 2, 2.2 — Supply, use, quality management and interpretation of meteorological information, in particular to 2.2.8, and Chapter 6 — Forecasts.

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.

Operationally desirable Element to be forecast	*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
Wind speed	± 2.5 m/s (5 kt)	90% of cases
Visibility	± 200 m up to 800 m ± 30% between 800 m and 10 km	90% of cases
Precipitation	Occurrence or non-occurrence	90% of cases

Element to be forecast	*Operationally desirable accuracy of forecasts*	*Minimum percentage of cases within range*
Cloud amount	One category below 450 m (1 500 ft)	90% of cases
Occurrence or non-occurrence of BKN or OVC between 450 m (1 500 ft) and 3 000 m (10 000 ft)		
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 (Modulus of vector difference for 900 km (500 NM))	± 5 m/s (10 kt)	90% of cases
Significant en-route weather phenomena and cloud	Occurrence or non-occurrence	80% of cases
	Location: ± 100 km (60 NM)	70% of cases
	Vertical extent: ± 300 m (1 000 ft)	70% of cases
	Flight level of tropopause: ± 300 m (1 000 ft)	80% of cases
	Max wind level: ± 300 m (1 000 ft)	80% of cases

ATTACHMENT C. SELECTED CRITERIA APPLICABLE TO AERODROME REPORTS

(The guidance in this table relates to Chapter 4 and Appendix 3.)

	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*
											Amount				*Type*[2]				
Specifications	Directional variations[3]			Speed variations[3]	Directional variations[4]			Past tendency[5]		No general criteria applicable to all the WX phenomena (for specific criteria, see Appendix 3, 4.4.2)	Layers reported if coverage					No criteria			
	≥ 60° and < 180°		≥ 180°			Special cases Minimum VIS ≠ prevailing VIS		$\lvert \bar{R}_{5(AB)} - \bar{R}_{5(BC)} \rvert$											
	Mean speed																		
	< 1.5 m/s (3 kt)	≥ 1.5 m/s (3 kt)		Exceeding the mean speed by ≥ 5 m/s (10 kt)	General rule	Minimum VIS < 1 500 m or < 0.5 × prevailing VIS	VIS fluctuating and prevailing VIS cannot be determined	< 100 m	≥ 100 m		Lowest layer	Next layer >	Next higher layer >	CB[6] or TCU	Identification		Parameters reported	Updated if changes > agreed magnitude	Parameter to be included
Local routine and special report	2/10 min[7] VRB + 2 extreme directions	2/10 min[7] mean + 2 extreme directions	2 min VRB (no extremes)	10 min[8] Minimum and maximum speed	1 min VIS along the runway(s)	N/A	N/A	1 min N/A[9]			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	10 min Prevailing VIS	Prevailing VIS and minimum VIS + direction	Minimum VIS	10 min No tendency observed ("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 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 800 m ≤ VIS < 5 000 m 5 000 m ≤ VIS < 10 km VIS ≥ 10 km	*Step applicable* : 50 m : 100 m : 1 km : None, given as 10 km or covered under CAVOK		*If* RVR < 400 m 400 m ≤ RVR ≤ 800 m 800 m < RVR < 2 000 m	*Step applicable* : 25 m : 50 m : 100 m[13]	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 to whole degrees: up for decimal 5	In whole hPa[15] rounded down for decimals 1 – 9		N/A

Notes.—

1. 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.
2. Layer composed of CB and TCU with a common base should be reported as "CB".
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).
4. If several directions, the most operationally significant direction used.
5. Let $\bar{R}_{5AB}$ = 5-minute mean runway visual range value during period AB and $\bar{R}_{5BC}$ = 5-minute mean runway visual range value during period BC.
6. CB (cumulonimbus) and TCU (towering cumulus = cumulus congestus of great vertical extent) if not already indicated as one of the other layers.
7. Time averaging, for mean values and, if applicable, referring period for extreme values, indicated in the upper left-hand corner.
8. According to the *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".
9. N/A = not applicable.
10. 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.
11. As listed in Appendix 3, 4.8.
12. Also sea-surface temperature, and state of the sea or the significant wave height from offshore structures in accordance with regional air navigation agreement.
13. Report if RVR and/or VIS < 1 500 m, limits for assessments 50 and 2 000 m.
14. 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.
15. Measured in 0.1 hPa.

ATTACHMENT D. CONVERSION OF INSTRUMENTED READINGS INTO RUNWAY VISUAL RANGE AND VISIBILITY

(See Appendix 3, 4.3.5 of this CAR.)

1. 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.

2. 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).

3. 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.

4. In instrumented systems without continuous adjustment of the illumination threshold, the use of four equally spaced illumination threshold values with agreed corresponding background 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/m^2)*
Night	8×10^{-7}	≤ 50
Intermediate	10^{-5}	51 – 999
Normal day	10^{-4}	1 000 – 12 000
Bright day (sunlit fog)	10^{-3}	> 12 000

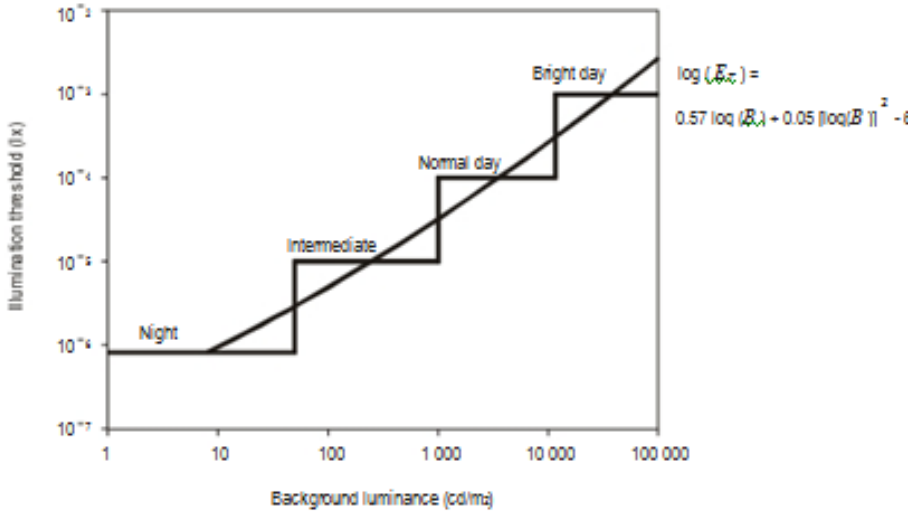

Figure D-1. Relationship between the illumination threshold E_T (lx) and background luminance B (cd/m²)

ATTACHMENT E. SPATIAL RANGES AND RESOLUTIONS FOR SPACE WEATHER ADVISORY INFORMATION

Note.— The guidance contained in this table relates to Appendix 2, 6.1 Space weather advisory information.

Element		Range	Resolution
Flight Level affected by radiation:		250-600	30
Longitudes for advisories: (degrees)		000 – 180	15
Latitudes for advisories: (degrees)		00-90	10
Latitude bands for advisories:	High latitudes northern hemisphere (HNH)	N9000 - N6000	30
	Middle latitudes northern hemisphere (MNH)	N6000 - N3000	
	Equatorial latitudes northern hemisphere (EQN)	N3000 - N0000	
	Equatorial latitudes southern hemisphere (EQS)	S0000 - S3000	
	Middle latitudes southern hemisphere (MSH)	S3000 - S6000	
	High latitudes southern hemisphere (HSH)	S6000 - S9000	