GOVERNMENT OF INDIA

OFFICE OF THE DIRECTOR GENERAL OF CIVIL AVIATION

TECHNICAL CENTRE, OPP SAFDURJUNG AIRPORT, NEW DELHI

CIVIL AVIATION REQUIREMENTS

SECTION 9 – AIR SPACE AND AIR TRAFFIC MANAGEMENT

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1. INTRODUCTION

In pursuant to Article 28 of the Convention on International Civil Aviation each contracting State undertakes to provide Air navigation facilities and standard systems in accordance with standards which may be recommended or established from time to time, pursuant to this Convention. International Civil Aviation Organization adopts and amends from time to time, as may be necessary, international standards and recommended practices and procedures for Meteorological services for International Air Navigation in Annex 3.

This CAR is issued under the provisions of Rule 29C and Rule 133A of the Aircraft Rules, 1937 for provision of Meteorological services for International Air Navigation to ensure the flow of information/data necessary for the safety, regularity and efficiency of international air navigation.

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 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 expected meteorological 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 power-units where the flight time at the one power-unit 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; and

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.

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

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

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

Level - A generic term relating to 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 the area contained within a sector of a circle of 46 km (25 NM) radius centered on a radio aid to navigation.

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

are two kinds of navigation specifications:

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

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

Note.— The Performance-based Navigation (PBN) Manual (Doc 9613), Volume II, contains detailed guidance on 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 - A 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 ofgeneral 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 ornon-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 - All the planned and systematic activities implemented within the quality system, and demonstrated as needed, to provide adequate confidence that an entity will fulfil requirements for quality (ISO 9000*).

Quality control - The operational techniques and activities that are used to fulfil requirements for quality (ISO 9000*).

Quality management - All activities of the overall management function that determine the quality policy, objectives and responsibilities, and implementing them by means such as quality planning, quality control, quality assurance and quality improvement within the quality system (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 sub-centre 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.

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.

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

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

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 control centre/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 data banks 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 data banks 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.

2. General Provisions

2.1 Objective, determination and provision of meteorological service

2.1.1 The objective of meteorological service shall be to contribute towards the safety, regularity and efficiency of international air navigation.

2.1.2 The 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 The meteorological services to be provided for international air navigation over Indian Territory shall be in accordance with the provisions contained in this CAR. Meteorological service to be provided for international air navigation over international waters and other areas outside the territory of India shall be in accordance with regional air navigation agreements.

2.1.4 India Meteorological Department (IMD) shall provide Meteorological Services

for safety, regularity, and efficiency of International air navigation in accordance with the provisions of this CAR and regional air navigation agreements in this regard. ~~Details of the meteorological authority shall be included in the aeronautical information publication, in accordance with CAR Section 9 Series I Part I, Appendix 1, GEN 1.1~~.

Note1.— Detailed specifications concerning presentation and contents of the aeronautical information publication is provided in PANS-AIM (Doc 10066), Appendix 2.

Note2.— IMD shall be the designated Meteorological Authority for provision of Meteorological Services for ~~international~~ air navigation over the Indian Territory; including international waters and other areas outside the territory of India in accordance with regional air navigation agreement.

2.1.5 IMD shall ensure compliance 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 qualifications, ~~*and*~~ competencies, education and *training of meteorological personnel in aeronautical meteorology are given in WMO Publication No. 49*, Technical Regulations, *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.* ~~*Para B.4 — Education and Training*~~.

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 IMD shall ensure establishment and implementation of a properly organized quality system comprising procedures, processes and resources necessary to provide for the quality management of the meteorological information to be supplied to the users listed in 2.1.2.

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

Note.— 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 to International Air Navigation *(Doc 9873)*.

2.2.4 The quality system should 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 should 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 para 3, 4, 6, 7, 8, 9 and 10 and Appendices 2, 3, 5, 6, 7, 8 and 9 of this CAR ~~ICAO Annex 3~~ 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 ~~ICAO Annex 3~~.

2.2.5 In regard to the exchange of meteorological information for operational purposes, the quality system should 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 should be capable of detecting excessive transit times of messages and bulletins received.

Note.— Requirements concerning the exchange of operational meteorological information are given in para 11 and Appendix 10 of this CAR ~~ICAO Annex 3~~.

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

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

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

2.2.8 Owing to the variability of meteorological elements in space and time, to limitations of forecasting techniques and to limitations caused by the definitions of some of the elements, the specific value of any of the elements given in a forecast shall be understood by the recipient to be the most probable

value which the element is likely to assume during the period of the forecast. Similarly, when the time of occurrence or change of an element is given in a forecast, this time shall be understood to be the most probable time.

Note.— Guidance on the operationally desirable accuracy of forecasts is given in Attachment B of this CAR ~~ICAO Annex 3~~.

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 Paras.

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 IMD or concerned aerodrome meteorological office, sufficiently in advance. The minimum amount of advance notice required shall be as agreed between the IMD and the operator concerned.

2.3.2 IMD 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 IMD.

2.3.3 The operator or a flight crew member shall ensure that, where required by the meteorological authority in 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 should 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 and taken from the relevant list contained in the regional air navigation plan;

e) cruising level;

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

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

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

3. ~~WORLD AREA FORECAST SYSTEM AND METEOROLOGICAL OFFICES~~ GLOBAL SYSTEMS, SUPPORTING CENTRE AND METEOROLOGICAL OFFICES

Note. – Please refer Appendix 2 of this CAR ~~the ICAO Annex 3~~ for technical specifications and other detailed criteria.

3.1 Objective of the world area forecast system(WAFS)

The technical specifications related to World Area Forecast System (WAFS) are stipulates in Chapter 3 and Appendix 2 of ICAO Annex 3 for the contracting states which have accepted responsibilities for providing a World Area Forecast Centers (WAFC).

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

3.2 World area forecast centres (WAFC)

The technical specifications related to World Area Forecast System (WAFS) are stipulates in Chapter 3 and Appendix 2 of ICAO Annex 3 for the contracting states which have accepted responsibilities for providing a World Area Forecast Centers (WAFC).

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

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3.2.2 Intentionally left blank.

3.3 Aerodrome meteorological offices

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

3.3.2 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 as agreed between the meteorological, aeronautical information service and ATS authorities concerned.

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

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

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

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

3.4 Meteorological watch offices (MWO)

3.4.1 IMD shall establish one or more meteorological watch offices (MWO) for provision of services enumerated under para 3.4.2 to cover all the Flight Information Regions of India.

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 provision in the Manual of Aeronautical

Meteorological Practice (Doc 8896).

3.4.2 A MWO shall:

a) maintain watch over meteorological conditions affecting flight operations within its area of responsibility;

b) prepare SIGMET and other information relating to its area of responsibility;

c) supply SIGMET information and, as required, other meteorological information to associated air traffic services units;

d) disseminate SIGMET information;

e) when required by regional air navigation agreement, in accordance with 7.2.1

1) prepare AIRMET information related to its area of responsibility;

2) supply AIRMET information to associated air traffic services units; and

3) disseminate AIRMET information;

f) supply information received on pre-eruption volcanic activity, a volcanic eruption and volcanic ash cloud for which a SIGMET has not already been issued, to its associated ACC/FIC, as agreed between the meteorological and ATS authorities concerned, and to its associated VAAC as determined by regional air navigation agreement; and

g) supply information received concerning the release of radioactive materials into the atmosphere, in the area for which it maintains watch or adjacent areas, to its associated ACC/FIC, as agreed between the meteorological and ATS authorities concerned, and to aeronautical information service units, as agreed between the meteorological and appropriate civil aviation authorities concerned. The information shall comprise location, date and time of the release, and forecast trajectories of the radioactive materials.

Note.— The information is provided by WMO regional specialized meteorological centres (RSMC) for the provision of transport model products for radiological environmental emergency response, at the request of the delegated authority of the State in which the radioactive material was released into the atmosphere, or the International Atomic Energy Agency (IAEA). The information is sent by the RSMC to a single contact point of the national meteorological service in each State. This contact point has the responsibility of redistributing the RSMC products within the State concerned. Furthermore, the information is provided by IAEA to RSMC co-located with VAAC London (designated as the focal point) which in turn notifies the ACCs/FICs concerned about the release.

3.4.3 The boundaries of the area over which meteorological watch is to be

maintained by a MWO shall, be coincident with the boundaries of a FIR or a CTA or a combination of FIRs and/or CTAs.

3.5 Volcanic ash advisory centres (VAAC)

The technical specifications related to Volcanic Ash Advisory Centres (VAACs) are stipulates in Chapter 3 and Appendix 2 of ICAO Annex 3 for the contracting states which have accepted responsibilities for providing a VAAC.

India is not a VAAC. However, the Service Provider shall have to be familiar with the technical specifications so as to be able to interact with VAAC and use its products/services effectively.

3.6 State volcano observatories

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3.7 Tropical cyclone advisory centres

IMD shall establish Tropical Cyclone Advisory Centres (TCAC) having adequate facilities to:

a) monitor the development of tropical cyclones in its area of responsibility, using geostationary and polar-orbiting satellite data, radar data and other meteorological information;

b) issue advisory information concerning the position of the cyclone centre, its direction and speed of movement, central pressure and maximum surface wind near the centre; in abbreviated plain language to:

   1) MWOs in its area of responsibility;

   2) other TCACs whose areas of responsibility may be affected; and

   3) WAFCs, international OPMET data banks, and centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services; and

c) issue updated advisory information to MWOs for each tropical cyclone, as necessary, but at least every six hours.

3.8 Space weather centres (SWXC)

The technical specifications related to SWXC are stipulates in Chapter 3, Appendix 2 and Attachment E of ICAO Annex 3 for the contracting states which have accepted responsibilities to monitor and provide advisory information on space weather.

India is not a SWXC. However, the Service Provider shall have to be familiar with the technical specifications so as to be able to interact with SWXC and use its products/services effectively.

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4. METEOROLOGICAL OBSERVATIONS AND REPORTS

Note.— Please refer Appendix 3 of this CAR ~~ICAO Annex 3~~ for technical specifications and detailed criteria .

4.1 Aeronautical meteorological stations and observations

4.1.1 IMD shall establish at aerodromes and other points of significance to international air navigation, such aeronautical meteorological stations as it determines to be necessary. An aeronautical meteorological station may be a separate station or may be combined with a synoptic station.

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

4.1.2 IMD should establish, or arrange for the establishment of, aeronautical meteorological stations on offshore structures or at other points of significance if requested by the operators of the concerned offshore structure in support of helicopter operations to offshore structures.

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

4.1.4 IMD shall establish a mechanism for its aeronautical meteorological stations to be inspected at sufficiently frequent intervals to ensure that a high standard of observations is maintained, that instruments and all their indicators are functioning correctly, and to check whether the exposure of the instruments has 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).*

4.1.5 At aerodromes, with runways intended for Category II and III instrument approach and landing operations, automated equipment for measuring or assessing, as appropriate, and for monitoring and remote indicating of surface wind, visibility, runway visual range, height of cloud base, air and dew-point temperatures and atmospheric pressure shall be installed to

support approach and landing and take-off operations. These devices shall be integrated automatic systems for acquisition, processing, dissemination and display in real time of the meteorological parameters affecting landing and take-off 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 CAR Section 8 series B part 1.

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

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

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

4.1.8 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 IMD and the ATS authority should be established to cover, amongst 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 ICAO Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services (ICAO Doc 9377).

4.3 Routine observations and reports

4.3.1 At aerodromes, routine observations shall be made throughout the 24 hours each day, unless otherwise agreed between IMD, the appropriate ATS authority, and the operator concerned. Such observations shall be made at intervals of one hour or, if so determined by regional air navigation agreement, at intervals of one half hour. At other aeronautical meteorological stations, such observations shall be made as determined by the IMD taking into account the requirements of air traffic services units and aircraft operations.

4.3.2 Reports of routine observations shall be issued as:

a) local routine reports, only for dissemination at the aerodrome of origin, (intended for arriving and departing aircraft); and

b) METAR for dissemination beyond the aerodrome of origin (mainly intended for flight planning, VOLMET broadcasts and D-VOLMET).

Note.— Meteorological information used in ATIS (voice- ATIS and D-ATIS) is to be extracted from the local routine report, in accordance with CAR Section 9 Series E Part I Para 4.3.6.1g

4.3.3 At aerodromes that are not operational throughout 24 hours in accordance with 4.3.1, METAR shall be issued prior to the aerodrome resuming operations in accordance with agreement between IMD, ATS authority and operator.

4.4 Special observations and reports

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

4.4.2 Reports of special observations shall be issued as:

a) local special reports, only for dissemination at the aerodrome of origin, (intended for arriving and departing aircraft); and

b) SPECI for dissemination beyond the aerodrome of origin (mainly intended

for flight planning, VOLMET broadcasts and D-VOLMET) unless METAR are issued at half-hourly intervals.

Note.— Meteorological information used in ATIS (voice- ATIS and D-ATIS) is to be extracted from the local special report, in accordance with CAR Section 9 Series E Part I Para 4.3.6.1.

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

a) identification of the type of report;

b) location indicator;

c) time of the observation;

d) identification of an automated or missing report, when applicable;

e) surface wind direction and speed;

f) visibility;

g) runway visual range, when applicable;

h) present weather;

i) cloud amount, cloud type (only for cumulonimbus and towering cumulus clouds) and height of cloud base or, where measured, vertical visibility;

j) air temperature and dew-point temperature; and

k) QNH and, when applicable, QFE (QFE included only in local routine and special reports).

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

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

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

4.6 Observing and reporting meteorological elements

4.6.1 Surface wind

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

4.6.1.2 When local routine and special reports are used for departing aircraft, the surface wind observations for these reports should be representative of conditions along the runway; when local routine and special reports are used for arriving aircraft, the surface wind observations for these reports should be representative of the touchdown zone.

4.6.1.3 For METAR and SPECI, the surface wind observations should 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 this CAR shall be measured or observed, and reported in meters or kilometers.

Note.— Guidance on the conversion of instrument readings into visibility is given in Attachment D of this CAR ~~ICAO Annex 3~~.

4.6.2.2 Intentionally left blank

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

4.6.3 Runway visual range

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

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

4.6.3.2 Runway visual range as defined in this CAR should be assessed on all runways intended for use during periods of reduced visibility, including:

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

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

Note.— Precision approach runways are defined in CAR Section 4 Series 'B', Part 1, under "Instrument runway".

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

4.6.3.4 Runway visual range assessments shall be representative of:

a) the touchdown zone of the runway intended for non-precision or Category I instrument approach and landing operations;

b) the touchdown zone and the mid-point of the runway intended for Category II instrument approach and landing operations; and

c) the touchdown zone, the mid-point and stop-end of the runway intended for Category III instrument approach and landing operations.

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

4.6.4 Present weather

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

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

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

4.6.5 Clouds

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

4.6.5.2 Intentionally left blank.

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 local routine reports, local special reports, METAR and SPECI should 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

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4.8 Observations and reports of volcanic activity

The occurrence of pre-eruption volcanic activity, volcanic eruptions and volcanic ash cloud should be reported without delay to the associated air traffic services unit, aeronautical information services unit and meteorological watch office. The report should be made in the form of a volcanic activity report comprising the following information in the order indicated:

a) message type, VOLCANIC ACTIVITY REPORT;

b) station identifier, location indicator or name of station;

c) date/time of message;

d) location of volcano and name if known; and

e) concise description of event including, as appropriate, level of intensity of volcanic activity, occurrence of an eruption and its date and time, and the existence of a volcanic ash cloud in the area together with direction of ash cloud movement and height.

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

5. AIRCRAFT OBSERVATIONS AND REPORTS

Note.— Technical specifications and detailed criteria related to this Para are given in Appendix 4 of this CAR ~~ICAO Annex 3~~.

5.1 Obligations of States

Each Contracting State shall arrange, according to the provisions of this

Para, for observations to be made by aircraft of its registry operating on international air routes and for the recording and reporting of these observations.

5.2 Types of aircraft observations

The following aircraft observations shall be made:

a) routine aircraft observations during en-route and climb-out phases of the flight; and
b) special and other non-routine aircraft observations during any phase of the flight.

5.3 Routine aircraft observations - designation

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

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

5.3.3 In the case of air routes with high-density air traffic (e.g. organized tracks), an aircraft from among the aircraft operating at each flight level shall be designated, at approximately hourly intervals, to make routine observations in accordance with 5.3.1. The designation procedures shall be in accordance with regional air navigation agreement.

5.3.4 In the case of the requirement to report during the climb-out phase, an aircraft shall be designated, at approximately hourly intervals, at each aerodrome to make routine observations in accordance with 5.3.1.

5.4 **Routine aircraft observations - exemptions**

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

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; or
g) volcanic ash cloud; or
h) pre-eruption volcanic activity or a volcanic eruption.

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

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 aircraft observations during flight

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

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

5.7.3 Aircraft observations shall be reported as air-reports.

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

The meteorological authority concerned shall make arrangements with the appropriate ATS authority to ensure that, on receipt by the ATS units of:

a) special air-reports by voice communications, the ATS units relay them without delay to their associated MWO; and

b) routine and special air-reports by data link communications, the ATS units relay them without delay to their associated MWO, the WAFCs and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services.

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

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

6. FORECASTS

Note.— Please refer Appendix 5 of this CAR ~~ICAO Annex 3~~ for technical specifications and detailed criteria.

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 prepared, in accordance with regional air navigation agreement, by the aerodrome meteorological office designated by the meteorological authority concerned.

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

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

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

a) identification of the type of forecast;
b) location indicator;
c) time of issue of forecast;
d) identification of a missing forecast, when applicable;
e) date and period of validity of forecast;
f) identification of a cancelled forecast, when applicable;
g) surface wind;
h) visibility;
i) weather;
j) cloud; and
k) expected significant changes to one or more of these elements during the period of validity.

Optional elements shall be included in TAF in accordance with regional air navigation agreement.

6.2.4 Aerodrome meteorological offices preparing TAF shall keep the forecasts under continuous review and, when necessary, shall issue amendments promptly. The length of the forecast messages and the number of changes

indicated in the forecast shall be kept to a minimum.

Note. — Guidance on methods to keep TAF under continuous review is given in Chapter 3 of the Manual of Aeronautical Meteorological Practice *(ICAO 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 should be not less than 9 hours nor more than 30 hours; the period of validity should be determined by regional air navigation agreement. Routine TAF valid for less than 12 hours should 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 meteorological authority concerned; as determined by regional air navigation agreement; such forecasts are intended to meet requirements of local users and of aircraft within about one hour's flying time from the aerodrome.

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

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

6.4 Forecasts for take-off

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

6.4.2 A forecast for take-off shall refer to a specified period of time and should 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 should 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 should keep the forecasts under continuous review and, when necessary, should issue amendments promptly.

6.5 Area forecasts for low-level flights

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

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6.5.3 Intentionally left blank.

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

Note.— Please refer Appendix 6 of this CAR ~~ICAO Annex 3~~ for technical specifications and detailed criteria.

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 and/or expected occurrence of specified en-route weather and other phenomena in the atmosphere that may affect the safety of aircraft operations, and of the development of those phenomena in time and space.

7.1.2 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 and tropical cyclones, the period of validity shall be extended up to 6 hours.

7.1.4 SIGMET messages concerning volcanic ash cloud and tropical cyclones should be based on advisory information provided by VAACs and TCACs, respectively, designated by regional air navigation agreement.

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

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

7.2 AIRMET Information

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7.2.2 Intentionally left blank.

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7.3 Aerodrome warnings

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

7.4 Wind shear warnings and alerts

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

7.4.1 Wind shear warnings shall be prepared by the concerned aerodrome meteorological office and shall give concise information of the observed wind shear which could adversely affect aircraft on the approach path or take-off path or during circling approach.

7.4.2 Wind shear warnings for arriving aircraft and/or departing aircraft should be cancelled when aircraft reports indicate that wind shear no longer exists, or alternatively, after two hours elapsed time. The criteria for the cancellation of a wind shear warning should be defined locally for each aerodrome, as agreed between the meteorological authority, the appropriate ATS authority and the operators concerned.

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

7.4.4 Wind shear alerts issued in accordance with para 7.4.3 should be updated at least every minute. The wind shear alert should be cancelled as soon as the headwind/tailwind change falls below 7.5 m/s (15 kt).

8. AERONAUTICAL CLIMATOLOGICAL INFORMATION

Note1.— Please refer Appendix 7 of this CAR ~~ICAO Annex 3~~ for technical specifications and detailed criteria.

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 users concerned.

Note.— Climatological data required for aerodrome planning purposes are set out in CAR Section 4 Series B Part I para.3.1.4 & Attachment A. ~~of ICAO Annex 3.~~

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

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

8.2 Aerodrome climatological tables

IMD should 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 that the user concerned.

8.3 Aerodrome climatological summaries

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

8.4 Copies of meteorological observational data

Each meteorological authority, 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.

9. SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

Note.— Please refer Appendix 8 of this CAR ~~ICAO Annex 3~~ for technical specifications and detailed criteria.

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 one alternate aerodrome 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,

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 cloud, icing and turbulence are intended to be processed and, if necessary, visualized according to the specific thresholds relevant to user operations.

b) METAR or SPECI (including trend forecasts as issued in accordance with regional air navigation agreement) for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;

c) TAF or amended TAF for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;

d) forecasts for take-off;

e) SIGMET information and appropriate special air-reports relevant to the whole route;

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

f) volcanic ash and tropical cyclone advisory information relevant to the whole route;

g) as determined by regional air navigation agreement, GAMET area forecast and/or area forecasts for low-level flights in chart form prepared in support of the issuance of AIRMET information, and AIRMET information for low-level flights relevant to the whole route;

h) aerodrome warnings for the local aerodrome;

i) meteorological satellite images; ~~and~~

j) ground-based weather radar information; and

k) space weather advisory information relevant to the whole route.

9.1.4 Forecasts listed under 9.1.3 a) shall be generated from the digital forecasts provided by the WAFCs whenever these forecasts cover the intended flight path in respect of time, altitude and geographical extent, unless otherwise agreed between the meteorological authority 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 of this CAR ~~ICAO Annex 3~~, 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 ~~of *ICAO Annex 3*~~ 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 ~~of *ICAO Annex 3,*~~ 1.3.2 and Appendix 5 ~~of *ICAO Annex 3*~~, 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, IMD 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 the IMD, 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 India. At an aerodrome without an aerodrome meteorological office at the aerodrome, arrangements for the supply of meteorological information shall be as agreed between IMD and the operator concerned.

9.2 Briefing, consultation and display

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 IMD and the operator concerned, in lieu of flight documentation.

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

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

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 the meteorological authority and the operator concerned. In exceptional circumstances, such as an undue delay, the aerodrome meteorological office associated with the aerodrome shall provide or, if that is not practicable, arrange for the provision of a new briefing, consultation and/ or flight documentation as necessary.

9.2.5 The flight crew member or other flight operations personnel for whom briefing, consultation and/or flight documentation has been requested should visit the aerodrome meteorological office at the time agreed 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 should provide those services by telephone or other suitable telecommunications facilities.

9.3 Flight documentation

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 the meteorological authority and operator concerned, but in all cases the flight documentation shall at least comprise information on 9.1.3 b), c), e), f) and, if appropriate, g) and k).

9.3.2 Whenever it becomes apparent that the meteorological information to be included in the flight documentation will differ materially from that made available for pre-flight planning and in-flight re-planning, the operator shall be advised immediately and, if practicable, be supplied with the revised information as agreed between the operator and the 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 should, as agreed locally, issue the necessary amendment or updated information to the operator or to the local ATS unit, for transmission to the aircraft.

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

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

9.4.1 Where IMD uses automated pre-flight information systems to supply and display meteorological information to operators and flight crew members for self-briefing, flight planning and flight documentation purposes, the information supplied and displayed shall comply with the relevant provisions in 9.1 to 9.3 inclusive.

9.4.2 Automated pre-flight information systems providing for a harmonized, common point of access to meteorological information and aeronautical information services information by operators, flight crew members and other

aeronautical personnel concerned should be as agreed between the meteorological authority and the civil aviation authority or the agency to which the authority to provide service has been delegated in accordance with CAR Section 9, Series 'I', Part-I, Para 2.1.1.

Note.— The meteorological and aeronautical information services information concerned is specified in 9.1 to 9.3 and Appendix 8 and in CAR Section 9, Series 'I', Part-I, Para 8.1 and 8.2, respectively.

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

Note.— The responsibilities relating to aeronautical information services information and the quality assurance of the information are given in CAR Section 9, Series 'I' Part 1 Para 1, 2 and 3.

9.5 Information for aircraft in flight

9.5.1 Meteorological information for use by aircraft in flight shall be supplied by an aerodrome meteorological office or MWO to its associated ATS unit and through D-VOLMET or VOLMET broadcasts. Meteorological information for planning by the operator for aircraft in flight shall be supplied on request, as agreed between meteorological authority or authorities and the operator concerned.

9.5.2 Meteorological information for use by aircraft in flight shall be supplied to ATS units in accordance with the specifications of para 10.

9.5.3 Meteorological information shall be supplied through D-VOLMET or VOLMET broadcasts as determined by regional air navigation agreement, and in accordance with the specifications of para 11.

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

Note.— Please refer Appendix 9 of this CAR ~~ICAO Annex 3~~ for Technical specifications and detailed criteria.

10.1 Information for air traffic services units

10.1.1 IMD shall designate an aerodrome meteorological office or MWO to be associated with each ATS unit. The associated aerodrome meteorological office or MWO shall, after coordination with the ATS 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 should be associated with an aerodrome control tower or approach control unit for the provision of meteorological information.

10.1.3 A MWO shall be associated with a FIC or an ACC for the provision of meteorological information.

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

10.1.5 Any meteorological information requested by an ATS 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 MWO designated by the meteorological authority in accordance with regional air navigation agreement shall supply search and rescue services units with the meteorological information they require in a form established by mutual agreement. For that purpose, the designated aerodrome meteorological office or MWO shall maintain liaison with the search and rescue services unit throughout a search and rescue operation.

10.3 Information for aeronautical information services units

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

11. REQUIREMENTS FOR AND USE OF COMMUNICATIONS

Note 1.— Technical specifications and detailed criteria related to this Para are given in Appendix 10 of this CAR ~~ICAO Annex 3~~.

Note 2.— It is recognized that it is for each Contracting State to decide upon its own internal organization and responsibility for implementing the telecommunications facilities referred to in this Para.

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 ATS units on the aerodromes for which those offices and stations are responsible, and in particular to aerodrome control towers, approach control

units and the aeronautical telecommunications stations serving these aerodromes.

11.1.2 Suitable telecommunications facilities shall be made available to permit MWO to supply the required meteorological information to ATS and search and rescue services units in respect of the FIR, control areas and search and rescue regions for which those offices are responsible, and in particular to FIC, ACC and rescue coordination centres and the associated aeronautical telecommunications stations.

11.1.3 Suitable telecommunications facilities shall be made available to permit WAFC to supply the required WAFS products to aerodrome meteorological offices, meteorological authorities and other users

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 offices and FIC, ACC, rescue coordination centres and aeronautical telecommunications stations should 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 The telecommunications facilities required in accordance with Para 11.1.4 and 11.1.5 should be supplemented, as and where necessary, by other forms of visual or audio communications, for example, closed-circuit television or separate information processing systems.

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

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

11.1.9 The telecommunications facilities used for the exchange of operational

meteorological information should be the aeronautical fixed service or, for the exchange of non-time critical operational meteorological information, the public Internet, subject to availability, satisfactory operation and bilateral/multilateral and/or regional air navigation agreements.

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

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

11.2 Use of aeronautical fixed service communications and public Internet - Meteorological bulletins

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

Note.— Meteorological bulletins containing operational meteorological information authorized for transmission via the aeronautical fixed service are listed in CAR Section 9, Series 'D', Part 3, Para 4 together with the relevant priorities and priority indicators.

11.3 Use of aeronautical fixed service communications - WAFS products

World area forecast system products in digital form should be transmitted using binary data communications techniques. The method and channels used for the dissemination of the products should be as determined by regional air navigation agreement.

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 this CAR.

11.5 Intentionally left blank.

11.6 Use of aeronautical broadcasting service — contents of VOLMET broadcasts

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

11.6.2 Scheduled VOLMET broadcasts, normally on high frequencies (HF), shall contain current METAR and SPECI, together with trend forecasts where available and, where so determined by regional air navigation agreement, TAF and SIGMET.

APPENDICES

APPENDIX 1. FLIGHT DOCUMENTATION – MODEL CHARTS AND FORMS

(See Para 9 of this CAR)

MODEL A	-	OPMET information
MODEL IS	-	Upper wind and temperature chart for standard isobaric surface
		Example 1. Arrows, feathers and pennants (Mercator projection)
		Example 2. Arrows, feathers and pennants (Polar stereographic projection)
MODEL SWH	-	Significant weather chart (high level)
		Example. Polar stereographic projection (showing the jet stream and vertical extent)
MODEL SWM	-	Significant weather chart (medium level)
MODEL SWL	-	Significant weather chart (low level)
		Example 1
		Example 2
MODEL TCG	-	Tropical cyclone advisory information in graphical format
MODEL VAG	-	Volcanic ash advisory information in graphical format
MODEL STC	-	SIGMET for tropical cyclone in graphical format
MODEL SVA	-	SIGMET for volcanic ash in graphical format
MODEL SGE	-	SIGMET for phenomena other than tropical cyclone and volcanic ash in graphical format
MODEL SN	-	Sheet of notations used in flight documentation

OPMET INFORMATION MODEL A

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

INTENSITY

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

DESCRIPTORS

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

PRESENT WEATHER ABBREVIATIONS

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

EXAMPLES

+SHRA – heavy shower of rain	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

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

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

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

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

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

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

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

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

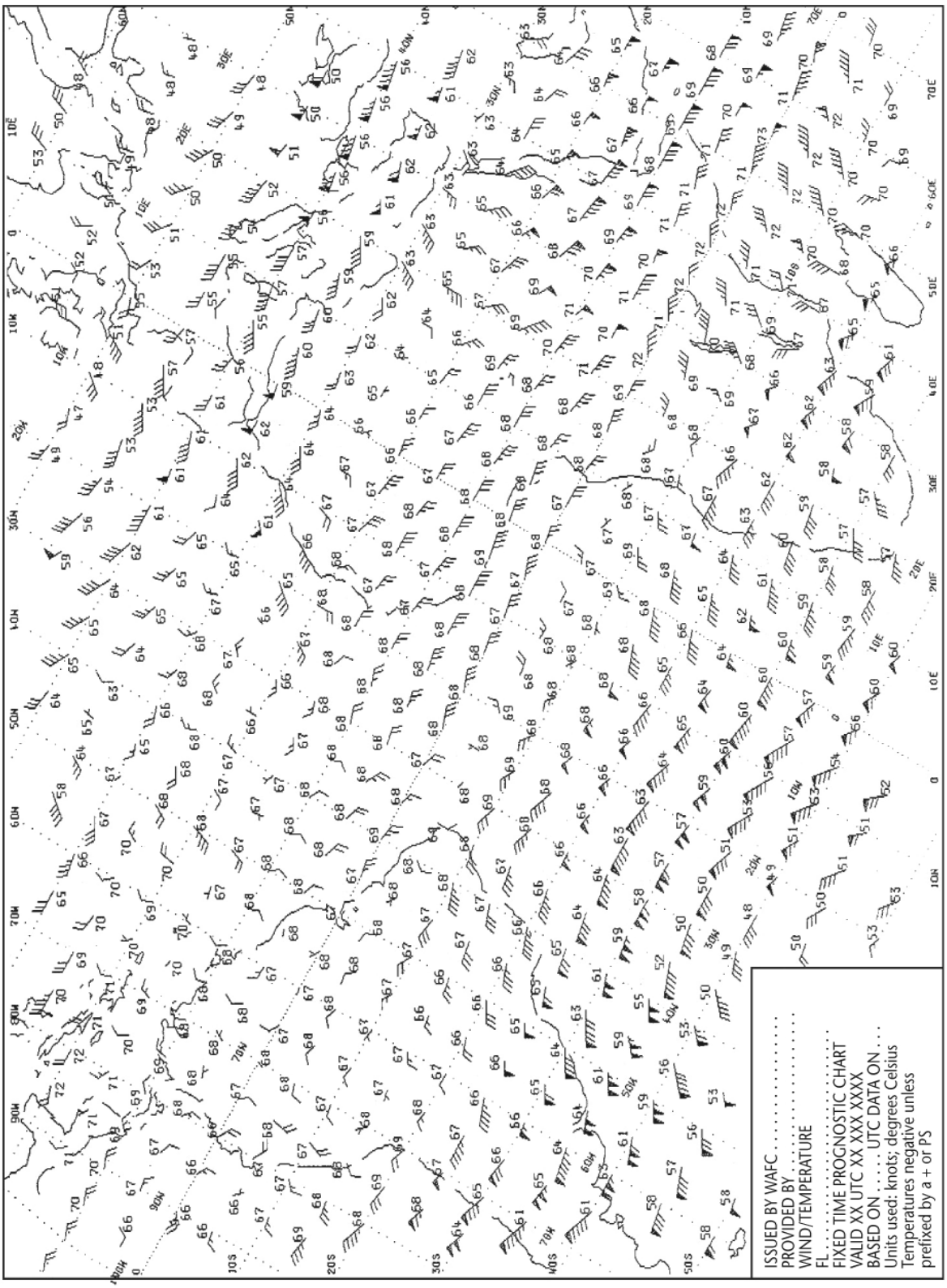
HECC SIGMET 2 VALID 240900/241200 HECA-

HECC CAIRO FIR SEV TURB OBS N OF N27 FL390/440 MOV E 25KMH NC.

UPPER WIND AND TEMPERATURE CHART FOR STANDARD ISOBARIC SURFACE

MODEL IS

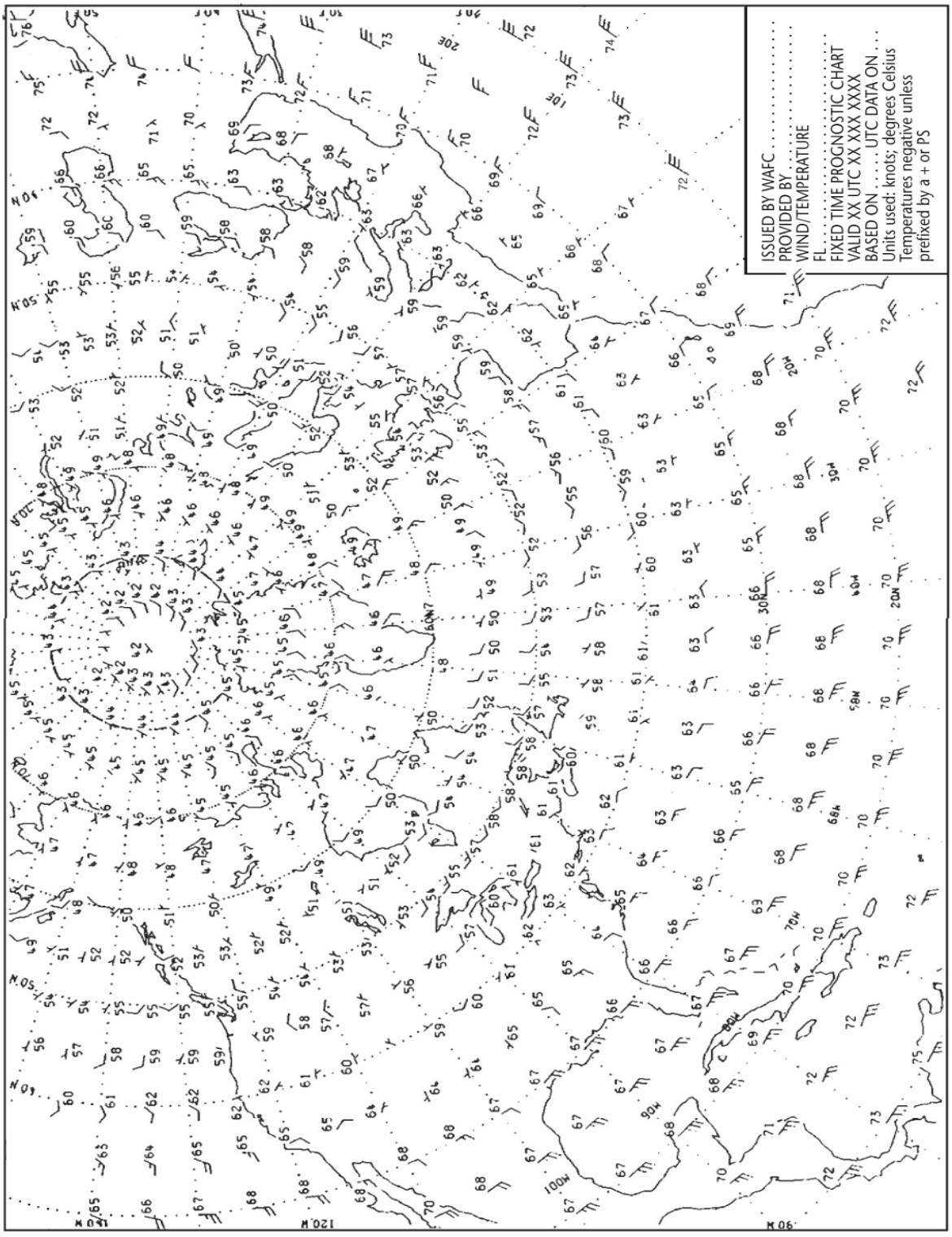
Example 1. Arrows, feathers and pennants (Mercator projection)



UPPER WIND AND TEMPERATURE CHART FOR STANDARD ISOBARIC SURFACE

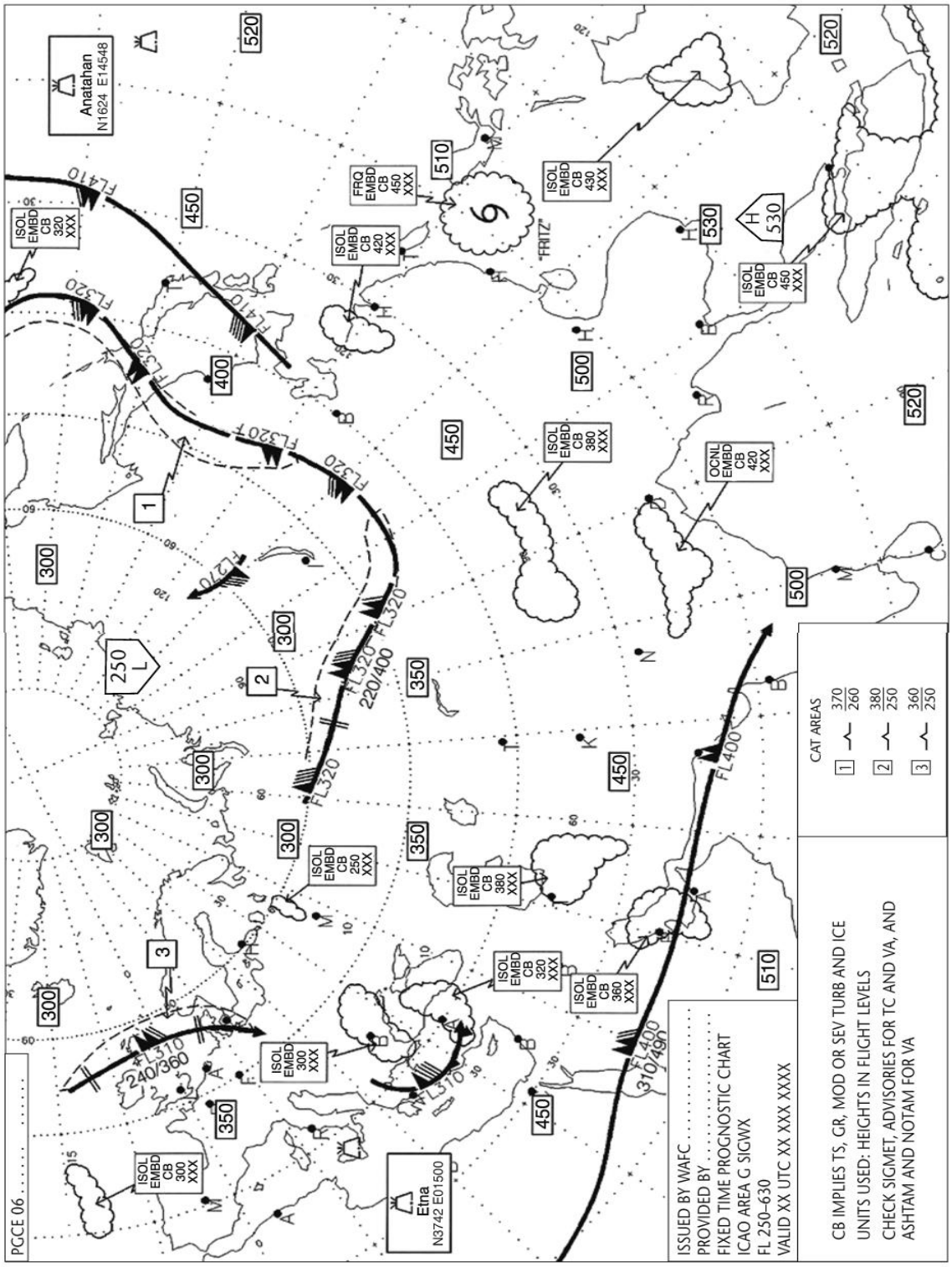
MODEL IS

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

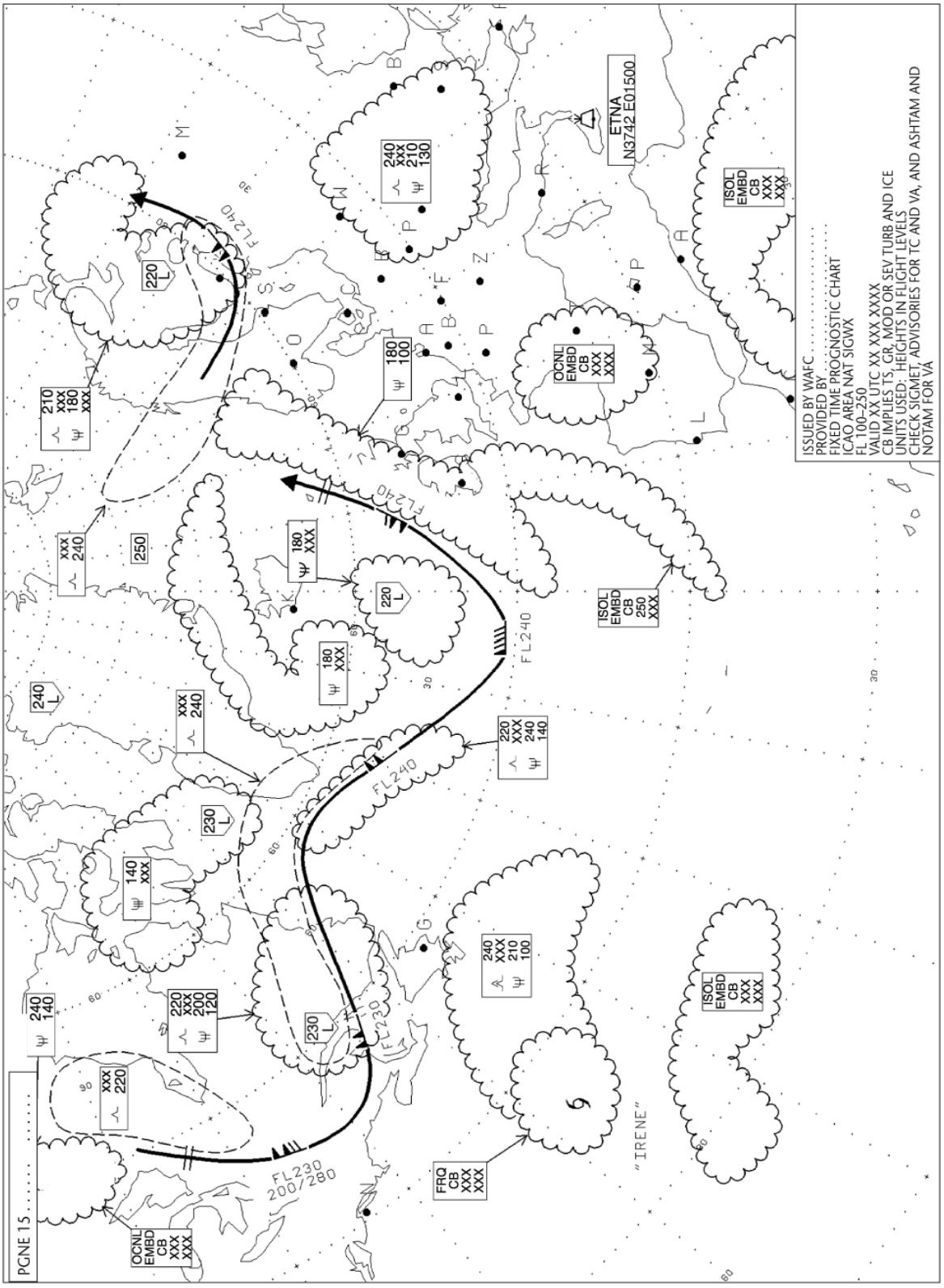


SIGNIFICANT WEATHER CHART (HIGH LEVEL)

MODEL SWH

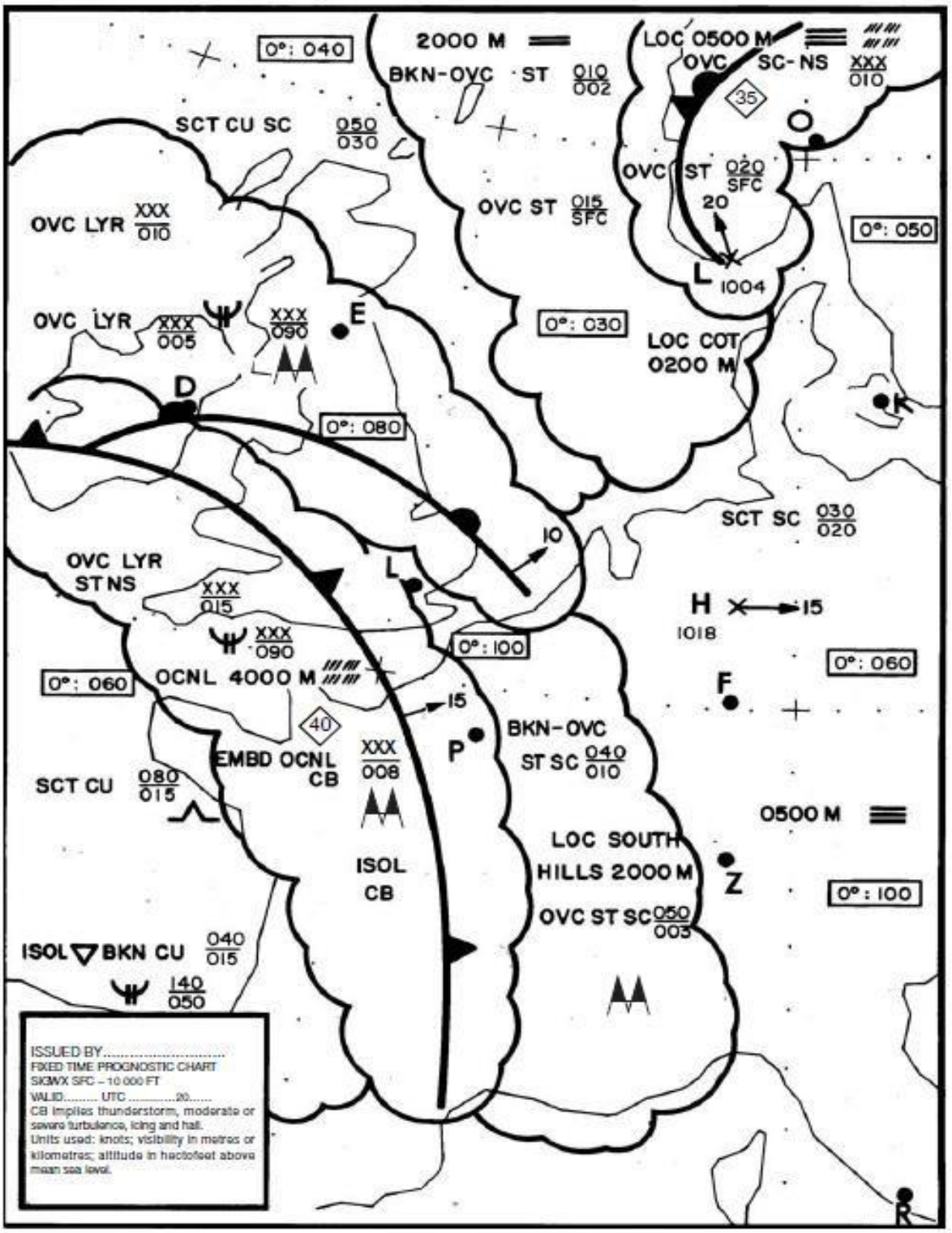


SIGNIFICANT WEATHER CHART (MEDIUM LEVEL) **MODEL SWM**



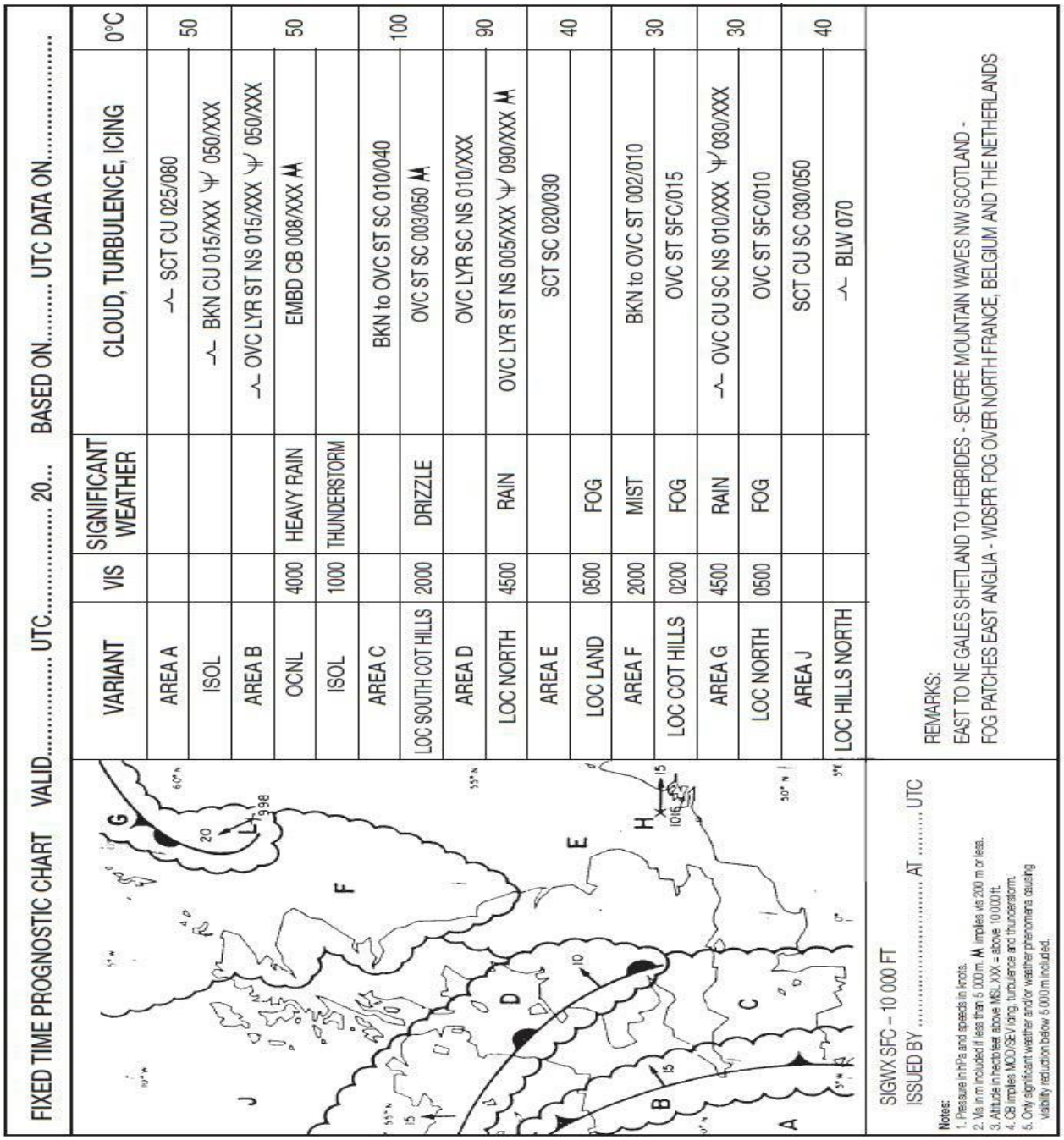
SIGNIFICANT WEATHER CHART (LOW LEVEL) **MODEL SWL**

Example 1



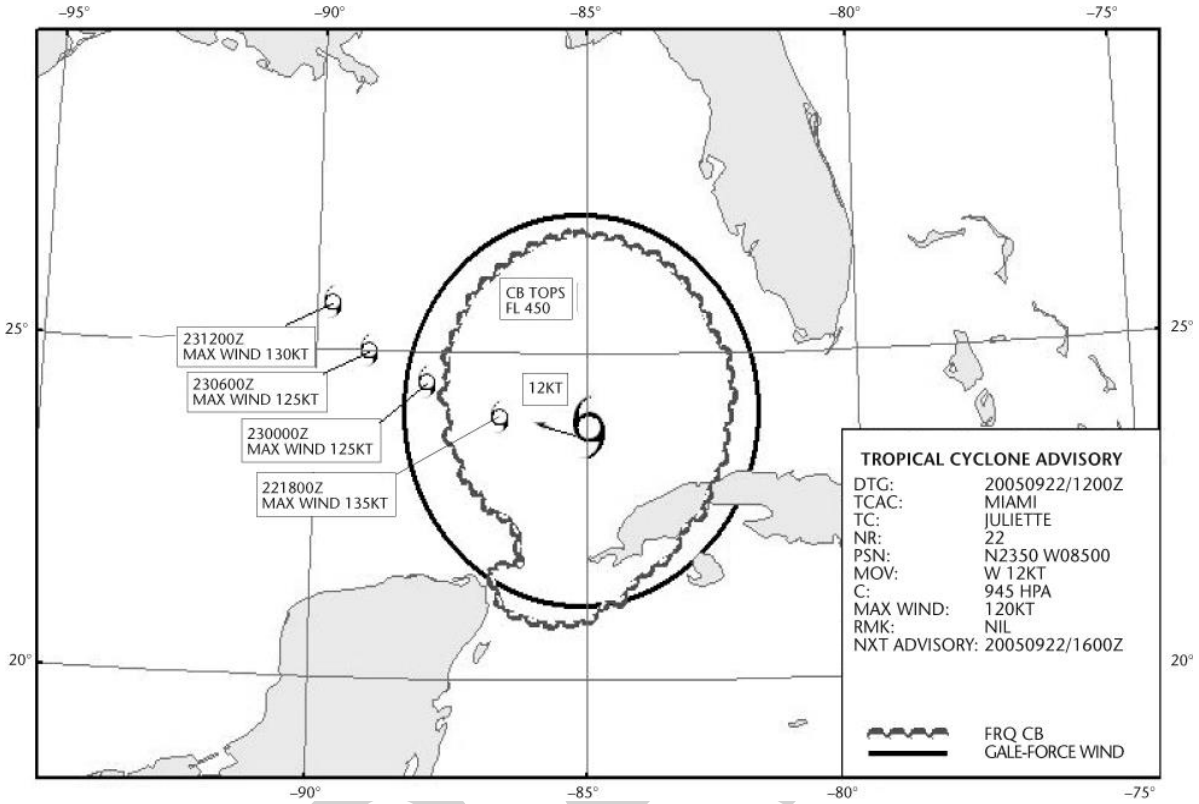
SIGNIFICANT WEATHER CHART (LOW LEVEL) **MODEL SWL**

Example 2

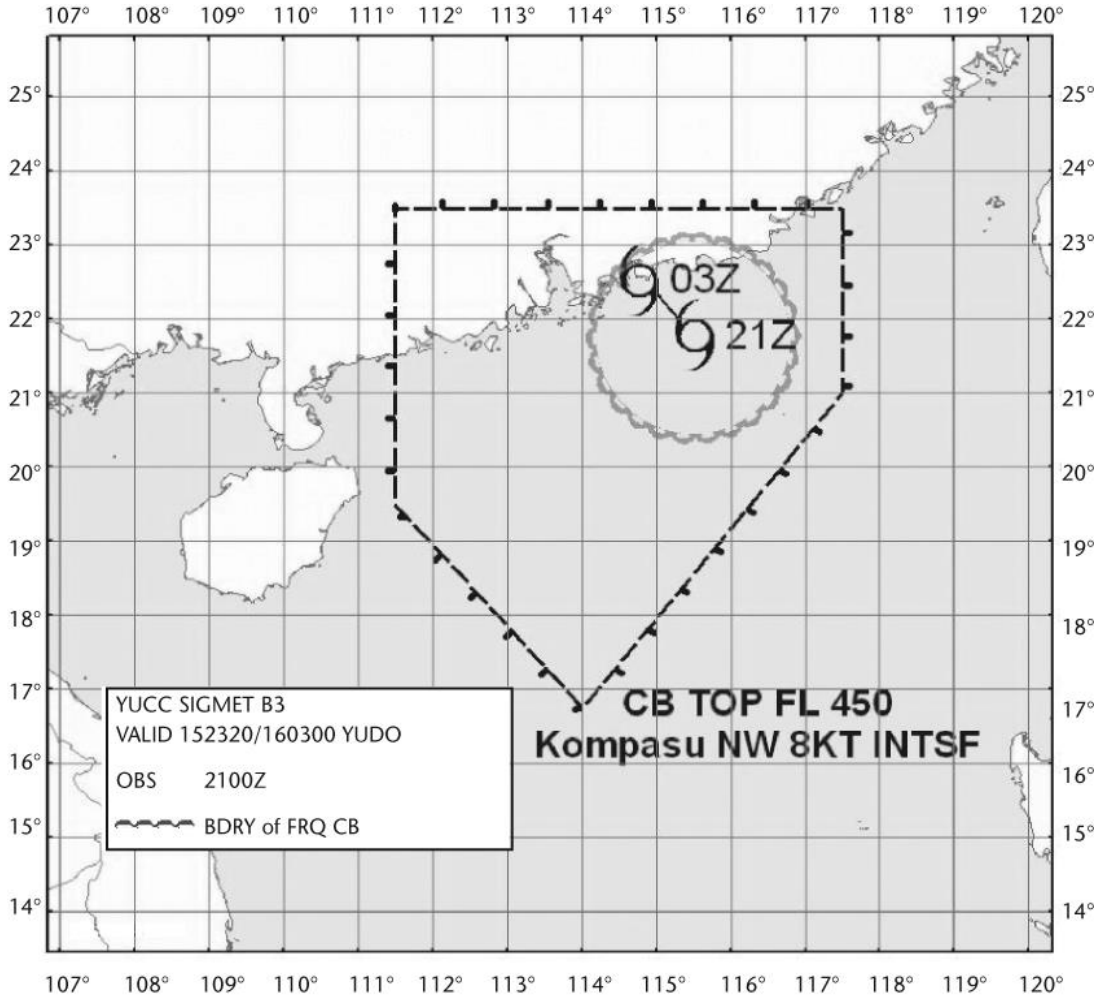


TROPICAL CYCLONE ADVISORY INFORMATION IN GRAPHICAL FORMAT

MODEL TCG

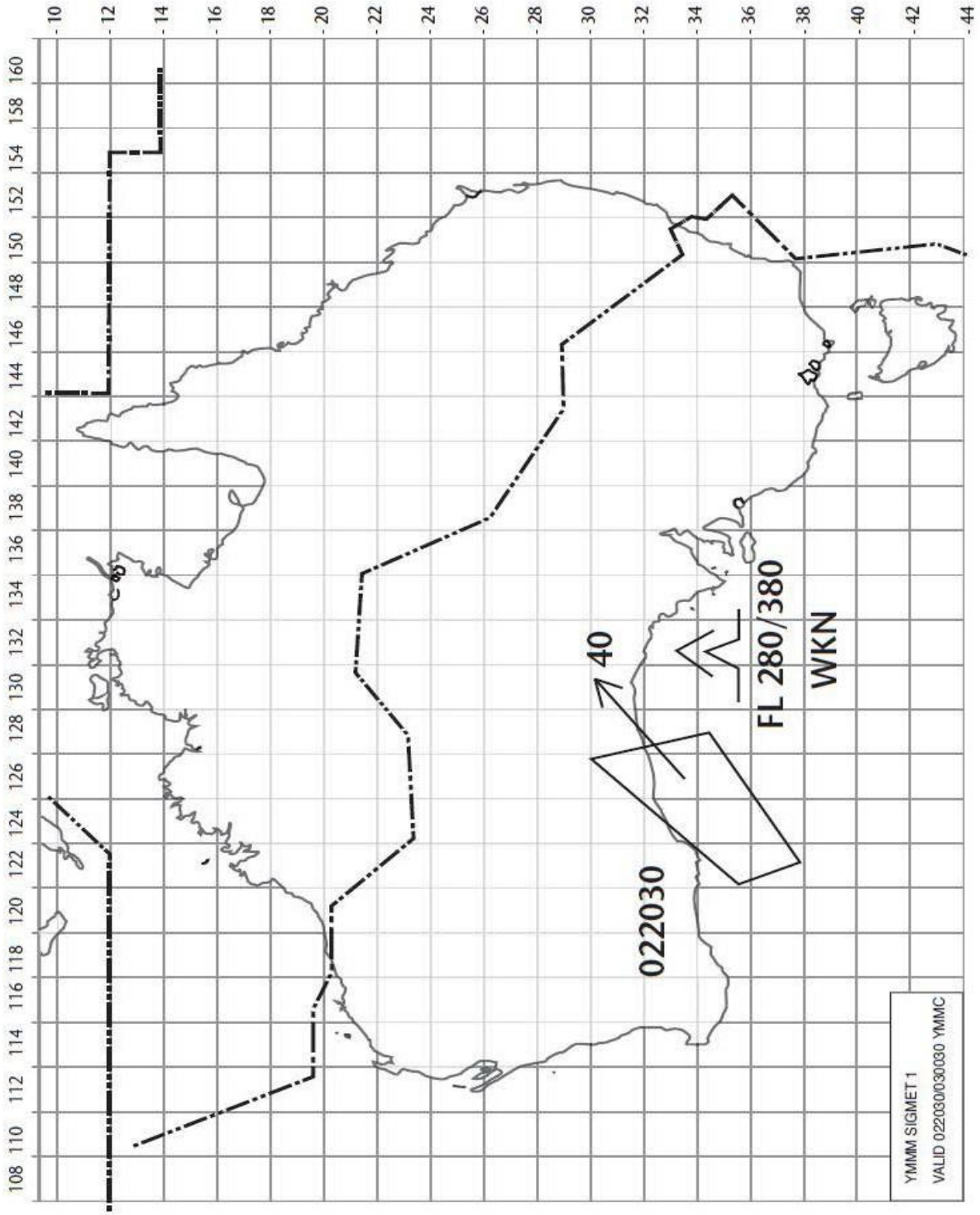


SIGMET FOR TROPICAL CYCLONE IN GRAPHICAL FORMAT MODEL STC



Note: Fictitious FIR.

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



SHEET OF NOTATIONS USED IN FLIGHT DOCUMENTATION

MODEL SN

1. Symbols for significant weather

	Tropical cyclone		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 at the side of the chart: radioactive materials symbol; latitude/longitude of accident site; date and time of accident; check NOTAM for further information.

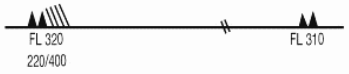
*** The following information should be included at the side of the chart: volcanic eruption symbol; name and international number of volcano (if known); latitude/longitude; date and time of the first eruption (if known); check SIGMETs and NOTAM or ASHTAM for volcanic ash.

**** 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 460	Tropopause high	10	State of the sea
270 L	Tropopause low	18	Sea-surface temperature
380	Tropopause level	40	Widespread strong surface wind*



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

* 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.
Figures on arrows	=	speed in kt or km/h of movements of frontal system
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 ~~WORLD AREA FORECAST SYSTEM~~ GLOBAL SYSTEMS, SUPPORTING CENTRES AND METEOROLOGICAL OFFICES

(See Para 3 of this CAR)

1 World Area Forecast System (WAFS)

The technical specifications related to World Area Forecast System (WAFS) are stipulates in Appendix 2 of ICAO Annex 3 for the contracting states which have accepted responsibilities for providing a World Area Forecast Centers (WAFC).

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

1.1 Formats and codes

Intentionally left blank

1.2 Upper-air gridded forecasts

Intentionally left blank

1.3 Significant weather (SIGWX) forecasts

Intentionally left blank

2 Aerodrome Meteorological Offices

2.1 Use of WAFS products

2.1.1 Aerodrome meteorological offices shall use forecasts issued by the WAFCs in the preparation of flight documentation, whenever these forecasts cover the intended flight path in respect of time, altitude and geographical extent, unless otherwise agreed between the meteorological authority and the operator concerned.

2.1.2 In order to ensure uniformity and standardization of flight documentation, the WAFS GRIB and BUFR data 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.

2.2 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 brief comment on the report and any action taken, using the same means of communication employed by the originator.

Note.— Guidance on reporting significant discrepancies is provided in the Manual of Aeronautical Meteorological Practice (Doc 8896).

3 Volcanic Ash Advisory centres (VAAC)

3.1 Volcanic ash advisory information

The technical specifications related to Volcanic Ash Advisory Centres (VAACs) are stipulates in Appendix 2 of ICAO Annex 3 for the contracting states which have accepted responsibilities for providing a VAAC.

India is not a VAAC. However, the Service Provider shall have to be familiar with the technical specifications so as to be able to interact with VAAC and use its products/services effectively.

4 State Volcano Observatories

4.1 Information from State volcano observatories

ICAO stipulates in Appendix 2 of Annex 3 the technical specifications required of contracting states which maintain volcano observatories monitoring active volcanoes.

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

5 Tropical Cyclone Advisory centres (TCAC)

5.1 Tropical cyclone advisory information

5.1.1 The advisory information on tropical cyclones shall be issued for tropical cyclones when the maximum of the 10-minute mean surface wind speed is expected to reach or exceed 17 m/s (34 kt) during the period covered by the advisory.

5.1.2 The advisory information on tropical cyclones disseminated in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature, shall be in accordance with the template shown in Table A2-2.

5.1.3 Until 4 November 2020, ~~Tropical cyclone advisory centres should issue~~ tropical cyclone advisory information should be disseminated in ~~digital~~ IWXXM GML form in addition to the issuance of this advisory information in ~~abbreviated plain language in~~ accordance with 5.1.2.

5.1.3 As of 5 November 2020, tropical cyclone advisory centres shall disseminate tropical cyclone advisory information in IWXXM GML form in addition to the dissemination of this advisory information in abbreviated plain language in accordance with 5.1.2.

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).*

~~5.1.4 Tropical cyclone advisory information, if disseminated in digital form, shall be formatted in accordance with a globally interoperable information exchange model and shall use XML/GML.~~

~~5.1.5 Tropical cyclone advisory information, if disseminated in digital form, shall be accompanied by the appropriate metadata.~~

~~*Note.— Guidance on the information exchange model, XML/GML and the metadata profile is provided in Doc 10003.*~~

5.1.6 The tropical cyclone advisory information listed in Table A2-2, when prepared in graphical format, shall be as specified in Appendix 1 and issued using the PNG format.

6. Space Weather Centre

The technical specifications related to SWXC are stipulates in Chapter 3, para 3.8, Appendix 2 and Attachment E of ICAO Annex 3 for the contracting states which have accepted responsibilities to monitor and provide advisory information on space weather.

India is not a SWXC. However, the Service Provider shall have to be familiar with the technical specifications so as to be able to interact with SWXC and use its products/services effectively.

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

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Example A 2-1. Advisory message for volcanic ash

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

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

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

Note 2.— The explanations for the abbreviations can be found in the PANS-ABC, Doc 8400.

~~*Note 3.— All the elements are mandatory.*~~

Note ~~4~~ 3 — Inclusion of a "colon" after each element heading is mandatory.

Note ~~5~~ 4.— The numbers 1 to ~~19~~ 21 are included only for clarity and they are not part of the advisory message, as shown in the example.

	Element	*Detailed content*	*Template(s)*	*Examples*
1	Identification of the type of message	Type of message	TC ADVISORY	TC ADVISORY
2	Status indicator (C)[1]	Indicator of test or exercise	STATUS: TEST *or* EXER	STATUS: TEST STATUS: EXER
~~2~~ 3	Time of origin (M)	Year, month, day and time in UTC of issue	DTG: nnnnnnnn/nnnnZ	DTG 20040925/19~~6~~00Z
~~3~~ 4	Name of TCAC (M)	Name of TCAC (location indicator *or* full name)	TCAC: nnnn *or* nnnnnnnnnn	TCAC: YUFO[1] TCAC: MIAMI
~~4~~ 5	Name of tropical cyclone (M)	Name of tropical cyclone *or* "NN" for unnamed tropical cyclone	TC: nnnnnnnnnnnn *or* NN	TC: GLORIA
~~5~~ 6	Advisory number (M)	Advisory number: Year in full and message number(separate sequence ~~(starting with "01"~~ for each cyclone)	Advisory NR: nnnn/[n][n]nn	Advisory NR: 2004/13~~01~~
~~6~~ 7	Observed Position of the centre (M)	Day and time (in UTC) and Position of the centre of the tropical cyclone (in degrees and minutes)	OBS: nn/nnnnZ PSN: Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	OBS: 25/1800Z PSN: N2706 W07306
8	Observed CB cloud (C)	Location of CB cloud (referring to latitude and longitude (in degrees and minutes)) and vertical extent (flight level)	CB: WI nnnKM (*or* nnnNM) OF TC CENTRE *or* WI4 Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – 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]] TOP [ABV *or* BLW] FLnnn	CB: WI 250NM OF TC CENTRE TOP FL500
~~7~~ 9	Direction and speed of movement (M)	Direction and speed of movement given in sixteen compass points and km/h (*or* kt), respectively, ~~*or* moving slowly (< 6 km/h (3 kt))~~ *or* stationary (< 2 km/h (1 kt))	MOV: N nnKMH (*or* KT) *or* NNE nnKMH (*or* KT) *or* NE nnKMH (*or* KT) *or* ENE nnKMH (*or* KT) *or* E nnKMH (*or* KT) *or* ESE nnKMH (*or* KT) *or* SE nnKMH (*or* KT) *or* SSE nnKMH (*or* KT) *or* S nnKMH (*or* KT) *or* SSW nnKMH (*or* KT) *or* SW nnKMH (*or* KT) *or* WSW nnKMH (*or* KT) *or* W nnKMH (*or* KT) *or* WNW nnKMH (*or* KT) *or* NW nnKMH (*or* KT) *or* NNW nnKMH (*or* KT) *or* ~~SLW *or*~~ STNR	MOV: NW 20KMH

Element	*Detailed content*	*Template(s)*	*Examples*

~~8~~ 10	Central pressure (M)	Central pressure (in hPa)	C:	nnnHPA	C:	965HPA
~~9~~ 11	Maximum surface wind (M)	Maximum surface wind near the centre (mean over 10 minutes, in m/s (*or* kt))	MAX WIND:	nn[n]MPS (*or* nn[n]KT)	MAX WIND:	22MPS
~~10~~ 12	Forecast of centre position (+6 HR) (M)	Day and time (in UTC) (6 hours from the "DTG" given in Item 2); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +6 HR:	nn/nnnnZ Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	FCST PSN +6 HR:	25/2200Z N2748 W07350
~~11~~ 13	Forecast of maximum surface wind (+6 HR) (M)	Forecast of maximum surface wind (6 hours after the "DTG" given in Item 2)	FCST MAX WIND +6 HR:	nn[n]MPS (*or* nn[n]KT)	FCST MAX WIND +6 HR:	22MPS
~~12~~ 14	Forecast of centre position (+12 HR) (M)	Day and time (in UTC) (12 hours from the "DTG" given in Item 2); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +12 HR:	nn/nnnnZ Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	FCST PSN +12 HR:	26/0400Z N2830 W07430
~~13~~ 15	Forecast of maximum surface wind (+12 HR) (M)	Forecast of maximum surface wind (12 hours after the "DTG" given in Item 2)	FCST MAX WIND +12 HR:	nn[n]MPS (*or* nn[n]KT)	FCST MAX WIND +12 HR:	22MPS
~~14~~ 16	Forecast of centre position (+18 HR) (M)	Day and time (in UTC) (18 hours from the "DTG" given in Item 2); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +18 HR:	nn/nnnnZ Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	FCST PSN +18 HR:	26/1000Z N2852 W07500
~~15~~ 17	Forecast of maximum surface wind (+18 HR) (M)	Forecast of maximum surface wind (18 hours after the "DTG" given in Item 2)	FCST MAX WIND +18 HR:	nn[n]MPS (*or* nn[n]KT)	FCST MAX WIND +18 HR:	21MPS
~~16~~ 18	Forecast of centre position (+24 HR) (M)	Day and time (in UTC) (24 hours from the "DTG" given in Item 2); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +24 HR:	nn/nnnnZ Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]	FCST PSN +24 HR:	26/1600Z N2912 W07530
~~17~~ 19	Forecast of maximum surface wind (+24 HR) (M)	Forecast of maximum surface wind (24 hours after the "DTG" given in Item 2)	FCST MAX WIND +24 HR:	nn[n]MPS (*or* nn[n]KT)	FCST MAX WIND +24 HR:	20MPS

Element	*Detailed content*	*Template(s)*	*Examples*

~~18~~ 20	Remarks (M)	Remarks, as necessary	RMK:	*Free text up to 256 characters or* NIL	RMK:	NIL
~~19~~ 21	Expected time of issuance of next advisory (M)	Expected year, month, day and time (in UTC) of issuance of next advisory	NXT MSG:	[BFR] nnnnnnnn/nnnnZ *or* NO MSG EXP	NXT MSG:	20040925/2000Z

Note.—

1. Used only when the message issued to indicate that a test or an exercise is taking place. When the word “TEST” or the abbreviation “EXER” is included, the message may contain information that should not be used operationally or will otherwise end immediately after the word "TEST". *[Applicable 7 November 2019]*

~~1~~ 2. Fictitious location.

3. In the case of CB clouds associated with a tropical cyclone covering more than one area within the area of responsibility, this element can be repeated, as necessary.

4. The number of coordinates should be kept to a minimum and should not normally exceed seven.

Example A2-2. Advisory message for tropical cyclones

TC ADVISORY	
DTG:	20040925/19~~6~~00Z
TCAC:	YUFO
TC:	GLORIA
ADVISORY NR:	2004/13~~01~~
OBS PSN:	25/1800Z N2706 W07306
CB:	WI 250NM OF TC CENTRE
C:	965HPA
MAX WIND:	22MPS
FCST PSN +6 HR:	25/2200Z N2748 W07350
FCST MAX WIND +6 HR:	22MPS
FCST PSN +12 HR:	26/0400Z N2830 W07430
FCST MAX WIND +12 HR:	22MPS
FCST PSN +18 HR:	26/1000Z N2852 W07500
FCST MAX WIND +18 HR:	21MPS
FCST PSN +24 HR:	26/1600Z N2912 W07530
FCST MAX WIND +24 HR:	20MPS
RMK:	NIL
NXT MSG:	20040925/2000Z

Table A2-3. Template for advisory message for space weather information

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Example A2-3: Space weather advisory message (GNSS and HF COM effects)

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Example A2-4: Space weather advisory message (RADIATION effects)

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Example A2-5: Space weather advisory message (HF COM effects)

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APPENDIX 3. TECHNICAL SPECIFICATIONS RELATED TO METEOROLOGICAL OBSERVATIONS AND REPORTS

(See Para 4 of this CAR.)

1 General provision related to meteorological observations

1.1 Meteorological Observation

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

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

1.1.2 Meteorological instruments at aeronautical meteorological stations should be exposed, operated and maintained in accordance with the practices, procedures and specifications promulgated by the World Meteorological Organization (WMO).

1.1.3 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.

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

2 General criteria related to meteorological reports

2.1 Format of meteorological reports

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

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

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

2.1.3 Until 4 November 2020, METAR and SPECI should be disseminated in ~~digital~~ IWXXM GML form in addition to the dissemination of the METAR and SPECI in accordance with 2.1.2.

2.1.3 As of 5 November 2020, METAR AND SPECI shall be disseminate 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).*

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

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

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

2.2 Use of CAVOK

2.2.1 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 Appendix 3, Para 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 Appendix 3, Para 4.2.4.4.

Note 2. – The lowest visibility is reported in accordance with Appendix 3, Para 4.2.4.4 a).

b) no cloud of operational significance;

c) no weather of significance to aviation as given in *Appendix 3, Para* 4.4.2.3, 4.4.2.5 and 4.4.2.6;

information on visibility, runway visual range, present weather and cloud amount, cloud type and height of cloud base shall be replaced in all meteorological reports by the term “CAVOK”.

2.3 Criteria for issuance of local special reports and SPECI

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

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

b) those values which satisfy other local requirements of the air traffic

services units and of the operators;

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

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

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

f) those values which constitute criteria for SPECI.

2.3.2 Where required in accordance with Para 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 increased by 5 m/s (10 kt) or more from that at the time of the latest report, the mean speed before and/or after the change being 7.5 m/s (15 kt) or more;

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

- freezing precipitation
- moderate or heavy precipitation (including showers thereof)
- thunderstorm (with precipitation)

e) when the onset or cessation of any of the following weather phenomena occurs:

- freezing fog
- thunderstorm (without precipitation)

f) when the amount of a cloud layer below 450 m (1 500 ft) changes:

1) from SCT or less to BKN or OVC; or

2) from BKN or OVC to SCT or less;

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

a) when the wind changes through values of operational significance. The threshold values should be established by the meteorological authority in consultation with the appropriate ATS authority and operators concerned, taking into account changes in the wind which would:

   1) require a change in runway(s) in use; and

   2) indicate that the runway tailwind and crosswind components have changed through values representing the main operating limits for typical aircraft operating at the aerodrome;

b) when the visibility is improving and changes to or passes through one or more of the following values, or when the visibility is deteriorating and passes through one or more of the following values:

   1) 800, 1500 or 3000 m; and

   2) 5000 m, in cases where significant numbers of flights are operated in accordance with the visual flight rules;

   Note 1.— In local special reports, visibility refers to the value(s) to be reported in accordance with Appendix 3, 4.2.4.2 and 4.2.4.3; in SPECI, visibility refers to the value(s) to be reported in accordance with Appendix 3, 4.2.4.4.

   Note 2.— Visibility refers to “prevailing visibility” except in the case where only the lowest visibility is reported in accordance with Appendix 3, 4.2.4.4 b).

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

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

   — duststorm

   — sandstorm

   — funnel cloud (tornado or waterspout);

e) when the onset or cessation of any of the following weather phenomena occurs:

   — low drifting dust, sand or snow

   — blowing dust, sand or snow

   — squall;

f) when the height of base of the lowest cloud layer of BKN or OVC extent is lifting and changes to or passes through one or more of the following values, or when the height of base of the lowest cloud layer of BKN or OVC extent is lowering and passes through one or more of the following values:

   1) 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); and

   2) 450 m (1500 ft) in cases where significant numbers of flights are

operated in accordance with the visual flight rules;

g) when the sky is obscured and the vertical visibility is improving and changes to or passes through one or more of the following values, or when the vertical visibility is deteriorating and passes through one or more of the following values: 30, 60, 150 or 300 m (100, 200, 500 or 1000 ft); and

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

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

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

3 Dissemination of meteorological reports

3.1 METAR and SPECI

3.1.1 METAR and SPECI shall be disseminated to international OPMET databanks and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services, in accordance with regional air navigation agreement.

3.1.2 METAR and SPECI shall be disseminated to other aerodromes in accordance with regional air navigation agreement.

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

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

3.2 Local routine and special reports

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

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

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

included in local routine and special reports; and

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

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

4 Observing and reporting of meteorological elements

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

4.1 Surface wind

4.1.1 Siting

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

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

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

4.1.2 Displays

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

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

4.1.3 Averaging

4.1.3.1 The averaging period for surface wind observations shall be:

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

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

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

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

4.1.4 Accuracy of measurement

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

4.1.5 Reporting

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

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

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

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

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

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

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

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

1) 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.

4.1.5.3 In local routine and special reports:

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

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

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

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

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

4.2 Visibility

4.2.1 Siting

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

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

4.2.2 Displays

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

4.2.3 Averaging

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

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

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

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

4.2.4 Reporting

4.2.4.1 In local routine and special reports and in METAR and SPECI, the visibility shall be reported in steps of 50 m when the visibility is less than 800 m; in steps of 100 m, when it is 800 m or more but less than 5 km; in kilometre steps, when the visibility is 5 km or more but less than 10 km; and it shall be given as 10 km when the visibility is 10 km or more, except when the conditions for the use of CAVOK apply. Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale. *Note.— Specifications concerning the use of CAVOK are given in 2.2.*

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

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

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

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

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

a) when the lowest visibility is different from the prevailing visibility, and 1) less than 1500 m or 2) less than 50 per cent of the prevailing visibility and less than 5000 m; the lowest visibility observed should also be reported and, when possible, its general direction in relation to the aerodrome reference point indicated by reference to one of the eight points of the compass. If the lowest visibility is observed in more than one direction, then the most operationally significant direction should be reported; and

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

4.3 Runway visual range

4.3.1 Siting

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

4.3.1.2 Runway visual range should be assessed at a lateral distance from the runway centre line of not more than 120 m. The site for observations to be representative of the touchdown zone should be located about 300 m along the runway from the threshold. The sites for observations to be representative of the mid-point and stop-end of the runway should be located at a distance of 1000 to 1500 m along the runway from the threshold and at a distance of about 300 m from the other end of the runway. The exact position of these sites and, if necessary, additional sites should be decided after considering aeronautical, meteorological and climatological factors such as long runways, swamps and other fog-prone areas.

4.3.2 Instrumented systems

Note.— Since accuracy can vary from one instrument design to another, performance characteristics are to be checked before selecting an instrument for assessing runway visual range. The calibration of a forward-scatter meter has to be traceable and verifiable to a transmissometer standard, the accuracy

of which has been verified over the intended operational range. Guidance on the use of transmissometers and forward-scatter meters in instrumented runway visual range systems is given in the Manual of Runway Visual Range Observing and Reporting Practices *(Doc 9328).*

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

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

4.3.3 Display

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

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

4.3.4 Averaging

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

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

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

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

4.3.5 Runway light intensity

When instrumented systems are used for the assessment of runway visual range, computations should be made separately for each available runway. For local routine and special reports, the light intensity to be used for the computation should be:

a) for a runway with the lights switched on and the light intensity of more than 3 per cent of the maximum light intensity available, the light intensity actually in use on that runway;

b) for a runway with the lights switched on and the light intensity of 3 per cent or less of the maximum light intensity available, the optimum light intensity that would be appropriate for operational use in the prevailing conditions; and

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

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

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

4.3.6 Reporting

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

4.3.6.2 Fifty metres should be considered the lower limit and 2000 meters the upper limit for runway visual range. Outside of these limits, local routine and special reports and METAR and SPECI should merely indicate that the runway visual range is less than 50 m or more than 2000 m.

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

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

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

4.3.6.4 In local routine and special reports:

a) the units of measurement used shall be included;

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

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

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

4.3.6.5 In METAR and SPECI:

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

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

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

4.4 Present weather

4.4.1 Siting

When instrumented systems are used for observing present weather phenomena listed under 4.4.2.3 and 4.4.2.4, representative information should be obtained by the use of sensors appropriately sited.

4.4.2 Reporting

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

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

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

a) Precipitation

Drizzle	DZ
Rain	RA
Snow	SN
Snow grains	SG
Ice pellets	PL
Hail	GR

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

Small hail	GS

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

b) Obscurations (hydrometeors)

Fog	FG

— Reported when visibility is less than 1000 m, except when qualified by “MI”, “BC”, “PR” or “VC” (see 4.4.2.6 and 4.4.2.8).

Mist	BR

— Reported when visibility is at least 1000 m but not more than 5000 m;

c) Obscurations (lithometeors)

— The following should be used only when the obscuration consists predominantly of lithometeors and the visibility is 5000 m or less except "SA" when qualified by "DR" (see 4.4.2.6) and volcanic ash.

Sand	SA
Dust (widespread)	DU
Haze	HZ
Smoke	FU
Volcanic ash	VA

d) Other phenomena

Dust/sand whirls (dust devils)	PO
Squall	SQ
Funnel cloud (tornado or waterspout)	FC
Duststorm	DS
Sandstorm	SS

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

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

Thunderstorm	TS

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

Freezing FZ

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

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

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

Shower SH

— Used to report showers in accordance with the templates shown in Tables A3-1 and A3-2. Showers observed in the vicinity of the aerodrome (see 4.4.2.8) should be reported as “VCSH” without qualification regarding type or intensity of precipitation.

Blowing BL

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

Low drifting DR

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

Shallow MI

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

Patches BC

— Fog patches randomly covering the aerodrome.

Partial PR

— A substantial part of the aerodrome covered by fog while the

remainder is clear.

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

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

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

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

Vicinity VC

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

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

a) one or more, up to a maximum of three, of the present weather abbreviations given in 4.4.2.3 and 4.4.2.4 shall be used, as necessary, together with an indication, where appropriate, of the characteristics given in 4.4.2.5 and 4.4.2.6 and intensity or proximity to the aerodrome given in 4.4.2.8, so as to convey a complete description of the present weather of significance to flight operations;

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

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

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

4.5 Clouds

4.5.1 Siting

When instrumented systems are used for the measurement of the cloud amount and the height of cloud base, representative observations should be obtained by the use of sensors appropriately sited. For local routine and special reports, in the case of aerodromes with precision approach runways, sensors for cloud amount and height of cloud base should be sited to give the best practicable indications of the cloud amount and height of cloud base at the threshold of the runway in use. For that purpose, a sensor should be installed at a distance of less than 1 200 m (4 000 ft) before the landing threshold.

4.5.2 Display

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

4.5.3 Reference level

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

4.5.4 Reporting

4.5.4.1 In local routine reports, local special reports, METAR and SPECI, the height of cloud base shall be reported in steps of 30 m (100 ft) up to 3000 m (10000 ft).

4.5.4.2 At aerodromes where low-visibility procedures are established for approach and landing, as agreed between the meteorological authority and the appropriate ATS authority, in local routine and special reports the height of cloud base should be reported in steps of 15 m (50 ft) up to and including 90 m (300 ft) and in steps of 30 m (100 ft) between 90 m (300 ft) and 3 000 m (10000 ft), and the vertical visibility in steps of 15 m (50 ft) up to and including 90 m (300 ft) and in steps of 30 m (100 ft) between 90 m (300 ft) and 600 m (2000 ft).

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

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

b) cumulonimbus clouds and towering cumulus clouds should be indicated as “CB” and “TCU”, respectively;

c) the vertical visibility should be reported in steps of 30 m (100 ft) up to 600 m (2000 ft);

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

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

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

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

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

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

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

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

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

4.5.4.4 Any observed value in 4.5.4.1, 4.5.4.2 and 4.5.4.3 c) which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.

4.5.4.5 In local routine and special reports:

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

b) when there is more than one runway in use and the heights of cloud bases are observed by instruments for these runways, the available heights of

cloud bases for each runway shall be reported and the runways to which the values refer shall be indicated.

4.5.4.6 In automated local routine reports, local special reports, METAR and SPECI:

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

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

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

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

4.6 Air temperature and dew-point temperature

4.6.1 Display

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

4.6.2 Reporting

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

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

4.7 Atmospheric pressure

4.7.1 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.

4.7.2 Reference level

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

4.7.3 Reporting

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

4.7.3.2 In local routine and special reports:

a) QNH shall be included;

b) QFE shall be included if required by users or as agreed between the meteorological authority, the appropriate air traffic services authorities 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.

4.8 Supplementary information

4.8.1 Reporting

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

- freezing precipitation

- moderate or heavy precipitation (including showers thereof)

- blowing snow

- duststorm, sandstorm

- thunderstorm

- funnel cloud (tornado or water spout)

- volcanic ash

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

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

--cumulonimbus clouds	CB
--thunderstorm	TS
--moderate or severe turbulence	MOD TURB, SEV TURB
--wind shear	WS
--hail	GR
--severe squall line	SEV SQL
--moderate or severe icing	MOD ICE, SEV ICE
-- freezing precipitation	FZDZ, FZRA
-- severe mountain waves	SEV MTW
--duststorm, sandstorm	DS, SS
-- blowing snow	BLSN
-- funnel cloud (tornado or water spout)	FC

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

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

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

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

Note – The local circumstances referred to in 4.8.1.4 include, but are not necessarily limited to, wind shear of a non-transitory nature such as might be associat6ed with low level temperature inversions or local topography.

4.8.1.5 In METAR and SPECI, the following information should be included in the supplementary information, in accordance with regional air navigation agreement:

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

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

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

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

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

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, dependent on meteorological conditions;
O = inclusion optional.

Note 1.— The ranges and resolutions for the numerical elements included in the local routine and special reports are shown in Table A3-4 of this appendix.

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

Element as specified in Para 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) WIND RWY 18 TDZ 190/6MPS (WIND RWY 18 TDZ 190/12KT) WIND VRB1MPS WIND CALM (WIND VRB2KT) WIND VRB BTN 350/ AND 050/1MPS (WIND VRB BTN 350/ AND 050/2KT) WIND 270/ABV49MP S (WIND 270/ABV99KT) WIND 120/3MPS MAX9 MNM2 (WIND 120/6KT MAX18 MNM4)
	Runway (O)[2]	RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			
	Runway section (O)[3]	TDZ			
	Wind direction (M)	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	C A L M	
	Wind speed (M)	[ABV]n[n][n]MPS (*or* [ABV]n[n]KT)			
	Significant speed variations (C)[4]	MAX[ABV]nn[n] MNMn[n]			
	Significant directional variations (C)[5]	VRB BTN nnn/ AND nnn/	—		
	Runway section (O)[3]	MID			
	Wind direction (O)[3]	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	C A L	

	Wind speed (O)[3]	[ABV]n[n][n]MPS (*or* [ABV]n[n]KT)		M	WIND 020/5MPS VRB BTN 350/ AND 070/ (WIND 020/10KT VRB BTN 350/ AND 070/) WIND RWY 14R MID 140/6MPS (WIND RWY 14R MID 140/12KT) 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)[3]	END			
	Wind direction (O)[3]	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	C A L M	
	Wind speed (O)[3]	[ABV]n[n][n]MPS (*or* [ABV]n[n]KT)			

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

	Characteristics and type of present weather (C)[9,11]	DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* 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]	IC *or* FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or* TS *or* BCFG *or* BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG		MOD RA HVY TSRA HVY DZ FBL SN HZ FG VA MIFG HVY TSRASN FBL SNRA FBL DZ FG HVY SHSN BLSN HVY TSUP //

Element as specified in Para 4	*Detailed content*	*Template(s)*				*Examples*
	Height of cloud base *or* the value of vertical visibility (C)[9]	n[n][n][n]M (*or* n[n][n][n]FT) *or* /// M (*or* ///FT)[12]	[VER VIS n[n][n]M(*or* VER VIS n[n][n][n]FT)] *or* VER VIS ///M (*or* VER VIS ///FT)[12]			CLD /// CB 400M (CLD /// CB 1200FT) CLD NCD
Air temperature (M)	Name of the element (M)	T				T17 TMS0 8
	Air temperature (M)	[MS]nn				
Dew-point temperature (M)	Name of the element (M)	DP				DP15 DPMS 18
	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
	Location of the phenomena (C)[9]	IN APCH [n[n][n][n]M-WIND nnn/n[n]MPS] *or* IN CLIMB-OUT [n[n][n][n]M-WIND nnn/n[n]MPS] (IN APCH [n[n][n][n]FT-WIND nnn/n[n]KT] *or* IN CLIMB-OUT [n[n][n][n]FT-WIND nnn/n[n]KT]) *or* RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]				REFZRA CB IN CLIMB-OUT RETSRA

	Recent weather (C)[9, 10]	REFZDZ *or* REFZRA *or* REDZ *or* RE[SH]RA *or* 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][n]M *or* VIS n[n]KM			C A V O K	
	Weather phenomenon: intensity (C)[9]		FBL *or* MOD *or* HVY	—	NSW		

Element as specified in Para 4	*Detailed content*	*Template(s)*				*Examples*
	Visibility (C)[9]	VIS nn[n][n]M *or* VIS n[n]KM			C A V O K	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 AT 1130 CLD OVC 1000FT) TREND TEMPO TL150 HVY SHRA CLD BKN CB 360M (TREND TEMPO TL1530 HVY SHRA CLD BKN CB 1200FT)
	Weather phenomenon: intensity (C)[9]	FBL *or* MOD *or* HVY	—	NSW		
	Weather phenomenon: characteristics and type (C)[9, 10, 11]	DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* SHGR *or* SHGS *or* SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN	IC *or* FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or* TS *or* BCFG *or* BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG			
	Name of the element (C)[9]	CLD				
	Cloud amount and vertical visibility (C)[9]	FEW *or* SCT *or* BKN *or* OVC	OBSC	NSC		
	Cloud type (C)[9]	CB *or* TCU	—			

	Height of cloud base *or* the value of vertical visibility (C)[9]	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)]			

Notes.—

1. Fictitious location.
2. Optional values for one or more runways.
3. Optional values for one or more sections of the runway.
4. To be included in accordance with 4.1.5.2 c).
5. To be included in accordance with 4.1.5.2 b) 1).
6. To be included if visibility or runway visual range < 1 500 m.
7. To be included in accordance with 4.3.6.4 d).
8. To be included in accordance with 4.3.6.4 c).
9. To be included whenever applicable.
10. One or more, up to a maximum of three groups, in accordance with 4.4.2.9 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 Para 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 ICAO PANS-ABC, Doc 8400.

Element as specified in Para 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 *or* NIL
END OF METAR IF THE REPORT IS MISSING.				
Surface wind (M)	Wind direction (M)	nnn	VRB	24004MPS VRB01MPS (24008KT) (VB02KT)
	Wind speed (M)	[P]nn[n]		

	Significant speed variations (C)[3]	G[P]nn[n]		19006MPS (19012KT) 00000MPS (00000KT) 140P149MPS (140P99KT) 12003G09MPS (12006G18KT) 24008G14MPS (24016G28KT) 02005MPS 350V070 (02010KT 350V070)
	Units of measurement (M)	MPS (*or* KT)		
	Significant directional variations (C)[4]	nnnVnnn	—	
Visibility (M)	Prevailing *or* minimum visibility (M)[5]	nnnn	C A V O K	0350 CAVOK 7000 9999 0800 2000 1200NW 6000 2800E 6000 2800
	Minimum visibility and direction of the minimum visibility (C)[6]	nnnn[N] *or* nnnn[NE] *or* nnnn[E] *or* nnnn[SE] *or* nnnn[S] *or* nnnn[SW] *or* nnnn[W] *or* nnnn[NW]		
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 Para 4	*Detailed content*	*Template(s)*			*Examples*
Present weather (C)[2, 10]	Intensity *or* proximity of present weather (C)[11]	– *or* +	—	VC	
	Characteristics and type of present weather (M)[12]	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]	IC *or* FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* TS *or* BCFG *or* BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG or //[12]	FG *or* PO *or* FC *or* DS *or* SS *or* TS *or* SH *or* BLSN *or* BLSA *or* BLDU *or* VA	RA HZ VCFG +TSRA FG VCSH +DZ VA VCTS –SN MIFG VCBLSA +TSRASN –SNRA DZ FG +SHSN BLSN UP FZUP TSUP FZUP //
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///	NSC *or* NCD[12]	FEW015 VV005 OVC030 VV/// NSC SCT010 OVC020 BKN/// ///015

	Cloud type (C)[2]	CB *or* TCU *or* ///[12]	—	BKN009TCU NCD SCT008 BKN025CB BKN025/// /////CB
Air and dew-point temperature (M)	Air and dew-point temperature (M)	[M]nn/[M]nn		17/10 02/M08 M01/M10
Pressure values (M)	Name of the element (M)	Q		Q0995 Q1009 Q1022 Q0987
	QNH (M)	nnnn		
Supplementary information (C)	Recent weather (C)[2, 9]	REFZDZ *or* REFZRA *or* REDZ *or* RE[SH]RA *or* 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* REUP[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 Para 4	*Detailed content*		*Template(s)*			*Examples*
	State of the runway (C)[16]	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)[17]	Change indicator (M)[18]		NOSIG	BECMG *or* TEMPO		NOSIG BECMG FEW020
	Period of change (C)[2]			FMnnnn *and/or* TLnnnn *or* ATnnnn		TEMPO 25018G25MPS (TEMPO 25036G50KT)
	Wind (C)[2]			nnn[P]nn[n][G[P]nn[n]]MPS (*or* nnn[P]nn[G[P]nn]KT)		BECMG FM1030 TL1130 CAVOK BECMG TL1700 0800 FG
	Prevailing visibility (C)[2]			nnnn	CAVO	BECMG AT1800 9000 NSW
	Weather phenomenon: intensity (C)[10]			– *or* +	— NSW	BECMG FM1900 0500 +SNRA

	Weather phenomenon: characteristics and type (C)[2, 9, 11]		DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* SHGR *or* 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		K	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)[2, 14]		FEWnnn *or* SCTnnn *or* BKNnnn *or* OVCnnn	VVnnn *or* VV///	N S C		
	Cloud type (C)[2,14]		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 Para 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 Para 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)
RVR:	M	0 – 375	25
	M	400 – 750	50
	M	800 – 2000	100
Vertical visibility:	M	0 – 75**	15
	M	90 – 600	30
	FT	0 – 250**	50
	FT	300 – 2000	100
Clouds: height of cloud base:	M	0 – 75**	15
	M	90 – 3 000	30
	FT	0 – 250**	50

	FT	300 – 10000	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 Para 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 M M M	0000 – 0750 0800 – 4 900 5 000 – 9 000 10 000 –	50 100 1 000 0 (fixed value: 9 999)
RVR:	M M M	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):

MET REPORT YUDO 221630Z WIND 240/4MPS VIS 600M RVR RWY 12 TDZ 1000M MOD DZ FG CLD SCT 300M OVC 600M T17 DP16 QNH 1018HPA TREND BECMG TL1700 VIS 800M FG BECMG AT1800 VIS 10KM NSW

b) METAR for YUDO (Donlon/International):*

METAR YUDO 221630Z 24004MPS 0600 R12/1000U DZ FG SCT010 OVC020 17/16 Q1018 BECMG TL1700 0800 FG BECMG AT1800 9999 NSW

Meaning of both reports:

Routine report for Donlon/International* issued on the 22nd of the month at 1630 UTC; surface wind direction 240 degrees; wind speed 4 metres per second; visibility (along the runway(s) in the local routine report; prevailing visibility in METAR) 600 metres; runway visual range representative of the touchdown zone for runway 12 is 1 000 metres and the runway visual range values have shown an upward tendency during previous 10 minutes (RVR tendency to be included in METAR only); and moderate drizzle and fog; scattered cloud at 300 metres; overcast at 600 metres; air temperature 17 degrees Celsius; dew-point temperature 16 degrees Celsius; QNH 1 018 hectopascals; trend during next 2 hours, visibility (along the runway(s) in the local routine report; prevailing

visibility in METAR) becoming 800 metres in fog by 1700 UTC; at 1800 UTC visibility (along the runway(s) in the local routine report; prevailing visibility in METAR) becoming 10 kilometres or more and nil significant weather.

* Fictitious location

Note.— In this example, the primary units "metre per second" and "metre" were used for wind speed and height of cloud base, respectively. However, in accordance with Annex 5, the corresponding non-SI alternative units "knot" and "foot" may be used instead.

Example A3-2: Special report

a) *Local special report (same location and weather conditions as SPECI):*

SPECIAL YUDO 151115Z WIND 050/25KT MAX37 MNM10 VIS 1200M RVR RWY 05 ABV 1800M HVY TSRA CLD BKN CB 500FT T25 DP22 QNH 1018 HPA TREND TEMPO TL1200 VIS 600M BECMG AT1200 VIS 8KM NSW NSC

b) *SPECI for YUDO (Donlon/International)*:*

SPECI YUDO 151115Z 05025G37KT 3000 1200NE+TSRA BKN005CB 25/22 Q1008 TEMPO TL1200 0600 BECMG AT1200 8000 NSW NSC

Meaning of both reports:

Special report for Donlon/International* issued on the 15th of the month at 1115 UTC; surface wind direction 050 degrees; wind speed 25 knots gusting between 10 and 37 knots (minimum wind speed not to be included in SPECI) visibility 1 200 metres (along the runway(s) in the local special report); prevailing visibility 3 000 metres (in SPECI) with minimum visibility 1 200 metres to north east (directional variations to be included in SPECI only); RVR above 1 800 metres on runway 05 (RVR not required in SPECI with prevailing visibility of 3 000 metres); thunderstorm with heavy rain; broken cumulonimbus cloud at 500 feet; air temperature 25

degrees Celsius; dew-point temperature
22 degrees Celsius; QNH 1 018 hectopascals; trend during next 2 hours, visibility (along the runway(s) in the local special report; prevailing visibility in SPECI) temporarily 600 metres from 1115 to 1200, becoming at 1200 UTC visibility (along the runway(s) in the local special report; prevailing visibility in SPECI) 8 kilometres, thunderstorm ceases and nil significant weather and nil significant cloud.

* Fictitious location

Note.— In this example, the non-SI alternative units "knot" and "foot" were used for wind speed and height of cloud base, respectively. However, in accordance with Annex 5, the corresponding primary units "metres per second" and "metre" may be used instead.

APPENDIX 4. TECHNICAL SPECIFICATIONS RELATED TO AIRCRAFT OBSERVATIONS AND REPORTS

(See Para 5 of this CAR)

1 Contents of Air-Reports

1.1 Routine air-reports by air-ground data link

1.1.1 When air-ground data link is used and automatic dependent surveillance (ADS-c) or SSR Mode S is being applied, the elements contained in routine air-reports shall be:

Message type designator

Aircraft identification

Data block 1
- Latitude
- Longitude
- Level
- Time

Data block 2
- Wind direction
- Wind speed
- Wind quality flag
- Air temperature
- Turbulence (if available)
- Humidity (if available)

Note.— When ADS-C or SSR Mode S is being applied, the requirements of routine air-reports may be met by the combination of the basic ADS-C/SSR Mode S data block (data block 1) and the meteorological information data block (data block 2), available from ADS-C or SSR Mode S reports. The ADS-C message format is specified in the PANS-ATM (Doc 4444), 4.11.4 and Para 13 and the SSR Mode S message format is specified in Annex 10, Volume III, Part I, Para 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 Annex 10, Volume III, Part I.

1.2 Special air-reports by air-ground data link

When air-ground data link is used, the elements contained in special air-reports shall be:

Message type designator
Aircraft identification

Data block 1

Latitude
Longitude
Level
Time

Data block 2

Wind direction
Wind speed
Wind quality flag
Air temperature
Turbulence (if available)
Humidity (if available)

Data block 3

Condition prompting the issuance of a special air-report (one condition to be selected from the list presented in Table A4-1).

Note 1.— The requirements of special air-reports may be met by the data link

flight information service (D-FIS) application entitled "Special air-report service". The details of this data link application are specified in Doc 9694.

Note 2.— In the case of a special air-report of pre-eruption volcanic activity, volcanic eruption or volcanic ash cloud, additional requirements are indicated in 4.2.

1.3 Special air-reports by voice communications

When voice communications are used, the elements contained in special air-reports shall be:

Message type designator

Section 1 (Position information)

Aircraft identification

Position or latitude and longitude

Time

Level or range of levels

Section 3 (Meteorological information)

Condition prompting the issuance of a special air-report, to be selected from the list presented in Table A4-1.

Note 1.— Air-reports are considered routine by default. The message type designator for special air-reports is specified in the PANS-ATM (Doc 4444), Appendix 1.

Note 2.— In the case of a special air-report of pre-eruption volcanic activity, volcanic eruption or volcanic ash cloud, additional requirements are indicated in 4.2.

2 Criteria for Reporting

2.1 General

When air-ground data link is used, the wind direction, wind speed, wind quality flag, air temperature, turbulence and humidity included in air-reports shall be reported in accordance with the following criteria.

2.2 Wind direction

The wind direction shall be reported in terms degrees true, rounded to the nearest whole degree.

2.3 Wind speed

The wind speed shall be reported in metres per second or knots, rounded to the nearest 1 m/s (1 knot). The units of measurement used for the wind speed shall be indicated.

2.4 Wind quality flag

The wind quality flag shall be reported as 0 when the roll angle is less than 5 degrees and as 1 when the roll angle is 5 degrees or more.

2.5 Air temperature

The air temperature shall be reported to the nearest tenth of a degree Celsius.

2.6 Turbulence

The turbulence shall be reported in terms of the cube root of the eddy dissipation rate (EDR).

2.6.1 Routine air-reports

The turbulence shall be reported during the en-route phase of the flight and shall refer to the 15-minute period immediately preceding the observation. Both the average and peak value of turbulence, together with the time of occurrence of the peak value to the nearest minute, shall be observed. The average and peak values shall be reported in terms of the cube root of EDR. The time of occurrence of the peak value shall be reported as indicated in Table A4-2. The turbulence shall be reported during the climb-out phase for the first 10 minutes of the flight and shall refer to the 30-second period immediately preceding the observation. The peak value of turbulence shall be observed.

2.6.2 Interpretation of the turbulence report

Turbulence shall be considered:

a) severe when the peak value of the cube root of EDR exceeds 0.7;

b) moderate when the peak value of the cube root of EDR is above 0.4 and below or equal to 0.7;

c) light when the peak value of the cube root of EDR is above 0.1 and below or equal to 0.4; and

d) nil when the peak value of the cube root of EDR is below or equal to 0.1.

Note.— The EDR is an aircraft-independent measure of turbulence. However, the relationship between the EDR value and the perception of turbulence is a function of aircraft type, and the mass, altitude, configuration and airspeed of the aircraft. The EDR values given above describe the severity levels for a medium-sized transport aircraft under typical en-route conditions (i.e. altitude, airspeed and weight).

2.6.3 Special air-reports

Special air-reports on turbulence shall be made during any phase of the flight whenever the peak value of the cube root of EDR exceeds 0.4. The special air-report on turbulence shall be made with reference to the 1-minute period immediately preceding the observation. Both the average and peak value of turbulence shall be observed. The average and peak values shall be reported in terms of the cube root of EDR. Special air-reports shall be issued every minute until such time as the peak values of the cube root of EDR fall below 0.4.

2.7 Humidity

The humidity shall be reported as the relative humidity, rounded to the nearest whole per cent.

Note.— The ranges and resolutions for the meteorological elements included in air-reports are shown in Table A4-3.

3 Exchange of Air-Reports

3.1 Responsibilities of the meteorological watch offices

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

3.1.2 The meteorological watch office shall transmit without delay special air-reports of pre- eruption volcanic activity, a volcanic eruption or volcanic ash cloud received to the associated VAACs.

3.1.3 When a special air-report is received at the meteorological watch office but the forecaster considers that the phenomenon causing the report is not expected to persist and, therefore, does not warrant issuance of a SIGMET, the special air-report shall be disseminated in the same way that SIGMET messages are disseminated in accordance with Appendix 6, 1.2.1, i.e. to meteorological watch offices, WAFCs, and other meteorological offices in accordance with regional air navigation agreement.
Note: -- The template used for special air-reports which are uplinked to aircraft in flights is in Appendix 6, Table A6-1B.

3.2 Responsibilities of world area forecast centres

Intentionally left blank

3.3 Supplementary dissemination of air-reports

Where supplementary dissemination of air-reports is required to satisfy special aeronautical or meteorological requirements, such dissemination should be arranged and agreed between the meteorological authorities concerned.

3.4 Format of air-reports

Air-reports shall be exchanged in the format in which they are received.

4 Specific provisions related to reporting Wind Shear and Volcanic Ash

4.1 Reporting of wind shear

4.1.1 When reporting aircraft observations of wind shear encountered during the climb-out and approach phases of flight, the aircraft type should be included.

4.1.2 Where wind shear conditions in the climb-out or approach phases of flight were reported or forecast but not encountered, the pilot-in-command should advise the appropriate air traffic services unit as soon as practicable unless the pilot-in-command is aware that the appropriate air traffic services unit has already been so advised by a preceding aircraft.

4.2 Post-flight reporting of volcanic activity

Note.— The detailed instructions for recording and reporting volcanic activity observations are given in the PANS-ATM (Doc 4444), Appendix 1.

4.2.1 On arrival of a flight at an aerodrome, the completed report of volcanic activity shall be delivered by the operator or a flight crew member, without delay, to the aerodrome meteorological office, or if such office is not easily accessible to arriving flight crew members, the completed form shall be dealt with in accordance with local arrangements made by the meteorological authority and the operator.

4.2.2 The completed report of volcanic activity received by an aerodrome meteorological office shall be transmitted without delay to the meteorological watch office responsible for the provision of meteorological watch for the flight information region in which the volcanic activity was observed.

Table A4-1: Template for the special air-report (downlink)

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional; included whenever available.

Note.— Message to be prompted by the pilot-in-command. Currently only the condition "SEV TURB" can be automated (see 2.6.3).

Element as specified in Para 5	*Detailed content*	*Template(s)*	*Examples*
Message type designator (M)	Type of air-report (M)	ARS	ARS
Aircraft identification (M)	Aircraft radiotelephony call sign (M)	nnnnnn	VA812
DATA BLOCK 1			
Latitude (M)	Latitude in degrees and minutes (M)	Nnnnn *or* Snnnn	S4506
Longitude (M)	Longitude in degrees and minutes (M)	Wnnnnn *or* Ennnnn	E01056
Level (M)	Flight level (M)	FLnnn *or* FLnnn to FLnnn	FL330 FL280 to FL310
Time (M)	Time of occurrence in hours and minutes (M)	OBS AT nnnnZ	OBS AT 1216Z
DATA BLOCK 2			
Wind direction (M)	Wind direction in degrees true (M)	nnn/	262/
Wind speed (M)	Wind speed in metres per second (*or* knots) (M)	nnnMPS (*or* nnnKT)	40MPS (080KT)
Wind quality flag (M)	Wind quality flag (M)	n	1
Air temperature (M)	Air temperature in tenths of degrees C (M)	T[M]nnn	T127 TM455
Turbulence (C)	Turbulence in hundredths of $m^{2/3} s^{-1}$ and the time of occurrence of the peak value (C)[1]	EDRnnn/nn	EDR064/08
Humidity (C)	Relative humidity in per cent (C)	RHnnn	RH054
DATA BLOCK 3			
Condition prompting the issuance of a special air-report (M)		SEV TURB [EDRnnn][2] *or* SEV ICE *or* SEV MTW *or* TS GR[3] *or* TS[3] *or* HVY SS[4] *or* VA CLD [FL nnn/nnn] *or* VA[5] [MT nnnnnnnnnnnnnnnnnnn] *or* MOD TURB [EDRnnn][2] *or* MOD ICE	SEV TURB EDR076 VA CLD FL050/100

Notes.—

1. The time of occurrence to be reported in accordance with Table A4-2.
2. The turbulence to be reported in accordance with 2.6.3.
3. Obscured, embedded or widespread thunderstorms or thunderstorms in squall lines.
4. Duststorm or sandstorm.
5. Pre-eruption volcanic activity or a volcanic eruption.

Table A4-2: Time of occurrence of the peak value to be reported

Peak value of turbulence during the one-minute period .... minutes prior to the observation	Value to be reported
0-1	0
1-2	1
2-3	2
...	...
13-14	13
14-15	14
No timing information available	15

Table A4-3: Ranges and resolutions for the meteorological elements included in air-reports

Element as specified in Para 5		*Range*	*Resolution*
Wind direction:	°true	000 – 360	1
Wind speed:	MPS KT	00 – 125 00 – 250	1 1
Wind quality flag:	(index)*	0 – 1	1
Air temperature:	°C	–80 – +60	0.1
Turbulence: routine air-report:	$m^{2/3} s^{-1}$ (time of occurrence)*	0 – 2 0 – 15	0.01 1
Turbulence: special air-report:	$m^{2/3} s^{-1}$	0 – 2	0.01
Humidity:	%	0 – 100	1
* Non-dimensional			

APPENDIX 5. TECHNICAL SPECIFICATIONS RELATED TO FORECASTS

(See Para 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, Manual on Codes, WMO No. 306, Volume I.1, Part A —Alphanumeric Codes.

1.1.2 Until 4 November 2020, TAF should be disseminated in ~~digital~~ IWXXM GML form in addition to the dissemination of the TAF in accordance with 1.1.1.

1.1.2 As of 5 November 2020, TAF shall be disseminate in IWXXM GML form in addition to the dissemination 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).*

~~1.1.3 TAF if disseminated in digital form shall be formatted in accordance with a globally interoperable information exchange model and shall use extensible markup language (XML)/geography markup language (GML).~~

~~1.1.4 TAF if disseminated in digital form shall be accompanied by the appropriate metadata.~~

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

1.2 Inclusion of meteorological elements in TAF

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

1.2.1 Surface wind

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 should 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 the meteorological authority the appropriate ATS authority and operators concerned.

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

1.2.4 Cloud

Cloud amount should 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” shall be used.

1.2.5 Temperature

When forecast temperatures are included in accordance with regional air navigation agreement, the maximum and minimum temperatures expected to occur during the period of validity of the TAF should be given, together with their corresponding times of occurrence.

1.3 Use of change groups

Note. — Guidance on the use of change and time indicators in TAF is given in Table A5-2.

1.3.1 The criteria used for the inclusion of change groups in TAF or for the amendment of TAF shall be based on any of the following weather phenomena or combinations thereof being forecast to begin or end or change in intensity:

— Freezing fog

— freezing precipitation

— moderate or heavy precipitation (including showers)

— thunderstorm

— duststorm

— sandstorm

1.3.2 The criteria used for the inclusion of change groups in TAF or for the amendment of TAF should 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 should be established by the meteorological authority in consultation with the appropriate ATS authority and operators concerned, taking into account changes in the wind which would:

1) require a change in runway(s) in use; and

2) indicate that the runway tailwind and crosswind components will change through values representing the main operating limits for typical aircraft operating at the aerodrome;

e) when the visibility is forecast to improve and change to or pass through one or more of the following values, or when the visibility is forecast to deteriorate and pass through one or more of the following values:

1) 150, 350, 600, 800, 1500 or 3000m; or

2) 5000m 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 1000 ft); or

2) 450 m (1500 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 (1500 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 1000 ft); and

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

Note.— Other criteria based on local aerodrome operating minima are to be considered in parallel with similar criteria for the issuance of SPECI developed in response to Appendix 3, 2.3.3 h).

1.3.3 When a change in any of the elements given in Para 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 should 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, should be indicated.

1.3.4 The change indicator “BECMG” and the associated time group should be used to describe changes where the meteorological conditions are expected to reach or pass through specified threshold values at a regular or irregular rate and at an unspecified time during the time period. The time period shall normally not exceed 2 hours but in any case should not exceed 4 hours.

1.3.5 The change indicator “TEMPO” and the associated time group should 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” should 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 four-figure time group in whole hours and minutes UTC indicating the time the change is expected to occur. The subdivided period following the abbreviation “FM” should be self-contained and all forecast conditions given before the abbreviation should be superseded by those following the abbreviation.

1.4 Use of probability groups

The probability of occurrence of an alternative value of a forecast element or elements should be indicated, as necessary, by use of the abbreviation “PROB”

followed by the probability in tens of per cent and the time period during which the alternative value(s) is (are) expected to apply. The probability information 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 should be indicated, as necessary, by use of the abbreviation “PROB” followed by the probability in tens of per cent, placed before the change indicator “TEMPO” and associated time group. A probability of an alternative value or change of less than 30 per cent should not be considered sufficiently significant to be indicated. A probability of an alternative value or change of 50 per cent or more, for aviation purposes, should not be considered a probability but instead should be indicated, as necessary, by use of the change indicators “BECMG” or “TEMPO” or by subdivision of the validity period using the abbreviation “FM”. The probability group should not be used to qualify the change indicator “BECMG” nor the time indicator “FM”.

1.5 Numbers of change and probability groups

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

1.6 Dissemination of TAF

TAF and amendments there to shall be disseminated to international OPMET databanks and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service Internet-based services, in accordance with regional air navigation agreement.

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, Tables A3-1 and A3-2. The units and scales used in the trend forecast shall be the same as those used in the report to which it is appended.

Note.— Examples of trend forecasts are given in Appendix 3.

2.2 Inclusion of meteorological elements in trend forecasts

2.2.1 General provisions

The trend forecast shall indicate significant changes in respect of one or more of the elements: surface wind, visibility, weather and clouds. Only those elements shall be included for which a significant change is expected. However, in the case of significant changes in respect of cloud, all cloud groups, including layers or masses not expected to change, shall be indicated. In the case of a significant change in visibility, the phenomenon causing the reduction of visibility shall also be indicated. When no change is expected to occur, this shall be indicated by the term “NOSIG”.

2.2.2 Surface wind

The trend forecast shall indicate changes in the surface wind which involve:

a) a change in the mean wind direction of 60° or more, the mean speed before and/or after the change being 5 m/s (10 kt) or more;

b) a change in mean wind speed of 5 m/s (10 kt) or more; and

c) changes in the wind through values of operational significance. The threshold values shall be established by the meteorological authority in consultation with the appropriate ATS authority and operators concerned, taking into account changes in the wind which would:

1) require a change in runway(s) in use; and

2) indicate that the runway tailwind and crosswind components will change through values representing the main operating limits for typical aircraft operating at the aerodrome.

2.2.3 Visibility

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, 1500 or 3000 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 5000 m.

Note.— In trend forecasts appended to local routine and special reports, visibility refers to the forecast visibility along the runway(s); in trend forecasts appended to METAR and SPECI, visibility refers to the forecast prevailing visibility.

2.2.4 Weather phenomena

2.2.4.1 The trend forecast shall indicate the expected onset, cessation or change in intensity of one or more of the following weather phenomena or combinations thereof:

— freezing precipitation
— moderate or heavy precipitation (including showers)
— thunderstorm (with precipitation)
— duststorm
— sandstorm
— other weather phenomena given in Appendix 3, 4.4.2.3, as agreed by the meteorological authority, the appropriate ATS authority and operators concerned.

2.2.4.2 The trend forecast shall indicate the expected onset or cessation of one or more of the following weather phenomena or combinations thereof:

— freezing fog
— low drifting dust, sand or snow
— blowing dust, sand or snow
— thunderstorm (without precipitation)
— squall

— funnel cloud (tornado or waterspout).

2.2.4.3 The total number of phenomena reported in 2.2.4.1 and 2.2.4.2 shall not exceed three.

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

2.2.5 Clouds

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, 1000 and 1500 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 (1500 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 cloud 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 1000 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 Appendix3, 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 forecast for Take-off

3.1 Format of forecasts for take-off

The format of the forecast should 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 should 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 for forecasts for take-off for surface wind direction and speed, temperature and pressure and any other elements agreed locally should be agreed between the meteorological authority and the operators concerned. The criteria should be consistent with the corresponding criteria for special reports established for the aerodrome in accordance with Appendix 3, 2.3.1.

4 Criteria related to Area Forecast for Low-level flights

4.1 Format and content of GAMET area forecasts

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4.2 Amendments to GAMET area forecasts

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4.3 Exchange of area forecasts for low-level flights

4.3.1 When chart form is used for area forecasts for low-level flights, the forecast of upper wind and upper-air temperature shall be issued for points separated by no more than 500 km (300 NM) and for at least the following altitudes: 600, 1 500 and 3 000 m (2 000, 5 000 and 10 000 ft), and 4 500 m (15 000 ft) in mountainous areas.

4.3.2 When chart form is used for area forecasts for low-level flights, the forecast of SIGWX phenomena shall be issued as low-level SIGWX forecast for flight levels up to 100 (or up to flight level 150 in mountainous areas, or higher, where necessary). Low-level SIGWX forecasts shall include the following items:

a) the phenomena warranting the issuance of a SIGMET as given in Appendix 6 and which are expected to affect low-level flights; and

b) the elements in area forecasts for low-level flights as given in Table A5-3 except elements concerning:

1) upper wind and upper-air temperature; and

2) forecast QNH.

4.4 Exchange of area forecasts for low-level flights

Area forecasts for low-level flights prepared in support of the issuance of AIRMET information shall be exchanged between aerodrome meteorological offices and/or meteorological watch offices responsible for the issuance of flight documentation for low-level flights in the flight information regions concerned.

Table A5-1. Template for TAF

Key: M = inclusion mandatory, part of every message;
C = inclusion conditional, dependent on meteorological conditions or method of observation;
O = inclusion optional.

Note 1.— The ranges and resolutions for the numerical elements included in TAF are shown in Table A5-4 of this appendix.

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

Element as specified in Para 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.			
Days and period of validity of forecast (M)	Days and period of the validity of the forecast in UTC (M)	nnnn/nnnn	1606/1624 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)

	Wind speed (M)	[P]nn[n]			19005MPS (19010KT)
	Significant speed variations (C)[3]	G[P]nn[n]			00000MPS (00000KT) 140P49MPS (140P99KT)
	Units of measurement (M)	MPS (*or* KT)			12003G09MPS (12006G18KT) 24008G14MPS (24016G28KT)
Visibility (M)	Prevailing visibility (M)	nnnn		C A V O K	0350 CAVOK 7000 9000 9999
Weather (C)[4, 5]	Intensity of weather phenomena (C)[6]	– *or* +	—		RA HZ +TSRA FG –FZDZ PRFG +TSRAS N SNRA 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*	IC *or* FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or* TS *or* BCFG *or*		

Element as specified in Para 6	*Detailed content*	*Template(s)*				*Examples*
		SHGS *or* SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN		BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG		
Cloud (M)[8]	Cloud amount and height of base or vertical visibility (M)	FEWnnn *or* SCTnnn *or* BKNnnn *or* OVCnnn	VVnnn *or* VV///	NSC		FEW010 VV005 OVC020 VV/// NSC SCT005 BKN012
	Cloud type (C)[4]	CB *or* TCU	—			SCT008 BKN025CB
Temperature (O)[9]	Name of the element (M)	TX				TX25/1013Z TN09/1005Z TX05/2112Z TNM02/2103Z
	Maximum temperature (M)	[M]nn/				
	Day and time of occurrence of the maximum temperature (M)	nnnnZ				
	Name of the element (M)	TN				
	Minimum temperature (M)	[M]nn/				
	Day and time of occurrence of the minimum temperature (M)	nnnnZ				
Expected significant changes to one or more of the above elements during the period of validity (C)[4, 10]	Change or probability indicator (M)	PROB30 [TEMPO] *or* PROB40 [TEMPO] *or* BECMG *or* TEMPO *or* FM				TEMPO 0815/0818 25017G25MPS (TEMPO 0815/0818 25034G50KT) TEMPO 2212/2214 17006G13MPS 1000 TSRA
	Period of occurrence or change (M)	nnnn/nnnn or nnnnnn[11]				

	Wind (C)[4]	nnn[P]nn[n][G[P]nn[n]]MPS *or* VRBnnMPS (*or* nnn[P]nn[G[P]nn]KT *or* VRBnnKT)				SCT010CB BKN020 (TEMPO 2212/2214 17012G26KT 1000 TSRA SCT010CB BKN020) BECMG 3010/3011 00000MPS 2400 OVC010 (BECMG 3010/3011 00000KT 2400 OVC010) PROB30 1412/1414 0800 FG BECMG 1412/1414 RA TEMPO 2503/2504 FZRA TEMPO 0612/0615 BLSN PROB40 TEMPO 2923/3001 0500 FG
	Prevailing visibility (C)[4]	nnnn			C A V O K	
	Weather phenomenon: intensity (C)[6]	– or +	—	NSW		
	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*	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*			

Element as specified in Para 6	*Detailed content*	*Template(s)*				*Examples*
		SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN	BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG			
	Cloud amount and height of base or vertical visibility (C)[4]	FEWnnn *or* SCTnnn *or* BKNnnn *or* OVCnnn	VVnnn *or* VV///	NSC		FM051230 15015KMH 9999 BKN020 (FM051230 15008KT 9999 BKN020) BECMG 1618/1620 8000 NSW NSC BECMG 2306/2308 SCT015CB BKN020
	Cloud type (C)[4]	CB *or* TCU	—			

Notes.—

1. Fictitious location.
2. To be used in accordance with 1.2.1.
3. To be included in accordance with 1.2.1.
4. To be included whenever applicable.
5. One or more, up to a maximum of three, groups in accordance with 1.2.3.
6. To be included whenever applicable in accordance with 1.2.3. No qualifier for *moderate* intensity.
7. Weather phenomena to be included in accordance with 1.2.3.
8. Up to four cloud layers in accordance with 1.2.4.
9. To be included in accordance with 1.2.5, consisting of up to a maximum of four temperatures (two maximum temperatures and two minimum temperatures).
10. To be included in accordance with 1.3, 1.4 and 1.5.
11. To be used with FM only.

Table A5-2. Use of change and time indicators in TAF

Change or time indicator		*Time period*	*Meaning*	
FM		$n_dn_dn_hn_hn_mn_m$	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. Template for GAMET

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Table A5-4. Ranges and resolutions for the numerical elements included in TAF

Element as specified in Para 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 160000Z 1606/1624 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 16th of the month at 0000 UTC valid from 0600 UTC to 2400 UTC on the 16th of the month; surface wind direction 130 degrees; wind speed 5 metres per second; visibility 9 kilometres, broken cloud at 600 metres; becoming between 0600 UTC and 0800 UTC on the 16th of the month, scattered cumulonimbus cloud at 450 metres and broken cloud at 600 metres; temporarily between 0800 UTC and 1200 UTC on the 16th of the month surface wind direction 170 degrees; wind speed 6 metres per second gusting to 12 metres per second; visibility 1 000 metres in a thunderstorm with moderate rain, scattered cumulonimbus cloud at 300 metres and broken cloud at 600 metres; from 1230 UTC on the 16th of the month surface wind direction 150 degrees; wind speed 4 metres per second; visibility 10 kilometres or more; and broken cloud at 600 metres.

* Fictitious location

Note.— In this example, the primary units "metre per second" and "metre" were used for wind speed and height of cloud base, respectively. However, in accordance with Annex 5, the corresponding non-SI alternative units "knot" and "foot" may be used instead.

Example A5-2. Cancellation of TAF

Cancellation of TAF for YUDO (Donlon/International):*

TAF AMD YUDO 161500Z 1606/1624 CNL

Meaning of the forecast:

Amended TAF for Donlon/International* issued on the 16th of the month at 1500 UTC cancelling the previously issued TAF valid from 0600 UTC to 2400 UTC on the 16th of the month.

* Fictitious location

Example A5-3. GAMET area forecast

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

(See Para 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 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
tropical cyclone	
— tropical cyclone with 10-minute mean surface wind speed of 17 m/s (34 kt) or more	TC (+ cyclone name)
turbulence	
— severe turbulence	SEV TURB
icing	
— severe icing	SEV ICE
— severe icing due to freezing rain	SEV ICE (FZRA)
mountain wave	
— severe mountain wave	SEV MTW
duststorm	
— heavy duststorm	HVY DS
sandstorm	
— heavy sandstorm	HVY SS
volcanic ash	
— volcanic ash	VA (+ volcano name, if known)
radioactive cloud	RDOACT CLD

1.1.5 SIGMET information shall not contain unnecessary descriptive material. In describing the weather phenomena for which the SIGMET is issued, no descriptive material additional to that given in 1.1.4 shall be included. SIGMET information concerning thunderstorms or a tropical cyclone shall not include references to associated turbulence and icing.

1.1.6 Until 4 November 20202, ~~Meteorological watch offices should issue~~ SIGMET information should be disseminated in ~~digital~~ IWXXM GML form, in addition to the ~~issuance~~ dissemination of ~~this~~ SIGMET information in ~~abbreviated plain language in~~ accordance with 1.1.1.

1.1.6 As of 5 November 2020, SIGMET information shall be disseminate 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).*

~~1.1.7 SIGMET if disseminated in digital form shall be formatted in accordance with a globally interoperable information exchange model and shall use extensible markup language (XML)/geography markup language (GML).~~

~~1.1.8 SIGMET if disseminated in digital form shall be accompanied by the appropriate metadata.~~

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

1.1.9 SIGMET, when issued in graphical format, should be as specified in Appendix 1, including the use of applicable symbols and/or abbreviations.

1.2 Dissemination of SIGMET messages

1.2.1 SIGMET messages shall be disseminated to meteorological watch offices, WAFCs and to other meteorological offices in accordance with regional air navigation agreement. SIGMET messages for volcanic ash shall also be disseminated to VAACs.

1.2.2 SIGMET messages shall be disseminated to international OPMET databanks and the centres designated by regional air navigation agreement for the operation of aeronautical fixed service satellite distribution systems, in accordance with regional air navigation agreement.

2 Specification related to AIRMET Information

2.1 Format of AIRMET messages

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2.2 Dissemination of AIRMET messages

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3 SPECIFICATIONS RELATED TO SPECIAL AIR-REPORTS

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3.1 *Intentionally left blank*

3.2 *Intentionally left blank*

4 Detailed criteria related to SIGMET, AIRMET messages and Special Air-Reports (Uplink)

4.1 Identification of the flight information region (FIR)

In cases where the airspace is divided into a flight information region (FIR) and an upper flight information region (UIR), the SIGMET should be identified by the location indicator of the air traffic services unit serving the FIR.

Note.— The SIGMET message applies to the whole airspace within the lateral limits of the FIR, i.e. to the FIR and to the UIR. The particular areas and/or flight levels affected by the meteorological phenomena causing the issuance of the SIGMET are given in the text of the message.

4.2 Criteria related to phenomena included in SIGMET, AIRMET messages and special air-reports (uplink)

4.2.1 An area of thunderstorms and cumulonimbus clouds should be considered:

a) obscured (OBSC) if it is obscured by haze or smoke or cannot be readily seen due to darkness; and

b) embedded (EMBD) if it is embedded within cloud layers and cannot be readily recognized.

c) isolated (ISOL) if it consists of individual features which affect, or are forecast to affect, an area with a maximum spatial coverage less than 50 per cent of the area concerned (at a fixed time or during the period of validity); and

d) occasional (OCNL) if it consists of well-separated features which affect, or are forecast to affect, an area with a maximum spatial coverage between 50 and 75 per cent of the area concerned (at a fixed time or during the period of validity).

4.2.2 An area of thunderstorms should be considered frequent (FRQ) if within that area there is little or no separation between adjacent thunderstorms with a maximum spatial coverage greater than 75 per cent of the area affected, or forecast to be affected, by the phenomenon (at a fixed time or during the period of validity).

4.2.3 Squall line (SQL) should indicate a thunderstorm along a line with little or no space between individual clouds.

4.2.4 Hail (GR) should be used as a further description of the thunderstorm, as necessary.

4.2.5 Severe and moderate turbulence (TURB) should refer only to: low-level turbulence associated with strong surface winds; rotor streaming; or turbulence whether in cloud or not in cloud (CAT). Turbulence should not be used in connection with convective clouds.

4.2.6 Turbulence shall be considered:

a) severe whenever the peak value of the cube root of EDR exceeds 0.7; and

b) moderate whenever the peak value of the cube root of EDR is above 0.4 and below or equal to 0.7.

4.2.7 Severe and moderate icing (ICE) should refer to icing in other than convective

clouds. Freezing rain (FZRA) should refer to severe icing conditions caused by freezing rain.

4.2.8 A mountain wave (MTW) should be considered:

a) severe whenever an accompanying downdraft of 3.0 m/s (600 ft/min) or more and/or severe turbulence is observed or forecast; and

b) moderate whenever an accompanying downdraft of 1.75–3.0 m/s (350–600 ft/min) and/or moderate turbulence is observed or forecast.

4.2.9 Sandstorm/duststorm should be considered:

a) heavy whenever the visibility is below 200 m and the sky is obscured; and

b) moderate whenever the visibility is:

1) below 200 m and the sky is not obscured; or

2) between 200 m and 600 m.

5 Specifications related to Aerodrome Warnings

5.1 Format and dissemination of aerodrome warnings

5.1.1 The aerodrome warnings shall be issued in accordance with the template in Table A6-2 where required by operators or aerodrome services, and shall be disseminated in accordance with local arrangements to those concerned.

5.1.2 The sequence number referred to in the template in Table A6-2 shall correspond with the number of aerodrome warnings issued for the aerodrome since 0001 UTC on the day concerned.

5.1.3 In accordance with the template in Table A6-2, aerodrome warnings should relate to the occurrence or expected occurrence of one or more of the following phenomena:

- tropical cyclone (to be included if the 10-minute mean surface wind speed at the aerodrome is expected to be 17 m/s (34 kt) or more)
- thunderstorm
- hail
- snow (including the expected or observed snow accumulation)
- freezing precipitation
- hoar frost or rime
- sandstorm
- duststorm
- rising sand or dust
- strong surface wind and gusts
- squall
- frost
- volcanic ash

- tsunami
- volcanic ash deposition
- toxic chemicals
- other phenomena as agreed locally.

Note.— Aerodrome warnings related to the occurrence or expected occurrence of tsunami are not required where a national public safety plan for tsunami is integrated with the "at risk" aerodrome concerned.

5.1.4 The use of text additional to the abbreviations listed in the template in Table A6-2 should be kept to a minimum. The additional text should be prepared in abbreviated plain language using approved ICAO abbreviations and numerical values. If no ICAO approved abbreviations are available, English plain language text should be used.

5.2 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 should be as agreed between the aerodrome meteorological office and the users concerned.

6 Specifications related to Wind Shear Warnings

6.1 Detection of wind shear

Evidence of the existence of wind shear should be derived from:

a) ground-based, wind shear remote-sensing equipment, for example, Doppler radar;

b) ground-based, wind shear detection equipment, for example, a system of surface wind and/or pressure sensors located in an array monitoring a specific runway or runways and associated approach and departure paths;

c) aircraft observations during the climb-out or approach phases of flight to be made in accordance with Para 5; or

d) other meteorological information, for example, from appropriate sensors located on existing masts or towers in the vicinity of the aerodrome or nearby areas of high ground.

Note.— Wind shear conditions are normally associated with the following phenomena:

- *thunderstorms, microbursts, funnel cloud (tornado or waterspout), and gust fronts*
- *strong surface winds coupled with local topography*
- *sea breeze fronts*
- *mountain waves (including low-level rotors in the terminal area)*
- *low-level temperature inversions.*

6.2 Format and dissemination of wind shear warnings and alerts

Note.— Information on wind shear is also to be included as supplementary information in local routine reports, local special reports, METAR and SPECI in accordance with the templates in Tables A3-1 and A3-2.

6.2.1 The wind shear warnings shall be issued in accordance with the template in Table A6-3 and shall be disseminated in accordance with local arrangements to those concerned.

6.2.2 The sequence number referred to in the template in Table A6-3 shall correspond with the number of wind shear warnings issued for the aerodrome since 0001 UTC on the day concerned.

6.2.3 The use of text additional to the abbreviations listed in the template in Table A6-3 should be kept to a minimum. The additional text should be prepared in abbreviated plain language using approved ICAO abbreviations and numerical values. If no ICAO approved abbreviations are available, English plain language text should be used.

6.2.4 When an aircraft report is used to prepare a wind shear warning, or to confirm a warning previously issued, the corresponding aircraft report, including the aircraft type, should be disseminated unchanged in accordance with local arrangements to those concerned.

Note 1.— Following reported encounters by both arriving and departing aircraft, two different wind shear warnings may exist: one for arriving aircraft and one for departing aircraft.

Note 2.— Specifications for reporting the intensity of wind shear are still undergoing development. It is recognized, however, that pilots, when reporting wind shear, may use the qualifying terms "moderate", "strong" or "severe", based to a large extent on their subjective assessment of the intensity of the wind shear encountered.

6.2.5 The wind shear alerts shall be disseminated from automated, ground-based, wind shear remote-sensing or detection equipment in accordance with local arrangements to those concerned.

6.2.6 Where microbursts are observed, reported by pilots or detected by ground-based, wind shear detection or remote-sensing equipment, the wind shear warning and wind shear alert should include a specific reference to microburst.

6.2.7 Where information from ground-based, wind shear detection or remote-sensing equipment is used to prepare a wind shear alert, the alert shall, if practicable, relate to specific sections of the runway and distances along the approach path or take-off path as agreed between the meteorological authority, the appropriate ATS authority and the operators concerned.

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

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

C = inclusion conditional, included whenever applicable;

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

Note 1.— The ranges and resolutions for the numerical elements included in SIGMET/AIRMET messages are shown in Table A6-4 of this appendix.

Note 2.— In accordance with 1.1.5 and 2.1.5, severe or moderate icing and severe or moderate turbulence (SEV ICE, MOD ICE, SEV TURB, MOD TURB) associated with thunderstorms, cumulonimbus clouds or tropical cyclones should not be included.

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	nnnn nnnnnnnnnn FIR[/n]	YUCC AMSWELL FIR[2] YUDD SHANLON[2] FIR/UIR[2] UIR FIR/UIR	YUCC AMSWELL FIR/2[2] YUDD SHANLON FIR[2]

		or nnnn nnnnnnnnnn CTA		YUDD SHANLON CTA[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	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	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	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/ABV10000FT OVC CLD 270/ABV3000M

Element	*Detailed content*	*SIGMET template*	*AIRMET template*	*SIGMET message examples*	*AIRMET message examples*
		HVY SS [VA ERUPTION] [MT nnnnnnnnnn] [PSN Nnn[nn] *or* Snn[nn] Ennn[nn] *or* Wnnn[nn]] VA CLD RDOACT CLD	SFC/[ABV][n]nnnnFT) OVC CLD nnn/[ABV]nnnnM (*or* OVC CLD [n]nnn/[ABV][n]nnnnFT) *or* OVC CLD SFC/[ABV][n]nnnM (*or* OVC CLD SFC/[ABV][n]nnnnFT) ISOL[16][17] CB[18][19] OCNL[17][18] CB[18][19] FRQ[9][10] CB[18][19] ISOL[16][17] TCU[18][19] OCNL[17][18] TCU[18][19] FRQ[9][10] TCU[18][19] MOD TURB[12][13] MOD ICE[13][14] MOD MTW[14][15]	HVY DS HVY SS VA ERUPTION MT ASHVAL[2] PSN S15 E073 VA CLD RDOACT CLD	OVC CLD 900/ABV10000FT OVC CLD 1000/5000FT OVC CLD SFC/3000M OVC CLD SFC/ABV10000FT ISOL CB 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)[19][20]	Location (referring to latitude and longitude (in degrees and minutes))	Nnn[nn] Wnnn[nn] *or* Nnn[nn] Ennn[nn] *or* Snn[nn] Wnnn[nn] *or* Snn[nn] Ennn[nn] *or* N OF Nnn[nn] *or* S OF Nnn[nn] *or* N OF Snn[nn] *or* S OF Snn[nn] [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[20][21] *or* NE OF LINE[20][21] *or* E OF LINE[20][21] *or* SE OF LINE[20][21] *or* S OF LINE[20][21] *or* SW OF LINE[20][21] *or* W OF LINE[20][21] *or* NW OF LINE[20][21] 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[20][21] *or* NE OF LINE[20][21] *or* E OF LINE[20][21] *or* SE OF LINE[20][21] *or* S OF LINE[20][21] *or* SW OF LINE[20][21] *or* W OF LINE[20][21] *or* NW OF LINE[20][21] 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]]]	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

Element	*Detailed content*	*SIGMET template*	*AIRMET template*	*SIGMET message examples*	*AIRMET message examples*
		or WI[20][21], [21][22] Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – [Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn] – Nnn[nn] *or* Snn[nn] Wnnn[nn] *or* Ennn[nn]] *or* APRX nnKM WID LINE[20][21] BTN (*or* nnNM WID LINE[20][21] 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 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]		ENTIRE FIR ENTIRE UIR ENTIRE FIR/UIR ENTIRE CTA WI 400KM OF TC CENTRE WI 250NM OF TC CENTRE WI 30KM OF N6030 E02550[T]	

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 ABV 7000FT TOP ABV 9000FT TOP ABV 10000FT 3000M 2000/3000M 8000FT 6000/12000FT 2000M/FL150 10000FT/FL250 TOP FL500 TOP ABV FL500 TOP BLW FL450
Movement or expected movement (C)~~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]) *Or* STNR	MOV SE MOV NNW MOV E 40KMH MOV E 20KT MOV WSW 20KT STNR

† Applicable 7 November 2019.

Element	*Detailed content*	*SIGMET template*	*AIRMET template*	*SIGMET message examples*	*AIRMET message examples*
Changes in intensity (C)~~19~~20	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)~~19~~20, 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~~20~~21 *or* NE OF LINE~~20~~21 *or* E OF LINE~~20~~21 *or* SE OF LINE~~20~~21 *or* S OF LINE~~20~~21 *or* SW OF LINE~~20~~21 *or* W OF LINE~~20~~21 *or* NW OF LINE~~20~~21 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~~20~~21 *or* NE OF LINE~~20~~21 *or* E OF LINE~~20~~21 *or* SE OF LINE~~20~~21 *or* S OF LINE~~20~~21 *or* SW OF LINE~~20~~21 *or* W OF LINE~~20~~21 *or* NW OF LINE~~20~~21 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]]]	—	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

Element	*Detailed content*	*SIGMET template*	*AIRMET template*	*SIGMET message examples*	*AIRMET message examples*

		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] or Wnnn[nn] or Ennn[nn]		
Repetition of elements (C)[27]	Repetition of elements included in a SIGMET message for volcanic ash cloud or tropical cyclone	[AND][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]*

~~5~~6. In accordance with 1.1.4 and 2.1.4.
~~6~~7. In accordance with 4.2.1 a).
~~7~~8. In accordance with 4.2.4.
~~8~~9. In accordance with 4.2.1 b).
~~9~~10. In accordance with 4.2.2.
~~10~~11. In accordance with 4.2.3.
~~11~~12. Used for unnamed tropical cyclones.
~~12~~13. In accordance with 4.2.5 and 4.2.6.
~~13~~14. In accordance with 4.2.7.
~~14~~15. In accordance with 4.2.8.
~~15~~16. In accordance with 2.1.4.
~~16~~17. In accordance with 4.2.1 c).
~~17~~18. In accordance with 4.2.1 d).
~~18~~19. The use of cumulonimbus (CB) and towering cumulus (TCU) is restricted to AIRMETs in accordance with 2.1.4.
~~19~~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.
~~20~~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.
~~21~~22. The number of coordinates should be kept to a minimum and should not normally exceed seven.
~~22~~23. Only for SIGMET messages for tropical cyclones.
~~23 Only for SIGMET messages for volcanic ash cloud and 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 A6-1B. Template for special air-reports (uplink)

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Table A6-2. Template for aerodrome warning

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

C = inclusion conditional, included whenever applicable.

Note 1.— The ranges and resolutions for the numerical elements included in aerodrome warnings are shown in Table A6-4 of this appendix.

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

Element	*Detailed content*	*Template(s)*	*Examples*
Location indicator of the aerodrome (M)	Location indicator of the aerodrome	nnnn	YUCC[1]
Identification of the type of message (M)	Type of message and sequence number	AD WRNG [n]n	AD WRNG 2
Validity period (M)	Day and time of validity period in UTC	VALID nnnnnn/nnnnnn	VALID 211230/211530
IF THE AERODROME WARNING IS TO BE CANCELLED, SEE DETAILS AT THE END OF THE TEMPLATE.			
Phenomenon (M)[2]	Description of phenomenon causing the issuance of the aerodrome warning	TC[3] nnnnnnnnn *or* [HVY] TS *or* GR *or* [HVY] SN [nnCM][3] *or* [HVY] FZRA *or* [HVY] FZDZ *or* RIME[4] *or* [HVY] SS *or* [HVY] DS *or* SA *or* DU *or* SFC WSPD nn[n]MPS MAX nn[n] (SFC WSPD nn[n]KT MAX nn[n]) *or* SFC WIND nnn/nn[n]MPS MAX nn[n] (SFC WIND nnn/nn[n]KT MAX nn[n]) *or* SQ *or* FROST *or* TSUNAMI *or* VA[DEPO] *or* TOX CHEM *or* *Free text up to 32 charact*	TC ANDREW HVY SN 25CM SFC WSPD 20MPS MAX 30 VA TSUNAMI
Observed or forecast phenomenon (M)	Indication whether the information is observed and expected to continue, *or* forecast	OBS [AT nnnnZ] *or* FCST	OBS AT 1200Z OBS
Changes in intensity (C)	Expected changes in intensity	INTSF *or* WKN *or* NC	WKN

or

Cancellation of aerodrome warning[6]	Cancellation of aerodrome warning referring to its identification	CNL AD WRNG [n]n nnnnnn/nnnnnn	CNL AD WRNG 2 211230/211530[6]

Notes.—

1. Fictitious location.
2. One phenomenon or a combination thereof, in accordance with 5.1.3.
3. In accordance with 5.1.3.
4. Hoar frost *or* rime in accordance with 5.1.3.
5. In accordance with 5.1.4.
6. End of the message (as the aerodrome warning is being cancelled).

Table A6-2. Template for wind shear warning

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

C = inclusion conditional, included whenever applicable.

Note 1.— The ranges and resolutions for the numerical elements included in wind shear warnings are shown in Table A6-4 of this appendix.

Note 2.— The explanations for the abbreviations can be found in the PANS-ABC, Doc 8400.

Element	*Detailed content*	*Template(s)*	*Examples*
Location indicator of the aerodrome (M)	Location indicator of the aerodrome	nnnn	YUCC[1]
Identification of the type of message (M)	Type of message and sequence number	WS WRNG [n]n	WS WRNG 1
Time of origin and validity period (M)	Day and time of issue and, where applicable, validity period in UTC	nnnnnn [VALID TL nnnnnn] *or* [VALID nnnnnn/nnnnnn]	211230 VALID TL 211330 221200 VALID 221215/221315
IF THE WIND SHEAR WARNING IS TO BE CANCELLED, SEE DETAILS AT THE END OF THE TEMPLATE.			
Phenomenon (M)	Identification of the phenomenon and its location	[MOD] *or* [SEV] WS IN APCH *or* [MOD] *or* [SEV] WS [APCH] RWYnnn *or* [MOD] *or* [SEV] WS IN CLIMB-OUT *or* [MOD] *or* [SEV] WS CLIMB-OUT RWYnnn *or* MBST IN APCH *or* MBST [APCH] RWYnnn *or* MBST IN CLIMB-OUT *or* MBST CLIMB-OUT RWYnnn	WS APCH RWY12 MOD WS RWY34 WS IN CLIMB-OUT MBST APCH RWY26 MBST IN CLIMB-OUT
Observed, reported or forecast phenomenon (M)	Identification whether the phenomenon is observed or reported and expected to continue or forecast	REP AT nnnn nnnnnnnn *or* OBS [AT nnnn] *or* FCST	REP AT 1510 B747 OBS AT 1205 FCST
Details of the phenomenon (C)[2]	Description of phenomenon causing the issuance of the wind shear warning	SFC WIND: nnn/nnMPS (*or* nnn/nnKT) nnnM (nnnFT)-WIND: nnn/nnMPS (*or* nnn/nnKT) *or* nnKMH (*or* nnKT) LOSS nnKM (*or* nnNM) FNA RWYnn *or* nnKMH (*or* nnKT) GAIN nnKM (*or* nnNM) FNA RWYnn	SFC WIND: 320/5MPS 60M-WIND: 360/13MPS (SFC WIND: 320/10KT 200FT-WIND: 360/26KT) 60KMH LOSS 4KM FNA RWY13 (30KT LOSS 2NM FNA RWY13)

Or

Cancellation of wind shear warning[3]	Cancellation of wind shear warning referring to its identification	CNL WS WRNG [n]n nnnnnn/nnnnnn	CNL WS WRNG 1 211230/211330[3]

Notes.—

1. Fictitious location.
2. Additional provisions in 6.2.3.
3. End of the message (as the wind shear warning is being cancelled).

Table A6-4. Ranges and resolutions for the numerical elements included in volcanic ash and tropical cyclone advisory messages, SIGMET messages and aerodrome and wind shear warnings

Element as specified in Appendices 2 and 6		*Range*	*Resolution*
Summit elevation:	M	000 – 8 100	1
	FT	000 – 27 000	1
Advisory number:	for VA (index)*	000 – 2 000	1
	for TC (index)*	00 – 99	1
Maximum surface wind:	MPS	00 – 99	1
	KT	00 – 199	1
Central pressure:	hPa	850 – 1 050	1
Surface wind speed:	MPS	15 – 49	1
	KT	30 – 99	1
Surface visibility:	M	0000 – 0750	50
	M	0800 – 5 000	100
Cloud: height of base:	M	000 – 300	30
	FT	000 – 1 000	100
Cloud: height of top:	M	000 – 2 970	30
	M	3 000 – 20 000	300
	FT	000 – 9 900	100
	FT	10 000 – 60 000	1 000
Latitudes:	° (degrees)	00 – 90	1
	´ (minutes)	00 – 60	1
Longitudes:	° (degrees)	000 – 180	1
	´ (minutes)	00 – 60	1
Flight levels:		000 – 650	10
Movement:	KMH	0 – 300	10
	KT	0 – 150	5
* Non-dimensional			

Example A6-1: SIGMET message and the corresponding cancellations

SIGMET
YUDD SIGMET 2 VALID 101200/101600 YUSO –
YUDD SHANLON FIR/UIR OBSC
TS FCST S OF N54 AND E OF W012
TOP FL390 MOV E 20KT WKN

Cancellation of SIGMET
YUDD SIGMET 3 VALID 101345/101600 YUSO –
YUDD SHANLON FIR/UIR CNL SIGMET 2 101200/101600

Example A6-1: SIGMET message for Tropical cyclone

YUCC SIGMET 3 VALID 251600/252200 YUDO –
YUCC AMSWELL FIR TC GLORIA OBS AT 1600Z N2706 W07306 CB TOP FL500 WI 150NM OF CENTRE MOV NW 10KT NC FCST 2200Z TC CENTRE N2740 W07345

Meaning:

The third SIGMET message issued for the AMSWELL* flight information region (identified by YUCC Amswell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC; the message is valid from 1600 UTC to 2200 UTC on the 25th of the month; tropical cyclone Gloria was observed at 1600 UTC at 27 degrees 6 minutes north and 73 degrees 6 minutes west with cumulonimbus top at flight level 500 within 150 nautical miles of the centre; the tropical cyclone is expected to move northwestwards at 10 knots and not to undergo any changes in intensity; the forecast position of the centre of the tropical cyclone at 2200 UTC is expected to be at 27 degrees 40 minutes north and 73 degrees 45 minutes west.

Example A6-3. SIGMET message for volcanic ash

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Example A6-4. SIGMET message for radioactive cloud

YUCC SIGMET 2 VALID 201200/201600 YUDO –
YUCC AMSWELL FIR RDOACT CLD OBS AT 1155Z WI S5000 W14000 – S5000 W13800 – S5200 W13800 – S5200 W14000 – S5000 W14000 SFC/FL100 WKN FCST AT 1600Z WI S5200 W14000 – S5200 W13800 – S5300 W13800 – S5300 W14000 – S5200 W14000

Meaning:

The second SIGMET message issued for the AMSWELL* flight information region (identified by YUCC Amswell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC; the message is valid from 1200 UTC to 1600 UTC on the 20th of the month; radioactive cloud was observed at 1155 UTC within an area bounded by 50 degrees 0 minutes south 140 degrees 0 minutes west to 50 degrees 0 minutes south 138 degrees 0 minutes west to 52 degrees 0 minutes south 138 degrees 0 minutes west to 52 degrees 0 minutes south 140 degrees 0 minutes west to 50 degrees 0 minutes south 140 degrees 0 minutes west and between the surface and flight level 100; the radioactive cloud is expected to weaken in intensity; at 1600 UTC the radioactive cloud is forecast to be located within an area bounded by 52 degrees 0 minutes south 140 degrees 0 minutes west to 52 degrees 0 minutes south 138 degrees 0 minutes west to 53 degrees 0 minutes south 138 degrees 0 minutes west to 53 degrees 0 minutes south 140 degrees 0 minutes west to 52 degrees 0 minutes south 140 degrees 0 minutes west.

* Fictitious location

Example A6-5. SIGMET message for severe turbulence

YUCC SIGMET 5 VALID 221215/221600 YUDO –
YUCC AMSWELL FIR SEV TURB OBS AT 1210Z N2020 W07005 FL250 INTSF FCST AT 1600Z S OF N2020 AND E OF W06950

Meaning:

The fifth SIGMET message issued for the AMSWELL* flight information region (identified by YUCC Amswell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC; the message is valid from 1215 UTC to 1600 UTC on the 22nd of the month; severe turbulence was observed at 1210 UTC 20 degrees 20 minutes north and 70 degrees 5 minutes west at flight level 250; the turbulence is expected to strengthen in intensity; at 1600 UTC the severe turbulence is forecast to be located south of 20 degrees 20 minutes north and east of 69 degrees 50 minutes west.

* Fictitious locations

Example A6-6. AIRMET message for moderate mountain wave

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APPENDIX 7. TECHNICAL SPECIFICATIONS RELATED TO AERONAUTICAL CLIMATOLOGICAL INFORMATION

(See Para 8 of this CAR)

1 Processing of Aeronautical Climatological Information

Meteorological observations for regular and alternate aerodromes should be collected, processed and stored in a form suitable for the preparation of aerodrome climatological information.

2 Exchange of Aeronautical Climatological Information

Aeronautical climatological information should be exchanged on request between meteorological authorities. Operators and other aeronautical users desiring such information should normally apply to the meteorological authority responsible for its preparation.

3 Content of Aeronautical Climatological Information

3.1 Aerodrome climatological tables

3.1.1 An aerodrome climatological table should 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 should include information required for the preparation of aerodrome climatological summaries in accordance with 3.2.

3.2 Aerodrome climatological summaries

Aerodrome climatological summaries should cover:

a) frequencies of the occurrence of runway visual range/visibility and/or height of the base of the lowest cloud layer of BKN or OVC extent below specified values at specified times;

b) frequencies of visibility below specified values at specified times;

c) frequencies of the height of the base of the lowest cloud layer of BKN or OVC extent below specified values at specified times;

d) frequencies of occurrence of concurrent wind direction and speed within specified ranges;

e) frequencies of surface temperature in specified ranges of 5°C at specified times; and

f) mean values and variations therefrom, including maximum and minimum values of meteorological elements required for operational planning purposes, including take- off performance calculations.

Note.— Models of climatological summaries related to a) to e) are given in 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 Para 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 the meteorological authority and the operator concerned, and with the order shown below not implying priorities:

a) written or printed material, including specified charts and forms;
b) data in digital form;
c) briefing;
d) consultation;
e) display; or
f) in lieu of a) to e), by means of an automated pre-flight information system providing self-briefing and flight documentation facilities while retaining access by operators and aircrew members to consultation, as necessary, with the aerodrome meteorological office, in accordance with 5.1.

1.2 The meteorological authority, in consultation with the operator, shall determine:

a) the type and format of meteorological information to be supplied; and
b) methods and means of supplying that information.

1.3 On request by the operator, the meteorological information supplied for flight planning should include data for the determination of the lowest usable flight level.

2 Specifications related to information for Pre-flight planning and In-flight Re-planning

2.1 Format of upper-air gridded information

Upper-air gridded information supplied by WAFCs for pre-flight and in-flight re-planning shall be in the GRIB code form.

Note.— The GRIB code form is contained in 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 re- planning shall be in the BUFR code form.

Note.— The BUFR code form is contained in Manual on Codes WMO No. 306, Volume I.2, Part B — Binary Codes.

2.3 **Specific needs of helicopter operations**

Meteorological information for pre-flight planning and in-flight re- planning by operators of helicopters flying to offshore structures should include data covering the layers from sea level to flight level 100. Particular mention should be made of the expected surface visibility, the amount, type (where available), base and tops of cloud below flight level 100, sea state and sea-surface temperature, mean sea-level pressure, and the occurrence and expected occurrence of turbulence and icing, as determined by regional air navigation agreement.

3 Specifications related to briefing and consultation

3.1 Information required to be displayed

The material displayed shall be readily accessible to the flight crew members or other flight operations personnel concerned.

4 Specifications related to information flight documentation

4.1 Presentation of information

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

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 WMO on the basis of relevant operational requirements stated by ICAO.

4.1.2 The flight documentation related to concatenated route-specific upper wind and upper-air temperature forecasts should be provided as agreed between the meteorological authority and the operator concerned.

Note.— Guidance on the design, formulation and use of concatenated charts is given in the Manual of Aeronautical Meteorological Practice *(Doc 8896).*

4.1.3 METAR and SPECI (including trend forecasts as issued in accordance with regional air navigation agreement), TAF, SIGMET and tropical cyclone 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.

Note.— Examples of the form of presentation of METAR/SPECI and TAF are given in Appendix 1.

4.1.4 The location indicators and the abbreviations used should be explained in the flight documentation.

4.1.5 The forms and the legend of charts included in flight documentation should be printed in English, French, Russian or Spanish. Where appropriate, approved abbreviations should be used. The units employed for each element should be

indicated; they should be in accordance with Annex 5.

4.2 Charts in flight documentation

4.2.1 Characteristics of charts

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

a) for convenience, the largest size of charts should be about 42 × 30 cm (standard size A3) and the smallest size should be about 21 × 30 cm (standard size A4). The choice between these sizes should depend on the route lengths and the amount of detail that needs to be given in the charts as agreed between meteorological authority and users concerned;

b) major geographical features, such as coastlines, major rivers and lakes should be depicted in a way that makes them easily recognizable;

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

d) major aerodromes should be shown as a dot and identified by the first letter of the name of the city the aerodrome serves as given in Table AOP of the relevant regional air navigation plan;

e) a geographical grid should be shown with meridians and parallels represented by dotted lines at each 10° latitude and longitude; dots should be spaced one degree apart;

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

g) labels on the charts for flight documentation should be clear and simple and should present the name of the world area forecast centre (WAFC) 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.

4.2.1.2 Meteorological information included in flight documentation shall be represented as follows:

a) winds on charts shall be depicted by arrows with feathers and shaded pennants on a sufficiently dense grid;

b) temperatures shall be depicted by figures on a sufficiently dense grid;

c) wind and temperature data selected from the data sets received from a world area forecast centre shall be depicted in a sufficiently dense latitude/longitude grid; and

d) wind arrows shall take precedence over temperatures and either shall take precedence over chart background.

4.2.1.3 For short-haul flights, charts should be prepared covering limited areas at a scale of 1:15 × 10^6 as required.

4.2.2 Set of charts to be provided

4.2.2.1 The minimum number of charts for flights between flight level 250 and flight level 630 shall include a high-level SIGWX chart (flight level 250 to flight level 630) and a forecast 250 hPa wind and temperature chart. The actual charts provided for pre-flight and in-flight planning and for flight documentation shall be as agreed between meteorological authorities and users concerned.

4.2.2.2 Charts to be provided shall be generated from the digital forecast provided by the WAFCs whenever these forecasts cover the intended flight path in respect of time, altitude and geographical extent, unless otherwise agreed between the meteorological authority and the operator concerned.

4.2.3 Height indications

In flight documentation, height indications shall be given as follows:

a) all references to en-route meteorological conditions, such as height indications of upper winds, turbulence or bases and tops of clouds, shall preferably be expressed in flight levels; they may also be expressed in pressure, altitude or, for low-level flights, height above ground level; and

b) all references to aerodrome meteorological conditions, such as height indications of the bases of clouds, shall be expressed in height above the aerodrome elevation.

4.3 Specifications related to low-level flights

4.3.1 In chart form

Where the forecasts are supplied in chart form, flight documentation for low-level flights, including those in accordance with the visual flight rules, operating up to flight level 100 (or up to flight level 150 in mountainous areas or higher, where necessary), should contain the following as appropriate to the flight:

a) information from relevant SIGMET messages;

b) upper wind and upper-air temperature charts as given in Appendix 5, 4.3.1; and

c) significant weather charts as given in Appendix 5, 4.3.2.

4.3.2 In abbreviated plain language

Where the forecasts are not supplied in chart form, flight documentation for low-level flights, including those in accordance with the visual flight rules, operating up to flight level 100 (up to flight level 150 in mountainous areas or higher, where necessary), should contain the following information as appropriate to the flight:

a) SIGMET information; and

b) GAMET area forecasts.

Note.— An example of the GAMET area forecast is given in Appendix 5.

5 Specifications related to automated pre-flight information system for briefing, consultation, flight planning and flight documentation

5.1 Access to the systems

Automated pre-flight information systems providing self-briefing facilities shall provide for access by operators and flight crew members to consultation, as necessary, with an aerodrome meteorological office by telephone or other suitable telecommunications means.

5.2 Detailed specifications of the systems

Automated pre-flight information systems for the supply of meteorological information for self-briefing, pre-flight planning and flight documentation should:

a) provide for the continuous and timely updating of the system database and monitoring of the validity and integrity of the meteorological information stored;

b) permit access to the system by operators and flight crew members and also by other aeronautical users concerned through suitable telecommunications means;

c) use access and interrogation procedures based on abbreviated plain language and, as appropriate, ICAO location indicators, and aeronautical meteorological code data-type designators prescribed by the WMO, or based on a menu-driven user interface, or other appropriate mechanisms as agreed between the meteorological authority and operators concerned; and

d) provide for rapid response to a user request for information.

Note.— ICAO abbreviations and codes and location indicators are given respectively in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes *(PANS- ABC, Doc 8400) and* Location Indicators *(Doc 7910). Aeronautical meteorological code data-type designators are given in the* Manual on the Global Telecommunication System *(WMO No. 386).*

6 Specifications related to Information for aircraft in flight

6.1 Supply of information requested by an aircraft in flight

If an aircraft in flight requests meteorological information, the aerodrome meteorological office or meteorological watch office which receives the request should arrange to supply the information with the assistance, if necessary, of another aerodrome meteorological office or meteorological watch office.

6.2 Information for in-flight planning by the operator

Meteorological information for planning by the operator for aircraft in flight should be supplied during the period of the flight and should normally consist of any or all of the following:

a) METAR and SPECI (including trend forecasts as issued in accordance with regional air navigation agreement);

b) TAF and amended TAF;

c) SIGMET relevant to the flight, unless the latter have been the subject of a SIGMET message;

d) upper wind and upper-air temperature information;

e) volcanic ash and tropical cyclone advisory information relevant to the flight; and

f) other meteorological information in alphanumeric or graphical form as agreed between the meteorological authority and the operator concerned.

Note.— Guidance on the display of graphical information in the cockpit is provided in the Manual of Aeronautical Practice (Doc 8896).

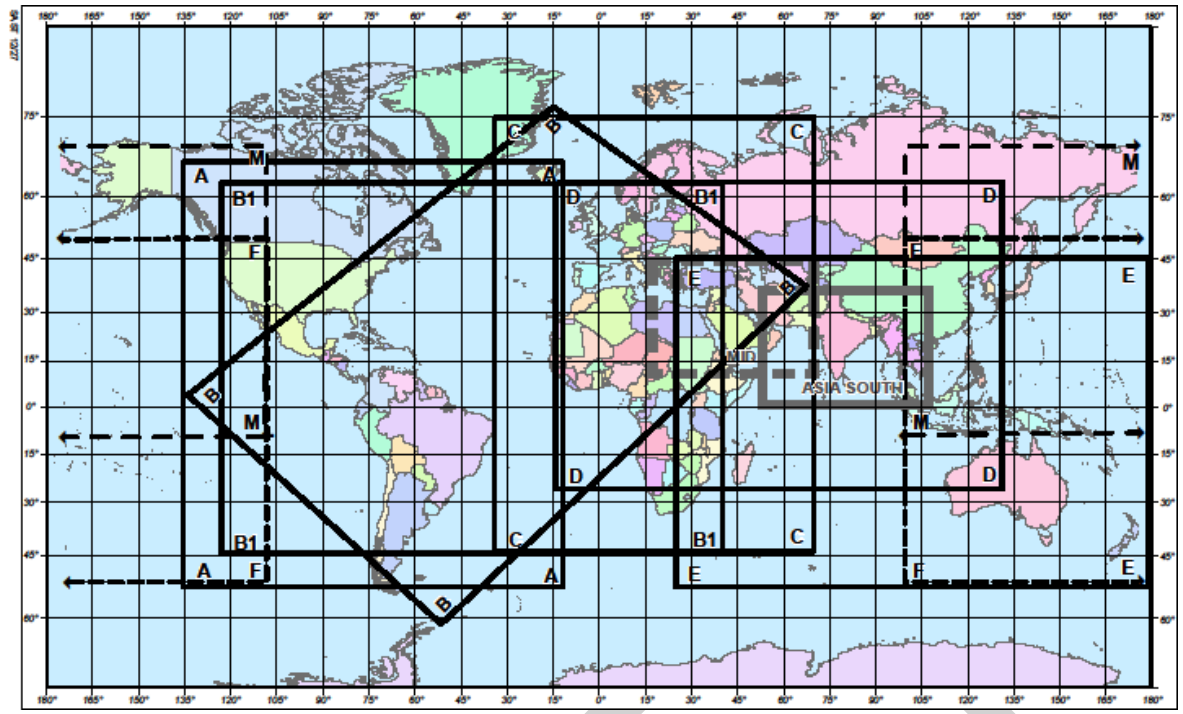

CHART	LATITUDE	LONGITUDE	CHART	LATITUDE	LONGITUDE
A	N6700	W13724	D	N6300	W01500
A	N6700	W01236	D	N6300	E13200
A	S5400	W01236	D	S2700	E13200
A	S5400	W13724	D	S2700	W01500
ASIA	N3600	E05300	E	N4455	E02446
ASIA	N3600	E10800	E	N4455	E18000
ASIA	0000	E10800	E	S5355	E18000
ASIA	0000	E05300	E	S5355	E02446
B	N0304	W13557	F	N5000	E10000
B	N7644	W01545	F	N5000	W11000
B	N3707	E06732	F	S5242	W11000
B	S6217	W05240	F	S5242	E10000
B1	N6242	W12500	M	N7000	E10000
B1	N6242	E04000	M	N7000	W11000
B1	S4530	E04000	M	S1000	W11000
B1	S4530	W12500	M	S1000	E10000
C	N7500	W03500	MID	N4400	E01700
C	N7500	E07000	MID	N4400	E07000
C	S4500	E07000	MID	N1000	E07000
C	S4500	W03500	MID	N1000	E01700

Figure A8-1: Fixed areas of coverage of WAFS forecasts in chart form — Mercator projection

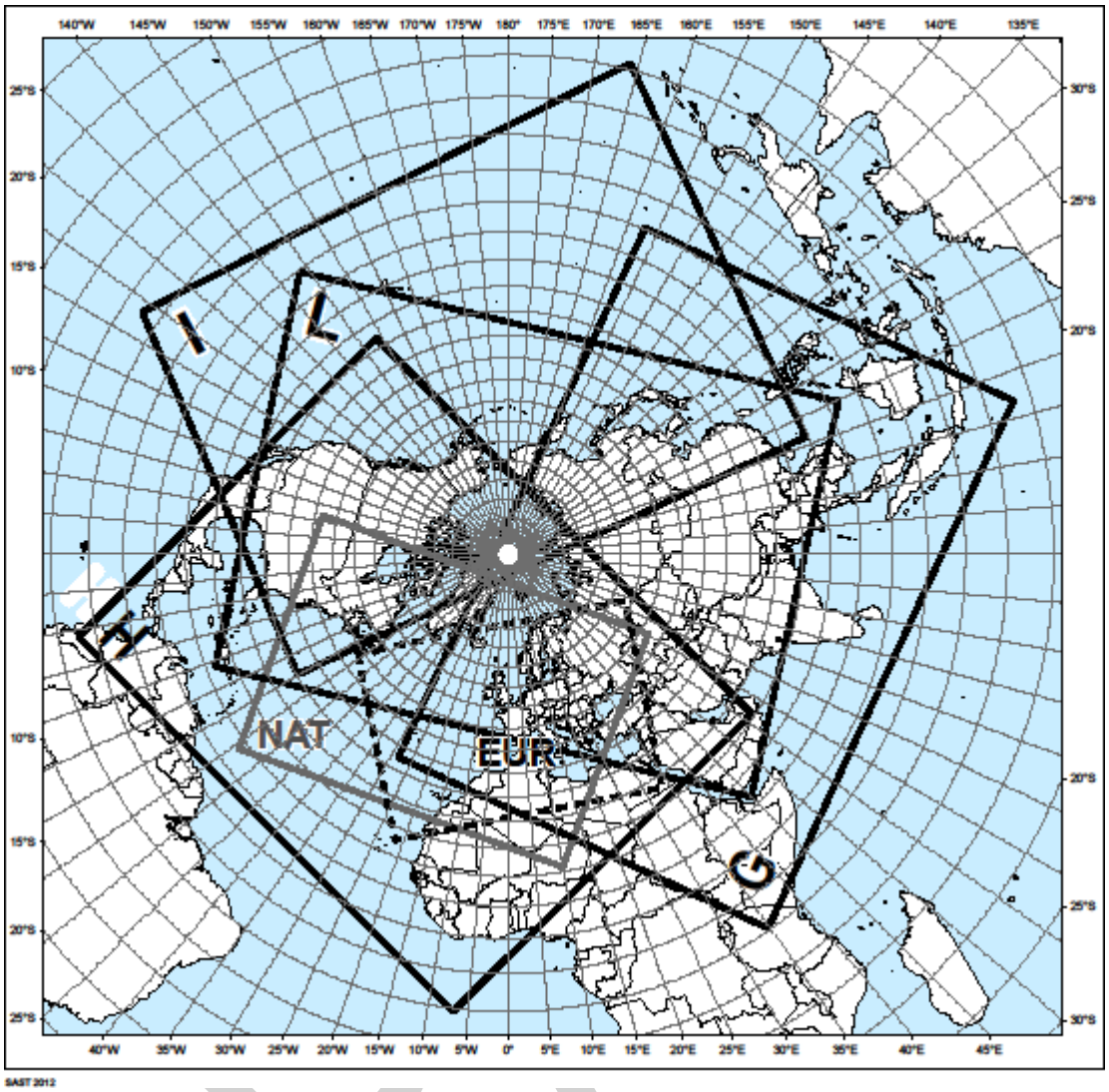

CHART	LATITUDE	LONGITUDE	CHART	LATITUDE	LONGITUDE
EUR	N4633	W05634	I	N1912	E11130
EUR	N5842	E06824	I	N3330	W06012
EUR	N2621	E03325	I	N0126	W12327
EUR	N2123	W02136	I	S0647	E16601
G	N3552	W02822	L	N1205	E11449
G	N1341	E15711	L	N1518	E04500
G	S0916	E10651	L	N2020	W06900
G	S0048	E03447	L	N1413	W14338
H	N3127	W14836	NAT	N4439	W10143
H	N2411	E05645	NAT	N5042	E06017
H	S0127	W00651	NAT	N1938	E00957
H	N0133	W07902	NAT	N1711	W05406

Figure A8-2: Fixed areas of coverage of WAFS forecasts in chart form — Polar stereographic projection (northern hemisphere)

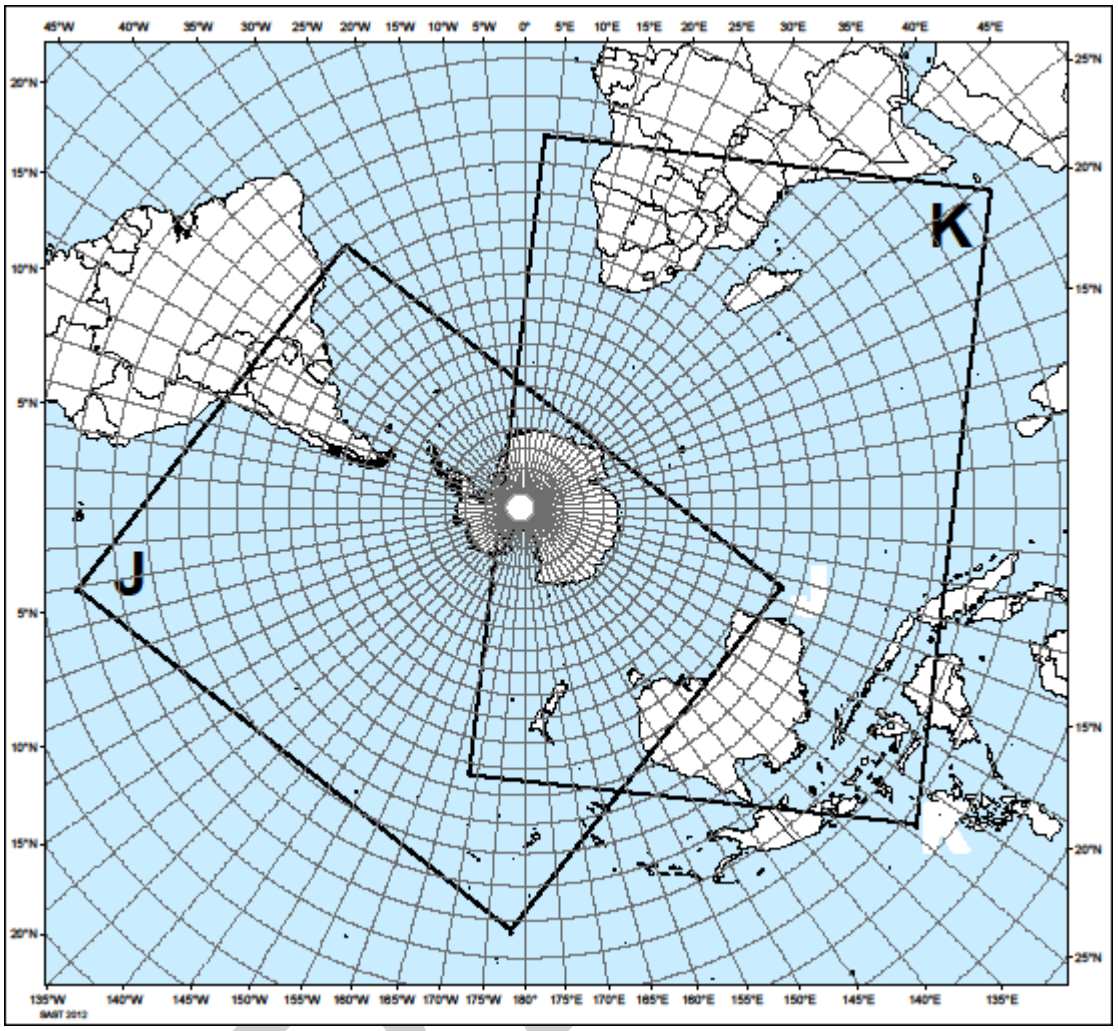

CHART	LATITUDE	LONGITUDE
J	S0318	W17812
J	N0037	W10032
J	S2000	W03400
J	S2806	E10717
K	N1255	E05549
K	N0642	E12905
K	S2744	W16841
K	S1105	E00317

Figure A8-3: Fixed areas of coverage of WAFS forecasts in chart form — Polar stereographic projection (southern hemisphere)

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

(See Para 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) local routine reports, local special reports, METAR, SPECI, TAF, trend forecasts and amendments thereto, for the aerodrome concerned;
b) SIGMET information, wind shear warnings and alerts and aerodrome warnings;
c) any additional meteorological information agreed upon locally, such as forecasts of surface wind for the determination of possible runway changes;
d) information received on volcanic ash cloud, for which a SIGMET has not already been issued; 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) local routine reports, local special reports, METAR, SPECI, TAF, trend forecasts and amendments thereto, for the aerodrome(s) with which the approach control unit is concerned;
b) SIGMET information, wind shear warnings and alerts for the airspace with which the approach control unit is concerned and aerodrome warning
c) s;
d) any additional meteorological information agreed upon locally;
e) 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
f) information received on pre-eruption volcanic activity and/or a volcanic eruption as agreed between the meteorological and ATS authorities concerned.

1.3 List of information for the area control centre (ACC) and flight information centre (FIC)

The following meteorological information shall be supplied, as necessary, to an area control centre (ACC) or a flight information centre (FIC) 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 flight information centre (FIC) or area control centre (ACC), covering aerodromes in neighbouring FIRs, as determined by regional air navigation agreement;

b) forecasts of upper winds, upper-air temperatures and significant en-route weather phenomena and amendments thereto, particularly those which are likely to make operation under visual flight rules impracticable, SIGMET information and appropriate special air-reports for the FIR or CTA and, if determined by regional air navigation agreement and required by the FIC or ACC, for neighbouring FIRs;

c) any other meteorological information required by the FIC or ACC to meet requests from aircraft in flight; if the information requested is not available in the associated 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 the meteorological and ATS authorities concerned;

e) information received concerning the release of radioactive materials into the atmosphere as agreed between the meteorological and ATS authorities concerned;

f) tropical cyclone advisory information issued by a TCAC in its area of responsibility;

g) volcanic ash advisory information issued by a VAAC in its area of responsibility; and

h) information received on pre-eruption volcanic activity and/or a volcanic eruption.

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 FIC or ACC.

1.5 Format of information

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

1.5.2 When computer-processed upper-air data for grid points are made available to air traffic services units in digital form for use by air traffic services computers, the contents, format and transmission arrangements should be as agreed between the meteorological authority and the

appropriate ATS authority. The data should normally be supplied as soon as is practicable after the processing of the forecasts has been completed.

2 Information to be provided for Search and Rescue Service 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-surface temperature, state of the sea, ice cover if any and ocean currents, if relevant to the search area; and

g) sea-level pressure data.

2.2 Information to be provided on request

2.2.1 On request from the rescue coordination centre, the designated aerodrome meteorological office or MWO should arrange to obtain details of the flight documentation which was supplied to the missing aircraft, together with any amendments to the forecast which were transmitted to the aircraft in flight.

2.2.2 To facilitate search and rescue operations, the designated aerodrome meteorological office or MWO should, on request, supply:

a) complete and detailed information on the current and forecast meteorological conditions in the search area; and

b) current and forecast conditions en route, covering flights by search aircraft from and returning to the aerodrome from which the search is being conducted.

2.2.3 On request from the rescue coordination centre, the designated aerodrome meteorological office or MWO should supply or arrange for the supply of meteorological information required by ships undertaking search and rescue operations.

3 Information to be provided for Aeronautical Information Service 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 ~~Annex 15~~ PANS-AIM, Appendix ~~1~~3, Part 1, 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 Annex 15, ~~5.1.1~~6.3.2.2 and ~~5.1.1.1~~6.3.2.3;

2) the occurrence of volcanic activity; and

Note.— The specific information required is given in Para 3, 3.3.2 and Para 4, 4.8 of this CAR.

3) release of radioactive materials into the atmosphere as agreed between the meteorological and appropriate civil aviation authorities concerned; and

Note.— The specific information required is given in Para 3, 3.4.2 g) of this CAR.

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 Para 11 of this CAR)

1 Specific requirements for communication

1.1 Required transit times of meteorological information

AFTN messages and bulletins containing operational meteorological information shall achieve transit times of less than 5 minutes, unless otherwise determined to be lower by regional air navigation agreement.

1.2 Grid point data for ATS and operators

1.2.1 When upper-air data for grid points in digital form are made available for use by air traffic services computers, the transmission arrangements should be as agreed between the meteorological authority and the appropriate ATS authority.

1.2.2 When upper-air data for grid points in digital form are made available to operators for flight planning by computer, the transmission arrangements should be as agreed among the WAFC concerned, the meteorological authority and the operators concerned.

2 Use of Aeronautical Fixed Service Communications and Public Internet

2.1 Meteorological bulletins in alphanumeric format

2.1.1 Composition of bulletins

Whenever possible, exchanges of operational meteorological information should be made in consolidated bulletins of the same types of meteorological information.

2.1.2 Filing times of bulletins

Meteorological bulletins required for scheduled transmissions should be filed regularly and at the prescribed scheduled times. METAR should be filed for transmission not later than 5 minutes after the actual time of observation. TAF should be filed for transmission not earlier than one hour prior to the beginning of their validity period.

2.1.3 Heading of bulletins

Meteorological bulletins containing operational meteorological information to be transmitted via the aeronautical fixed service or the public Internet shall contain a heading consisting of:

a) an identifier of four letters and two figures;

b) the ICAO four-letter location indicator corresponding to the geographical location of the meteorological office originating or compiling the

meteorological bulletin;

c) a day-time group; and

d) if required, a three-letter indicator.

Note 1.— Detailed specifications on format and contents of the heading are given in Manual on the Global Telecommunication System, WMO No. 386 *and are reproduced in the Manual of Aeronautical Meteorological Practice (Doc 8896).*

Note 2.— ICAO location indicators are listed in Location Indicators *(Doc 7910).*

2.1.4 Structure of bulletins

Meteorological bulletins containing operational meteorological information to be transmitted via the AFTN shall be encapsulated in the text part of the AFTN message format.

2.2 World area forecast system (WAFS) products

2.2.1 Telecommunications for the supply of WAFS products

The telecommunications facilities used for the supply of WAFS products should be the aeronautical fixed service or the public Internet.

2.2.2 Quality requirements for charts

Where WAFS products are disseminated in chart form, the quality of the charts received should be such as to permit reproduction in a sufficiently legible form for flight planning and documentation. Charts received should be legible over 95 per cent of their area.

2.2.3 Quality requirements for transmissions

Transmissions should be such as to ensure that their interruption should not exceed 10 minutes during any period of 6 hours.

2.2.4 Heading of bulletins containing WAFS products

Meteorological bulletins containing WAFS products in digital form to be transmitted via aeronautical fixed service or the public Internet shall contain a heading as given in 2.1.3.

3 Use of Aeronautical Mobile Service Communications

3.1 Content and format of meteorological messages

3.1.1 The content and format of reports, forecasts and SIGMET information transmitted to aircraft shall be consistent with the provisions of Para 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 Para 5 of this CAR and the *Procedures for* Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444), Appendix 1.

3.2 **Content and format of meteorological bulletins**

The substance of a meteorological bulletin transmitted via the aeronautical mobile service shall remain unchanged from that contained in the bulletin as originated.

4 Intentionally left blank.

5 Use of Aeronautical Broadcasting Service — VOLMET Broadcasts

5.1 Detailed content of meteorological information to be included in VOLMET broadcasts

5.1.1 The aerodromes for which METAR, SPECI and TAF are to be included in VOLMET broadcasts, the sequence in which they are to be transmitted and the broadcast time shall be determined by regional air navigation agreement.

5.1.2 The flight information regions for which SIGMET messages are to be included in scheduled VOLMET broadcasts shall be determined by regional air navigation agreement. Where this is done, the SIGMET message shall be transmitted at the beginning of the broadcast or of a five-minute time block.

5.2 Criteria related to information to be included in VOLMET broadcasts

5.2.1 When a report has not arrived from an aerodrome in time for a broadcast, the latest available report should be included in the broadcast, together with the time of observation.

5.2.2 TAF included in scheduled VOLMET broadcasts should be amended as necessary to ensure that a forecast, when transmitted, reflects the latest opinion of the aerodrome meteorological office concerned.

5.2.3 Where SIGMET messages are included in scheduled VOLMET broadcasts, an indication of “NIL SIGMET” should be transmitted if no SIGMET message is valid for the FIRs concerned.

5.3 Format of information to be included in VOLMET broadcasts

5.3.1 The content and format of reports, forecasts and SIGMET information included in VOLMET broadcasts shall be consistent with the provisions of Para 4, 6 and 7 of this CAR.

5.3.2 VOLMET broadcasts should use standard radiotelephony phraseologies.

Note.— Guidance on the standard radiotelephony phraseologies to be used in VOLMET broadcasts is given in the Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services (Doc 9377), Appendix 1.

ATTACHMENTS:

ATTACHMENT A. OPERATIONALLY DESIRABLE ACCURACY OF MEASUREMENT OR OBSERVATION

Note.— The guidance contained in this table relates to Para2, 2.2 — Supply, use, quality management and interpretation of meteorological information, in particular to 2.2.7, and Para 4 —Meteorological observations and reports.

Element to be observed	*Operationally desirable accuracy of measurement or observation**
Mean surface wind	Direction: ± 10° Speed: ± 0.5 m/s (1 kt) up to 5 m/s (10 kt) ± 10% above 5 m/s (10 kt)
Variations from the mean surface wind	± 1 m/s (2 kt), in terms of longitudinal and lateral components
Visibility	± 50 m up to 600 m ± 10% between 600 m and 1 500 m ± 20% above 1 500 m
Runway visual range	± 10 m up to 400 m ± 25 m between 400 m and 800 m ± 10% above 800 m
Cloud amount	± 1 okta
Cloud height	± 10 m (33 ft) up to 100 m (330 ft) ± 10% above 100 m (330 ft)
Air temperature and dew-point temperature	± 1°C
Pressure value (QNH, QFE)	± 0.5 hPa

* The operationally desirable accuracy is not intended as an operational requirement; it is to be understood 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 para 2, 2.2 — Supply, use, quality management and interpretation of meteorological information, in particular to 2.2.8, and Para 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.

Element to be forecast	*Operationally desirable accuracy of forecasts*	*Minimum percentage of cases within range*
	TAF	
Wind direction	± 20°	80% of cases
Wind speed	± 2.5 m/s (5 kt)	80% of cases
Visibility	± 200 m up to 800 m ± 30% between 800 m and 10 km	80% of cases
Precipitation	Occurrence or non-occurrence	80% of cases
Cloud amount	One category below 450 m (1 500 ft) Occurrence or non-occurrence of BKN or OVC between 450 m (1 500 ft) and 3 000 m (10 000 ft)	70% of cases
Cloud height	± 30 m (100 ft) up to 300 m (1 000 ft) ± 30% between 300 m (1 000 ft) and 3 000 m (10 000 ft)	70% of cases
Air temperature	± 1°C	70% of cases
	TREND FORECAST	
Wind direction	± 20°	90% of cases
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
Cloud amount	One category below 450 m (1500 ft) Occurrence or non-occurrence of BKN or OVC between 450 m (1 500 ft) and 3000 m (10000 ft)	90% of cases
Cloud height	± 30 m (100 ft) up to 300 m (1000 ft) ± 30% between 300 m (1000 ft) and 3000 m (10000 ft)	90% of cases

Element to be forecast	*Operationally desirable*	*Minimum percentage of*

	accuracy of forecasts	*cases within range*
	FORECAST FOR TAKE-OFF	
Wind direction	± 20°	90% of cases
Wind speed	± 2.5 m/s (5 kt) up to 12.5 m/s (25 kt)	90% of cases
Air temperature	± 1°C	90% of cases
Pressure value (QNH)	± 1 hPa	90% of cases
	AREA, FLIGHT AND ROUTE FORECASTS	
Upper-air temperature	± 2°C (Mean for 900 km (500 NM)	90% of cases
Relative humidity	± 20%	90% of cases
Upper wind	± 5 m/s (10 kt) (Modulus of vector difference for 900 km (500 NM)	90% of cases
Significant en-route weather phenomena and cloud	Occurrence or non-occurrence Location: ± 100 km (60 NM) Vertical extent: ± 300 m (1 000 ft) Flight level of tropopause: ± 300 m (1 000 ft) Max wind level: ± 300 m (1 000 ft)	80% of cases 70% of cases 70% of cases 80% of cases 80% of cases

ATTACHMENT C. SELECTED CRITERIA APPLICABLE TO AERODROME REPORTS

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

	Surface wind				*Visibility (VIS)*			*Runway visual range*[1] *(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°	Exceeding the mean speed by ≥ 5 m/s (10 kt)	General rule	Special cases Minimum VIS prevailing VIS				Lowest layer	Next layer >	Next higher layer >	CB[6] or TCU	Identification		Parameters reported	Updated if changes > agreed magnitude	Parameter to be included
	Mean speed					Minimum VIS < 1 500 m or < 0.5 × prevailing VIS	VIS fluctuating and prevailing VIS cannot be determined											
	< 1.5 m/s (3 kt)	≥ 1.5 m/s (3 kt)																
Local routine and special report	2/10 min[7]	2/10 min[7]	2 min	10 min[8]	1 min	N/A	N/A	1 min		Always	2/8	4/8	Always	CB TCU		QNH QFE[10]	Yes	All[11]
	VRB + 2 extreme directions	mean + 2 extreme directions	VRB (no extremes)	Minimum and maximum speed	VIS along the runway(s)			N/A[9]										
METAR/ SPECI	10 min	10 min	10 min	10 min[8]	10 min	Prevailing VIS and minimum VIS + direction	Minimum VIS	10 min		Always	2/8	4/8	Always	CB TCU		QNH	No	Recent WX of operational significance and wind shear[12]
	VRB (no extremes)	mean + 2 extreme directions	VRB (no extremes)	Maximum speed	Prevailing VIS			No tendency observed ("N") / Upward ("U") or downward ("D") / 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: *Step applicable* : 50 m; 800 m ≤ VIS < 5 000 m: : 100m; 5 000 m ≤ VIS < 10 km: : 1 km; VIS ≥ 10 km: : None, given as 10 km or covered under CAVOK			*If* RVR < 400 m: *Step applicable* : 25 m; 400 m ≤ RVR ≤ 800 m: 50m; 800 m < RVR < 2 000 m: 100 m[13]	N/A	*If* Base ≤ 3 000 m (10 000 ft): *Step applicable* : 30 m (100 ft); (Reference level: Aerodrome elevation[14] or mean sea level for offshore structures)				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 $\bar{R}_{5(AB)}$= 5-minute mean runway visual range value during period AB and $\bar{R}_{5(BC)}$ = 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 READING 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 back-ground luminance ranges is convenient but will reduce accuracy. The four values are shown in Figure D-1 in the form of a step function; they are tabulated in Table D-1 for greater clarity.

Note 1.— Information and guidance material on the runway lights to be used for assessment of runway visual range are contained in the Manual of Runway Visual Range Observing and Reporting Practices *(Doc 9328).*

Note 2.— In accordance with the definition of visibility for aeronautical purposes, the intensity of lights to be used for the assessment of visibility is in the vicinity of 1 000 cd.

Table D-1. Illumination threshold steps

Condition	*Illumination threshold (lx)*	*Background luminance (cd/m^2)*
Night	8×10^{-7}	≤ 50
Intermediate	10^{-5}	51 – 999
Normal day	10^{-4}	1000 – 12000
Bright day (sunlit fog)	10^{-3}	> 12000

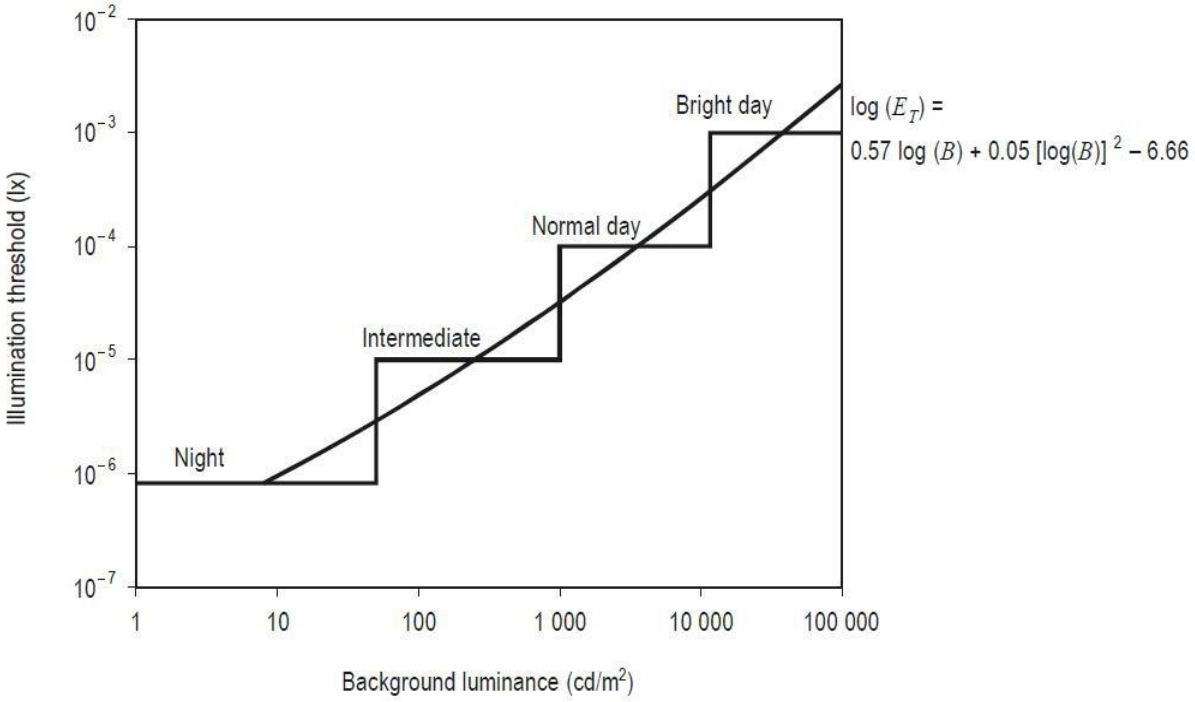

Figure D-1. Relationship between the illumination threshold E_T (lx) and background luminance B (cd/m^2)

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

The technical specifications related to SWXC are stipulates in Chapter 3, Appendix 2 and Attachment E of ICAO Annex 3 for the contracting states which have accepted responsibilities to monitor and provide advisory information on space weather.

India is not a SWXC. However, the Service Provider shall have to be familiar with the technical specifications so as to be able to interact with SWXC and use its products/services effectively.

(B. S. Bhullar)

Director General of Civil Aviation