

STATUTORY INSTRUMENTS SUPPLEMENT

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S T A T U T O R Y I N S T R U M E N T S

2020 No. 30.

**THE CIVIL AVIATION (METEOROLOGICAL SERVICES FOR AIR
NAVIGATION) REGULATIONS, 2020**

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STATUTORY INSTRUMENTS

2020 No. 30.

The Civil Aviation (Meteorological Services for Air Navigation) Regulations, 2020

(Under sections 34(2) and 61 of the Civil Aviation Authority Act, Cap. 354)

IN EXERCISE of the powers conferred upon the Minister by sections 34(2) and 61(2) of the Civil Aviation Authority Act, and on the recommendation of the Uganda Civil Aviation Authority, these Regulations are made this 5th day of February, 2020.

PART I—PRELIMINARY

1. Title

These regulations may be cited as the Civil Aviation (Meteorological Services for Air Navigation) Regulations, 2020.

2. Interpretation

In these Regulations unless the context otherwise requires—

“Act” means the Civil Aviation Authority Act, Cap. 354;

“aerodrome” means 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 table” means a Table providing statistical data on the observed occurrence of one or more meteorological elements at an aerodrome;

“aerodrome climatological summaries” means a concise summary of specified meteorological elements at an aerodrome based on a statistical data;

- “aerodrome control tower” means a unit established to provide air traffic control service to aerodrome traffic;
- “aerodrome elevation” means the elevation of the highest point of the landing area;
- “aerodrome meteorological office” means an office designated to provide meteorological service for aerodromes serving air navigation;
- “aerodrome reference point” means the designated geographical location of an aerodrome;
- “Aeronautical Fixed Service (AFS)” means 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)” means a worldwide system of aeronautical fixed circuits provided, as part of the aeronautical fixed service, for the exchange of messages or digital data between aeronautical fixed stations having the same or compatible communications characteristics;
- “aeronautical meteorological station” means a station designated to make observations and meteorological reports for use in air navigation;
- “aeronautical meteorological station” means a station designated to make observations and meteorological reports for use in air navigation.
- “aeronautical mobile service” means 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” means a station in the aeronautical telecommunication service;

- “AFI” mean African-Indian Ocean region in accordance with ICAO regional structure;
- “aircraft” means 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” means the evaluation of one or more meteorological elements made from an aircraft in flight;
- “AIRMET information” means 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;
- “air navigation services” means services provided to air traffic during all phases of operation including air traffic management, meteorological services for air navigation, communication, navigation and surveillance, search and rescue, aeronautical information services and construction of instrument flight procedures;
- “air navigation service provider (ANSR)” means the directorate in the Authority designated for the purposes of operating and managing air navigation services;
- “air-report” means a report from an aircraft in flight prepared in conformity with requirements for position, and operational or meteorological reporting;
- “air traffic services unit” means a generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office;
- “alternate aerodrome” means 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” means an alternate aerodrome at which an aircraft would be able to land shall this become necessary shortly after take-off and it is not possible to use the aerodrome of departure;

“En-route alternate” means 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 shall it become either impossible or inadvisable to land at the aerodrome of intended landing;

“altitude” means the vertical distance of a level, a point or an object considered as a point, measured from mean sea level (MSL);

“approach control unit” means a unit established to provide air traffic control service to controlled flights arriving at, or departing from, one or more aerodromes;

“Appropriate Air Traffic Service (ATS) provider” means the relevant ATS designated by the State responsible for providing air traffic services in the airspace concerned;

“area control centre” means a unit established to provide air traffic control service to controlled flights in control areas under its jurisdiction;

“Area Navigation (RNAV)” means 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;

“Authority” means Uganda Civil Aviation Authority established under section 3 of the Civil Aviation Authority Act, Cap. 354;

“Automatic Dependent Surveillance (ADS)” means a surveillance technique in which aircraft automatically provide, via a data link, data derived from on-board navigation and position-fixing systems, including aircraft identification, four-dimensional position and additional data as appropriate;

“Automatic Dependent Surveillance - Contract (ADS-C)” means an arrangement 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;

“briefing” means oral commentary on existing or expected meteorological conditions;

“cloud of operational significance” means a cloud with the height of cloud base below 1500 m (5000 ft.) or below the highest minimum sector altitude, whichever is greater, or a cumulonimbus cloud or a towering cumulus cloud at any height;

“consultation” means a discussion with a meteorologist or another qualified person of existing or expected meteorological conditions relating to flight operations; a discussion includes answers to questions;

“Control Area (CTA)” means a controlled airspace extending upwards from a specified limit above the earth;

“cruising level” means a level maintained during a significant portion of a flight;

“currency point” as the same value assigned to it in Schedule 1 of these Regulations;

“department of meteorology” means the Uganda National Meteorological Authority established under the Uganda National Meteorological Authority Act, 2012, Act No.11 of 2012;

“direct speech” means a direct link of aeronautical fixed service (AFS) telephone circuit for direct exchange of information between air traffic services (ATS) units and other service providers;

“elevation” means 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” means any flight by an aeroplane with two turbine engines where the flight time at the one engine inoperative cruise speed (in ISA and still air conditions), from a point on the route to an adequate alternate aerodrome, is greater than the threshold time approved by the State of the Operator;

“flight crew member” means a licensed crew member charged with duties essential to the operation of an aircraft during a flight duty period;

“flight documentation” means written or printed documents, including charts or forms, containing meteorological information for a flight;

“flight information centre” means a unit established to provide flight information service and alerting service;

“flight information region” means airspace of defined dimensions within which flight information service and alerting service are provided;

“flight level” means a surface of constant atmospheric pressure which is related to a specific pressure datum, 1013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals;

“forecast” means a statement of expected meteorological conditions for a specified time or period, and for a specified area or portion of airspace;

“GAMET area forecast” means 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 department of meteorology concerned and exchanged with meteorological offices in adjacent flight information regions, as agreed between the meteorological authorities concerned;

“grid point data in digital form” means 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;

“height” means the vertical distance of a level, a point or an object considered as a point, measured from a specified datum;

“Hectopascal (hPa)” means a metric (SI) measurement unit of pressure equivalent to millibars;

“human factors principles” means principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance;

“ICAO meteorological information exchange model (IWXXM)” means a data model for representing aeronautical meteorological information;

“International Airways Volcano Watch (IAVW)” means International arrangements for monitoring and providing warnings to aircraft of volcanic ash in the atmosphere;

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

“level” means a generic term relating to the vertical position of an aircraft in flight and meaning variously height, altitude or flight level;

“make available” is used solely in connection with cases where the obligation ends with making the information accessible to a user;

“METAR” means aerodrome routine meteorological reports;

“Meteorological Authority” means an entity providing meteorological service for air navigation;

“meteorological bulletin” means a text comprising meteorological information preceded by an appropriate heading;

“meteorological information” means Meteorological report, analysis, forecast, and any other statement relating to existing or expected meteorological conditions;

“meteorological office” means an office designated to provide meteorological service for air navigation;

“meteorological report” means a statement of observed meteorological conditions related to a specified time and location;

“meteorological satellite” means an artificial Earth satellite making meteorological observations and transmitting these observations to Earth;

“Meteorological Watch Office (MWO)” means 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” means the lowest altitude which may be used which will provide a minimum clearance of 300 m(1 000 ft) above all objects located in an area contained within a sector of a circle of 46 km (25 NM) radius centred on a radio aid to navigation;

“navigation specification” means a set of aircraft and flight crew requirements needed to support performance-based navigation operations within a defined airspace; and

the navigation specifications are—

- (a) “required navigation performance (RNP) specification” means 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; and
- (b) “Area navigation (RNAV) specification” means 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;

“observation (meteorological)” means the evaluation of one or more meteorological elements;

“operational control” means 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” means the operator’s plan for the safe conduct of the flight based on considerations of aero plane performance, other operating limitations and relevant expected conditions on the route to be followed and at the aerodromes concerned;

“operational planning” means the planning of flight operations by an operator;

“operator” means a person, organization or enterprise engaged in or offering to engage in an aircraft operation;

“OPMET databanks” means operational aeronautical meteorological databank that uses ICAO Meteorological Information Exchange Model;

“Performance-Based Navigation (PBN)” means Area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace;

“pilot-in-command” means the pilot designated by the operator, or in the case of general aviation, the owner, as being in command and charged with the safe conduct of a flight;

“person” means natural person including an entity, a company or association or body of persons, corporate or incorporate;

“prevailing visibility” means the greatest visibility value, observed in accordance with the definition of visibility;

“visibility” which is reached within at least half the horizon circle or within at least half of the surface of the aerodrome. These areas could comprise contiguous or non-contiguous sectors;

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

“prognostic chart” means a forecast of a specified meteorological elements for a specified time or period and a specified surface or portion of airspace, depicted graphically on a chart;

“quality assurance” means Part of quality management focused on providing confidence that quality requirements will be fulfilled;

“quality control” means Part of quality management focused on fulfilling quality requirements (ISO 9000*);

“quality management” means Coordinated activities to direct and control an organization with regard to quality;

“Regional Air navigation aAgreement” means an Agreement approved by the Council of ICAO, normally on the advice of a regional air navigation meeting;

“reporting point” means a specified geographical location in relation to which the position of an aircraft can be reported;

“Rescue Coordination Centre” means 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” means a defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft;

“Runway visual range (RVR)” means 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;

“Space Weather Centre (SWXC)” means 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 or pose a radiation risk to aircraft occupants;

“search and rescue services unit means a generic term meaning, as the case may be, rescue coordination centre, rescue sub centre or alerting post;

“SIGMET information” means 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;

“SPECI” means aerodrome special meteorological reports;

“standard isobaric surface” means an isobaric surface used on a worldwide basis for representing and analyzing the conditions in the atmosphere;

“supply” is used solely in connection with cases where there is an obligation to issue or make available a particular service in support of air navigation;

“TAF” mean Terminal Aerodrome Forecasts, referred to as aerodrome forecasts in these Regulations;

“threshold” means the beginning of that portion of the runway usable for landing;

“touchdown zone” means the portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway;

“tropical cyclone” means Generic term for a non-frontal synoptic-scale cyclone originating over tropical or subtropical waters with organized convection and definite cyclonic surface wind circulation;

“Tropical Cyclone Advisory Centre (TCAC)” means a meteorological centre designated by regional air navigation agreement to provide advisory information to

meteorological watch offices, world area forecast centres and international OPMET databanks regarding the position, forecast direction and speed of movement, central pressure and maximum surface wind of tropical cyclones;

“upper-air chart” means a meteorological chart relating to a specified upper-air surface or layer of the atmosphere;

“visibility” means 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;

“Volcanic Ash Advisory Centre (VAAC)” means a meteorological centre designated by regional air navigation agreement to provide advisory information to meteorological watch offices, area control centres, flight information centres, world area forecast centres and international OPMET databanks regarding the lateral and vertical extent and forecast movement of volcanic ash in the atmosphere following volcanic eruptions;

“state volcano observatory” means 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 or flight information centre, meteorological watch office and volcanic ash advisory centre;

“VOLMET” means meteorological information for aircraft in flight;

“Data link-VOLMET (D-VOLMET)” means 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” means provision, as appropriate, of current METAR, SPECI, TAF and SIGMET by means of continuous and repetitive voice broadcasts;

“World Area Forecast Centre (WAFC)” means 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)” means a worldwide system by which world area forecast centres provide aeronautical meteorological en-route forecasts in uniform standardized formats.

3. Application

(1) These Regulations apply to a person or entity providing meteorological services for air navigation services within the Uganda air space and at aerodromes.

(2) These Regulations may not apply to a person providing air navigation services in the course of his or her duties for state aircraft.

PART II—PROVISION OF METEOROLOGICAL SERVICE FOR AIR NAVIGATION SERVICES

4. Designation and authorisation to provide meteorological services for air navigation

(1) The Authority shall provide specified aviation meteorological services in Uganda and information concerning weather conditions and forecast shall be provided to all aircraft in Ugandan airspace in a timely and orderly manner.

(2) The appropriate meteorological services shall be provided to the Authority by the department of meteorology.

(3) The Authority shall determine the meteorological services which shall be provided to meet the needs of air navigation.

5. Procedures for provision of meteorological services for air navigation

The department of meteorology shall provide meteorological services for air navigation in accordance with the Uganda National Meteorological Act, 2012, the Civil Aviation Act, these Regulations, Africa and Indian Ocean regional air navigation agreements and the procedures prescribed in the manuals of operations issued by the department from time to time.

6. Obligations of the department of meteorology.

The department of meteorology shall—

- (a) maintain adequate personnel with required competency to provide meteorological services;
- (b) have facilities, services and equipment to provide meteorological services for air navigation in accordance with these Regulations;
- (c) provide operating procedures to ensure safety of aircraft; and
- (d) put in place a quality management system.

PART III—GENERAL PROVISIONS FOR METEOROLOGICAL
SERVICES FOR AIR NAVIGATION

7. Objective, determination and provision of meteorology service

(1) The objective of meteorological service for air navigation is to contribute towards the safety, regularity and efficiency of air navigation.

(2) The objective in subregulation (1) shall be achieved by the department of meteorology through supplying meteorological information to the following—

- (a) operators and flight crew members;
- (b) air traffic services units;
- (c) search and rescue services units;
- (d) airport operators; and
- (e) any other person as may be identified by the Authority.

(3) The Authority shall determine the meteorological services required to meet the needs of air navigation and shall include meteorological service to be provided for international air navigation over international waters and other areas which lie outside the territory of Uganda.

8. Personnel, qualification and training

The department of meteorology shall—

- (a) comply with the requirements of the World Meteorological Organization in respect of qualifications, competencies, education and training of personnel providing meteorological service for air navigation;
- (b) establish a procedure to assess the competency of personnel authorised to install meteorological facility for operational use and to perform meteorological services; and
- (c) maintain the competence of the personnel authorised to provide the meteorological services.

9. Supply, use and quality management of meteorological information

(1) The Authority shall, ensure that close liaison is maintained between the department of meteorology and the users referred to in regulation 7(2), on matters which affect the provision of meteorological service for air navigation.

(2) The Authority shall ensure that the department of meteorology establishes and implements a quality system comprising procedures, processes and resources necessary to provide for the quality management of the meteorological information to be supplied to users.

(3) The quality system established by department of meteorology under subregulation (2) shall be in conformity with the International Organization for Standardization (ISO) 9000 series of quality assurance standards and shall be certified by an organization recognized by the Authority.

(4) The quality system established by the department of meteorology shall provide the users with assurance that the meteorological information supplied complies with the stated requirements in terms of the geographical and spatial coverage, format and content, time and frequency of issuance and period of validity, as well as the accuracy of measurements, observations and forecasts.

(5) With regard to the exchange of meteorological information for operational purposes, the quality system established by the department of meteorology shall include verification and validation procedures and resources for monitoring adherence to the prescribed transmission schedules for individual messages or bulletins required to be exchanged, and the times of their filing for transmission.

(6) The quality system established by the department of meteorology shall be capable of detecting excessive transit times of messages and bulletins received.

(7) The department of meteorology shall through audit by the Authority demonstrate compliance of the quality system and where non-conformity of the system is identified, action shall be initiated to determine and correct the cause.

(8) Audit observations referred to in subregulation (7), shall be evidenced and properly documented by the Authority.

(9) The quality system established by the department of meteorology shall ascertain that specific value of any element given in—

- (a) an observation report shall be best approximation of the actual conditions at time of observation as set out in Schedule 2 of these Regulations; and
- (b) a forecast report shall be the most probable value which the element is likely to assume during the period of forecast as set out in Schedule 3 of these Regulations.

(10) The department of meteorology shall ascertain that meteorological information supplied to the users listed in regulation 7 (2) shall be consistent with Human Factors principles and shall be in a form which requires minimum interpretation by the users

10. Notifications required from operators

(1) An operator requiring meteorological service or changes in existing meteorological service shall give the the department of meteorology at least 14 days prior notice in writing.

(2) The department of meteorology shall be notified by the operator who requires the services where—

- (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.

(3) The operator referred to in subregulation (1) shall provide details necessary for the planning by the department of meteorology.

(4) The operator or a flight crew member shall ensure that, where required by the department of meteorology 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.

(5) The notification from operators to the aerodrome meteorological office of individual flights shall contain the following information—

- (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 aerodromes;
- (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; type of meteorological information requested for by a flight crew member, whether flight documentation or briefing or consultation; and
- (g) time at which briefing, consultation or flight documentation are required.

(6) Notwithstanding provisions of subregulation (5), in the case of scheduled flights, the requirement for some or all of this information may be waived by agreement between the aerodrome meteorological office and the operator

PART IV—GLOBAL SYSTEMS, SUPPORTING CENTRES AND METEOROLOGICAL OFFICES

11. Objective of the world area forecast system

(1) The department of meteorology shall establish meteorological offices in accordance with the technical specification and detailed criteria provided in Schedule 4.

(2) The department of meteorology shall receive global aeronautical meteorological en-route forecasts in digital form and subsequently supply to users referred to in regulation 7(2) in accordance with the objective of the world area forecast system.

(3) The objective in subregulation (2) shall be achieved through a comprehensive, integrated, worldwide uniform system, taking full advantage of evolving technologies.

12. Aerodrome meteorological offices

(1) The department of meteorology shall establish one or more aerodrome or other meteorological offices which shall be adequate for the provision of the meteorological services required to meet the needs of air navigation as specified in Part II of Schedule 4.

(2) An aerodrome meteorological office established under subregulation (1), shall carry out all or some of the following functions as necessary to meet the needs of flight operations at the aerodrome—

- (a) prepare or obtain forecasts and other relevant information for flights with which it is concerned and 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 meteorological offices;
- (b) prepare 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 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 air traffic service authorities concerned.

(3) The aerodromes for which landing forecasts are required shall be determined by the department of meteorology in accordance with AFI regional air navigation agreement.

(4) The department of meteorology shall, for an aerodrome without an aerodrome meteorological office—

- (a) designate one or more aerodrome meteorological offices to supply meteorological information to an aerodrome without an aerodrome meteorological office; and
- (b) agree with the concerned aerodrome operators to establish means by which such information can be supplied to the aerodromes.

13. Meteorological watch offices

(1) The department of meteorology shall establish, on the basis of AFI regional air navigation agreement, one or more meteorological watch offices as specified in Part II of Schedule 4 of these Regulations.

(2) A meteorological watch office shall—

- (a) maintain continuous watch over meteorological conditions affecting flight operations within its area of responsibility;
- (b) prepare SIGMET and other information relating to its area of responsibility;

- (c) supply SIGMET information and, as required, other meteorological information to associated air traffic services units;
- (d) disseminate SIGMET information to users referred to in regulation 7(2);
- (e) supply information received on pre-eruption volcanic activity, a volcanic eruption and volcanic ash cloud for which a SIGMET has not already been issued, to its associated area control center or flight information centre, as agreed between the meteorological and air traffic services authorities concerned, and to its associated VAAC as determined by the AFI regional air navigation agreement;
- (f) supply information received concerning the release of radioactive materials into the atmosphere, in the adjacent states, to its associated area control center or flight information centre, and to aeronautical information service units, as agreed between the meteorological and appropriate civil aviation authorities concerned and such information shall comprise location, date and time of the release, and forecast trajectories of the radioactive materials; and
- (g) prepare, supply and disseminate any other information as may be required by the AFI regional air navigation agreement.

(3) The boundaries of the area over which meteorological watch is to be maintained by a meteorological watch office shall be coincident with the boundaries of a flight information region or a control area or a combination of flight information region and control areas.

14. State volcano observatories

(1) Where there are active or potentially active volcanoes, the department of meteorology shall arrange with State volcano

observatories monitoring volcanic activities within Uganda in accordance with AFI regional air navigation agreement and the department of meteorology shall use observations from the State volcano observatories to prepare reports on—

- (a) significant pre-eruption volcanic activity or a cessation;
- (b) a volcanic eruption or a cessation; and
- (c) volcanic ash in the atmosphere.

(2) The department of meteorology shall send the reports referred to in subregulation (1) as quickly as practicable to their associated ACC, MWO and VAAC.

15. Space Weather Centres (SWXC)

(1) The department of meteorology shall establish the space weather centre (SWXC) to monitor and provide advisory information on space weather phenomena in its area of responsibility by arranging for that centre to—

- (a) monitor relevant ground-based, airborne and space-based observations to detect, and predict when possible, the existence of space weather phenomena that have an impact in the following areas—
 - (i) High Frequency (HF) radio communications;
 - (ii) communications via satellite;
 - (iii) Global Navigation Satellite System-based navigation and surveillance; and
 - (iv) radiation exposure at flight levels;
- (b) issue advisory information regarding the extent, severity and duration of the space weather phenomena that have an impact referred to in paragraph (a);
- (c) supply the advisory information referred to in paragraph (b) to—

- (i) area control centres, flight information centres and aerodrome meteorological offices in its area of responsibility which may be affected;
- (ii) other SWXCs; and
- (iii) international OPMET databanks, international NOTAM offices and aeronautical fixed service Internet-based services.

(2) The SWXC shall maintain a 24-hour watch and in the event of interruption of the operation of the SWXC, its functions shall be carried out by another SWXC as designated by the department of meteorology.

PART V—OBSERVATION AND REPORTING METEOROLOGICAL ELEMENTS

16. Aeronautical meteorological stations and observations

(1) The Authority shall ensure that department of meteorology establishes aeronautical meteorological stations at aerodromes, as deemed necessary and such aeronautical meteorological stations may be separate stations or may be combined with a synoptic station.

(2) The department of meteorology shall carry out meteorological observations and issue reports in accordance with the technical specification and detailed criteria set out in Part IV of Schedule 2, Schedule 11 and Schedule 13 of these Regulations.

(3) The aeronautical meteorological stations shall include sensors installed outside the aerodrome, where considered justified, by the department of meteorology to ensure the compliance of meteorological service for air navigation with the provisions of this regulation.

(4) The department of meteorology shall establish or arrange for the establishment of, aeronautical meteorological stations on offshore structures or at other points of significance in support of helicopter operations to offshore structures, as required by the AFI regional air navigation agreement.

(5) Aeronautical meteorological stations shall make routine observations at fixed time intervals and in case of 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 or air temperature.

(6) The Authority shall ensure that the department of meteorology arranges for its aeronautical meteorological stations to be inspected at sufficiently frequent intervals to ensure that a high standard of observation is maintained, that instruments and all their indicators are functioning correctly, and that the exposure of the instruments has not changed significantly.

(7) The department of meteorology may install automated equipment at aerodromes with runways intended for Category II and III instrument approach and landing operations and such equipment shall be 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 to support approach and landing and take-off operations.

(8) The department of meteorology shall ensure that automated equipment referred to in subregulation (7), are integrated automatic systems for acquisition, processing, dissemination and display in real time of the meteorological parameters affecting landing and take-off operations.

(9) The department of meteorology shall ensure that the design of integrated automatic systems observe human factors principles and include back-up procedures.

(10) The department of meteorology shall ensure that where an integrated semi-automatic system is used for the dissemination or display of meteorological information, it shall be capable of accepting the manual insertion of data covering those meteorological elements which cannot be observed by automatic means.

(11) The department of meteorology shall ensure that the observations form the basis for the preparation of reports to be disseminated at the aerodrome of origin and reports to be disseminated beyond the aerodrome of origin.

17. Agreement between air traffic services provider and department of meteorology

An agreement between the department of meteorology and the appropriate air traffic services provider shall be established to cover—

- (a) the provision of air traffic services units with display systems and instruments related to integrated automatic systems installed by the department of meteorology;
- (b) the calibration and maintenance of display system referred to in paragraph (a);
- (c) the procedures on how air traffic services personnel shall utilize the display system and instruments referred to in paragraph (a);
- (d) where necessary, supplementary visual observations made by air traffic services personnel when such observations are used to update or supplement the information supplied by the meteorological station;
- (e) meteorological information obtained from aircraft taking off or landing; or
- (f) meteorological information obtained from ground weather radar; and
- (g) any other meteorological information deemed necessary.

18. Routine observations and reports

(1) The department of meteorology shall make routine observations at aerodromes throughout the 24 hours each day, except as otherwise agreed between the department of meteorology, the appropriate air traffic services provider and the operator concerned

and such observations shall be made at intervals of one hour or, if so determined by AFI regional air navigation agreement, at intervals of 30 minutes.

(2) Routine observations at other aeronautical meteorological stations shall be made as determined by the department of meteorology taking into account the requirements of air traffic services units and aircraft operations.

(3) The department of meteorology shall issue reports of routine observations a—

- (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 intended for flight planning, VOLMET broadcasts and D-VOLMET.

(4) The department of meteorology shall issue a METAR prior to the aerodrome resuming operations at aerodromes that are not operational throughout 24 hours a day, in accordance with the AFI regional air navigation agreement.

19. Special observations and reports

(1) The department of meteorology shall establish a list of criteria for special observations, in consultation with, the appropriate air traffic services provider, operators and other users referred to in regulation 7(2).

(2) The department of meteorology shall issue reports of special observations 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.

(3) The department of meteorology shall issue SPECI at aerodromes that are not operational throughout 24 hours, following the resumption of the issuance of METAR, as necessary.

20. Contents of reports

(1) Local routine, special reports, METAR and SPECI issued by department of meteorology shall contain the following elements in the order indicated—

- (a) identification of the type of report;
- (b) location indicator;
- (c) date and 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 where QFE included only in local routine and special reports.

(2) In addition to elements listed under subregulation (1), local routine, special reports, METAR and SPECI issued by department of meteorology shall contain supplementary information to be placed after element referred to under subregulation (1) (k).

21. Observation and reporting of surface wind

The department of meteorology shall make observations and report surface wind and ascertain that—

- (a) the mean direction and the mean speed of the surface wind are measured, as well as significant variations of the wind direction and speed, and report in degrees true and metres per second or knots, respectively, in the routine observation reports;
- (b) when local routine and special reports are used for departing and arriving aircrafts, the surface wind observations for these reports shall be representative of conditions along the runway for departing aircraft and the touchdown zone for arriving aircraft; and
- (c) the surface wind observations for METAR and SPECI shall be representative of conditions above the whole runway where there is only one runway and the whole runway complex where there is more than one runway.

22. Observation and reporting of visibility

(1) The department of meteorology shall measure or observe visibility and report it in metres or kilometres.

(2) Where local routine and special reports are used for departing aircraft, the visibility observations for these reports shall be representative of conditions along the runway.

(3) Where local routine and special reports are used for arriving aircraft, the visibility observations for these reports shall be representative of the touchdown zone of the runway.

(4) The visibility observations shall be representative of the aerodrome for METAR and SPECI.

23. Observation and reporting of runway visual range

(1) The department of meteorology shall assess runway visual range (RVR) on all runways intended for Category II and III instrument approach and landing operations.

(2) The department of meteorology shall assess runway visual range 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 or centre line lights.

(3) The department of meteorology shall report runway visual range, in paragraphs (a) and (b) in metres throughout periods where either the visibility or the runway visual range is less than 1500 m.

(4) The department of meteorology shall assess and ascertain that runway visual range in the routine observation reports are 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.

(5) The department of meteorology shall keep units providing air traffic service and aeronautical information service for an aerodrome informed without delay of changes in the serviceability status of the automated equipment used for assessing runway visual range.

(6) Subject to subregulation (1), (2), (3) and (4), the conversion of Instrumented readings into Runway Visual Range and Visibility shall be in accordance with Schedule 14 set in these Regulations

24. Observation and reporting of present weather

The department of meteorology shall observe and report as necessary the present weather occurring at the aerodrome and ensure that—

- (a) the present weather occurring at the aerodrome is observed and reported as necessary for at least a minimum of rain, drizzle including intensity, haze, mist, fog, and thunderstorms including thunderstorms in the vicinity;
- (b) for local routine and special reports, the present weather information is representative of conditions at the aerodrome; and
- (c) for METAR and SPECI, the present weather information is representative of conditions at the aerodrome and, for certain specified present weather phenomena, in its vicinity.

25. Observation and reporting of clouds

The department of meteorology shall observe and report the observed cloud information including—

- (a) cloud amount, cloud type and height of cloud, as necessary, to describe the clouds of significance to aircraft operations;
- (b) 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;
- (c) the height of cloud base and vertical visibility shall be reported in metres or feet;
- (d) cloud observations and reporting for local routine and special reports shall be representative of the runway thresholds in use; and
- (e) cloud observations and reporting for METAR and SPECI shall be representative of the aerodrome and its vicinity.

26. Observation and reporting of air temperature and dew-point temperature

(1) The department of meteorology shall measure and report air temperature and the dew- point temperature in degrees Celsius.

(2) Observations of air temperature and dew-point temperature for local routine and special reports and METAR and SPECI shall be representative of the whole runway or runway complex.

27. Observation and reporting of atmospheric pressure

The department of meteorology shall measure and report atmospheric pressure, and compute QNH and QFE values in hectopascals.

28. Observation and reporting of supplementary information

The department of meteorology shall make supplementary observations at aerodromes including significant meteorological conditions, particularly those in the approach and climb-out areas and where practicable, the information shall identify the location of the meteorological condition.

29. Reporting meteorological information from automatic observing systems

(1) The department of meteorology shall, in consultation with users of meteorological information, determine the use of METAR and SPECI from automatic observing systems during operational and non-operational hours of the aerodrome, and during operational hours of the aerodrome based on the availability and efficient use of personnel.

(2) The department of meteorology shall identify local routine, special reports, METAR and SPECI from automatic observing systems with the word “AUTO” at the beginning of the routine reports.

30. Observations and reports of volcanic activity

(1) The department of meteorology shall report without delay occurrence of pre-eruption volcanic activity, volcanic eruptions and volcanic ash cloud to the associated air traffic services unit, aeronautical information services unit and meteorological watch office.

(2) The department of meteorology shall make such reports in the form of a volcanic activity report comprising the following information in the order indicated—

- (a) message type stating “VOLCANICACTIVITYREPORT”;
- (b) station identifier, location indicator or name of station;
- (c) date and time of message;
- (d) location of volcano and name, if known; and
- (e) concise description of event including, as appropriate—
 - (i) the level of intensity of volcanic activity;
 - (ii) the occurrence of an eruption and its date and time; and
 - (iii) the existence of a volcanic ash cloud in the area together with direction of ash cloud movement and height.

PART VI—AIRCRAFT OBSERVATIONS AND REPORTS

31. Obligations of the air navigation service provider

The air navigation services provider shall arrange for observations to be made by aircraft registered in Uganda and operating on international air routes, to record and report the observations in accordance with the technical specification and detailed criteria set out in Schedule 5 of these Regulations.

32. Types of aircraft observations

The aircraft observations referred to in regulation 31 shall include—

- (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.

33. Designation of aircraft for routine aircraft observations

(1) Where air-ground data link is used and automatic dependent surveillance (ADS) or Secondary surveillance radar (SSR) Mode S

is being applied; the aircraft registered in Uganda and operating on international air routes shall make automated routine observations 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.

(2) For helicopter operations to and from aerodromes on offshore structures, routine observations shall be made from helicopters at points and times as agreed between the air navigation services provider and the helicopter operators concerned.

(3) The air navigation services provider shall designate an aircraft from among the aircraft operating at each flight level, to make routine observations at approximately hourly intervals in the case of air routes with high-density air traffic in accordance with these Regulations.

(4) The air navigation services provider shall ensure that the designation procedures for the aircraft to make routine observations specified in subregulation (3) are subject to AFI regional air navigation agreement.

(5) The air navigation services provider shall designate an aircraft, in the case of the requirement to report during the climb-out phase, at each aerodrome to make routine observations at approximately hourly intervals in accordance with these Regulations.

34. Exemption of aircraft from routine aircraft observations

The air navigation services provider may exempt an aircraft not equipped with air-ground data link from making routine aircraft observations.

35. Special aircraft observations

The air navigation services provider shall ensure that special observations are made by all aircraft whenever the following conditions are encountered or observed—

- (a) moderate or severe turbulence;
- (b) moderate or severe icing;

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

36. Other non-routine aircraft observations

Where other meteorological conditions not listed under regulation 35, 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.

37. Reporting of aircraft observations during flight

(1) The air navigation services provider shall ensure that aircraft observations are reported by air-ground data link and where air-ground data link is not available or appropriate, special and other non-routine aircraft observations during flight are reported by voice communications.

(2) The air navigation services provider shall ensure that aircraft observations are reported during flight at the time the observation is made or as soon as practicable.

(3) The air navigation services provider shall ensure that aircraft observations are reported as air-reports.

38. Relay of air-reports by air traffic services units to meteorological offices

The department of meteorology shall make arrangements to ensure that, on receipt by the air traffic services units of —

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

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

(1) The air navigation services provider shall ensure that special aircraft observations of pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud are recorded on the special air-report of volcanic activity form.

(2) The department of meteorology shall include a copy of the volcanic activity form in the flight documentation provided to flights operating on routes which, in the opinion of the department of meteorology, could be affected by volcanic ash clouds.

PART VII—FORECASTS

40. Interpretation and use of forecasts

(1) The aerodrome meteorological office designated by department of meteorology shall issue meteorological forecasts in accordance with the technical specification and detailed criteria set in Schedule 3 and the operationally desirable accuracy of forecasts set out in Schedule 12 of these Regulations.

(2) The department of meteorology shall inform all users of meteorological information that owing to the variability of meteorological elements in space and time, limitations of forecasting techniques and 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 and 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.

(3) The department of meteorology shall inform all users of meteorological information that 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 or part of the same period of validity.

41. Aerodrome forecasts

(1) The aerodrome meteorological office shall prepare aerodrome forecasts on the basis of AFI regional air navigation agreement.

(2) The aerodrome meteorological office shall issue aerodrome forecasts at a specified time not earlier than one hour prior to the beginning of its validity period consisting of a concise statement of the expected meteorological conditions at an aerodrome for a specified period, in any case not exceeding 30 hours.

(3) The aerodrome meteorological office shall issue aerodrome forecasts and amendments of forecasts in form of Terminal Aerodrome Forecasts (TAF) and the TAF shall include the following information in the order indicated—

- (a) identification of the type of forecast;
- (b) location indicator;
- (c) date and 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.

(4) The aerodrome meteorological office shall include optional elements in TAF in accordance with the AFI regional air navigation agreement.

(5) The aerodrome meteorological offices preparing TAFs shall keep the forecasts under continuous review and where necessary, shall issue amendments promptly.

(6) The aerodrome meteorological office shall ensure that the length of the forecast messages and the number of changes indicated in the forecast are kept to a minimum.

(7) The aerodrome meteorological office shall cancel the TAFs that cannot be kept under continuous review.

(8) The appropriate aerodrome meteorological office shall ensure that the period of validity of a routine TAF is not less than 6 hours and not more than 30 hours, as determined by AFI regional air navigation agreement.

(9) The aerodrome meteorological office shall issue TAFs valid for less than 12 hours every 3 hours and those valid for 12 to 30 hours every 6 hours.

(10) The aerodrome meteorological offices shall ensure that not more than one TAF is valid at an aerodrome at any given time when issuing TAFs.

42. Landing forecasts

(1) The aerodrome meteorological office shall prepare a landing forecast as determined by AFI regional air navigation agreement that meet the requirements of local users and aircraft within one hour's flying time from the aerodrome.

(2) The aerodrome meteorological office shall prepare landing forecasts in the form of a trend forecast.

(3) The trend forecast referred to in subregulation (2) shall consist of a concise statement of the expected significant changes in the meteorological conditions at that aerodrome appended to a local routine or local special report, or a METAR or SPECI.

(4) 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.

43. Forecasts for take-off

(1) The aerodrome meteorological office shall prepare a forecast for take-off where required by agreement between the department of meteorology and operators.

(2) The aerodrome meteorological office shall issue forecast for take-off that refer to a specified period of time containing information on expected conditions over the runway complex in regard to surface wind direction and speed, any variations, temperature, pressure (QNH) and any other elements as agreed with operators.

(3) The aerodrome meteorological office shall supply a forecast for take-off to operators and flight crew members on request within the 3 hours before the expected time of departure.

(4) The aerodrome meteorological offices preparing forecasts for take-off shall keep the forecasts under continuous review and, when necessary, shall issue amendments promptly.

44. Area forecasts for low-level flights

(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 the forecasts and the criteria for amendments shall be determined by the department of meteorology in consultation with the users.

(2) Where abbreviated plain language is used, the forecast shall be prepared as a GAMET area forecast, employing approved ICAO abbreviations and numerical values.

(3) Where chart form is used, the GAMET area forecast shall be prepared as a combination of forecasts of upper wind and upper-air temperature, and of significant weather phenomena.

PART VIII—SIGMET INFORMATION, AERODROME
WARNINGS AND WIND SHEAR WARNINGS AND ALERT

45. SIGMET information

(1) The meteorological watch office shall issue SIGMET information, aerodrome warnings and wind shear warnings and alerts in accordance with the technical specification and detailed criteria set out in Schedule 6 of these Regulations.

(2) The SIGMET information issued under subregulation (1) shall give a concise description in abbreviated plain language concerning the occurrence or expected occurrence of specified en-route weather phenomena, which may affect the safety of aircraft operations.

(3) The meteorological watch office shall cancel SIGMET information when the phenomena are no longer occurring or are no longer expected to occur in the area.

(4) The period of validity of a SIGMET message shall be not more than 4 hours and 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.

(5) The SIGMET messages concerning volcanic ash cloud and tropical cyclones shall be based on advisory information provided by VAACs and TCACs, as designated by the AFI regional air navigation agreement.

(6) The department of meteorology shall maintain coordination between the meteorological watch office and the associated area control centre or flight information centre to ensure that information on volcanic ash included in SIGMET and NOTAM messages is consistent.

(7) The SIGMET messages shall be issued not more than 4 hours before the commencement of the period of validity.

(8) In the special case of SIGMET messages for volcanic ash cloud and tropical cyclones, the messages shall be issued as soon as practicable but not more than 12 hours before the commencement of the period of validity.

(9) SIGMET messages for volcanic ash and tropical cyclones shall be updated at least every 6 hours.

46. Aerodrome warnings

(1) The aerodrome meteorological office designated by department of meteorology shall issue aerodrome warnings.

(2) The aerodrome warning referred to in subregulation (1), shall give concise information of meteorological conditions which could adversely affect aircraft on the ground, including parked aircraft and the aerodrome facilities and services.

(3) The aerodrome warnings shall be cancelled where the conditions are no longer occurring or no longer expected to occur at the aerodrome.

47. Wind shear warnings and alerts

(1) Where wind shear is considered a factor, the aerodrome meteorological office shall prepare wind shear warnings in accordance with arrangements made with the appropriate air traffic services unit and operators concerned.

(2) The wind shear warnings shall give concise information on the observed or expected existence of wind shear which could adversely affect aircraft on the approach path or take-off path or during circling approach between runway level and 500 m (1600 ft) above that level and aircraft on the runway during the landing roll or take-off run.

(3) Where local topography has been shown to produce significant wind shears at heights in excess of 500 m (1600 ft) above runway level, then 500 m (1600 ft) referred to in subregulation (2) shall not be considered restrictive.

(4) The department of meteorology shall cancel the wind shear warnings for arriving aircraft or departing aircraft where aircraft reports indicate that wind shear no longer exists or, alternatively, after an agreed elapsed time.

(5) The department of meteorology shall develop the criteria for the cancellation of a wind shear warning referred to in subregulation (4) and defined locally for each aerodrome, as agreed between the department of meteorology, the air navigation service provider and the operators concerned.

(6) The department of meteorology shall ensure that 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 are issued.

(7) The department of meteorology shall issue wind shear alerts that give concise, up-to-date information related to the observed existence of wind shear involving a headwind or 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.

(8) The department of meteorology shall ensure that wind shear alerts generated by automated ground-based sensors are updated at least every minute and are cancelled as soon as the headwind or tailwind change falls below 7.5 m/s or 15 kt.

PART IX—AERONAUTICAL CLIMATOLOGICAL INFORMATION

48. General provisions

(1) The department of meteorology shall issue aeronautical climatological information in accordance with the technical specification and detailed criteria set out in Schedule 7 of these Regulations.

(2) The department of meteorology shall prepare the aeronautical climatological information required for the planning of flight operations in the form of aerodrome climatological tables and aerodrome climatological summaries and supplied to aeronautical users as agreed between the department of meteorology and the users.

(3) Where it is impracticable to meet the requirements for aeronautical climatological information, the department of meteorology shall collect, process and store observational data through computer facilities available for international use or may by agreement delegate the preparation of the required aeronautical climatological information to another meteorological authority.

(4) The aeronautical climatological information shall be based on observations made over a period of at least five years and the period shall be indicated in the information supplied.

(5) The department of meteorology shall collect climatological data related to sites for new aerodromes and to additional runways at existing aerodromes before the commissioning of the aerodromes or runways.

49. Aerodrome climatological tables

The department of meteorology shall make arrangements for collecting and retaining the necessary observational data and shall have the capability—

- (a) to prepare aerodrome climatological tables for each regular and alternate international aerodrome within its Flight Information Region (FIR); and
- (b) to make available such climatological tables to an aeronautical user within a time period as agreed between the department of meteorology and that user.

50. Aerodrome climatological summaries

(1) The department of meteorology shall issue the aerodrome climatological summaries in accordance with the procedures prescribed by the World Meteorological Organization.

(2) Where computer facilities are available to store, process and retrieve the information referred to in subregulation (1), the summaries shall be published or made available to aeronautical users on request.

(3) Where computer facilities referred to in subregulation (2) are not available, the department of meteorology shall prepare the summaries using the models specified by the World Meteorological Organization and shall publish and keep the summaries up to date.

51. Copies of meteorological observational data

The department of meteorology shall on request and to the extent practicable, make available to the air navigation services provider, operators and other states concerned with the application of meteorological services to international air navigation, copies of meteorological observational data required for research, investigation or operational analysis.

PART X—SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

52. General provisions

(1) The department of meteorology shall provide meteorological service to operators and flight crew members in accordance with the technical specification and detailed criteria set out in Schedule 8 of these Regulations.

(2) The meteorological information required under these Regulations 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.

(3) The meteorological information supplied to operators and flight crew members under these Regulations shall cover the flight in respect of time, altitude and geographical extent.

(4) The meteorological information referred to in subregulation (2) shall relate to appropriate fixed times, periods of time and extend to the aerodrome of intended landing, covering the meteorological conditions expected between the aerodrome of intended landing and alternate aerodromes designated by the operator.

(5) The meteorological information supplied to operators and flight crew members shall be up to date and include the following—

- (a) forecasts of—
 - (i) upper wind and upper-air temperature;
 - (ii) upper-air humidity;
 - (iii) geopotential altitude of flight levels;
 - (iv) flight level and temperature of tropopause;
 - (v) direction, speed and flight level of maximum wind;
and
 - (vi) significant weather phenomena;
- (b) METAR or SPECI including trend forecasts as issued in accordance with the AFI regional air navigation agreement for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;
- (c) TAF or amended TAF for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;
- (d) forecasts for take-off;
- (e) SIGMET information and appropriate special air-reports relevant to the whole route;
- (f) volcanic ash and tropical cyclone advisory information relevant to the whole route;
- (g) in accordance with AFI regional air navigation agreement, GAMET area forecast or area forecasts for low-level flights in chart form relevant to the whole route;

- (h) aerodrome warnings for the local aerodrome;
- (i) meteorological satellite images; and
- (j) ground-based weather radar information.

(6) The forecasts listed under subregulation (5) (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 department of meteorology and the operator concerned.

(7) Where forecasts are identified as being originated by the WAFCs, the department of meteorology shall not modify the meteorological content of the forecasts.

(8) The department of meteorology shall avail charts generated from the digital forecasts provided by the WAFCs as required by operators, for fixed areas of coverage in accordance with technical guidance provided by the Authority.

(9) Where forecasts of upper wind and upper-air temperature are supplied in chart form, they shall be fixed time prognostic charts for flight levels in accordance with guidance provided for in Schedule 8.

(10) Where forecasts of significant weather phenomena are supplied in chart form, they shall be fixed time prognostic charts for an atmospheric layer limited by flight levels as specified in technical standards provided for in Schedules 8 and 9 of these Regulations.

(11) The department of meteorology shall, as soon as possible, but not later than 3 hours before departure provide—

- (a) the forecasts of upper wind, upper-air temperature and significant weather phenomena above flight level 100 requested for pre-flight planning and in-flight re-planning by the operator; and

- (b) any other meteorological information requested for pre-flight planning and in-flight re-planning by the operator.

(12) The department of meteorology shall coordinate with the meteorological authorities of other States to obtain reports or forecasts required by operators and flight crew under these Regulations.

(13) The department of meteorology shall supply meteorological information to operators and flight crew members at the location and time agreed upon with the operators.

(14) The department of meteorology shall provide meteorological service for preflight planning to flights originating from within Uganda.

(15) The department of meteorology shall ensure that at an aerodrome without an aerodrome meteorological office, arrangements for the supply of meteorological information is as agreed upon between the department of meteorology and the operators concerned.

53. Briefing, consultation and display

(1) The department of meteorology shall provide, on request, briefing or consultation to flight crew members or other flight operations personnel.

(2) The department of meteorology shall ascertain that the briefing or consultation referred to in subregulation (1), shall be to supply the latest available information on existing and expected meteorological conditions along the route to be flown, at the aerodrome of intended landing, alternate aerodromes and other aerodromes as relevant, either to explain and amplify the information contained in the flight documentation or, if so agreed between the department of meteorology and the operator, in lieu of flight documentation.

(3) The department of meteorology shall ascertain that meteorological information used for briefing, consultation and display shall include any or all of the information listed in regulation 52 (5).

(4) The department of meteorology shall, 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, inform the flight crew members of the divergence: provided 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.

(5) The department of meteorology shall ascertain that the required briefing, consultation, display or flight documentation shall be provided by the aerodrome meteorological office associated with the aerodrome of departure.

(6) The department of meteorology shall ascertain that arrangements to meet the requirements of flight crew members shall be as agreed upon between the department of meteorology and the operator concerned at an aerodrome where the services referred to in subregulation (5) are not available.

(7) The aerodrome meteorological office associated with the aerodrome of departure shall provide or if that is not practicable, arrange for the provision of a new briefing, consultation or flight documentation as necessary in exceptional circumstances, such as an undue delay.

(8) The department of meteorology shall ascertain that the flight crew member or other flight operations personnel for whom briefing, consultation or flight documentation has been requested shall visit the aerodrome meteorological office at the time agreed upon between the aerodrome meteorological office and the operator concerned.

(9) The aerodrome meteorological office shall, where local circumstances at an aerodrome make personal briefing or consultation impracticable, provide those services by telephone or other suitable telecommunications facilities.

54. Flight documentation

(1) The aerodrome meteorological office designated by the department of meteorology shall provide flight documentation which shall comprise information on—

- (a) upper winds and upper-air temperature;
- (b) Significant weather (SIGWIX) phenomena;
- (c) METAR or SPECI (including trend forecasts as issued in accordance with AFI regional air navigation agreement) for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;
- (d) TAF or amended TAF for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;
- (e) SIGMET information and appropriate special air-reports relevant to the whole route;
- (f) volcanic ash and tropical cyclone advisory information relevant to the whole route; and
- (g) if appropriate; subject to regional air navigation agreement, GAMET area forecast and/or area forecasts for low-level flights in chart form prepared in support of the issuance of AIRMET information, and AIRMET information for low-level flights relevant to the whole route.

(2) When agreed between the department of meteorology and operator concerned, flight documentation for flights of two hours' duration or less, after a short stop or turnaround, shall be limited to the information operationally needed, but in all cases the flight documentation shall at least comprise information in regulations 47 (5) (b), (c), (e), (f) and if appropriate, (g).

(3) The department of meteorology shall ascertain that 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.

(4) The department of meteorology shall ascertain that where a need for amendment arises after the flight documentation has been supplied, and before take-off of the aircraft, the aerodrome meteorological office shall, as agreed locally, issue the necessary amendment or updated information to the operator or to the local air traffic services unit, for transmission to the aircraft.

(5) The department of meteorology 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 and 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.

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

(1) The department of meteorology shall ascertain that where the aerodrome meteorological office 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 regulations 52, 53 and 54.

(2) The department of meteorology shall ascertain that an agreement is established between the department of meteorology and the operators for provision of 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.

(3) The department of meteorology shall remain responsible for the quality control, 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.

56. Information for aircraft in flight

(1) The department of meteorology shall ascertain that meteorological information for use by aircraft in flight shall be supplied by an aerodrome meteorological office or meteorological watch office to its associated air traffic services unit and through D-VOLMET or VOLMET broadcasts as determined by regional air navigation agreement.

(2) The department of meteorology shall ascertain that meteorological information for planning by the operator for aircraft in flight shall be supplied on request, as agreed between the department of meteorology and the operator concerned.

(3) The department of meteorology shall ascertain that meteorological information for use by aircraft in flight shall be supplied to air traffic services units in accordance with the Part XI of these Regulations.

(4) The department of meteorology shall ascertain that meteorological information shall be supplied through D-VOLMET or VOLMET broadcasts in accordance with the requirements in Part XII of these Regulations.

PART XI—INFORMATION FOR AIR TRAFFIC SERVICES, SEARCH AND RESCUE SERVICES AND AERONAUTICAL INFORMATION SERVICES

57. Information for air traffic services units

(1) The department of meteorology shall provide information for air traffic services, search and rescue services and aeronautical

information services in accordance with the technical specification and detailed criteria set out in Part I of schedule 9.

(2) The department of meteorology shall designate an aerodrome meteorological office or meteorological watch office to be associated with each air traffic services unit.

(3) The associated aerodrome meteorological office or meteorological watch office shall, after coordination with the air traffic services unit, supply, or arrange for the supply of, up-to-date meteorological information to the unit as necessary for the conduct of its functions.

(4) An aerodrome meteorological office shall be associated with an aerodrome control tower or approach control unit for the provision of meteorological information.

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

(6) Where, owing to local circumstances, it is convenient for the duties of an associated aerodrome meteorological office or meteorological watch office to be shared between two or more aerodrome meteorological offices or meteorological watch offices, the division of responsibility shall be determined by the department of meteorology in consultation with the appropriate air traffic service provider.

(7) The department of meteorology shall ascertain that any meteorological information requested by an air traffic services unit in connection with an aircraft emergency shall be supplied immediately.

58. Information for search and rescue services units

(1) The department of meteorology shall in accordance with regional air navigation agreement, designate aerodrome meteorological offices or meteorological watch offices to supply search and rescue

(SAR) services units with the meteorological information they require, in a form established by mutual agreement between the department of meteorology and the SAR services unit in accordance with the technical specification and detailed criteria set out in Part II of Schedule 9.

(2) For the purpose of subregulation (1), the designated aerodrome meteorological office or meteorological watch office shall maintain liaison with the search and rescue services unit throughout a search and rescue operation.

59. Information for aeronautical information services units

The department of meteorology, in coordination with the Aeronautical Information Services (AIS), shall arrange for the supply of up-to-date meteorological information to AIS unit, as necessary, for the conduct of its functions in accordance with the technical specification and detailed criteria set out in Part III of Schedule 9 of these Regulations.

PART XII—REQUIREMENTS FOR AND USE OF COMMUNICATIONS

60. Requirements for communications

(1) The department of meteorology shall provide and use communication system in accordance with the technical specification and detailed criteria set out in Schedule 10 of these Regulations.

(2) The department of meteorology shall ascertain that suitable telecommunications facilities are available—

- (a) to permit aerodrome meteorological offices and, as necessary, aeronautical meteorological stations to supply the required meteorological information to air traffic services units on the aerodromes for which those offices and stations are responsible, and in particular to aerodrome control towers, approach control units and the aeronautical telecommunications stations serving these aerodromes;

- (b) to permit meteorological watch offices to supply the required meteorological information to air traffic services and search and rescue services units in respect of the flight information regions, control areas and search and rescue regions for which those offices are responsible, and in particular to flight information centres, area control centres and rescue coordination centres and the associated aeronautical telecommunications stations; and
- (c) to permit world area forecast centres (WAFCs) to supply the required world area forecast system products to aerodrome meteorological offices, department of meteorology and other users.

(3) The department of meteorology shall ascertain that telecommunications facilities between aerodrome meteorological offices and, as necessary, aeronautical meteorological stations and air traffic services 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.

(4) The department of meteorology shall ascertain that telecommunications facilities between aerodrome meteorological offices or meteorological watch offices and flight information centres, area control centres, rescue coordination centres and aeronautical telecommunications stations shall permit—

- (a) communications by direct speech, the speed with which the communications can be established being such that the required points may normally be contacted within approximately 15 seconds; and
- (b) printed communications, when a record is required by the recipients; the message transit time shall not exceed 5 minutes.

(5) The department of meteorology shall ascertain that telecommunications facilities referred to in subregulation (3) shall be supplemented, as and where necessary, by other forms of visual or audio communications, for example, closed-circuit television or separate information processing systems.

(6) Where agreed between the department of meteorology and operators concerned, the department of meteorology shall make a provision to enable operators to establish suitable telecommunications facilities for obtaining meteorological information from aerodrome meteorological office or other appropriate sources.

(7) The department of meteorology shall ensure that suitable telecommunications facilities be made available to permit meteorological offices to exchange operational meteorological information with other meteorological offices within Uganda.

(8) The department of meteorology shall ascertain that the telecommunications facilities used for the exchange of operational meteorological information shall be the aeronautical fixed service or, for the exchange of non-time critical operational meteorological information, the public Internet, subject to availability, satisfactory operation and bilateral or multilateral or AFI regional air navigation agreement.

61. Use of aeronautical fixed service communications and the public Internet -Meteorological bulletins

(1) The department of meteorology shall ascertain that meteorological bulletins containing operational meteorological information to be transmitted via the aeronautical fixed service or the public Internet shall be originated by the appropriate meteorological office or aeronautical meteorological station.

(2) The department of meteorology shall ascertain that meteorological and air traffic service providers maintain coordination in regard to the installation, maintenance and use of the aeronautic fixed telecommunication service.

62. Use of aeronautical fixed service communications - world area forecast system products

The department of meteorology shall ensure that world area forecast system products in digital form shall be received using binary data communications techniques and the method and channels used for the dissemination of the products shall be as determined by regional air navigation agreement

63. Use of aeronautical mobile service communications

The department of meteorology, air traffic services and aircrafts shall ascertain that the content and format of meteorological information transmitted to aircrafts and by aircrafts shall be consistent with the provisions of these Regulations

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

The department of meteorology shall ascertain that where D-VOLMET is required, it shall contain current METAR and SPECI, together with trend forecasts where available, TAF, SIGMET, and special air-reports not covered by a SIGMET.

65. Use of aeronautical broadcasting service — contents of VOLMET broadcasts

(1) The department of meteorology shall ascertain that where continuous VOLMET broadcasts are required, on very high frequencies (VHF), they contain current METAR and SPECI, together with trend forecasts where available.

(2) Notwithstanding the provisions of subregulation (1), 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.

66. Requirements for application for exemption

(1) A person may apply to the Authority for an exemption from any provision of these Regulations.

(2) Unless in case of emergency, a person requiring exemptions from any of these regulations shall make an application to the Authority at least sixty days prior to the proposed effective date, giving the following information—

- (a) name and contact address including electronic mail and fax if any;
- (b) telephone number;
- (c) a citation of the specific requirement from which the applicant seeks exemption;
- (d) justification for the exemption;
- (e) a description of the type of operations to be conducted under the proposed exemption; the proposed duration of the exemption;
- (f) an explanation of how the exemption would be in the public interest;
- (g) a detailed description of the alternative means by which the applicant will ensure a level of safety equivalent to that established by the regulation in question;
- (h) a safety risk assessment carried out in respect of the exemption applied for;
- (i) if the applicant handles international operations and seeks to operate under the proposed exemption, an indication whether the exemption would contravene any provision of the Standards and Recommended Practices of the International Civil Aviation Organization (ICAO); and
- (j) any other information that the Authority may require.

(3) Where the applicant seeks emergency processing of an application for exemption, the application shall contain supporting

facts and reasons for not filing the application within the time specified in subregulation (2) and satisfactory reason for deeming the application an emergency.

(4) The Authority may in writing, refuse an application made under subregulation (3), where in the opinion of the Authority, the reasons given for emergency processing are not satisfactory.

(5) The application for exemption shall be accompanied by a fee prescribed by the Authority.

67. Review and publication

(1) The Authority shall review the application for exemption for accuracy and compliance and if the application is satisfactory, the Authority shall publish a detailed summary of the application for comments, within a prescribed time, in either—

- (a) the State Gazette;
- (b) aeronautical information circular; or
- (c) a daily newspaper with a wide national circulation.

(2) The Authority shall, where application requirements have not been fully complied with, request the applicant in writing, to comply prior to publication or making a decision under subregulation (3).

(3) The Authority shall, if the request is for emergency relief, publish the decision as soon as possible after processing the application.

68. Evaluation of the request

(1) The Authority shall, where the application requirements have been satisfied, conduct an evaluation of the request to include—

- (a) determination of whether an exemption would be in the public interest;
- (b) a determination, after a technical evaluation of whether the applicant's proposal would provide a level of safety

equivalent to that established by the regulation, although where the Authority decides that a technical evaluation of the request would impose a significant burden on the technical resources of the Authority, the Authority may deny the exemption on that basis;

- (c) a determination of whether a grant of the exemption would contravene these Regulations; and a recommendation based on the preceding elements, of whether the request should be granted or denied, and
- (d) of any conditions or limitations that should be part of the exemption.

(2) The Authority shall notify the applicant in writing, the decision to grant or deny the request and publish a detailed summary of its evaluation and decision.

(3) The summary referred to in subregulation (2), shall specify the duration of the exemption and any conditions or limitations of the exemption.

(4) The Authority shall, if the exemption affects a significant population of the aviation community, publish the summary in aeronautical information circular

PART XIV—GENERAL

69. Drug and alcohol testing and reporting

(1) Any person who performs any function prescribed by these Regulations directly or by contract under the provisions of these Regulations may be tested for drug or alcohol usage.

(2) A person who—

- (a) refuses to submit to a test to indicate the percentage by weight of alcohol in the blood; or

- (b) refuses to submit to a test to indicate the presence of narcotic drugs, marijuana, or depressant or stimulant drugs or substances in the body, when requested by a law enforcement officer or the Authority, or refuses to furnish or to authorise the release of the test results requested by the Authority shall—
 - (i) be denied any licence, certificate, rating, qualification or authorisation issued under these Regulations for a period of up to one year from the date of that refusal; or
 - (ii) have their licence, certificate, rating, qualification, or authorisation issued under these Regulations suspended or revoked

70. Change of Name

(1) A holder of a certificate issued under these Regulations may apply to the Authority for—

- (a) replacement of the certificate if lost or destroyed;
- (b) change of name on the certificate; or
- (c) an endorsement on the certificate

(2) The holder of a certificate shall When applying under subregulation (1), submit to the Authority—

- (a) the original or copy of the certificate in case of loss; and
- (b) a court order or other legal document verifying the name change.

(3) The Authority shall return to the holder of a certificate, with the appropriate changes applied for, if any, the originals specified under subregulation (2) and, where necessary, retain copies of the certificate.

71. Change of address

(1) A holder of a certificate issued under these Regulations shall notify the Authority of the change in the physical and mailing address within fourteen days of such change.

(2) A person who does not notify the Authority of the change in the physical and mailing address within the time frame specified in subregulation (1), shall not exercise the privileges of the certificate.

72. Replacement of documents

A person may apply to the Authority in the prescribed form for replacement of documents issued under these Regulations if such documents are lost or destroyed

73. Use and retention of documents and records

(1) A person shall not—

- (a) use any certificate or exemption issued or required by or under these Regulations which has been forged, altered, cancelled, or suspended, or
- (b) to which he is not entitled; or
- (c) forge or alter any certificate or exemption issued or required by or under these Regulations; or
- (d) lend any certificate or exemption issued or required by or under these Regulations to any other person; or
- (e) make any false representation for the purpose of procuring for himself or any other person the grant, issue, renewal or variation of any such certificate or exemption;
- (f) mutilate, alter, render illegible or destroy any records, or any entry made therein, required by or under these Regulations to be maintained, or knowingly make, or procure or assist in the making of, any false entry in any such record, or wilfully omit to make a material entry in any such record

(2) All records required to be maintained by or under these Regulations shall be recorded in a permanent and indelible material.

(3) A person shall not issue any certificate or exemption under these Regulations unless he is authorised to do so by the Authority.

(4) A person shall not issue any certificate referred to in sub-regulation (3) unless he has satisfied himself that all statements in the certificate are correct, and that the applicant is qualified to hold that certificate.

74. Reports of violation

(1) Any person, who knows of a violation of the Act, or any Regulations, rules or orders issued there under, shall report the violation to the Authority.

(2) The Authority may determine the nature and type of investigation or enforcement action that need to be taken.

75. Failure to comply with direction

Any person who fails to comply with any direction given to him by the Authority or by any authorized person under any provision of these Regulations shall be deemed for the purposes of these Regulations to have contravened that provision.

76. Aeronautical fees

(1) The Authority shall notify in writing the fees to be charged in connection with the issue, renewal or variation of any certificate, test, inspection or investigation required by or for the purpose of these Regulations any orders, notices or proclamations made there under.

(2) Upon an application being made in connection with which any fee is chargeable in accordance with the provisions of subregulation (1), the applicant shall be required, before the application is accepted, to pay the fee so chargeable.

(3) Where, after that payment has been made, the application is withdrawn by the applicant or otherwise ceases to have effect or is refused, the Authority shall not refund the payment made.

77. Contravention of Regulations

A person who contravenes any provision of these Regulations may have his certificate or exemption cancelled or suspended.

PART XV—OFFENCES AND PENALTIES

78. Penalties

(1) A person who contravenes any provision of these Regulations, orders, notices or proclamations made there under shall, upon conviction, be liable to a fine or imprisonment or both, and in the case of a continuing contravention, each day of the contravention shall constitute a separate offence.

(2) Any person who contravenes any provision of these Regulations shall upon conviction be liable to a fine not exceeding one million shillings or to imprisonment for a term not more than six months or to both.

(3) If it is proved that an act or omission of any person, which would otherwise have been a contravention by that person of a provision of these Regulations, orders, notices or proclamations made there under was due to any cause not avoidable by the exercise of reasonable care by that person, the act or omission shall be deemed not to be a contravention by that person of that provision

79. Revocation

(1) The Civil Aviation (Air Navigation Services) Regulations, 2001, S.I. No. 66 of 2001 are revoked.

(2) The Civil Aviation (Air Navigation Services) Regulations, 2008, S.I. No. 47 of 2008 are revoked.

(3) The Civil Aviation (Air Navigation Services) Regulations, 2014, S.I. No. 63 of 2014 are revoked.

SCHEDULES

SCHEDULE 1

regulation 2

A currency point is equivalent to twenty thousand shillings

SCHEDULE 2

regulations 9(a),16(2)

TECHNICAL SPECIFICATIONS RELATED TO METEOROLOGICAL OBSERVATIONS AND REPORTS

PART I. GENERAL PROVISIONS RELATED TO METEOROLOGICAL OBSERVATIONS

- (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. Specifications concerning the siting of equipment and installations on operational areas, aimed at reducing the hazard to aircraft to a minimum, are contained The Civil Aviation (Aerodromes) Regulations, 2019.
- (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).
- (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.
- (4) Where automated equipment forms part of an integrated semi-automatic observing system, displays of data which are made available to the local air traffic services units 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.

PART II. GENERAL CRITERIA RELATED TO METEOROLOGICAL REPORTS

1. Format of meteorological reports—

- (1) Local routine and special reports shall be issued in abbreviated plain language, in accordance with the template shown in Table A3-1.
- (2) METAR and SPECI shall be issued in accordance with the template shown in Table A3-2 and disseminated in the METAR and SPECI code forms prescribed by WMO.
- (3) METAR and SPECI should be disseminated in digital form in addition to the dissemination of the METAR and SPECI in accordance with (5).
- (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).
- (5) METAR and SPECI if disseminated in digital form shall be accompanied by the appropriate metadata.

2. Use of CAVOK

When the following conditions occur simultaneously at the time of observation, 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”

- (a) visibility, 10 km or more, and the lowest visibility is not reported;
- (b) no cloud of operational significance;
- (c) no weather of significance to aviation;

3. Criteria for issuance of local special reports and SPECI

- (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 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) Where required, SPECI shall be issued whenever changes in accordance with the following criteria occur—
- (a) when the mean surface wind direction has changed by 60° or more from that given in the latest report, the mean speed before and/or after the change being 5 m/s (10 kt) or more;
 - (b) when the mean surface wind speed has changed by 5 m/s (10 kt) or more from that given in the latest report;
 - (c) when the variation from the mean surface wind speed (gusts) has changed by 5 m/s (10 kt) or more from that at the time of the latest report, the mean speed before and/or after the change being 7.5 m/s (15 kt) or more;
 - (d) when the onset, cessation or change in intensity of any of the following weather phenomena occurs:
 - (i) freezing precipitation
 - (ii) moderate or heavy precipitation (including showers thereof)
 - (iii) thunderstorm (with precipitation);

- (e) when the onset or cessation of any of the following weather phenomena occurs:
 - (i) freezing fog
 - (ii) thunderstorm (without precipitation);
- (f) when the amount of a cloud layer below 450 m (1 500 ft) changes—
 - (i) from SCT or less to BKN or OVC; or
 - (ii) from BKN or OVC to SCT or less.
- (g) SPECI should be issued whenever changes wind is observed, following this criteria—
 - (i) where 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 the operators concerned, taking into account changes in the wind direction and speed;
 - (ii) where changes in wind direction and speed require a change in runway(s) in use; and
 - (iii) where changes in wind direction and speed indicate that the runway tailwind and crosswind components have changed through values representing the main operating limits for typical aircraft operating at the aerodrome;
- (h) 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—
 - (i) 800, 1500 or 3000 m; and
 - (ii) 5000 m, in cases where significant numbers of flights are operated in accordance with the visual flight rules;
- (i) 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;

- (j) when the onset, cessation or change in intensity of any of the following weather phenomena occurs:
 - (i) duststorm
 - (ii) sandstorm
 - (iii) funnel cloud (tornado or waterspout);
- (k) when the onset or cessation of any of the following weather phenomena occurs—
 - (i) low drifting dust, sand or snow
 - (ii) blowing dust, sand or snow
 - (iii) squall;
- (l) 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:
 - (i) 30, 60, 150 or 300 m (100, 200, 500 or 1000 ft); and
 - (ii) 450 m (1500 ft), in cases where significant numbers of flights are operated in accordance with the visual flight rules;
- (m) 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
- (n) any other criteria based on local aerodrome operating minima, as agreed between the meteorological authority and the operators concerned.
- (o) 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.

PART III. DISSEMINATION OF METEOROLOGICAL REPORTS

1. METAR and SPECI

- (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.
- (2) METAR and SPECI shall be disseminated to other aerodromes in accordance with regional air navigation agreement.
- (3) SPECI representing 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.
- (4) 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.

2. Local routine and special reports

- (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.
- (2) Local special reports shall be transmitted to local air traffic services units as soon as the specified conditions occur. However, as agreed between the meteorological authority and the appropriate ATS authority, they need not be issued in respect of:
 - (a) any element for which there is in the local air traffic services unit a display corresponding to the one in the meteorological station, and where arrangements are in force for the use of this display to update information included in local routine and special reports; and

- (b) runway visual range, when all changes of one or more steps on the reporting scale in use are being reported to the local air traffic services unit by an observer on the aerodrome.
- (3) Local special reports shall also be made available to the operators and to other users at the aerodrome.

PART IV. OBSERVING AND REPORTING OF METEOROLOGICAL ELEMENTS

1. Siting of Surface wind sensors—

- (1) Surface wind should be observed at a height of 10 ± 1 m (30 ± 3 ft) above the ground.
- (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.
- (3) 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.
- (4) 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.

2. Display of surface wind observations

- (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, the displays shall be clearly marked to identify the runway and section of runway monitored by each sensor.

- (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.

3. Averaging of surface wind observations

- (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.
- (2) 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.
- (3) The averaging period for measuring variations from the mean wind speed (gusts) reported should be 3 seconds for local routine reports, local special reports, METAR, SPECI and wind displays used for depicting variations from the mean wind speed (gusts) in air traffic services units.
- (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.

4. Reporting of surface winds

- (1) In local routine reports, local special reports, METAR and SPECI, the surface wind direction and speed shall be reported in steps of 10 degrees true and 1 metre per second (or 1 knot), respectively. Any observed value which does not fit the reporting scale in use shall be rounded to the nearest step in the scale.
- (2) In local routine reports, local special reports, 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—
 - (i) 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;
 - (ii) 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
 - (iii) 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—
 - (i) 2.5 m/s (5 kt) or more in local routine and special reports when noise abatement procedures are applied; or
 - (ii) 5 m/s (10 kt) or more; otherwise
 - (iii) when a wind speed of less than 0.5 m/s (1 kt) is reported, it shall be indicated as calm;
 - (iv) 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
 - (v) 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.

- (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 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, they shall be reported as the maximum and minimum values of the wind speed attained.
- (4) In METAR and SPECI, when variations from the mean wind speed (gusts) are reported in accordance with, the maximum value of the wind speed attained shall be reported.

5. Visibility

- (1) Siting of visibility sensors
 - (a) 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.
 - (b) 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.
- (2) Displays of observed visibility
 - (a) 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.

- (b) 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, the displays should be clearly marked to identify the area, runway and section of runway, monitored by each sensor.

(3) Averaging of visibility

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) One (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.

(4) Reporting of visibility

- (a) In local routine reports, local special reports, METAR and SPECI, the visibility shall be reported—
 - (i) in steps of 50 m when the visibility is less than 800 m;
 - (ii) in steps of 100 m, when it is 800 m or more but less than 5 km;
 - (iii) in kilometre steps, when the visibility is 5 km or more but less than 10 km; and
 - (iv) 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.

- (v) Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.
- (b) In local routine and special reports, visibility along the runway(s) shall be reported together with the units of measurement used to indicate visibility.
- (c) In local routine and special reports, when instrumented systems are used for the measurement of visibility—
 - (i) if the visibility is observed from more than one location along the runway as specified, 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
 - (ii) 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.
- (d) In METAR and SPECI, visibility should be reported as prevailing visibility, as defined in Chapter 1. When the visibility is not the same in different directions.
- (e) When the lowest visibility is different from the prevailing visibility—
 - (i) less than 1 500 m or
 - (ii) less than 50 per cent of the prevailing visibility and less than 5 000 m;
 - (iii) 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; and

- (iv) if the lowest visibility is observed in more than one direction, then the most operationally significant direction should be reported; and
- (f) 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.

6. Runway visual range

(1) Siting

- (a) 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.
- (b) Runway visual range should be assessed at a lateral distance from the runway centre line of not more than 120 m.
- (c) The site for observations to be representative of the touchdown zone should be located about 300 m along the runway from the threshold.
- (d) 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.
- (e) 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.

(2) Instrumented systems

- (a) 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.

- (b) 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.
 - (c) 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).
 - (d) 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.
 - (e) 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.
- (3) Display
- (a) 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.
 - (b) 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, the displays shall be clearly marked to identify the runway and section of runway monitored by each sensor.
 - (c) 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.
 - (d) The transmission of runway visual range reports should normally be completed within 15 seconds after the termination of the observation.

(4) Averaging

- (a) 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.
- (b) The averaging period for runway visual range values shall be: 1 minute for local routine and special reports and for runway visual range displays in air traffic services units; and in local routine reports, local special reports, METAR and SPECI—
 - (i) 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;
 - (ii) 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.
 - (iii) 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.
 - (iv) 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.

(5) Runway light intensity

- (a) When instrumented systems are used for the assessment of runway visual range, computations should be made separately for each available runway.
- (b) For local routine and special reports, the light intensity to be used for the computation should be—
 - (i) 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;
 - (ii) 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
 - (iii) 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.
 - (iv) In METAR and SPECI, the runway visual range should be based on the maximum light intensity available on the runway.

(6) Reporting

- (a) In local routine reports, local special reports, 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.
- (b) Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.

- (c) Fifty metres should be considered the lower limit and 2000 metres the upper limit for runway visual range.
- (d) Outside of these limits, local routine reports, local special reports, METAR and SPECI should merely indicate that the runway visual range is less than 50 m or more than 2000 m.
- (e) In local routine and special reports—
 - (i) the units of measurement used shall be included;
 - (ii) 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;
 - (iii) 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
 - (iv) 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.
- (f) In METAR and SPECI—
 - (i) only the value representative of the touchdown zone should be reported and no indication of location on the runway should be included; and
 - (ii) 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.

- (g) 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.
- (h) 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.
- (i) 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.

7. Present weather

(1) Siting

- (a) When instrumented systems are used for observing present weather phenomena listed under, representative information should be obtained by the use of sensors appropriately sited.

(2) Reporting

- (a) 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.
- (b) 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.

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

- (i) Precipitation- all these forms of precipitation are reported when diameter of largest hailstones is 5 mm or more.

Drizzle - *DZ*

Rain - *RA*

Snow - *SN*

Snow grains - *SG*

Ice pellets - *PL*

Hail - *GR*

- (ii) This form of precipitation is reported when diameter of largest hailstones is less than 5 mm.

Small hail and/or snow pellets - *GS*

- (iii) Fog- Fog (FG) is reported when visibility is less than 1000 m, except when qualified by “MI”, “BC”, “PR” or “VC”;

- (iv) Mist- Mist (BR) is reported when visibility is at least 1000 m but not more than 5000 m.

- (v) 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” and volcanic ash.

Sand - *SA*

Dust (widespread) - *DU*

Haze - *HZ*

Smoke - *FU*

Volcanic ash - *VA*

- (vi) Other phenomena

<i>Dust/sand whirls (dust devils)</i>	- <i>PO</i>
<i>Squall</i>	- <i>SQ</i>
<i>Funnel cloud (tornado or waterspout)</i>	- <i>FC</i>
<i>Duststorm</i>	- <i>DS</i>
<i>Sandstorm</i>	- <i>SS</i>
- (vii) In automated local routine reports, local special reports, METAR and SPECI, in addition to the precipitation types listed under paragraph (i), the abbreviation UP should be used for Unidentified Precipitation when the type of precipitation cannot be identified by the automatic observing system.
- (viii) In local routine reports, local special reports, METAR and SPECI, the following characteristics of present weather phenomena, as necessary, shall be reported, using their respective abbreviations and relevant criteria, as appropriate:
 - (d) Thunderstorm (TS) - TS is used to report a thunderstorm with precipitation in accordance with the templates shown in Tables A3-1 and A3-2. When thunder is heard or lightning is detected at the aerodrome during the 10-minute period preceding the time of observation but no precipitation is observed at the aerodrome, the abbreviation “TS” shall be used without qualification.
 - (e) Freezing (FZ) - FZ is used when supercooled water droplets or precipitation, used with types of present weather phenomena in accordance with the templates shown in Tables A3-1 and A3-2.
 - (f) 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).
 - (g) 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—

- (i) Shower (SH)- SH is 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 should be reported as “VCSH” without qualification regarding type or intensity of precipitation.
 - (ii) Blowing (BL)- BL is 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.
 - (iii) Low drifting (DR)- DR is 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;
 - (iv) Shallow (MI)- MI is used when present weather phenomena such as ice or hail is less than 2 m (6 ft) above ground level;
 - (v) Patches (BC)- BC is used when fog patches are randomly covering the aerodrome;
 - (vi) Partial (PR)- PR is used when a substantial part of the aerodrome covered by fog while the remainder is clear.
- (h) In automated local routine reports, local special reports, METAR and SPECI, when showers (SH) referred to in (g) cannot be determined based upon a method that takes account of the presence of convective cloud, the precipitation should not be characterized by SH.
 - (i) 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	+

- (j) The intensity codes in paragraph (i) are 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.
- (k) Vicinity (VC)- VC is used 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.
- (l) In local routine reports, local special reports, METAR and SPECI—
 - (i) one or more, up to a maximum of three, of the present weather abbreviations given in paragraph (c) shall be used, as necessary, together with an indication, where appropriate, of the characteristics given in paragraph (d), (e) and (g), and intensity or proximity to the aerodrome given in paragraph (i), so as to convey a complete description of the present weather of significance to flight operations;
 - (ii) the indication of intensity or proximity, as appropriate, shall be reported first followed respectively by the characteristics and the type of weather phenomena; and
 - (iii) 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.

- (m) 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.

8. Clouds

(1) Siting sensors for observation of clouds

- (a) 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.
- (b) 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.
- (c) For that purpose, a sensor should be installed at a distance of less than 1200 m (4000 ft) before the landing threshold.

(2) Display

- (a) Where 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.
- (b) 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, the displays should clearly identify the area monitored by each sensor.

- (3) Reference level
- (a) The height of cloud base shall be reported above aerodrome elevation.
 - (b) 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.
 - (c) In the case of reports from offshore structures, the height of cloud base shall be given above mean sea level.
- (4) Reporting
- (a) 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).
 - (b) 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 3000m (10000 ft), and the vertical visibility in steps of 15m (50ft) up to and including 90m (300ft) and in steps of 30m (100ft) between 90m (300ft) and 600m (2000ft).
 - (c) In local routine reports, local special reports, METAR and SPECI—
 - (i) 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);
 - (ii) cumulonimbus clouds and towering cumulus clouds should be indicated as “CB” and “TCU”, respectively;
 - (iii) the vertical visibility should be reported in steps of 30 m (100 ft) up to 600 m (2 000 ft); and

- (iv) 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.
- (d) 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:
 - (i) the lowest layer or mass, regardless of amount to be reported as FEW, SCT, BKN or OVC as appropriate;
 - (ii) the next layer or mass, covering more than 2/8 to be reported as SCT, BKN or OVC as appropriate;
 - (iii) the next higher layer or mass, covering more than 4/8 to be reported as BKN or OVC as appropriate; and
 - (iv) cumulonimbus and/or towering cumulus clouds, whenever observed and not reported in 1) to 3);
- (e) When the cloud base is diffuse or ragged or fluctuating rapidly, the minimum height of cloud base, or cloud fragments, should be reported.
- (f) 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.
- (g) When Towering cumulus is reported, this indicates cumulus congestus clouds of great vertical extent.
- (h) Any observed value in paragraph (a), (b) and (c) which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.
 - (i) In local routine and special reports—
 - (i) the units of measurement used for the height of cloud base and vertical visibility shall be indicated; and

- (ii) 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.
- (j) In automated local routine reports, local special reports, METAR and SPECI—
 - (i) when the cloud type cannot be observed by the automatic observing system, the cloud type in each cloud group should be replaced by “///”;
 - (ii) when no clouds are detected by the automatic observing system, it should be indicated by using the abbreviation “NCD”;
 - (iii) when cumulonimbus clouds or towering cumulus clouds are detected by the automatic observing system and the cloud amount and/or the height of cloud base cannot be observed, the cloud amount and/or the height of cloud base should be replaced by “///”; and
 - (iv) 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.

9. Air temperature and dew-point temperature

- (1) Display
 - (a) 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.
 - (b) The displays in the meteorological station and in the air traffic services units should relate to the same sensors.
- (2) Reporting
 - (a) In local routine reports, local special reports, METAR and SPECI, the air temperature and the dew-point temperature shall be reported in steps of whole degrees

Celsius.

- (b) 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.
- (c) In local routine reports, local special reports, METAR and SPECI, a temperature below 0°C shall be identified.

10. Atmospheric pressure

(1) Display

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

(2) Reference level

- (a) The reference level for the computation of QFE should be the aerodrome elevation.
- (b) 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.

(3) Reporting

- (a) 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.
- (b) Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower whole hectopascal.

- (c) In local routine and special reports:
 - (i) QNH shall be included;
 - (ii) QFE shall be included if required by users or as agreed between the meteorological authority, the appropriate ATS authority and the operators concerned, on a regular basis;
 - (iii) the units of measurement used for QNH and QFE values shall be included; and
 - (iv) 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.
- (d) In METAR and SPECI, only QNH values shall be included.

11. Supplementary information

- (1) Reporting
 - (a) 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—
 - (i) freezing precipitation
 - (ii) moderate or heavy precipitation (including showers thereof)
 - (iii) blowing snow
 - (iv) duststorm, sandstorm
 - (v) thunderstorm
 - (vi) funnel cloud (tornado or waterspout)
 - (vii) volcanic ash

- (b) In local routine and special reports, the following significant meteorological conditions, or combinations thereof, should be reported in supplementary information—
- (i) cumulonimbus clouds CB;
 - (ii) thunderstorm TS;
 - (iii) moderate or severe turbulence MOD TURB or SEV TURB;
 - (iv) wind shear WS;
 - (v) hail GR;
 - (vi) severe squall line SEV SQL;
 - (vii) moderate or severe icing MOD ICE or SEV ICE;
 - (viii) freezing precipitation FZDZ, FZRA;
 - (ix) severe mountain waves SEV MTW;
 - (x) duststorm, sandstorm DS, SS;
 - (xi) blowing snow BLSN; and
 - (xii) funnel cloud (tornado or waterspout) FC
- (c) The location of the condition should be indicated. Where necessary, additional information should be included using abbreviated plain language.
- (d) 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.
- (e) In METAR and SPECI, where local circumstances so warrant, information on wind shear should be added.
- (f) The local circumstances referred to in paragraph (e) include, but are not necessarily limited to, wind shear of a non-transitory nature such as might be associated with low-level temperature inversions or local topography.

- (g) In METAR and SPECI, the following information should be included in the supplementary information, in accordance with regional air navigation agreement:
- (i) information on sea-surface temperature, and the state of the sea or the significant wave height from aeronautical meteorological stations established on offshore structures in support of helicopter operations; and
 - (ii) information on the state of the runway provided by the appropriate airport authority.

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 Schedule.

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).

<i>Element as specified in Chapter 4</i>	<i>Detailed content</i>	<i>Template(s)</i>	<i>Examples</i>
Identification of the type of report (M)	Type of report	MET REPORT <i>or</i> 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			
	Runway (O) ²	RWY nn[L] <i>or</i> RWY nn[C] <i>or</i> RWY nn[R]			WIND 240/4MPS (WIND 240/8KT)
	Runway section (O) ³	TDZ			
	Wind direction (M)	nnn/	VRB BTN nnn/ AND nnn/ <i>or</i> VRB	C A L M	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 speed (M)	[ABV]n[n][n]MPS (<i>or</i> [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/ <i>or</i> VRB	C A L M	WIND 270/ABV49MPS (WIND 270/ABV99KT) WIND 120/3MPS MAX9 MNM2 (WIND 120/6KT MAX18 MNM4) WIND 020/5MPS VRB BTN 350/ AND 070/ (WIND 020/10KT VRB BTN 350/ AND 070/)
	Wind speed (O) ³	[ABV]n[n][n]MPS (<i>or</i> [ABV]n[n]KT)			
	Significant speed variations (C) ⁴	MAX[ABV]nn[n] MNMn[n]			
	Significant directional variations (C) ⁵	VRB BTN nnn/ AND nnn/	—		
	Runway section (O) ³	END			
	Wind direction (O) ³	nnn/	VRB BTN nnn/ AND nnn/ <i>or</i> VRB	C A L M	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)
	Wind speed (O) ³	[ABV]n[n][n]MPS (<i>or</i> [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/	—		

<i>Element as specified in Chapter 4</i>	<i>Detailed content</i>	<i>Template(s)</i>			<i>Examples</i>
Visibility (M)	Name of the element (M)	VIS			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] <i>or</i> RWY nn[C] <i>or</i> RWY nn[R]			
	Runway section (O) ³	TDZ			
	Visibility (M)	n[n][n][n]M <i>or</i> n[n]KM			
	Runway section (O) ³	MID			
	Visibility (O) ³	n[n][n][n]M <i>or</i> n[n]KM			
	Runway section (O) ³	END			
	Visibility (O) ³	n[n][n][n]M <i>or</i> 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] <i>or</i> RWY nn[C] <i>or</i> RWY nn[R]			
	Runway section (C) ⁸	TDZ			
	Runway visual range (M)	[ABV <i>or</i> BLW] nn[n][n]M			
	Runway section (C) ⁸	MID			
	Runway visual range (C) ⁸	[ABV <i>or</i> BLW] nn[n][n]M			
	Runway section (C) ⁸	END			
	Runway visual range (C) ⁸	[ABV <i>or</i> BLW] nn[n][n]M			
Present weather (C) ^{9, 10}	Intensity of present weather (C) ⁹	FBL <i>or</i> MOD <i>or</i> HVY		—	MOD RA HVY TSRA HVY DZ FBL SN HZ FG VA MIFG HVY TSRASN FBL SNRA FBL DZ FG HVY SHSN BLSN HVY TSUP //
	Characteristics and type of present weather (C) ^{9,11}	DZ <i>or</i> RA <i>or</i>		FG <i>or</i> BR <i>or</i>	
		SN <i>or</i> SG <i>or</i>		SA <i>or</i> DU <i>or</i>	
		PL <i>or</i> DS <i>or</i>		HZ <i>or</i> FU <i>or</i>	
		SS <i>or</i> FZDZ <i>or</i>		VA <i>or</i> SQ <i>or</i>	
		FZUP ¹² <i>or</i> FC ¹³ <i>or</i>		PO <i>or</i> TS <i>or</i>	
		FZRA <i>or</i> SHGR <i>or</i>		BCFG <i>or</i> BLDU <i>or</i>	
		SHGS <i>or</i> SHRA <i>or</i>		BLSA <i>or</i> BLSN <i>or</i>	
		SHSN <i>or</i> SHUP ¹² <i>or</i>		DRDU <i>or</i> DRSA <i>or</i>	
		TSGR <i>or</i> TSGS <i>or</i>		DRSN <i>or</i> FZFG <i>or</i>	
		TSRA <i>or</i> TSSN <i>or</i>		MIFG <i>or</i> PRFG <i>or</i>	
TSUP ¹² <i>or</i> UP ¹²		// ¹²			
Cloud (M) ¹⁴	Name of the element (M)	CLD			CLD NSC CLD SCT 300M OVC 600M (CLD SCT 1000FT OVC 2000FT) CLD OBSC VER VIS 150M (CLD OBSC VER VIS 500FT) CLD BKN TCU 270M (CLD BKN TCU 900FT) CLD RWY 08R BKN 60M RWY 26 BKN 90M (CLD RWY 08R BKN 200FT RWY 26 BKN 300FT) CLD /// CB ///M (CLD /// CB ///FT)
	Runway (O) ²	RWY nn[L] <i>or</i> RWY nn[C] <i>or</i> RWY nn[R]			
	Cloud amount (M) <i>or</i> vertical visibility (O) ⁹	FEW <i>or</i> SCT <i>or</i> BKN <i>or</i> OVC <i>or</i> /// ¹²	OBSC	NSC <i>or</i> NCD ¹²	
	Cloud type (C) ⁹	CB <i>or</i> TCU <i>or</i> /// ¹²	—		

Element as specified in Chapter 4	Detailed content	Template(s)			Examples
	Height of cloud base or the value of vertical visibility (C) ⁹	n[n][n][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 TMS08
	Air temperature (M)	[MS]nn			
Dew-point temperature (M)	Name of the element (M)	DP			DP15 DPMS18
	Dew-point temperature (M)	[MS]nn			
Pressure values (M)	Name of the element (M)	QNH			QNH 0995HPA QNH 1009HPA
	QNH (M)	nnnnHPA			QNH 1022HPA QFE 1001HPA
	Name of the element (O)	QFE			QNH 0987HPA 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]			RWY 18 0956HPA RWY 24 0955HPA
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			
	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]			FC IN APCH WS IN APCH 60M-WIND 360/13MPS WS RWY 12 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
	Change indicator (M) ¹⁷	NOSIG	BECMG <i>or</i> TEMPO			BECMG FEW 600M (TREND BECMG FEW 2000FT)
	Period of change (C) ⁹		FMnnnn <i>and/or</i> TLnnnn <i>or</i> ATnnnn			TREND TEMPO 250/18 MPS MAX25 (TREND TEMPO 250/36KT MAX50)
	Wind (C) ⁹		nnn/[ABV]n[n][n]MPS [MAX[ABV] nn[n]] (<i>or</i> nnn/[ABV]n[n]KT [MAX[ABV]nn])			TREND BECMG AT1800 VIS 10KM NSW TREND BECMG TL1700 VIS 800M FG TREND BECMG FM1030 TL1130 CAVOK
	Visibility (C) ⁹		VIS n[n][n][n]M <i>or</i> VIS n[n]KM			TREND TEMPO TL1200 VIS 600M BECMG AT1230 VIS 8KM NSW CLD NSC
	Weather phenomenon: intensity (C) ⁹		FBL <i>or</i> MOD <i>or</i> HVV	—	NSW	
Element as specified in Chapter 4	Detailed content	Template(s)				Examples
	Weather phenomenon: characteristics and type (C) ⁹ , 10, 11		DZ <i>or</i> RA <i>or</i> SN <i>or</i> SG <i>or</i> PL <i>or</i> DS <i>or</i> SS <i>or</i> FZDZ <i>or</i> FZRA <i>or</i> SHGR <i>or</i> SHGS <i>or</i> SHRA <i>or</i> SHSN <i>or</i> TSGR <i>or</i> TSGS <i>or</i> TSRA <i>or</i> TSSN FZFG <i>or</i> MIFG <i>or</i> PRFG	FG <i>or</i> BR <i>or</i> SA <i>or</i> DU <i>or</i> HZ <i>or</i> FU <i>or</i> VA <i>or</i> SQ <i>or</i> PO <i>or</i> FC <i>or</i> TS <i>or</i> BCFG <i>or</i> BLDU <i>or</i> BLSA <i>or</i> BLSN <i>or</i> DRDU <i>or</i> DRSA <i>or</i> DRSN <i>or</i> FZFG <i>or</i> MIFG <i>or</i> PRFG		TREND TEMPO FM0300 TL0430 MOD FZRA TREND BECMG FM1900 VIS 500M HVV SNRA TREND BECMG FM1100 MOD SN TEMPO FM1130 BLSN TREND BECMG AT1130 CLD OVC 300M (TREND BECMG AT1130 CLD OVC 1000FT) TREND TEMPO TL1530 HVV SHRA CLD BKN CB 360M (TREND TEMPO TL1530 HVV SHRA CLD BKN CB 1200FT)
	Name of the element (C) ⁹		CLD			
	Cloud amount and vertical		FEW <i>or</i>	OBSC	NSC	
	visibility (C) ^{9,14}		SCT <i>or</i>			
			BKN <i>or</i>			
			OVC			
	Cloud type (C) ^{9,14}		CB <i>or</i> TCU	—		
	Height of cloud base <i>or</i> the value of vertical visibility		n[n][n][n]	[VER VIS		
			M (<i>or</i>	n[n][n]M		

	(C) ^{9,14}	n[n][n][n]	(or VER	
		FT)	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 if visibility or runway visual range < 1 500 m.
5. To be included whenever applicable.
6. One or more, up to a maximum of three groups.
7. Precipitation types as listed may be combined. Only moderate or heavy precipitation to be indicated in trend forecasts.
8. For automated reports only.
9. Heavy used to indicate tornado or waterspout; moderate used to indicate funnel cloud not reaching the ground.
10. Up to four cloud layers may be included.
11. Abbreviated plain language may be used.
12. Number of change indicators to be kept to a minimum, 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 schedule.

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

<i>Element as specified in Chapter 4</i>	<i>Detailed content</i>	<i>Template(s)</i>		<i>Examples</i>	
Identification of the type of report (M)	Type of report (M)	METAR, METAR COR, SPECI <i>or</i> 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 <i>or</i> missing report identifier (C)	AUTO <i>or</i> NIL		AUTO NIL	
END OF METAR IF THE REPORT IS MISSING.					
Surface wind (M)	Wind direction (M)	nnn	VRB	24004MPS (24008KT) 19006MPS (19012KT)	VRB01MPS (VRB02KT)
	Wind speed (M)	[P]nn[n]		00000MPS (00000KT) 140P49MPS (140P99KT)	
	Significant speed variations (C) ³	G[P]nn[n]		12003G09MPS (12006G18KT)	
	Units of measurement (M)	MPS (<i>or</i> KT)		24008G14MPS (24016G28KT)	
	Significant directional variations (C) ⁴	nnnVnnn	—	02005MPS 350V070 (02010KT 350V070)	

Visibility (M)	Prevailing or minimum visibility (M) ⁵	nnnn	CAVOK 7000 9999 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	K R32/0400 R12R/1700 R10/M0050 R14L/P2000 R16L/0650 R16C/0500 R16R/0450 R17L/0450 R12/1100U R26/0550N R20/0800D R12/0700
	Runway (M)	nn[L]/or nn[C]/or nn[R]/	
	Runway visual range (M)	[P or M]nnnn	
	Runway visual range past tendency (C) ⁸	U, D or N	
Element as specified in Chapter 4	Detailed content	Template(s)	Examples

Sea-surface temperature and state of the sea or significant wave height (C) ¹⁵	W[M]nn/Sn or W[M]nn/Hn[n][n]	W15/S2 W12/H75

Element as specified in Chapter 4	Detailed content	Template(s)		Examples
	State of the runway (C) 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 /	
		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)		
	Prevailing visibility (C) ²	nnnn		BECMG FM1030 TL1130
	Weather phenomenon: intensity (C) ¹⁰	- or +	—	CAVOK BECMG TL1700 0800 FG BECMG AT1800 9000 NSW BECMG FM1900
	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 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 BLSA or BLSN or DRDU or DRSA or DRSN or FZFG or MIFG or PRFG	C A V O K TEMPO FM0330 TL0430 FZRA TEMPO TL1200 0600 BECMG AT1200 8000 NSW NSC BECMG AT1130 OVC010
	Cloud amount and height of cloud base or vertical visibility (C) ^{2, 14}	FEWnnn SCTnnn BKNnnn OVCnnn	or VVnnn or or VV///	N S C TEMPO TL1530 +SHRA BKN012CB
	Cloud type (C) ^{2, 14}	CB or TCU	—	

Notes.—

1. Fictitious location.
2. To be included whenever applicable.
3. To be included if visibility or runway visual range < 1 500 m; for up to a maximum of four runways.
4. One or more, up to a maximum of three groups.
5. To be included whenever applicable; no qualifier for *moderate* intensity.
6. Precipitation types listed may be combined. Only moderate or heavy precipitation to be indicated in trend forecasts.
7. For automated reports only.
8. Heavy used to indicate tornado or waterspout; moderate (no qualifier) to indicate funnel cloud not reaching the ground.
9. Up to four cloud layers.
10. Number of change indicators to be kept to a minimum, normally not exceeding three groups.

Table A3-3. Use of change indicators in trend forecasts

<i>Change indicator</i>	<i>Time indicator and period</i>	<i>Meaning</i>	
NOSIG	—	no significant changes are forecast	
BECMG	FMn1n1n1n1 TLn2n2n2n2	the change is forecast to	commence at n1n1n1n1 UTC and be completed by n2n2n2n2 UTC
	TLnnnn		commence at the beginning of the trend forecast period and be completed by nnnn UTC
	FMnnnn		commence at nnnn UTC and be completed by the end of the trend forecast period
	ATnnnn		occur at nnnn UTC (specified time)
	—		a) commence at the beginning of the trend forecast period and be completed by the end of the trend forecast period; <i>or</i> b) the time is uncertain
TEMPO	FMn1n1n1n1 TLn2n2n2n2	temporary fluctuations are forecast to	commence at n1n1n1n1 UTC and cease by n2n2n2n2 UTC
	TLnnnn		commence at the beginning of the trend forecast period and cease by nnnn UTC
	FMnnnn		commence at nnnn UTC and cease by the end of the trend forecast period
	—		commence at the beginning of the trend forecast period and cease by the end of the trend forecast period

Table A3-4. Ranges and resolutions for the numerical elements included in local reports

<i>Element as specified in Chapter 4</i>		<i>Range</i>	<i>Resolution</i>
Runway: (no units)		01 – 36	1
Wind direction: °true		010 – 360	10
Wind speed:	MPS KT	1 – 99* 1 – 199*	1 1
Visibility:	M	0 – 750	50
	M	800 – 4 900	100
	KM	5 – 9	1
	KM	10 –	0 (fixed value: 10 KM)
Runway visual range:	M	0 – 375	25
	M	400 – 750	50
	M	800 – 2 000	100
Vertical visibility:	M	0 – 75**	15
	M	90 – 600	30
	FT	0 – 250**	50
	FT	300 – 2 000	100
Clouds: height of cloud base:	M	0 – 75**	15
	M	90 – 3 000	30
	FT	0 – 250**	50
	FT	300 – 10 000	100
Air temperature; Dew-point temperature:	°C	–80 – +60	1
QNH; QFE:	hPa	0500 – 1 100	1
<p>* 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.</p> <p>** Under circumstances as specified in 4.5.4.2; otherwise a resolution of 30 m (100 ft) is to be used.</p>			

Table A3-5. Ranges and resolutions for the numerical elements included in METAR and SPECI

<i>Element as specified in Chapter 4</i>		<i>Range</i>	<i>Resolution</i>
Runway:	(no units)	01 – 36	1
Wind direction:	°true	000 – 360	10
Wind speed:	MPS KT	00 – 99*	1
		00 – 199*	1
Visibility:	M	0000 – 0750	50
	M	0800 – 4 900	100
	M	5 000 – 9 000	1 000
	M	10 000 –	0 (fixed value: 9999)
Runway visual range:	M	0000 – 0375	25
	M	0400 – 0750	50
	M	0800 – 2 000	100
Vertical visibility:	30's M (100's FT)	000 – 020	1
Clouds: height of cloud base:	30's M (100's FT)	000 – 100	1
Air temperature;	°C	–80 – +60	1
Dew-point temperature:			
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
	Runway deposits:	(no units)	0 – 9
	Extent of runway contamination:	(no units)	1; 2; 5; 9
	Depth of deposit:	(no units)	00 – 90; 92 – 99
	Friction coefficient/braking action:	(no units)	00 – 95; 99
* 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 (runway visual range tendency to be included in METAR only); and moderate drizzle and fog; scattered cloud at 300 metres; overcast at 600 metres; air temperature 17 degrees Celsius; dew-point temperature 16 degrees Celsius; QNH 1 018 hectopascals; trend during next 2 hours, visibility (along the runway(s) in the local routine report; prevailing visibility in METAR) becoming 800 metres in fog by 1700 UTC; at 1800 UTC visibility (along the runway(s) in the local routine report; prevailing visibility in METAR) becoming 10 kilometres or more and nil significant weather.

*Fictitious location

Note.— In this example, the primary units “metre per second” and “metre” were used for wind speed and height of cloud base, respectively.

However, in accordance with Annex 5, the corresponding non-SI alternative units “knot” and “foot” may be used instead.

Example A3-2. 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 1008HPA 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); runway visual range above 1 800 metres on runway 05 (runway visual range not required in SPECI with prevailing visibility of 3 000 metres); thunderstorm with heavy rain; broken cumulonimbus cloud at 500 feet; air temperature 25 degrees Celsius; dew-point temperature 22 degrees Celsius; QNH 1 008 hectopascals; trend during next 2 hours, visibility (along the runway(s) in the local special report; prevailing visibility in SPECI) temporarily 600 metres from 1115 to 1200, becoming at 1200 UTC visibility (along the runway(s) in the local special report; prevailing visibility in SPECI) 8 kilometres, thunderstorm ceases and nil significant weather and nil significant cloud.

*Fictitious location

Note.— In this example, the non-SI alternative units “knot” and “foot” were used for wind speed and height of cloud base, respectively.

However, in accordance with Annex 5, the corresponding primary units “metres per second” and “metre” may be used instead.

Example A3-3. Volcanic activity report

VOLCANICACTIVITYREPORTYUSB*231500MTTROJEEN*VOLCANO
N5605 W12652 ERUPTED 231445 LARGE ASH CLOUD EXTENDING TO
APPROX 30000 FEET MOVING SW

Meaning:

Volcanic activity report issued by Siby/Bistock meteorological station at 1500 UTC on the 23rd of the month. Mt. Trojeen volcano 56 degrees 5 minutes north 126 degrees 52 minutes west erupted at 1445 UTC on the 23rd; a large ash cloud was observed extending to approximately 30 000 feet and moving in a south-westerly direction.

* Fictitious location

SCHEDULE 3

Regulations 9(b), 40(l)

TECHNICAL SPECIFICATIONS RELATED TO FORECASTS

PART I - CRITERIA RELATED TO TAF

1. TAF format

- (1) The TAF code form is contained in the Manual on Codes (WMO-No. 306), Volume I.1, Part A- Alphanumeric Codes.
- (2) TAF should be disseminated in digital form in addition to dissemination of the TAF in accordance with (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).
- (4) TAF if disseminated in digital form shall be accompanied by the appropriate metadata.
- (5) 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).
- (6) 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. Inclusion of meteorological elements in TAF

- (1) Surface wind
 - (a) In forecasting surface wind, the expected prevailing direction shall be given and 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”.

- (b) When the wind is forecast to be less than 0.5 m/s (1 kt), the forecast wind speed shall be indicated as calm.
- (c) 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.
- (d) 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).

(2) Visibility

- (a) When the visibility is forecast to be less than 800 m, it should be expressed in steps of 50 m;
- (b) When it is forecast to be 800 m or more but less than 5 km, in steps of 100 m;
- (c) When visibility is 5 km or more but less than 10 km, it should be expressed in kilometre steps;
- (d) 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.
- (e) When visibility is forecast to vary in different directions and the prevailing visibility cannot be forecast, the lowest forecast visibility should be given.

(3) Weather phenomena

- (a) 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—
 - (i) freezing precipitation
 - (ii) freezing fog
 - (iii) moderate or heavy precipitation (including showers thereof)
 - (iv) low drifting dust, sand or snow

- (v) blowing dust, sand or snow
 - (vi) duststorm
 - (vii) sandstorm
 - (viii) thunderstorm (with or without precipitation)
 - (ix) squall
 - (x) funnel cloud (tornado or waterspout)
 - (xi) other weather phenomena, as agreed between the meteorological authority, the appropriate ATS authority and the operators concerned.
 - (b) The expected end of occurrence of those phenomena shall be indicated by the abbreviation “NSW”.
- (4) Cloud
- (a) Cloud amount should be forecast using the abbreviations “FEW”, “SCT”, “BKN” or “OVC” as necessary;
 - (b) When it is expected that the sky will remain or become obscured and clouds cannot be forecast and information on vertical visibility is available at the aerodrome, the vertical visibility should be forecast in the form “VV” followed by the forecast value of the vertical visibility.
 - (c) When several layers or masses of cloud are forecast, their amount and height of base should be included in the following order—
 - (i) the lowest layer or mass regardless of amount, to be forecast as FEW, SCT, BKN or OVC as appropriate;
 - (ii) the next layer or mass covering more than 2/8, to be forecast as SCT, BKN or OVC as appropriate;
 - (iii) the next higher layer or mass covering more than 4/8, to be forecast as BKN or OVC as appropriate; and
 - (iv) cumulonimbus clouds and/or towering cumulus clouds, whenever forecast and not already included under a) to c).

- (d) Cloud information should be limited to cloud of operational significance and when no cloud of operational significance is forecast, and “CAVOK” is not appropriate, the abbreviation “NSC” should be used.
- (5) Temperature
The forecast temperatures forecasts are not included TAF in accordance with AFI regional air navigation agreement.

3. Use of change groups

- (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-
 - (i) freezing fog
 - (ii) freezing precipitation
 - (iii) moderate or heavy precipitation (including showers)
 - (iv) thunderstorm
 - (v) duststorm
 - (vi) sandstorm.
- (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 60° 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 the operators concerned, taking into account changes in the wind which would—
 - (i) require a change in runway(s) in use; and
 - (ii) 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—
 - (i) 150, 350, 600, 800, 1 500 or 3 000 m; or
 - (ii) 5000 m in cases where significant numbers of flights are operated in accordance with the visual flight rules;
- (f) when any of the following weather phenomena or combinations thereof are forecast to begin or end:
 - (i) low drifting dust, sand or snow
 - (ii) blowing dust, sand or snow
 - (iii) squall
 - (iv) 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:

- (i) 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); or
 - (ii) 450 m (1 500 ft) in cases where significant numbers of flights are operated in accordance with the visual flight rules.
 - (h) when the amount of a layer or mass of cloud below 450 m (1 500 ft) is forecast to change:
 - (i) from NSC, FEW or SCT to BKN or OVC; or
 - (ii) from BKN or OVC to NSC, FEW or SCT.
 - (i) when the vertical visibility is forecast to improve and change to or pass through one or more of the following values, or when the vertical visibility is forecast to deteriorate and pass through one or more of the following values: 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); and
 - (j) any other criteria based on local aerodrome operating minima, as agreed between the meteorological authority and the operators concerned.
 - (k) 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 changes in visibility.
- (3) When a change in any of the elements given in the TAF is required to be indicated in accordance with the criteria given in schedule 6 (PART I, 2), the change indicators “BECMG” or “TEMPO” should 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.

- (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 should normally not exceed 2 hours but in any case should not exceed 4 hours.
- (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 TAF or the validity period should be subdivided in accordance with schedule 6 (PART I, 2).
- (6) Where one set of prevailing weather conditions is expected to change significantly and more or less completely to a different set of conditions, the period of validity should be subdivided into self-contained periods using the abbreviation “FM” followed immediately by a six-figure time group in days, hours and minutes UTC indicating the time the change is expected to occur. The subdivided period following the abbreviation “FM” should be self-contained and all forecast conditions given before the abbreviation should be superseded by those following the abbreviation.
- (7) Guidance on the use of change and time indicators in TAF is given in Table A5-2.

4. Use of probability groups

- (1) The probability of occurrence of an alternative value of a forecast element or elements should be indicated, as necessary, by use of the abbreviation “PROB” followed by the probability in tens of per cent and the time period during which the alternative value(s) is (are) expected to apply.

- (2) The probability information should be placed after the element or elements forecast and be followed by the alternative value of the element or elements.
- (3) 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.
- (4) A probability of an alternative value or change of less than 30 per cent should not be considered sufficiently significant to be indicated.
- (5) 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”.

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.

6. Dissemination of TAF

TAF and amendments thereto 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.

PART II - CRITERIA RELATED TO TREND FORECASTS

1. Format of trend forecasts

Trend forecasts shall be issued in accordance with the templates shown in, 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 and examples of trend forecasts are given in Schedule 4.

2. Inclusion of meteorological elements in trend forecasts

(1) General provisions in preparing trend forecasts

- (a) The trend forecast shall indicate significant changes in respect of one or more of the elements: surface wind, visibility, weather and clouds and only those elements shall be included for which a significant change is expected.
- (b) In the case of significant changes in respect of cloud, all cloud groups, including layers or masses not expected to change shall be indicated.
- (c) In the case of a significant change in visibility, the phenomenon causing the reduction of visibility shall also be indicated.
- (d) When no change is expected to occur, this shall be indicated by the term “NOSIG”.
- (e) The trend forecast shall indicate changes in the surface wind which involve—
 - (i) 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;
 - (ii) a change in mean wind speed of 5 m/s (10 kt) or more; and
 - (iii) changes in the wind through values of operational significance.
- (f) The threshold values shall be established by the meteorological authority in consultation with the appropriate ATS authority and the operators concerned, taking into account changes in the wind which would—
 - (i) require a change in runway(s) in use; and
 - (ii) indicate that the runway tailwind and crosswind components will change through values representing the main operating limits of typical aircraft operating at the aerodrome.

(2) Visibility in trend forecasts

- (a) 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.
- (b) 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.
- (c) 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.

(3) Weather phenomena in trend forecasts

- (a) 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—
 - (i) freezing precipitation
 - (ii) moderate or heavy precipitation (including showers)
 - (iii) thunderstorm (with precipitation)
 - (iv) duststorm
 - (v) sandstorm
 - (vi) other weather phenomena as agreed between the meteorological authority, the appropriate ATS authority and the operators concerned.
- (b) The trend forecast shall indicate the expected onset or cessation of one or more of the following weather phenomena or combinations thereof—

- (i) freezing fog
 - (ii) low drifting dust, sand or snow
 - (iii) blowing dust, sand or snow
 - (iv) thunderstorm (without precipitation)
 - (v) squall
 - (vi) funnel cloud (tornado or waterspout).
 - (c) The total number of phenomena reported in the trend forecast shall not exceed three.
 - (d) The expected end of occurrence of the weather phenomena shall be indicated by the abbreviation “NSW”.
- (4) Clouds in trend forecasts
- The trend forecast shall indicate the change—
- (a) when the height of the base of a cloud layer of BKN or OVC extent is expected to lift and change to or pass through one or more of the following values, or when the height of the base of a cloud layer of BKN or OVC extent is expected to lower and pass through one or more of the following values: 30, 60, 150, 300 and 450 m (100, 200, 500, 1 000 and 1 500 ft), the trend forecast shall indicate the change.
 - (b) When the height of the base of a cloud layer is below or is expected to fall below or rise above 450 m (1 500 ft), the trend forecast shall also indicate changes in cloud amount from FEW, or SCT increasing to BKN or OVC, or changes from BKN or OVC decreasing to FEW or SCT.
 - (c) When no clouds of operational significance are forecast and “CAVOK” is not appropriate, the abbreviation “NSC” shall be used.

- (5) Vertical visibility in trend forecasts
The trend forecast shall indicate the change when the sky is expected to remain or become obscured and vertical visibility observations are available at the aerodrome, and the vertical visibility is forecast to improve and change to or pass through one or more of the following values, or when the vertical visibility is forecast to deteriorate and pass through one or more of the following values: 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft), the trend forecast shall indicate the change.
- (6) Additional criteria in preparing trend forecasts
Criteria for the indication of changes based on local aerodrome operating minima, shall be used as agreed between the meteorological authority and the operator concerned.

3. Use of change groups in trend forecasts

- (1) When a change is expected to occur, the trend forecast shall begin with one of the change indicators “BECMG” or “TEMPO”.
- (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.
- (3) 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.
- (4) 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.

- (5) 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.
- (6) 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.
- (7) 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.
- (8) 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.
- (9) 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.
- (10) 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.

- (11) 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.
- (12) Guidance on the use of change indicators in trend forecasts is given in Table A3-3.

4. Use of the probability indicator

The indicator “PROB” shall not be used in trend forecasts.

PART III —CRITERIA RELATED TO FORECASTS FOR TAKE-OFF

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.

2. Amendments to forecasts for take-off

The criteria for the issuance of amendments to forecasts for take-off for surface wind direction and speed, temperature and pressure and any other elements agreed locally 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.

PART IV - CRITERIA RELATED TO AREA FORECASTS FOR LOW-LEVEL FLIGHTS

1. Format and content of GAMET area forecasts

- (1) When prepared in GAMET format, area forecasts shall contain two sections—
 - (a) Section I related to information on en-route weather phenomena hazardous to low-level flights, prepared in support of the issuance of AIRMET information; and
 - (b) Section II related to additional information required by low-level flights.
- (2) The content and order of elements in a GAMET area forecast, when prepared, shall be in accordance with the template shown in Table A5-3.
- (3) Additional elements in Section II shall be included in accordance with AFI regional air navigation agreement.
- (4) Elements which are already covered by a SIGMET message shall be omitted from GAMET area forecasts.

2. Amendments to GAMET area forecasts

When a weather phenomenon hazardous to low-level flights has been included in the GAMET area forecast and the phenomenon forecast does not occur, or is no longer forecast, an amendment coded GAMET AMD shall be issued, amending only the weather element concerned.

3. Content of area forecasts for low-level flights in chart form

- (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.
- (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 Schedule 7 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-
 - (i) upper wind and upper-air temperature; and
 - (ii) Forecast QNH.
- (3) Guidance on the use of terms “ISOL”, “OCNL” and “FRQ” referring to cumulonimbus and towering cumulus clouds, and thunderstorms is given in Schedule 7.

4. Exchange of area forecasts for low-level flights

Area forecasts for low-level flights prepared in support of the issuance of GAMET 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 schedule .

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

<i>Element as specified in Chapter 6</i>	<i>Detailed content</i>	<i>Template(s)</i>		<i>Examples</i>
Identification of the type of forecast (M)	Type of forecast (M)	TAF <i>or</i> TAF AMD <i>or</i> 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.				
<i>Element as specified in Chapter 6</i>	<i>Detailed content</i>	<i>Template(s)</i>		<i>Examples</i>
Days and period of validity of forecast (M)	Days and period of the validity of the forecast in UTC (M)	nnnn/nnnn		0812/0918
Identification of a cancelled forecast (C)	Cancelled forecast identifier (C)	CNL		CNL
END OF TAF IF THE FORECAST IS CANCELLED.				
Surface wind (M)	Wind direction (M)	nnn <i>or</i> VRB ²		24004MPS; VRB01MPS (24008KT); (VRB02KT)
	Wind speed (M)	[P]nn[n]		19005MPS (19010KT) 00000MPS (00000KT) 140P49MPS (140P99KT) 12003G09MPS
	Significant speed variations (C) ³	G[P]nn[n]		12006G18KT24008G14MPS (24016G28KT)
	Units of measurement (M)	MPS (<i>or</i> KT)		
Visibility (M)	Prevailing visibility (M)	nnnn	C A V O K	0350 7000 9000 9999 CAVOK

Weather (C) ^{4, 5}	Intensity of weather phenomena (C) ⁶	— or +	—	RA HZ FG +TSRA -FZDZ PRFG
	Characteristics and type of weather phenomena (C) ⁷	DZ or RA or SN or SG or PL or DS or SS or FZDZ or FZRA or SHGR or SHGS or SHRA or SHSN or TSGR or TSGS or TSRA or TSSN	FG or BR or SA or DU or HZ or FU or VA or SQ or TS or BCFG or BLDU or BLSA or BLSN or DRDU or DRSA or DRSN or FZFG or MIFG or PRFG	+TSRASN SNRA FG
Cloud (M) ⁸	Cloud amount and height of base or vertical visibility (M)	FEWnnn or VVnnn or SCTnnn or VV/// BKNnnn or OVCnnn	NSC	F E W 0 1 0VV005 OVC020 NSC VV/// SCT005 BKN012 SCT008 BKN025CB
	Cloud type (C) ⁴	CB or TCU	—	
Temperature (O) ⁹	Name of the element (M)	TX		TX25/1013Z TN09/1005Z TX05/2112Z TNM02/2103Z
	Maximum temperature (M)	[M]nn/		
	Day and time of occurrence of the maximum temperature (M)	nnnnZ		
	Name of the element (M)	TN		
	Minimum temperature (M)	[M]nn/		
	Day and time of occurrence of the minimum temperature (M)	nnnnZ		

Expected significant changes to one or more of the above elements during the period of validity (C) ⁴ , 10	Change or probability indicator (M)	PROB30 [TEMPO] or PROB40 [TEMPO] or BECMG or TEMPO or FM			TEMPO 0815/0818 25017G25MPS (TEMPO 0815/0818 25034G50KT) TEMPO 2212/2214 17006G13MPS 1000 TSRA SCT010CB BKN020
	Period of occurrence or change (M)	nnnn/nnnn or nnnnn ¹¹			(TEMPO 2212/2214 17012G26KT 1000 TSRA SCT010CB BKN020)
	Wind (C) ⁴	nnn[P]nn[n][G[P]nn[n]]MPS or VRBnnMPS (or nnn[P]nn[G[P]nn]KT or VRBnnKT)			BECMG 3010/3011 00000MPS 2400 OVC010 (BECMG 3010/3011 00000KT 2400 OVC010)
	Prevailing visibility (C) ⁴	nnnn			PROB30 1412/1414 0800 FG BECMG 1412/1414 RA TEMPO 2503/2504 FZRA TEMPO 0612/0615 BLSN PROB40 TEMPO 2923/3001 0500 FG
	Weather phenomenon: intensity (C) ⁶	- or +	—	NSW	C A V O K
	Weather phenomenon: characteristics and type (C) ⁴ , 7	DZ or RA or SN or BR or SA SG or PL or DU DS or SS or HZ or FZDZ or FU or VA FZRA or SQ or SHGR or PO or FC SHGS or TS or SHRA or BCFG or SHSN or BLDU or TSGR or BLSA or TSGS or BLSN or TSRA or DRDU or TSSN or DRSR 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		ndndn hnhnmnm	used to indicate a significant change in most weather elements occurring at ndnd day, nhnh hours and nmnm minutes (UTC); all the elements given before “FM” are to be included following “FM” (i.e. they are all superseded by those following the abbreviation)	
BECMG		nd1nd1nh1nh1/nd2nd2nh2nh2	the change is forecast to commence at nd1nd1 day and nh1nh1 hours (UTC) and be completed by nd2nd2 day and nh2nh2 hours (UTC); only those elements for which a change is forecast are to be given following “BECMG”; the time period nd1nd1nh1nh1/nd2nd2nh2nh2 should normally be less than 2 hours and in any case should not exceed 4 hours	
TEMPO		nd1nd1nh1nh1/nd2nd2nh2nh2	temporary fluctuations are forecast to commence at nd1nd1 day and nh1nh1 hours (UTC) and cease by nd2nd2 day and nh2nh2 hours (UTC); only those elements for which fluctuations are forecast are to be given following “TEMPO”; temporary fluctuations should not last more than one hour in each instance, and in the aggregate, cover less than half of the period nd1nd1nh1nh1/nd2nd2nh2nh2	
PROBnn	—	nd1nd1nh1nh1/nd2nd2nh2nh2	probability of occurrence (in %) of an alternative value of a forecast element or elements; nn = 30 or nn = 40 only; to be placed after the element(s) concerned	—
	TEMPO	nd1nd1nh1nh1/nd2nd2nh2nh2		probability of occurrence of temporary fluctuations

Table A5-3. Template for GAMET

Key: M = inclusion mandatory, part of every message;
 C = inclusion conditional, dependent on meteorological conditions;
 O = inclusion optional;
 = = a double line indicates that the text following it should be placed on the subsequent line.

<i>Element</i>	<i>Detailed content</i>	<i>Template(s)</i>			<i>Examples</i>
Location indicator of FIR/CTA (M)	ICAO location indicator of the ATS unit serving the FIR or CTA to which the GAMET refers (M)	nnnn			YUCC ¹
Identification (M)	Message identification (M)	GAMET			GAMET
Validity period (M)	Day-time groups indicating the period of validity in UTC (M)	VALID nnnnnn/nnnnnn			VALID 220600/221200
Location indicator of aerodrome meteorological office or meteorological watch office (M)	Location indicator of aerodrome meteorological office or meteorological watch office originating the message with a separating hyphen (M)	nnnn-			YUDO ⁻¹
Name of the FIR/CTA or part thereof (M)	Location indicator and name of the FIR/CTA, or part thereof for which the GAMET is issued (M)	nnnn nnnnnnnnnn FIR/[n] [BLW FLnnn] or nnnn nnnnnnnnnn CTA/[n] [BLW FLnnn]			YUCC AMSWELL FIR/2 BLW FL120 YUCC AMSWELL FIR
<i>Element</i>	<i>Detailed content</i>	<i>Template(s)</i>			<i>Examples</i>
		<i>Identifier and time</i>	<i>Location</i>	<i>Content</i>	
Indicator for the beginning of Section I (M)	Indicator to identify the beginning of Section I (M)	SECN I			SECN I
Surface wind (C)	Widespread surface wind exceeding 15 m/s (30 kt)	SFC WIND: [nn/nn]	[N OF Nnn or Snn] or [S OF Nnn or Snn] or [W OF Wnnn or Ennn] or [E OF Wnnn or Ennn] or [nnnnnnnnnn] ²	nnn/[n]nnMPS (or nnn/[n]nnKT)	SFC WIND: 10/12 310/16MPS SFC WIND: E OF W110 050/40KT
Surface visibility (C)	Widespread surface visibility below 5000 m including the weather phenomena causing the reduction in visibility	SFC VIS: [nn/nn]		nnnnM FG or BR or SA or DU or HZ or FU or VA or PO or DS or SS or DZ or RA or SN or SG or FC or GR or GS or PL or SQ	SFC VIS: 06/08 N OF N51 3000M BR
Significant weather (C)	Significant weather conditions encompassing thunderstorms, heavy sandstorm and duststorm, and volcanic ash	SIGWX: [nn/nn]		ISOL TS or OCNL TS or FRQ TS or OBSC TS or EMBD TS or HVY DS or HVY SS or SQL TS or ISOL TSGR or OCNL TSGR or FRQ TSGR or OBSC TSGR or EMBD TSGR or SQL TSGR or VA	SIGWX: 11/12 ISOL TS SIGWX: 12/14 S OF N35 HVY SS

Mountain obscuration (C)	Mountain obscuration	MT OBSC: [nn/nn]		nnnnnnnnnn ²	MT OBSC: S OF N48 MT PASSES
Cloud (C)	Widespread areas of broken <i>or</i> overcast cloud with height of base less than 300 m (1 000 ft) above ground level (AGL) <i>or</i> above mean sea level (AMSL) <i>and/ or</i> any occurrence of cumulonimbus (CB) <i>or</i> towering cumulus (TCU) clouds	SIG CLD: [nn/nn]		BKN <i>or</i> OVC [n]nnn/[n]nnnM (<i>or</i> [n]nnn/[n]nnnFT) AGL <i>or</i> AMSL ISOL <i>or</i> OCNL <i>or</i> FRQ <i>or</i> OBSC <i>or</i> EMBD CB ³ <i>or</i> TCU ³ [n]nnn/[n]nnnM (<i>or</i> [n]nnn/[n]nnnFT) AGL <i>or</i> AMSL	SIG CLD: 06/09 N OF N51 OVC 800/1100FT AGL 10/12 ISOL TCU 1200/8000FT AGL
Icing (C)	Icing (except for that occurring in convective clouds and for severe icing for which a SIGMET message has already been issued)	ICE: [nn/nn]		MOD FLnnn/nnn <i>or</i> MOD ABV FLnnn <i>or</i> SEV FLnnn/nnn <i>or</i> SEV ABV FLnnn	ICE: MOD FL050/080
Turbulence (C)	Turbulence (except for that occurring in convective clouds and for severe turbulence for which a SIGMET message has already been issued)	TURB: [nn/nn]		MOD FLnnn/nnn <i>or</i> MOD ABV FLnnn <i>or</i> SEV FLnnn/nnn <i>or</i> SEV ABV FLnnn	TURB: MOD ABV FL090
Mountain wave (C)	Mountain wave (except for severe mountain wave for which a SIGMET message has already been issued)	MTW: [nn/nnn]		MOD FLnnn/nnn <i>or</i> MOD ABV FLnnn <i>or</i> SEV FLnnn/nnn <i>or</i> SEV ABV FLnnn	MTW: N OF N63 MOD ABV FL080
<i>Template(s)</i>					
<i>Element</i>	<i>Detailed content</i>	<i>Identifier and time</i>	<i>Location</i>	<i>Content</i>	<i>Examples</i>
SIGMET (C)	SIGMET messages applicable to the FIR/CTA concerned or a sub-area thereof, for which the area forecast is valid	SIGMET APPLICABLE:	—	[n][n]n ⁴	SIGMET APPLICABLE: 3, A5, B06
<i>or</i> HAZARDOUS WX NIL (C) ⁵		HAZARDOUS WX NIL			HAZARDOUS WX NIL
Indicator for the beginning of Section II (M)	Indicator to identify the beginning of Section II (M)	SECN II			SECN II

Pressure centres and fronts (M)	Pressure centres and fronts and their expected movements and developments	PSYS: [nn]	Nnnnn or Snnnn Wnnnn or Ennnnn or Nnnnn or Snnnn Wnnnn or Ennnnn TO Nnnnn or Snnnn Wnnnn or Ennnnn	L [n]nnnHPA or H [n] nnnHPA or FRONT or NIL	PSYS: 06 N5130 E01000 L 1004HPA MOV NE 25KT WKN
				MOV N or MOV NE or MOV E or MOV SE or MOV S or MOV SW or MOV W or MOV NW nnKMH (or nnKT) WKN or NC or INTSF	
Upper winds and temperatures (M)	Upper wind and upper-air temperatures for at least the following altitudes: 600, 1 500 and 3 000 m (2 000, 5 000 and 10 000 ft)	WIND/T:	Nnnnn or Snnnn Wnnnn or Ennnnn or [N OF Nnn or Snn] or [S OF Nnn or Snn] or [W OF Wnnn or Ennn] or [E OF Wnnn or Ennn] or [nnnnnnnnnn] ²	[n]nnnM (or [n]nnnFT) nnn/[n] nnMPS (or nnn/[n] nnKT) PSnn or MSnn	WIND/T: 2000FT N5500 W01000 270/18MPS PS03 5000FT N5500 W01000 250/20MPS MS02 10000FT N5500 W01000 240/22MPS MS11
Cloud (M)	Cloud information not included in Section I giving type, height of base and top above ground level (AGL) or above mean sea level (AMSL)	CLD: [nn/nn]	[E OF Wnnn or Ennn] or [nnnnnnnnnn] ²	FEW or SCT or BKN or OVC ST or SC or CU or AS or AC or NS [n]nnn/ [n]nnnM (or [n]nnn/[n]nnnFT) AGL or AMSL or NIL	CLD: BKN SC 2500/8000FT AGL CLD: NIL
Freezing level (M)	Height indication of OC level(s) above ground level (AGL) or above mean sea level (AMSL), if lower than the top of the airspace for which the forecast is supplied	FZLVL:		[ABV] [n]nnnFT AGL or AMSL	FZLVL: 3000FT AGL
Forecast QNH (M)	Forecast lowest QNH during the period of validity	MNM QNH:		[n]nnnHPA	MNM QNH: 1004HPA
Sea-surface temperature and state of the sea (O)	Sea-surface temperature and state of the sea if required by regional air navigation agreement	SEA:		Tnn HGT [n]nM	SEA: T15 HGT 5M
Volcanic eruptions (M)	Name of volcano	VA:		nnnnnnnnnn or NIL	VA: ETNA VA: NIL

Notes.—

1. Fictitious location.
2. Free text describing well-known geographical locations should be kept to a minimum.
3. The location of the CB and/or TCU should xbe specified in addition to any widespread areas of broken or overcast cloud as given in the example.
4. List as necessary, with comma separating.
5. When no elements are included in Section I.

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

<i>Element as specified in Chapter 6</i>	<i>Range</i>	<i>Resolution</i>
Wind direction: ° true	000 – 360	10
Wind speed: MPS KT	00 – 99* 00 – 199*	1 1
Visibility: M M M M	0000 – 0750 0800 – 4 900 5 000 – 9 000 10 000 –	50 100 1 000 0 (fixed value: 9 999)
Vertical visibility: 30's M (100's FT)	000 – 020	1
Cloud: height of cloud base: 30's M (100's FT)	000 – 100	1
Air temperature (maximum and minimum): °C	–80 – +60	1

* There is no aeronautical requirement to report surface wind speeds of 50 m/s (100 kt) or more; however, provision has been made for reporting wind speeds up to 99 m/s (199 kt) for non-aeronautical purposes, as necessary.

Example A5-1. TAF

TAF for YUDO (Donlon/International):*

TAF YUDO 151800Z 1600/1618 13005MPS 9000 BKN020 BECMG 1606/1608 SCT015CB
BKN020 TEMPO 1608/1612 17006G12MPS 1000 TSRA SCT010CB BKN020 FM161230
15004MPS 9999 BKN020

Meaning of the forecast:

TAF for Donlon/International* issued on the 15th of the month at 1800 UTC valid from 0000 UTC to 1800 UTC on the 16th of the month; surface wind direction 130 degrees; wind speed 5 metres per second; visibility 9 kilometres, broken cloud at 600 metres; becoming between 0600 UTC and 0800 UTC on the 16th of the month, scattered cumulonimbus cloud at 450 metres and broken cloud at 600 metres; temporarily between 0800 UTC and 1200 UTC on the 16th of the month surface wind direction 170 degrees; wind speed 6 metres per second gusting to 12 metres per second; visibility 1 000 metres in a thunderstorm with moderate rain, scattered cumulonimbus cloud at 300 metres and broken cloud at 600 metres; from 1230 UTC on the 16th of the month surface wind direction 150 degrees; wind speed 4 metres per second; visibility 10 kilometres or more; and broken cloud at 600 metres.

* Fictitious location

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

Example A5-2. Cancellation of TAF

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

TAF AMD YUDO 161500Z 1600/1618 CNL

Meaning of the forecast:

Amended TAF for Donlon/International* issued on the 16th of the month at 1500 UTC cancelling the previously issued TAF valid from 0000 UTC to 1800 UTC on the 16th of the month.

* Fictitious location

Example A5-3.

GAMET area forecast

YUCC GAMET VALID 220600Z/221200 YUCC -	
YUCC ANSWELL FILLZ NEW FILLZ SECH	
SFC WIND:	30/12 330/16MPS
SFC VIS:	06/08 N OF NS1 9000M BR
SIGWX:	
SIG CLD:	33/12 40LTS
ICE TYPE:	06/08 N OF NS1 0MC 000/1300FT AGL 30/12 ISOL TOU 1200/4000FT AGL MOD FLSS/080
SIGMETS APPLICABLE:	
SECH II PSYS WIND/VT:	06 NS130 601000 L 1004HPA MOV NE 25 KT WIND 2800FT NS1500 W01000 270/20MPS PSBR 5000FT NS500 W01000 250/20MPS MS02
CLD:	1800FT NS500 W01000 240/22MPS MS11 BKN SC 2500/4000FT AGL
FZLV: MINN	
CPNE SEA:	
VA:	3000FT AGL
Meaning:	An area forecast for low-level flights (GAMET) issued for sub-area two of the Answell [®] flight information region (identified by YUCC Answell area control centre) for below flight level 120 by the Donlon/International [®] aerodrome meteorological office (YUDD); the
Section I:	
surface wind speed and direction: between 1000 UTC and 1200 UTC surface wind direction 330 degrees, wind speed 36 metres per second;	
surface visibility: between 0600 UTC and 0800 UTC north of 51 degrees north 3 000 metres (due to mist); significant weather phenomena: between 1300 UTC and 1200 UTC isolated thunderstorms without hail;	
significant clouds: between 0600 UTC and 0900 UTC north of 51 degrees north overcast base 800, top 1 100 feet above ground level; between 1000 UTC and 1200 UTC isolated towering cumulus base 1 200, top 6 000 feet above ground level;	

Section II: pressure systems:

at 0600 UTC low pressure of 1.004 hectopascals at 51.5 degrees north 110.0 degrees east, expected to move north-eastwards at 25 knots and to weaken;

winds and temperatures:

at 2.000 feet above ground level at 55 degrees north 10 degrees west wind direction 270 degrees,

clouds:

wind speed 18 metres per second, temperature plus 3 degrees Celsius; at 5.000 feet above

freezing level:

ground level at 55 degrees north 10 degrees west wind direction 250 degrees, wind speed 20

minimum QNH:

metres per second, temperature minus 2 degrees Celsius; at 10.000 feet above ground level at 55

sea:

degrees north 10 degrees west wind direction 240 degrees, wind speed 22 metres per second,

volcanic ash:

temperature minus 11 degrees Celsius;

broken stratocumulus, base 2.500 feet, top 6.000 feet above ground level;

3.000 feet above ground level;

1.004 hectopascals;

^a Plotlines location

SCHEDULE 4

regulation 11(1)

TECHNICAL SPECIFICATIONS RELATED TO GLOBAL SYSTEMS, SUPPORTING CENTERS AND WORLD METEOROLOGICAL OFFICES

PART I - WORLD AREA FORECAST SYSTEM

1. Formats and codes

World area forecast centres (WAFCs) shall adopt uniform formats and codes for the supply of forecasts.

2. Upper-air gridded forecasts

- (1) The forecasts of upper winds; upper-air temperature; and humidity; direction, speed and flight level of maximum wind; flight level and temperature of tropopause, areas of cumulonimbus clouds, icing, clear-air and in-cloud turbulence, and geopotential altitude of flight levels shall be prepared four times a day by a WAFc and shall be valid for fixed valid times at 6, 9, 12, 15, 18, 21, 24, 27, 30, 33 and 36 hours after the time (0000, 0600, 1200 and 1800 UTC) of the synoptic data on which the forecasts were based. The dissemination of each forecast shall be in the above order and shall be completed as soon as technically feasible but not later than 6 hours after standard time of observation.
- (2) The grid point forecasts prepared by a WAFc shall comprise:
 - (a) wind and temperature data for flight levels 50 (850 hPa), 80 (750 hPa), 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 210 (450 hPa), 240 (400 hPa), 270 (350 hPa), 300 (300 hPa), 320 (275 hPa), 340 (250 hPa), 360 (225 hPa), 390 (200 hPa), 410 (175 hPa), 450 (150 hPa), 480 (125 hPa) and 530 (100 hPa);
 - (b) flight level and temperature of tropopause;
 - (c) direction, speed and flight level of maximum wind;
 - (d) humidity data for flight levels 50 (850 hPa), 80 (750 hPa), 100 (700 hPa), 140 (600 hPa) and 180 (500 hPa);

- (e) horizontal extent and flight levels of base and top of cumulonimbus clouds;
 - (f) icing for layers centred at flight levels 60 (800 hPa), 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 240 (400 hPa) and 300 (300 hPa);
 - (g) clear-air turbulence for layers centred at flight levels 240 (400 hPa), 270 (350 hPa), 300 (300 hPa), 340 (250 hPa), 390 (200 hPa) and 450 (150 hPa);
 - (h) in-cloud turbulence for layers centred at flight levels 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 240 (400 hPa) and 300 (300 hPa); and
 - (i) geopotential altitude data for flight levels 50 (850 hPa), 80 (750 hPa), 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 210 (450 hPa), 240 (400 hPa), 270 (350 hPa), 300 (300 hPa), 320 (275 hPa), 340 (250 hPa), 360 (225 hPa), 390 (200 hPa), 410 (175 hPa), 450 (150 hPa), 480 (125 hPa) and 530 (100hPa).
- (3) The foregoing grid point forecasts shall be issued by a WAFC in binary code form using the GRIB code form prescribed by the World Meteorological Organization (WMO).
 - (4) The foregoing grid point forecasts shall be prepared by a WAFC in a regular grid with a horizontal resolution of 1.25° of latitude and longitude.
 - (5) The GRIB code form is contained in the Manual on Codes (WMO-No. 306), Volume I.2, Part B - Binary Codes.

3. Significant weather (SIGWX) forecasts

- (1) General provisions of SIGWX forecasts include_
 - (a) Forecasts of significant en-route weather phenomena shall be prepared as SIGWX forecasts four times a day by a WAFC and shall be valid for fixed valid times at 24 hours after the time (0000, 0600, 1200 and 1800 UTC) of the synoptic data on which the forecasts were based.

The dissemination of each forecast shall be completed as soon as technically feasible but not later than 9 hours after standard time of observation.

- (b) SIGWX forecasts shall be issued in binary code form using the BUFR code form prescribed by WMO.
- (2) Types of SIGWX forecasts—
- (a) SIGWX forecasts shall be issued as high-level SIGWX forecasts for flight levels between 250 and 630.
 - (b) Medium-level SIGWX forecasts for flight levels between 100 and 250 for limited geographical areas will continue to be issued until such time that flight documentation to be generated from the gridded forecasts of cumulonimbus clouds, icing and turbulence fully meets user requirements.
- (3) SIGWX forecasts shall include the following items—
- (a) tropical cyclone provided that the maximum of the 10-minute mean surface wind speed is expected to reach or exceed 17 m/s (34 kt);
 - (b) severe squall lines;
 - (c) moderate or severe turbulence (in cloud or clear-air);
 - (d) moderate or severe icing;
 - (e) widespread sandstorm/duststorm;
 - (f) cumulonimbus clouds associated with thunderstorms and with a) to e);
 - (g) flight level of tropopause;
 - (h) jet streams;
 - (i) information on the location of volcanic eruptions that are producing ash clouds of significance to aircraft operations, comprising: volcanic eruption symbol at the location of the volcano and, in a separate text box on the chart, the volcanic eruption symbol, the name of

the volcano (if known) and the latitude/longitude of the eruption. In addition, the legend of SIGWX charts should indicate “CHECK SIGMET, ADVISORIES FOR TC AND VA, AND ASHTAM AND NOTAM FOR VA”; and

- (j) information on the location of a release of radioactive materials into the atmosphere of significance to aircraft operations, comprising: the radioactive materials in the atmosphere symbol at the location of the release and, in a separate text box on the chart, the radioactive materials in the atmosphere symbol, latitude/longitude of the site of the release, and (if known) the name of site of the radioactive source. In addition, the legend of SIGWX charts on which a release of radiation is indicated should contain “CHECK SIGMET AND NOTAM FOR RDOACTCLD”.

4. Criteria for including items in SIGWX forecasts

- (1) items a) to f) in (3)(c) shall only be included if expected to occur between the lower and upper levels of the SIGWX forecast;
- (2) the abbreviation “CB” shall only be included when it refers to the occurrence or expected occurrence of cumulonimbus clouds:
 - (a) affecting an area with a maximum spatial coverage of 50 per cent or more of the area concerned;
 - (b) along a line with little or no space between individual clouds; or
 - (c) embedded in cloud layers or concealed by haze;
- (3) the inclusion of “CB” shall be understood to include all weather phenomena normally associated with cumulonimbus clouds, i.e. thunderstorm, moderate or severe icing, moderate or severe turbulence and hail;
- (4) where a volcanic eruption or a release of radioactive materials into the atmosphere warrants the inclusion of the volcanic eruption symbol or the radioactive materials in the atmosphere symbol in SIGWX forecasts, the symbols shall be included on

SIGWX forecasts irrespective of the height to which the ash column or radioactive material is reported or expected to reach; and

- (5) in the case of co-incident or the partial overlapping of items a), i) and j) in 1.3.3, the highest priority shall be given to item i), followed by items j) and a). The item with the highest priority shall be placed at the location of the event, and an arrow shall be used to link the location of the other item(s) to its associated symbol or text box.

PART II—AERODROME METEOROLOGICAL OFFICES

1. Use of world area forecast system (WAFS) products

- (1) Aerodrome meteorological offices shall use WAFS forecasts issued by the WAFCs in the preparation of flight documentation, whenever these forecasts cover the intended flight path in respect of time, altitude and geographical extent, unless otherwise agreed between the meteorological authority and the operator concerned.
- (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 Annex, and the meteorological content and identification of the originator of the WAFS forecasts shall not be amended.

2. Notification of WAFS concerning significant discrepancies

- (1) Aerodrome meteorological offices using WAFS BUFR data shall notify the WAFS concerned immediately if significant discrepancies are detected or reported in respect of WAFS SIGWX forecasts concerning:
 - (a) icing, turbulence, cumulonimbus clouds that are obscured, frequent, embedded or occurring at a squall line, and sandstorms/dust storms; and
 - (b) volcanic eruptions or a release of radioactive materials into the atmosphere, of significance to aircraft operations.

- (2) The WAFC receiving the message shall acknowledge its receipt to the originator, together with a brief comment on the report and any action taken, using the same means of communication employed by the originator.

PART III - VOLCANIC ASH ADVISORY CENTRES

1. Volcanic Ash Advisory Information

- (1) The advisory information on volcanic ash issued 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 A2-1. When no approved ICAO abbreviations are available, English plain language text, to be kept to a minimum, shall be used.
- (2) As of 5 November 2020, volcanic ash advisory information shall be disseminated in IWXXM GML form in addition to the dissemination of this advisory information in accordance with 3.1.1.
- (3) The volcanic ash advisory information listed in Table A2-1 when prepared in graphical format, shall be as specified in the Third Schedule and issued using the portable network graphics (PNG) format.

PART IV—STATE VOLCANO OBSERVATORIES

1. Information from State volcano observatories

- (1) The information required to be sent by State volcano observatories to their associated area control centres (ACCs)/flight information centres (FICs), meteorological watch office (MWO) and VAAC should comprise:
- (2) For significant pre-eruption volcanic activity: the date/time (UTC) of report; name and, if known, number of the volcano; location (latitude/longitude); and description of volcanic activity; and

- (3) For volcanic eruption: the date/time (UTC) of report and time of eruption (UTC) if different from time of report; name and, if known, number of the volcano; location (latitude/longitude); and description of the eruption including whether an ash column was ejected and, if so, an estimate of height of ash column and the extent of any visible volcanic ash cloud, during and following an eruption; and
- (4) For volcanic eruption cessation: the date/time (UTC) of report and time of eruption cessation (UTC); name and, if known, number of the volcano; and location (latitude/longitude).
- (5) Pre-eruption volcanic activity in this context means unusual and/or increasing volcanic activity which could presage a volcanic eruption.
- (6) The State volcano observatories may use the Volcano Observatory Notice for Aviation (VONA) format to send information to their associated ACCs/FICs, MWO and VAAC.

PART V - TROPICAL CYCLONE ADVISORY CENTRES

1. Tropical cyclone advisory information

- (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.
- (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.
- (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.

PART VI - SPACE WEATHER CENTERS

1. Space weather advisory information

- (1) Advisory information on space weather shall be issued in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature, and shall be in accordance with the template shown in Table A2-3. When no approved ICAO abbreviations are available, English plain language text, to be kept to a minimum, shall be used.
- (2) As of 5 November 2020 and until 4 November 2020, space weather advisory information shall be made available in IWXXM GML form, in addition to the dissemination of space weather advisory information in abbreviated plain language in accordance with 6.1.1.
- (3) As of 5 November 2020, space weather advisory information shall be disseminated in IWXXM GML form, in addition to the dissemination of this advisory information in abbreviated plain language in accordance with 6.1.1.
- (4) One or more of the following space weather effects shall be included in the space weather advisory information, using their respective abbreviations as indicated below:
 - (a) HF communications (propagation, absorption) HF COM
 - (b) Communications via satellite (propagation, absorption) SATCOM
 - (c) GNSS-based navigation and surveillance (degradation) GNSS
 - (d) Radiation at flight levels (increased exposure) RADIATION
- (5) The following intensities shall be included in space weather advisory information, using their respective abbreviations as indicated below:
 - (a) moderate MOD
 - (b) severe SEV
- (6) Updated advisory information on space weather phenomena shall be issued as necessary but at least every six hours until such time as the space weather phenomena are no longer detected or are no longer expected to have an impact.

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

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

<i>Element</i>	<i>Detailed content</i>	<i>Template(s)</i>	<i>Examples</i>
1	Identification of the type of message (M)	Type of message VA ADVISORY	VA ADVISORY
2	Status indicator (C)1	Indicator of test or exercise STATUS: TEST or EXER	STATUS: TEST STATUS: EXER
3	Time of origin (M)	Year, month, day, time in UTC DTG: nnnnnnnn/nnnnZ	DTG: 20080923/0130Z
4	Name of VAAC (M)	Name of VAAC VAAC: nnnnnnnnnnn	VAAC: TOKYO
5	Name of volcano (M)	Name and IAVCEI number of volcano VOLCANO: nnnnnnnnnnnnnnnnnnnnn [nnnnnn] or UNKNOWN or UNNAMED	VOLCANO: KARYMSKY 1000-13 VOLCANO: UNNAMED
6	Location of volcano (M)	Location of volcano in degrees and minutes PSN: Nnnnn or Snnnn Wnnnn or Ennnnn or UNKNOWN	PSN: N5403 E15927 PSN: UNKNOWN
7	State or region (M)	State, or region if ash is not reported over a State AREA: nnnnnnnnnnnnnnnnn	AREA: RUSSIA
8	Summit elevation (M)	Summit elevation in m (or ft) SUMMIT ELEV: nnnnM (or nnnnnFT)	SUMMIT ELEV: 1536M
9	Advisory number (M)	Advisory number: year in full and message number (separate sequence for each volcano) ADVISORY NR: nnnn/nnnn	ADVISORY NR: 2008/4
10	Information source (M)	Information source using free text INFO SOURCE: <i>Free text up to 32 characters</i>	INFO SOURCE: MTSAT-1R KVERT KEMSD
11	Colour code (O)	Aviation colour code AVIATION COLOUR CODE RED or ORANGE or YELLOW or GREEN or UNKNOWN or NOT GIVEN or NIL	AVIATION RED COLOUR CODE:
<i>Element</i>	<i>Detailed content</i>	<i>Template(s)</i>	<i>Examples</i>
12	Eruption details (M)	Eruption details (including date/time of eruption(s)) ERUPTION DETAILS: <i>Free text up to 64 characters or UNKNOWN</i>	ERUPTION AT 20080923/0000Z DETAILS: FL300 REPORTED

15	Forecast height and position of the ash clouds (+6 HR) (M)	Day and time (in UTC) (6 hours from the "Time of observation (or estimation) of ash" given in Item 12); Forecast height and position (in degrees and minutes) for each cloud mass for that fixed valid time	FCST VA CLD +6 HR:	nn/nnnnZ SFC or FLnnn/[FL]nnn [nnKM WID LINE ² BTN (nnNM WID LINE BTN)] Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn][– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] ³ or NO VA EXP or NOT AVBL or NOT PROVIDED	FCST VA CLD +6 HR: FL250/350 N5130 E16030 – N5130 E16230 – N5330 E16230 – N5330 E16030 SFC/FL180 N4830 E16330 – N4830 E16630 – N5130 E16630 – N5130 E16330 NO VA EXP NOT AVBL NOT PROVIDED
	<i>Element</i>	<i>Detailed content</i>	<i>Template(s)</i>		<i>Examples</i>
16	Forecast height and position of the ash clouds (+12 HR) (M)	Day and time (in UTC) (12 hours from the "Time of observation (or estimation) of ash" given in Item 12); Forecast height and position (in degrees and minutes) for each cloud mass for that fixed valid time	FCST VA CLD +12 HR:	nn/nnnnZ SFC or FLnnn/[FL]nnn [nnKM WID LINE ² BTN (nnNM WID LINE BTN)] Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn][– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] ³ or NO VA EXP or NOT AVBL or NOT PROVIDED	FCST VA CLD +12 HR: 23/1300Z SFC/FL270 N4830 E16130 – N4830 E16600 – N5300 E16600 – N5300 E16130 NO VA EXP NOT AVBL NOT PROVIDED

17	Forecast height and position of the ash clouds (+18 HR) (M)	Day and time (in UTC) (18 hours from the “Time of observation (or estimation) of ash” given in Item 12); Forecast height and position (in degrees and minutes) for each cloud mass for that fixed valid time	FCST VA CLD +18 HR: nn/nnnnZ SFC or FLnnn/[FL]nnn [nnKM WID LINE ² BTN (nnNM WID LINE BTN)] Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn][– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] ³ Or NO VA EXP or NOT AVBL or NOT PROVIDED	FCST VA CLD +18 HR: 23/1900Z NO VA EXP NOT AVBL NOT PROVIDED
18	Remarks (M)	Remarks, as necessary	RMK: Free text up to 256 characters or NIL	RMK: LATEST REP FM KVERT (0120Z) INDICATES ERUPTION HAS CEASED. TWO DISPERSING VA CLD ARE EVIDENT ON SATELLITE IMAGERY NIL
19	Next advisory (M)	Year, month, day and time in UTC	NXT ADVISORY: nnnnnnnn/nnnnZ or NO LATER THAN nnnnnnnn/nnnnZ or NO FURTHER ADVISORIES or WILL BE ISSUED BY nnnnnnnn/nnnnZ	NXT ADVISORY: 20080923/0730Z NO LATER THAN nnnnnnnn/nnnnZ NO FURTHER ADVISORIES WILL BE ISSUED BY nnnnnnnn/nnnnZ

Notes.—

1. Used only when the message issued to indicate that a test or an exercise is taking place. When the word “TEST” or the abbreviation “EXER” is included, the message may contain information that should not be used operationally or will otherwise end immediately after the word “TEST”. [*Applicable 7 November 2020*]
2. International Association of Volcanology and Chemistry of the Earth’s Interior (IAVCEI).
3. A straight line between two points drawn on a map in the Mercator projection or a straight line between two points which crosses lines of longitude at a constant angle.
4. Up to 4 selected layers.
5. If ash reported (e.g. AIREP) but not identifiable from satellite data.

Example A2-1. Advisory message for volcanic ash

VA ADVISORY DTG: VAAC: VOLCANO PSN: AREA: SUMMIT ELEV: ADVISORY NR: INFO SOURCE: AVIATION COLOUR CODE: ERUPTION DETAILS: OBS VA DTG: OBS VA CLD:	20080923/0130Z TOKYO KARYMSKY 1000-13 N5403 E15927 RUSSIA 1536M 2008/4 MTSAT-1R KVERT KEMSD RED ERUPTION AT 20080923/0000Z FL300 REPORTED 23/0100Z FL250/300 N5400 E15930 – N5400 E16100 – N5300 E15945 MOV SE 20KT SFC/FL200 N5130 E16130 – N5130 E16230 – N5230 E16230 – N5230 E16130 MOV SE 15KT 23/0700Z FL250/350 N5130 E16030 – N5130 E16230 – N5330 E16230 – N5330 E16030 SFC/ FL180 N4830 E16330 – N4830 E16630 – N5130 E16630 – N5130 E16330 23/1300Z SFC/FL270 N4830 E16130 – N4830 E16600 – N5300 E16600 – N5300 E16130 23/1900Z NO VA EXP
FCST VA CLD +6 HR:	
FCST VA CLD +12 HR:	
FCST VA CLD +18 HR:	
RMK:	LATEST REP FM KVERT (0120Z) INDICATES ERUPTION HAS CEASED. TWO DISPERSING VA CLD ARE EVIDENT ON SATELLITE IMAGERY
NXT ADVISORY:	20080923/0730Z

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

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

Element	Detailed content	Template(s)	Examples
1	Identification of the type of message(M)	Type of message	TC ADVISORY
2	Status indicator (C)1	Indicator of test or exercise	STATUS: TEST STATUS: EXER
3	Time of origin(M)	Year, month, day and time in UTC of issue	DTG: 20040925/1600Z
4	Name of TCAC(M)	Name of TCAC (location indicator <i>or</i> full name)	TCAC: YUFO ¹ TCAC: MIAMI
5	Name of tropical cyclone(M)	Name of tropical cyclone <i>or</i> "NN" for unnamed tropical cyclone	TC: GLORIA
6	Advisory number(M)	Advisory number.Year in full and message number (separate sequence for each cyclone)	ADVISORY NR: 2004/13
7	Observed position of the centre (M)	Day and time in UTCand position of the centre of the tropical cyclone (in degrees and minutes)and minutes)	OBS PSN 25/1800Z N2706 W07306

	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]] and TOP [ABV or BLW] FLnnn (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	CB:	WI 250NM OF TC CENTRE TOP FL500
10	Central pressure (M)	Central pressure (in hPa)	C:	nnnHPA	C:	965HPA
	Element	Detailed content	Template(s)			Examples
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
12	Forecast of centre position (+6 HR) (M) Forecast of centre position	Day and time (in UTC) (6 hours from the “DTG” given in Item 2);	FCST PSN +6 HR:	nn/nnnnZ Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]	FCST PSN +6 HR:	25/2200Z N2748 W07350

		Forecast position (in degrees and minutes) of the centre of the tropical cyclone		
13	Forecast of maximum (M) surface wind (+6 HR)	Forecast of maximum surface wind (6 hours after the “DTG” given in Item 2)	FCST MAX WIND +6 HR: nn[n]MPS (<i>or</i> nn[n]KT)	FCST MAX WIND +6 HR: 22MPS
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] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]	FCST PSN +12 HR: 26/0400Z N2830 W07430
15	Forecast of maximum surface wind (+12 HR)(M)	Forecast of maximum surface wind (12 hours after the “DTG” given in Item 2)	FCST MAX WIND +12 HR: nn[n]MPS (<i>or</i> nn[n]KT)	FCST MAX WIND +12 HR: 22MPS
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] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]	FCST PSN +18 HR: 26/1000Z N2852 W07500
17	Forecast of maximum surface wind (+18 HR)(M)	Forecast of maximum surface wind (18 hours after the “DTG” given in Item 2)	FCST MAX WIND +18 HR: nn[n]MPS (<i>or</i> nn[n]KT)	FCST MAX WIND +18 HR: 21MPS
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	FCST PSN +24 HR: nn/nnnnZ Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]	FCST PSN +24 HR: 26/1600Z N2912 W07530

		the centre of the tropical cyclone		
19	Forecast of maximum surface wind (+24 HR)(M)	Forecast of maximum surface wind (24 hours after the “DTG” given in Item 2)	FCST MAX WIND nn[n]MPS (or nn[n]KT) +24 HR:	FCST MAX WIND +24 HR: 20MPS
20	Remarks(M)	Remarks, as necessary	RMK: <i>Free text up to 256 characters or NIL</i>	RMK: NIL
21	Expected time of issuance of next advisory (M)	Expected year, month, day and time (in UTC) of issuance of next advisory	NXT MSG: <i>[BFR] nnnnnnnn/nnnnZ or NO MSG EXP</i>	NXT MSG: 20040925/2000Z

Notes.—

1. Used only when the message issued to indicate that a test or an exercise is taking place. When the word “TEST” or the abbreviation “EXER” is included, the message may contain information that should not be used operationally or will otherwise end immediately after the word “TEST”. [Applicable 7 November 2020]
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

2. Fictitious location.

Example A2-2. Advisory message for tropical cyclones

TC ADVISORY DTG: TCAC: TC: ADVISORY NR: OBS PSN: CB: MOV: C: MAX WIND: FCST PSN +6 HR: FCST MAX WIND +6 HR: FCST PSN +12 HR: FCST MAX WIND +12 HR: FCST PSN +18 HR: FCST MAX WIND +18 HR: FCST PSN +24 HR: FCST MAX WIND +24 HR: RMK: NXT MSG: *Fictitious location	20040925/1900Z YUFO* GLORIA 2004/13 25/1800Z N2706 W07306 WI 250NM OF TC CENTRE TOP FL500 NW 20KMH 965HPA 22MPS 25/2200Z N2748 W07350 22MPS 26/0400Z N2830 W07430 22MPS 26/1000Z N2852 W07500 21MPS 26/1600Z N2912 W07530 20MPS NIL 20040925/2000Z
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Table A2-3. Template for advisory message for space weather information

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

Notes.

1. Used only when the message issued to indicate that a test or an exercise is taking place. When the word “TEST” or the abbreviation “EXER” is included, the message may contain information that should not be used operationally or will otherwise end immediately after the word “TEST”. [Applicable 7 November 2020]
2. Fictitious location.
3. One or more latitude ranges should be included in the space weather advisory information for “GNSS” and “RADIATION”.

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

SWX ADVISORY	
DTG:	20161108/0100Z
SWXC:	DONLON*
ADVISORY NR:	2016/2
NR RPLC:	2016/1
SWX EFFECT:	HF COM MOD AND GNSS MOD
OBS SWX:	08/0100Z HNH HSH E18000 – W18000
FCST SWX +6 HR:	08/0700Z HNH HSH E18000 – W18000
FCST SWX +12 HR:	08/1300Z HNH HSH E18000 – W18000
FCST SWX +18 HR:	08/1900Z HNH HSH E18000 – W18000
FCST SWX +24 HR	09/0100Z NO SWX EXP
RMK:	
NXT ADVISORY:	LOW LVL GEOMAGNETIC STORMING CAUSING INCREASED AURORAL ACT AND SUBSEQUENT MOD DEGRADATION OF GNSS AND HF COM AVBL IN THE AURORAL ZONE. THIS STORMING EXP TO SUBSIDE IN THE FCST PERIOD.
*Fictitious location	
	SEE WWW.SPACEWEATHERPROVIDER.WEB NO FURTHER ADVISORIES

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

SWX ADVISORY	
DTG:	20161108/0000Z
SWXC:	DONLON*
ADVISORY NR:	2016/2
NR RPLC:	2016/1
SWX EFFECT:	RADIATION MOD
FCST SWX:	08/0100Z HNH HSH E18000 – W18000 ABV FL 350
FCST SWX +6 HR:	08/0700Z HNH HSH E18000 – W18000 ABV FL 350
FCST SWX +12 HR:	08/1300Z HNH HSH E18000 – W18000 ABV FL 350
FCST SWX +18 HR:	08/1900Z HNH HSH E18000 – W18000 ABV FL 350
FCST SWX +24 HR:	09/0100Z NO SWX EXP
RMK:	RADIATION LVL EXCEEDED 100 PCT OF BACKGROUND LVL AT FL350 AND ABV. THE CURRENT EVENT HAS PEAKED AND LVL SLW RTN TO BACKGROUND LVL.
NXT ADVISORY:	
* Fictitious location	
	SEE WWW.SPACEWEATHERPROVIDER.WEB NO FURTHER ADVISORIES

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

SWX ADVISORY DTG: SWXC: ADVISORY NR: SWX EFFECT: OBS SWX: FCST SWX +6 HR: FCST SWX +12 HR: FCST SWX +18 HR: FCST SWX +24 HR RMK:	20161108/0100Z DONLON* 2016/1 HF COM SEV 08/0100Z DAYLIGHT SIDE 08/0700Z DAYLIGHT SIDE 08/1900Z DAYLIGHT SIDE 09/0100Z NO SWX EXP PERIODIC HF COM ABSORPTION AND LIKELY TO CONT IN THE NEAR TERM. CMPL AND PERIODIC LOSS OF HF ON THE SUNLIT SIDE OF THE EARTH EXP. CONT HF COM DEGRADATION LIKELY OVER THE NXT 7 DAYS. SEE WWW.SPACEWEATHERPROVIDER. WEB
NXT ADVISORY: * Fictitious location	20161108/0700Z

PART V - FLIGHT DOCUMENTATION—MODEL CHARTS AND FORMS

(Under part XI of these Regulations)

MODEL A

OPMET information

MODEL IS

Upper wind and upper-air temperature chart for standard isobaric surface Example 1. Arrows, feathers and pennants (Mercator projection)
Example 2. Arrows, feathers and pennants (Polar stereographic projection)

MODEL SWH

Significant weather chart (high level)

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

Significant weather chart (medium level)

MODEL SWL

Significant weather chart (low level)

Example 1

Example 2

MODEL 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

ISSUED BY METEOROLOGICAL OFFICE (DATE, TIME UTC)

INTENSITY

" - " (light); n - indicator (moderate); + " (heavy, or a tornado/waterspout in the case of funnel cloud(s)) are used to indicate the intensity of certain phenomena

DESCRIPTOR

MI - shallow
BC - patches

PR - partial
DR - low drifting

BL - blowing
SH - shower(s)

TS - thunderstorm
FZ - freezing (supercooled)

PRESENT WEATHER ABBREVIATIONS

DZ - drizzle

RA - rain

SN - snow

SG - snow grains

PL - ice pellets

GR - hail

GS - small hail and/or snow pellets

BR - mist

FG - fog

FU - smoke

VA - volcanic ash

DU - widespread dust

SA - sand

HZ - haze

PO - dust/sand whirls (dust devils)

SQ - squall

FC - funnel cloud(s) (tornado or waterspout)

SS - sandstorm

DS - duststorm

EXAMPLES

+SHRA - heavy shower of rain

FZDZ - moderate freezing drizzle

+TSSNGR - thunderstorm with heavy snow and hail

TSN - thunderstorm with moderate snow

SNRA - moderate snow and rain

SELECTED ICAO LOCATION INDICATORS

CYUL Montreal Pierre Elliot
Trudeau Intl

EDDF Frankfurt/Main

EGLL London/Heathrow

GMMC Casablanca/Anfa

HECA Cairo/Intl

HKJK Nairobi/Jomo Kenyatta

KJFK New York/John F. Kennedy Intl

LFPG Paris/Charles de Gaulle

NZAA Auckland Intl

OBBI Bahrain Intl

RJTT Tokyo Intl

SBGL Rio de Janeiro/Caleão Intl

YSSY Sydney/Kingsford Smith Intl

ZBAA Beijing/Capital

METAR CYUL 240700Z 27018C30KT 5000 SN FEW020 BKN045M02/M07 Q0995=

METAR EDDF 240950Z 05015KT 9999 FEW02504/M05 Q1018NOSIG=

METAR LFPG 211000Z 07010KT 5000 SCT010 BKN040 02/M01 Q1014 NOSIG=

SPECI GMMC 20530Z 24006KT 5000 -TSGR BKN016TCU FEW020CB SCT026 08/07 Q1013=

TAF AMD NZAA 240855Z 2409/2506 24010KT 9999 FEW030 B:CMG 2411/2413 VRB02KT 2000 HZ
FM 242200 2410KT CAVOK=

TAF ZBAA 24040Z 2406/2506 13004MP5 6006 NSC BECMG 2115/2416 2000 SN OV040 TEMPO
2418/24211000SN BECMG 2504/2501 32004MP5 3500 BR NSC B:CMG 2503/2504 32010G20MP5CAVOK=

TAF YSSY 24043Z 2406/2506 05015KT 3000 BR SCT030 BECMG 2414/2416 33008KT FM 2422 04020KT
CAVOK=

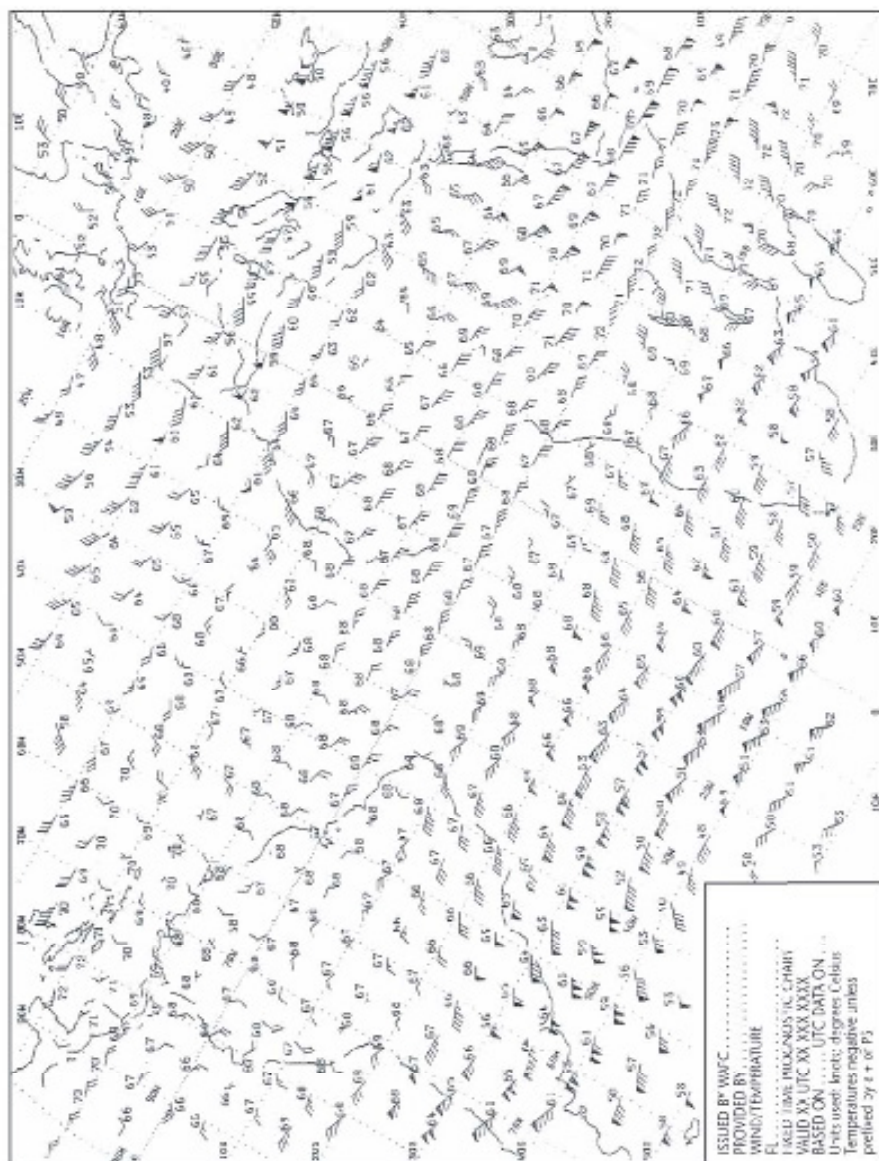
HECC SIGMET 2 VALID 240900/241200 HECA-

HECC CAIRO FR SEV TURB OBS N OF N27 FL 390/440 MOV E 15KMH NC.

UPPER WIND AND UPPER-AIR TEMPERATURE CHART FOR STANDARD ISOBARIC SURFACE

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

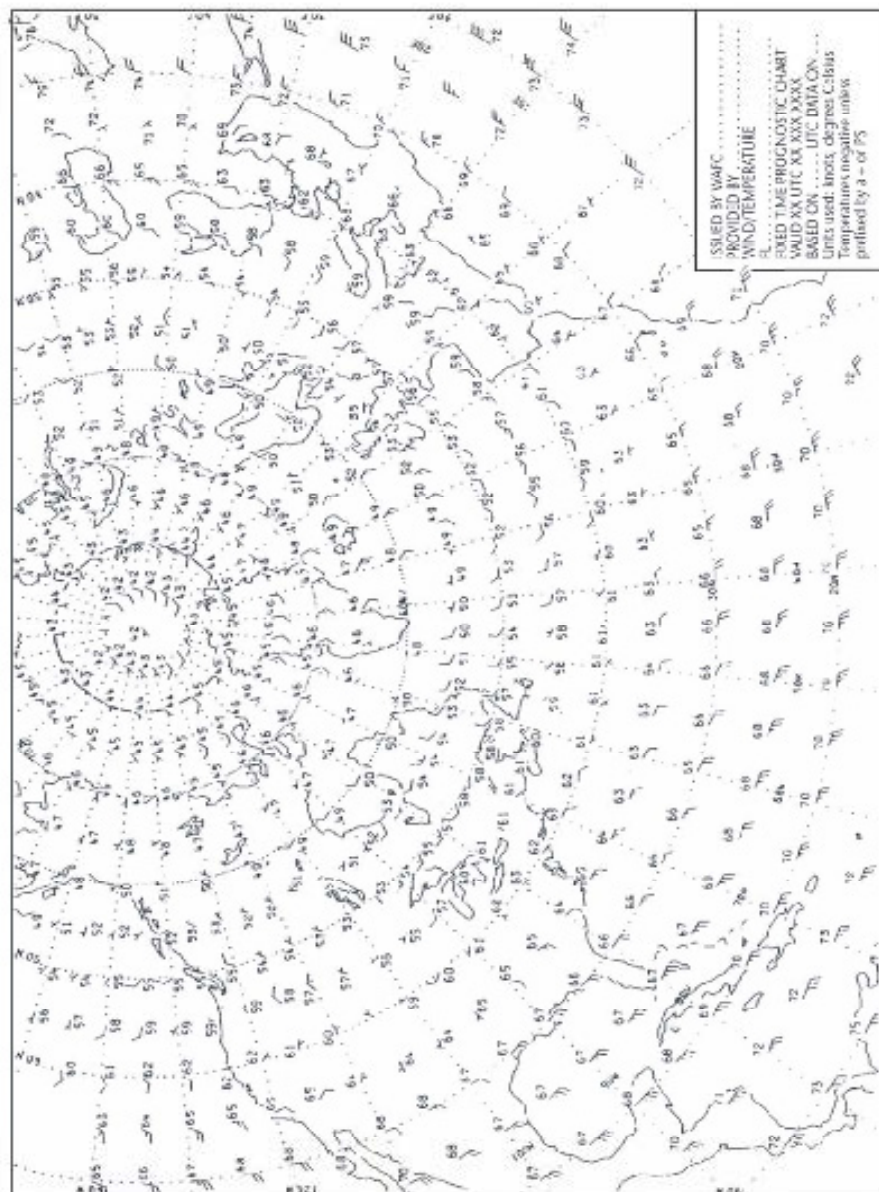
MODEL IS



UPPER WIND AND UPPER-AIR TEMPERATURE CHART FOR STANDARD ISOBARIC SURFACE

MODEL IS

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



Example 1

0°: 040

2000 M

BKN-OVC ST 010 002

LCA 0500 M

OVC SC-NS XXX 010

SCT CU SC 050 030

OVC Lyr XXX 010

OVC Lyr XXX 005

XXX 050

E

0°: 080

0°: 030

OVC ST 015 SFC

LCA COT 0200 M

SCT SC C30 C20

OVC Lyr STNS XXX 015

XXX 090

0°: 050

OCNL 4000 M

EMB D OCNL CB XXX 008

ISOL CB

ISOL BKN CU 040 015

XXX 050

0°: 100

BKN-OVC ST SC 040 010

LCA SOUTH

HILLS 2000 M

OVC ST SC C50 003

0500 M

0°: 100

H X → 15 1018

F

0°: 060

0°: 060

0°: 100

ISSUED BY:

FIXED TIME PROGNOSTIC CHART

SIGWX SFC - 10 000 FT

VALID: ... UTC ... 20 ...

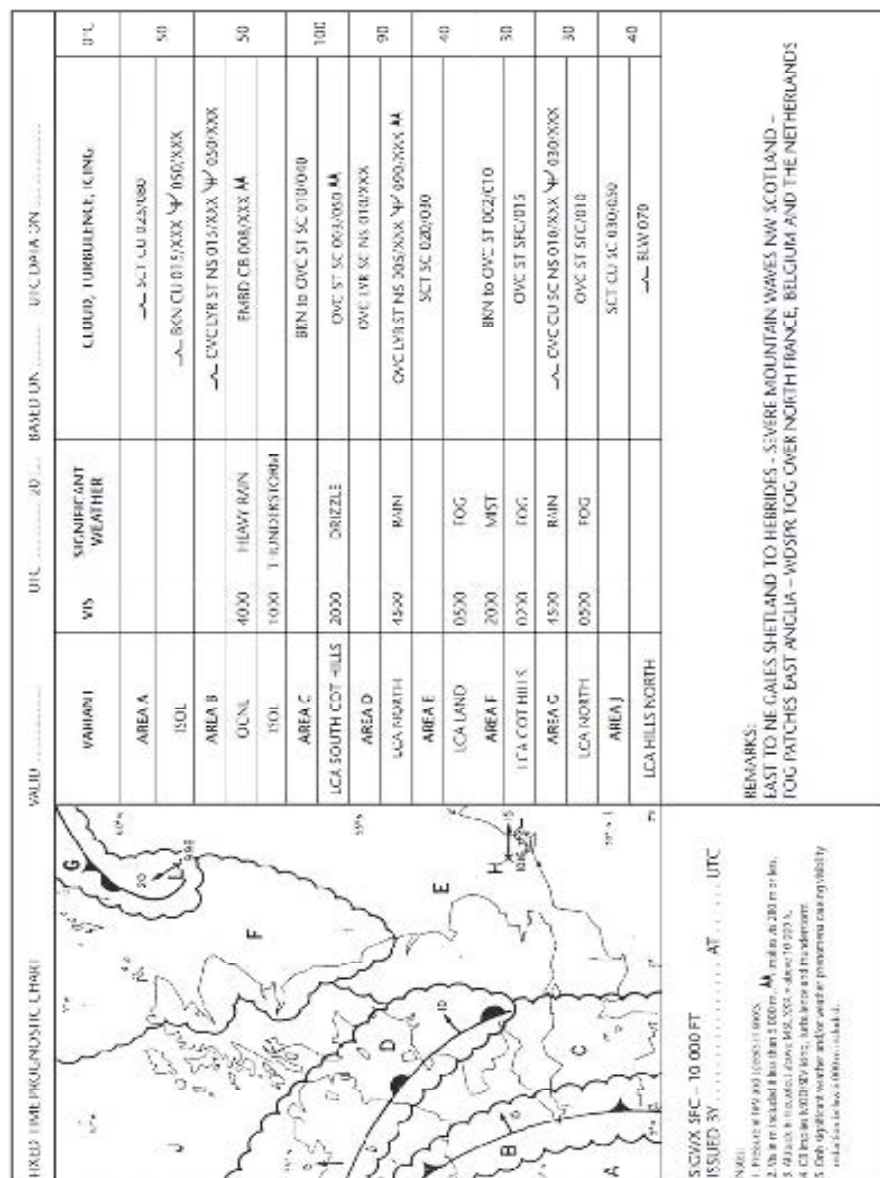
CB implies thunderstorm; moderate or severe turbulence, icing and hail.

Units used: knots; visibility in metres or kilometres; altitude in feet (or above mean sea level).

SIGNIFICANT WEATHER CHART (LOW LEVEL)

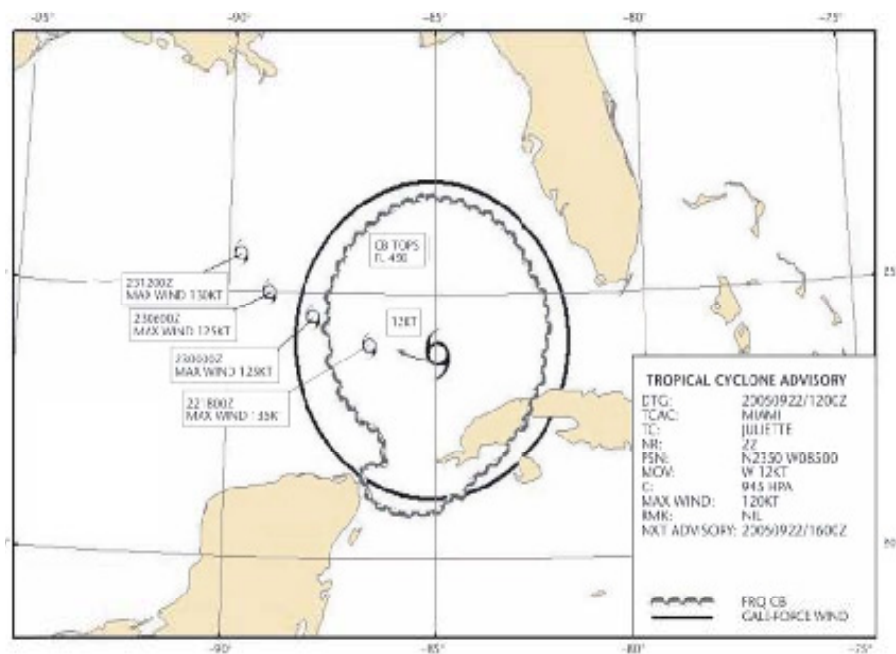
Example 2

MODEL SWL



TROPICAL CYCLONE ADVISORY INFORMATION IN GRAPHICAL FORMAT

MODEL TCG



VOLCANIC ASH ADVISORY INFORMATION IN GRAPHICAL FORMAT

MODEL VAG



VOLCANIC ASH ADVISORY

DTG: 20080923/0130Z

VAAC: TOKYO

VOLCANO: KARYMSKY 1000-13

AREA: RUSSIAN FEDERATION

SUMMIT ELEV: 1536M

ADVISORY NR: 2008/4

INFO SOURCE: MTSAT-1R, KVERT KEMSC

AVIATION COLOUR CODE: RED

ERUPTION DETAILS: ERUPTED AT 20080523/0000Z FL300 REPORTED

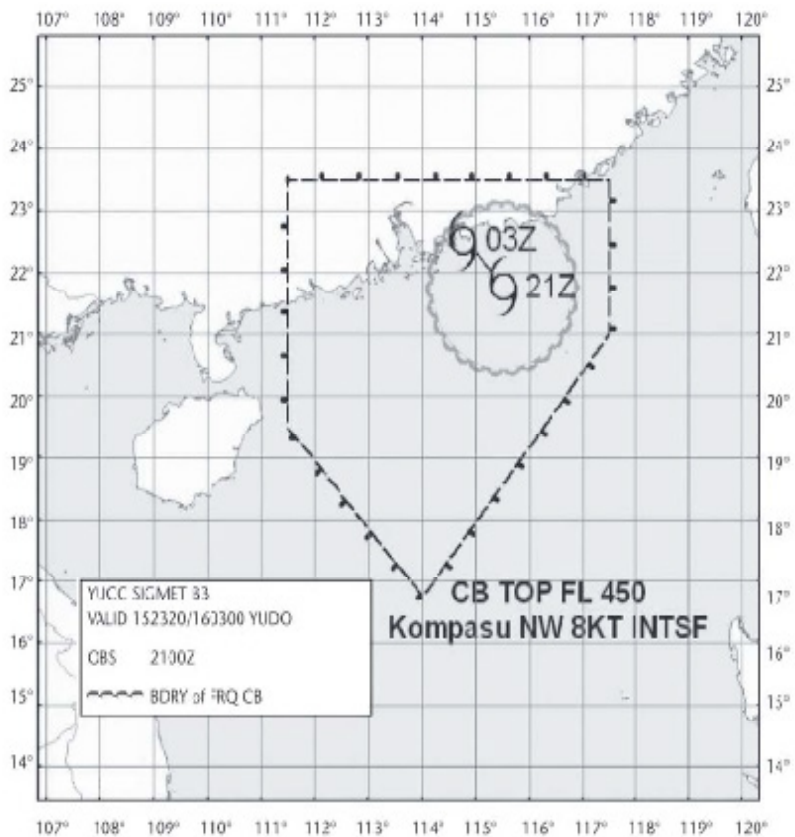
RMK: LATEST REP FM KVERT (0120Z) INDICATES ERUPTION HAS CEASED

TWO DISPERSING VACUOLAR ARE EVIDENT ON SATELLITE IMAGERY

NXT ADVISORY: 20080923/0730Z

SIGMET FOR TROPICAL CYCLONE IN GRAPHICAL FORMAT

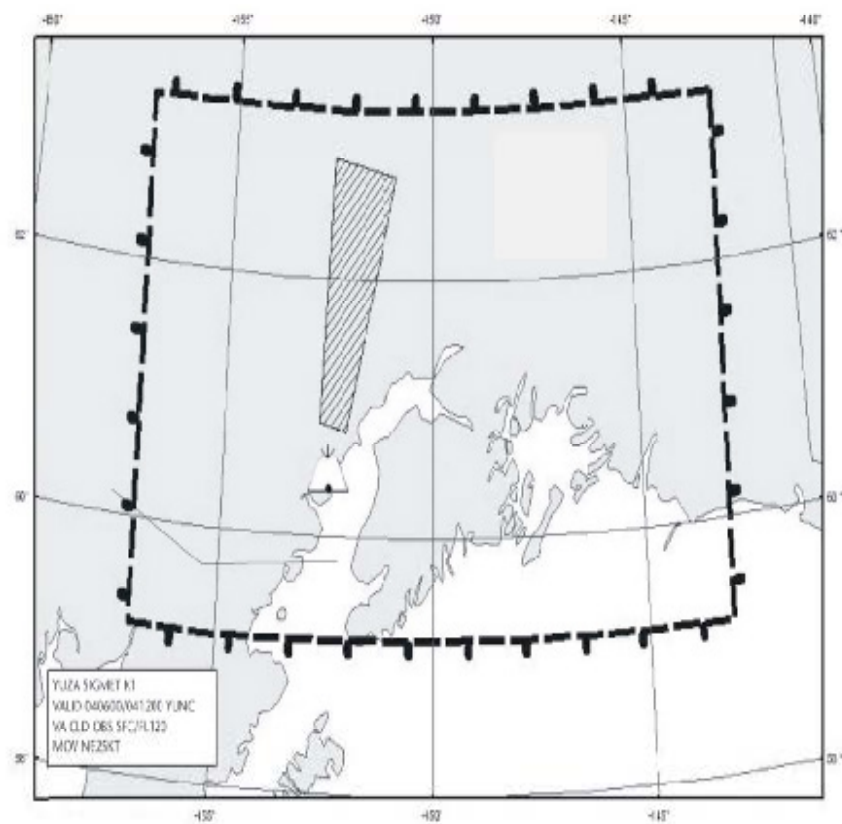
MODEL STC



Note:  Fictitious FIR.

SIGMET FOR VOLCANIC ASH IN GRAPHICAL FORMAT

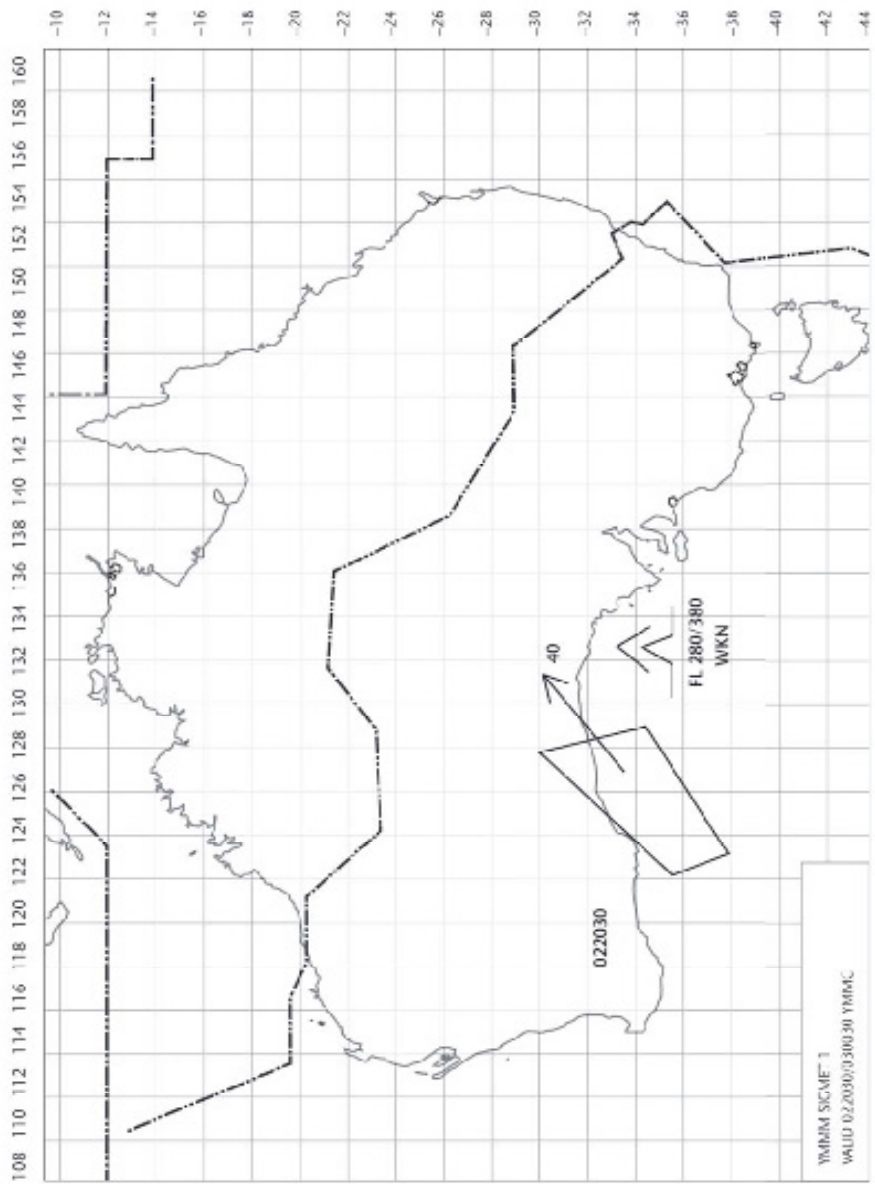
MODEL SVA



 Fictitious FIR.

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

MODEL SGE



SHEET OF NOTATIONS USED IN FLIGHT DOCUMENTATION

MODEL SN

1. Symbols for significant weather

	Tropical cyclone		Turbulence
	Severe squall line*		Rain
	Moderate rime/snow		Snow
	Severe turbulence		Snow shower
	Moderate rime/snow		Hail
	Moderate rime/snow		Widespread blowing snow
	Severe rime/snow		Severe sand or dust haze
	Widespread fog		Widespread sandstorm or dust storm
	Radiation mist in the atmosphere**		Widespread haze
	Volcanic eruption***		Widespread mist
	Moderate obscuration		Widespread smoke
			Freezing precipitation****

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

** The following information should be included in a separate text box on the chart: radiation mist in the atmosphere symbol; latitude/longitude of release site and if known, the name of the site of the radioactive source. In addition, the legend of SIGWX charts, in which a release of nuclear material should contain "CHECK SIGNET AND NOTAM FOR RADIOACT. CLOUD". The code of the radioactive material in the atmosphere symbol should be placed on significant weather charts at the latitude/longitude of the release site.

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

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

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

2. Fronts and convergence zones and other symbols used

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

Wind arrows indicate the maximum wind in kt and the flight levels at which it occurs. If the maximum wind speed is 45 m/s (100 kt) or more, the flight levels between which winds are greater than 40 m/s (90 kt) are placed below the maximum wind block. In this example, winds are greater than 40 m/s (90 kt) between FL 220 and FL 400.

* The heavy line delineating the jet axis leg extends at the points where wind speed of 40 m/s (90 kt) is forecast.

|| Symbol also denotes the height of the jet axis change by ± 2000 ft at the speed change by ± 20 kt.

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

3. Abbreviations used to describe clouds

3.1 Type			
CI = Cirrus	AL = Altimeter	ST = Stratus	
CC = Cirrocumulus	NS = Nimbostratus	CU = Cumulus	
CS = Cirrostratus	SC = Stratocumulus	CB = Cumulonimbus	
AC = Altostratus			
3.2 Amount			
CBW = low (1/8 to 3/8)	BRN = broken (5/8 to 7/8)		
SCT = scattered (3/8 to 4/8)	OCN = overcast (8/8)		
CB only			
ISOL = individual CBs (isolated)			
OCNL = well separated CBs (occasional)			
FRQ = CBs with little or no separation (frequent)			
EMBO = CBs embedded in layers of other clouds or concealed by haze (embedded)			

3.3 Heights

Heights are indicated on SWI and SSM charts in flight levels (FL), top over base. When 2500 ft steps, tops or bases are outside the layer of the atmosphere in which the chart applies. In SWI charts: (a) Heights are indicated as altitudes above mean sea level; (b) The abbreviation SFC is used to indicate ground level.

4. Delineating of lines and systems on specific charts

4.1 Models SWI and SSM – Significant weather charts (high and medium)	
Scalloped line	– delineation of areas of significant weather
Heavy broken line	– delineation of areas of CB
Heavy solid line	– position of jet stream axis with indication of wind direction, speed in kt and height in flight levels. The vertical extent of the jet stream is indicated (e.g. flight level), e.g. FL 270 accompanied by 300/270 indicates that the jet ascends from FL 240 to FL 280.
Flight levels inside small rectangles	– height in flight levels of tropopause at spot locations, e.g. Low and high on both of the tropopause topography are indicated by the letters L and H, respectively, inside a rectangle with the height in flight levels. Display explicit FL for jet heights and tropopause height even if outside forecast levels.

4.2 Model SWI – Significant weather chart (low level)

X	– position of pressure centers given in hectopascals
L	– centre of low pressure
H	– centre of high pressure
Scalloped line	– delineation of areas of significant weather
Dashed line	– altitude of 0°C isotherm in feet (thick line) or metres (thin line). 0°C level may also be indicated by or 0°C level is at an altitude of 6000 ft.
Figures on arrows	– speed in kt or m/s of movement of frontal systems
Figure inside the state of the sea symbol	– sea wave height in feet or metres
Figure inside the sea surface temperature symbol	– 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 pennant and/or feather correspond to speed.

Example: 270/115 kt (equivalent to 57.5 m/s)
 Pennant corresponds to 50 kt or 25 m/s
 Feathers correspond to 10 kt or 5 m/s
 Indicated mean corresponds to 5 kt or 2.5 m/s

* Acceleration factor of 1 to 2 is used.

**TECHNICAL SPECIFICATIONS RELATED TO AIRCRAFT
OBSERVATIONS AND REPORTS****PART I - CONTENTS OF AIR-REPORTS****1. Routine air-reports by air-ground data link**

(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:

- (a) Message type designator
- (b) Aircraft identification
- (c) Data block 1
 - (i) Latitude Longitude level
 - (ii) Time
- (d) Data block 2
 - (i) Wind direction and Wind speed
 - (ii) Air temperature
 - (iii) Turbulence (if available)
 - (iv) Humidity (if available)

(2) 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.

(3) The ADS-C message format is specified in the PANS-ATM (Doc 4444), 4.11.4 and Chapter 13 and the SSR Mode S message format is specified in the Civil Aviation (Communications Systems) Regulations 2017.

(4) 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—

- (a) Message type designator

- (b) Section 1 (Position information)
 - (i) Aircraft identification
 - (ii) Position or latitude and longitude
 - (iii) Time
 - (iv) Flight level or altitude
 - (v) Next position and time over
 - (vi) Ensuing significant point
- (c) Section 2 (Operational information)
 - (i) Estimated time of arrival
 - (ii) Endurance
- (d) Section 3 (Meteorological information)
 - (i) Air temperature
 - (ii) Wind direction and Wind speed
 - (iii) Turbulence Aircraft icing
 - (iv) Humidity (if available)
- (e) 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 the Civil Aviation (Aeronautical Communications Systems) Regulations 2020.

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—

- (a) Message type designator
- (b) Aircraft identification

- (c) Data block 1
 - (i) Latitude Longitude Level
 - (ii) Time
- (d) Data block 2
 - (i) Wind direction
 - (ii) Wind speed
 - (iii) Wind quality flag
 - (iv) Air temperature
 - (v) Turbulence (if available)
 - (vi) Humidity (if available)
- (e) Data block 3
 - (i) Condition prompting the issuance of a special air-report (one condition to be selected from the list presented in Table A4-1);
 - (ii) 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; and
 - (iii) In the case of a special air-report of pre-eruption volcanic activity, volcanic eruption or volcanic ash cloud, additional requirements are indicated in Table A4-1.

3. Special air-reports by voice communications

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

- (a) Message type designator
- (b) Section 1 (Position information)
 - (i) Aircraft identification
 - (ii) Position or latitude and longitude Time

- (iii) Level or range of levels
- (c) Section 3 (Meteorological information)
 - (i) Condition prompting the issuance of a special air-report, to be selected from the list presented in Table A4-1.
 - (ii) Air-reports are considered routine by default.
 - (iii) The message type designator for special air-reports is specified in the PANS-ATM (Doc 4444), Appendix 1.
 - (iv) In the case of a special air-report of pre-eruption volcanic activity, *volcanic eruption or volcanic ash cloud, additional requirements are indicated in Table A4-1.*

PART II. CRITERIA FOR REPORTING

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—

- (1) Wind direction
The wind direction shall be reported in terms of degrees true, rounded to the nearest whole degree.
- (2) Wind speed
The wind speed shall be reported in metres per second or knots, rounded to the nearest 1 m/s (1 knot) and the units of measurement used for the wind speed shall be indicated.
- (3) 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.
- (4) Air temperature
The air temperature shall be reported to the nearest tenth of a degree Celsius.

(5) Turbulence

- (a) The turbulence shall be reported in terms of the cube root of the eddy dissipation rate (EDR) as follows—
 - (i) 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.
 - (ii) 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.
 - (iii) 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.
 - (iv) 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.
 - (v) The peak value of turbulence shall be recorded.
- (b) Turbulence report shall be interpreted as follows-
 - (i) severe when the peak value of the cube root of EDR exceeds 0.7;
 - (ii) moderate when the peak value of the cube root of EDR is above 0.4 and below or equal to 0.7;
 - (iii) light when the peak value of the cube root of EDR is above 0.1 and below or equal to 0.4; and
 - (iv) nil when the peak value of the cube root of EDR is below or equal to 0.1.
- (c) The EDR is an aircraft-independent measure of turbulence and the relationship between the EDR value and the perception of turbulence is a function of aircraft

type, mass, altitude, configuration and airspeed of the aircraft.

- (d) 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).
- (6) Special air-reports
 - (a) 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.
 - (b) The special air-report on turbulence shall be made with reference to the 1-minute period immediately preceding the observation.
 - (c) 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.
 - (d) 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.
- (7) Humidity

The humidity shall be reported as the relative humidity, rounded to the nearest whole per cent.
- (8) The ranges and resolutions for the meteorological elements included in air-reports are shown in Table A4-3.

PART III. EXCHANGE OF AIR-REPORTS

4. Responsibilities of the meteorological watch offices

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

- (2) The meteorological watch office shall transmit without delay special air-reports of pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud received to the associated volcanic ash advisory centres.
- (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.
- (4) The template used for special air-reports uplinked to aircraft in flight is in Table A6-1B.

5. Responsibilities of world area forecast centres

(1) Air-reports received at WAFCs shall be further disseminated as basic meteorological data.

(2) The dissemination of basic meteorological data is normally carried out on the World Meteorological Organization (WMO) global telecommunication system.

6. 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.

7. Format of air-reports

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

PART IV. SPECIFIC PROVISIONS RELATED TO REPORTING WIND SHEAR AND VOLCANIC ASH

1. Reporting of wind shear

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

(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.

2. Post-flight reporting of volcanic activity

(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.

(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.

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

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.

<i>Element as specified in Chapter 5</i>	<i>Detailed content</i>	<i>Template(s)</i>	<i>Examples</i>
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 (<i>or</i> knots) (M)	nnnMPS (<i>or</i> nnnKT)	040MPS (080KT)
Wind quality flag (M)	Wind quality flag (M)	n	1
Air temperature (M)	Air temperature in tenths of degrees C (M)	T[M]nnn	T127 TM455
Turbulence (C)	Turbulence in hundredths of $\text{m}^2/3 \text{ s}^{-1}$ 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			
<i>Element as specified in Chapter 5</i>	<i>Detailed content</i>	<i>Template(s)</i>	<i>Examples</i>

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 HVV SS ⁴ or VA CLD [FL nnn/nnn] or VA ⁵ [MT nnnnnnnnnnnnnnnnnnnnnnnn] or MOD TURB [EDRnnn] ² or MOD ICE	SEV TURB EDR076 VA CLD FL050/100
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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

<i>Peak value of turbulence occurring during the one-minute period minutes prior to the observation</i>	<i>Value to be reported</i>
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

<i>Element as specified in Chapter 5</i>	<i>Range</i>	<i>Resolution</i>
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: $\text{m}^{2/3} \text{ s}^{-1}$ (time of occurrence)*	0 – 2 0 – 15	0.01 1
Turbulence: special air-report: $\text{m}^{2/3} \text{ s}^{-1}$	0 – 2	0.01
Humidity: %	0 – 100	1
* Non-dimensional		

SCHEDULE 6

regulations 45(1) and entire Part VIII

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

PART I - SPECIFICATIONS RELATED TO SIGMET INFORMATION

1. Format of SIGMET messages

(1) The content and order of elements in a SIGMET message shall be in accordance with the template shown in Table A6-1A.

(2) Messages containing SIGMET information shall be identified as: “SIGMET”.

(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.

(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—

(5) thunderstorm

(a) Reporting thunderstorms at cruising levels irrespective of altitude—

(i) obscured	OBSC TS
(ii) embedded	EMBD TS
(iii) frequent	FRQ TS
(iv) squall line	SQL TS
(v) obscured with hail	OBSC TSGR

- | | | |
|--------|--|---------------|
| (vi) | embedded with hail | EMBD TSGR |
| (vii) | frequent, with hail | FRQ TSGR |
| (viii) | squall line with hail | SQL TSGR |
| (b) | Reporting tropical cyclone at cruising levels irrespective of altitude— | |
| (i) | tropical cyclone with 10-minute mean | |
| (ii) | TC (+ cyclone name) surface wind speed of 17 m/s (34 kt) or more | |
| (c) | Reporting turbulence at cruising levels irrespective of altitude— | |
| (i) | severe turbulence | SEV TURB |
| (d) | reporting icing at cruising levels irrespective of altitude— | |
| (i) | severe icing | SEV ICE |
| (ii) | severe icing due to | SEV ICE |
| (iii) | freezing rain | FZRA |
| (e) | reporting other phenomena at cruising levels irrespective of altitude— | |
| (i) | severe mountain wave | SEV MTW |
| (ii) | heavy duststorm | HVY DS |
| (iii) | heavy sandstorm | HVY SS |
| (iv) | volcanic ash
name, if known) | VA (+ volcano |
| (v) | radioactive cloud | RDOACT CLD |
| (f) | 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 paragraph (5) shall be included. SIGMET information concerning thunderstorms or a tropical cyclone shall not include references to associated turbulence and icing. | |

- (g) Meteorological watch offices should issue SIGMET information in digital form, in addition to the issuance of this SIGMET information in abbreviated plain language.
- (h) 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).
- (i) SIGMET if disseminated in digital form shall be accompanied by the appropriate metadata.

2. Dissemination of SIGMET messages

(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 volcanic ash advisory centres.

(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 Internet-based services, in accordance with regional air navigation agreement.

PART II—DETAILED CRITERIA RELATED TO SIGMET AND SPECIAL AIR-REPORTS (UPLINK)

1. Identification of the flight information region

(1) In cases where the airspace is divided into an 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.

(2) 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.

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

(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;
- (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).

(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).

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

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

(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.

(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.

(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.

(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.

(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:
 - (i) below 200 m and the sky is not obscured; or
 - (ii) between 200 m and 600 m.

PART III - SPECIFICATIONS RELATED TO AERODROME WARNINGS

1. Format and dissemination of aerodrome warnings

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

(2) 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.

(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:

- (a) 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)
- (b) thunderstorm
- (c) hail
- (d) snow (including the expected or observed snow accumulation)
- (e) freezing precipitation
- (f) hoar frost or rime
- (g) sandstorm
- (h) duststorm
- (i) rising sand or dust
- (j) strong surface wind and gusts
- (k) squall
- (l) frost
- (m) volcanic ash
- (n) tsunami
- (o) volcanic ash deposition
- (p) toxic chemicals
- (q) other phenomena as agreed locally.

(4) 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) 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 for any weather phenomena, English plain language text should be used.

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.

PART IV - SPECIFICATIONS RELATED TO WIND SHEAR WARNINGS

1. Detection of wind shear Recommendation.-

(1) Evidence of the existence of wind shear should be derived from-

- (i) ground-based, wind shear remote-sensing equipment, for example, Doppler radar;
- (ii) 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;
- (iii) aircraft observations during the climb-out or approach phases of flight to be made in accordance with provisions of Part VI of these Regulations; or
- (iv) 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.

(2) Wind shear conditions are normally associated with the following phenomena—

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

2. Format and dissemination of wind shear warnings and alerts

(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.

(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.

(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.

(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.

(5) 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.

(6) Specifications for reporting the intensity of wind shear recognizes that pilots, when reporting wind shear, may use the qualifying terms “moderate”, “strong” or “severe”, based to a large extent on their assessment of the intensity of the wind shear encountered.

(7) 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.

(8) 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.

(9) 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.

(10) Information on wind shear is also to be included as supplementary information in local routine reports, local special reports, METAR and SPECI in accordance with the templates in Appendix 3, Tables A3-1 and A3-2.

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

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

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

Note 2.— 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 221215/221600 VALID 251600/252200 152000/160000 VALID 192300/200300	VALID 101520/101800 VALID 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 or UIR or FIR/UIR nnnn nnnnnnnnnn CTA	nnnn nnnnnnnnnn FIR[/n]	YUCC AMSWELL FIR ² YUDD SHANLON ² UIR FIR/UIR YUDD SHANLON CTA ²	YUCC AMSWELL FIR/ ² YUDD SHANLON FIR ²
IF THE SIGMET OR AIRMET MESSAGE IS TO BE CANCELLED, SEE DETAILS AT THE END OF THE TEMPLATE.					
Status indicator (C) ⁵	Indicator of test or exercise	TEST or EXER	TEST or EXER	TEST EXER	TEST EXE

phenomenon (M)6	Description of phenomenon causing the issuance of SIGMET/ AIRMET	OBSC7 TS[GR8] EMBD9 TS[GR8] FRQ10 TS[GR8] SQL11 TS[GR8] TC nnnnnnnnnn PSN Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] CB <i>or</i> TC NN12 PSN Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] CB SEV TURB13 SEV ICE14 SEV ICE (FZRA)14 SEV MTW15 HVV DS HVV SS [VA ERUPTION] [MT nnnnnnnnnn] [PSN Nnn[nn] <i>or</i> Snn[nn] Ennn[nn] <i>or</i> Wnnn[nn]] VA CLD RDOACT CLD	SFC WIND nnn/ nn[n]MPS (<i>or</i> SFC WIND nnn/ nn[n]KT) SFC VIS [n][n]nnM (nn)16 [ISOL17 TS[GR8] OCNL18 TS[GR8] MT OBSC BKN CLD nnn/[ABV][n]nnnM (<i>or</i> BKN CLD [n]nnn/[ABV][n] nnnnFT) BKN CLD SFC/ [ABV][n]nnnM (<i>or</i> BKN CLD SFC/[ABV][n] nnnnFT) OVC CLD nnn/[ABV][n]nnnM (<i>or</i> OVC CLD [n]nnn/[ABV][n] nnnnFT) <i>or</i> OVC CLD SFC/ [ABV][n]nnnM (<i>or</i> OVC CLD SFC/[ABV][n] nnnnFT) ISOL17 CB19 OCNL18 CB19 FRQ10 CB19 ISOL17 TCU19 OCNL18 TCU19 FRQ10 TCU19 MOD TURB13 MOD ICE14 MOD MTW15	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 HVV DS HVV SS VA ERUPTION MT ASHVAL2 PSN S15 E073 VA CLD RDOACT CLD	SFC WIND 040/40MPS SFC WIND 310/20KT SFC VIS 1500M (BR) ISOL TS ISOL TSGR OCNL TS OCNL TSGR MT OBSC BKN CLD 120/900M BKN CLD 400/3000FT BKN CLD 1000/5000FT BKN CLD SFC/3000M BKN CLD SFC/ ABV10000FT OVC CLD 270/ ABV3000M OVC CLD 900/ ABV10000FT OVC CLD1000/5000FT 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] <i>or</i> FCST [AT nnnnZ]		OBS OBS AT 1210Z FCST FCST AT 1815Z	

Location (C)20	Location (referring to latitude and longitude (in degrees and minutes))	<p>Nnn[nn] Wnnn[nn] <i>or</i> Nnn[nn] Ennn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Snn[nn] Ennn[nn] <i>or</i> N OF Nnn[nn] <i>or</i> S OF Nnn[nn] <i>or</i> N OF Snn[nn] <i>or</i> S OF Snn[nn] [AND] W OF Wnnn[nn] <i>or</i> E OF Wnnn[nn] <i>or</i> W OF Ennn[nn] <i>or</i> E OF Ennn[nn] <i>or</i> N OF Nnn[nn] <i>or</i> N OF Snn[nn] AND S OF Nnn[nn] <i>or</i> S OF Snn[nn] <i>or</i> W OF Wnnn[nn] <i>or</i> W OF Ennn[nn] AND E OF Wnnn[nn] <i>or</i> E OF Ennn[nn] <i>or</i> N OF LINE21 <i>or</i> NE OF LINE21 <i>or</i> E OF LINE21 <i>or</i> SE OF LINE21 <i>or</i> S OF LINE21 <i>or</i> SW OF LINE21 <i>or</i> W OF LINE21 <i>or</i> NW OF LINE21 Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] – Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] [– Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] [– Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] [AND N OF LINE21 <i>or</i> NE OF LINE21 <i>or</i> E OF LINE21 <i>or</i> SE OF LINE21 <i>or</i> S OF LINE21 <i>or</i> SW OF LINE21 <i>or</i> W OF LINE21 <i>or</i> NW OF LINE21 Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] – Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] [– Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] [– Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]]] <i>or</i> WI21, 22 Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] – Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] – Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] – [Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] – Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] <i>or</i> APRX nnKM WID LINE21 BTN (<i>or</i> nnNM WID LINE21 BTN) Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] – Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] [– Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] [– Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] <i>or</i> ENTIRE UIR <i>or</i> ENTIRE FIR <i>or</i> ENTIRE FIR/UIR <i>or</i> ENTIRE CTA <i>or</i>23 WI nnnKM (<i>or</i> nnnNM) OF TC CENTRE <i>or</i>24 WI nnKM (<i>or</i> nnNM) OF Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]</p>	<p>N2020 W07005 N48 E010 S60 W160 S0530 E16530 N OF N50 S OF N5430 N OF S10 S OF S4530 W OF W155 E OF W45 W OF E15540 E OF E09015 N OF N1515 AND W OF E13530 S OF N45 AND N OF N40 N OF LINE S2520 W11510 – S2520 W12010 SW OF LINE N50 W005 – N60 W020 SW OF LINE N50 W020 – N45 E010 AND NE OF LINE N45 W020 – N40 E010 WI N6030 E02550 – N6055 E02500 – N6050 E02630 – N6030 E02550 APRX 50KM WID LINE BTN N64 W017 – N60 W010 – N57 E010 ENTIRE FIR ENTIRE UIR ENTIRE FIR/UIR ENTIRE CTA WI 400KM OF TC CENTRE WI 250NM OF TC CENTRE WI 30KM OF N6030 E02550+</p>
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Element	Detailed content	SIGMET template	AIRMET template	SIGMET message examples	AIRMET message examples
Level (C)20, 24	Flight level or altitude	[SFC]/FLnnn or [SFC]/nnnnM (or [SFC]/[n]nnnnFT) or FLnnn/nnn or TOP FLnnn or [TOP] ABV FLnnn (or [TOP] ABV [n]nnnnFT) [nnnn]/nnnnM (or [[n]nnnn]/[n]nnnnFT) or [nnnnM]/FLnnn (or [[n]nnnnFT]/FLnnn) or 23 TOP [ABV or BLW] FLnnn		FL180 SFC/FL070 SFC/3000M SFC/10000FT FL050/080 TOP FL390 ABV FL250 TOP ABV FL100 ABV 7000FT TOP ABV 9000FT TOP ABV 10000FT 3000M 2000/3000M 8000FT 6000/12000FT 2000M/FL150 10000FT/FL250 TOP FL500 TOP ABV FL500 TOP BLW FL450	
Movement or expected movement (C)20, 25	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	

Changes in intensity (C)20	Expected changes in intensity	INTSF or WKN or NC		INTSF WKN NC	
Forecast time (C)25	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 NT030 TC CENTRE PSN E1600015	—

Forecast position (C)20, 25, 26	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 LINE21 or NE OF LINE21 or E OF LINE21 or SE OF LINE21 or S OF LINE21 or SW OF LINE21 or W OF LINE21 or NW OF LINE21 Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]] [AND N OF LINE21 or NE OF LINE21 or E OF LINE21 or SE OF LINE21 or S OF LINE21 or SW OF LINE21 or W OF LINE21 or NW OF LINE21 Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] – Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn] [– Nnn[nn] or Snn[nn] Wnnn[nn] or Ennn[nn]]	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 NO VA EXP WI 30KM OF N6030 E02550†	
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		<i>or</i> WI21, 22 Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] – Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] – Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] – Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] <i>or</i> APRX nnKM WID LINE21 BTN (nnNM WID LINE21 BTN) Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] – Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn] [– Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] [– Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]] <i>or</i> ENTIRE FIR <i>or</i> ENTIRE UIR <i>or</i> ENTIRE FIR/UIR <i>or</i> ENTIRE CTA <i>or</i> 27 NO VA EXP <i>or</i> 24 WI nnKM (<i>or</i> nnNM) OF Nnn[nn] <i>or</i> Snn[nn] Wnnn[nn] <i>or</i> Ennn[nn]			
Repetition of elements (C)28	Repetition of elements included in a SIGMET message for volcanic ash cloud or tropical cyclone	[AND]28	—	AND	—

OR

Cancellation of SIGMET/AIRMET (C)29	Cancellation of SIGMET/AIRMET referring to its identification	CNL SIGMET [n][n]n nnnnnn/nnnnnn Or 27 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 FIR2	CNL AIRMET 05 151520/151800
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Notes.—

1. Fictitious location.
2. 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 2020]*
3. The use of cumulonimbus (CB) and towering cumulus (TCU) is restricted to AIRMETs.
4. 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.
5. 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.
6. The number of coordinates should be kept to a minimum and should not normally exceed seven.
7. Only for SIGMET messages for tropical cyclones.
8. 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 2020]*
9. The elements “forecast time” and “forecast position” are not to be used in conjunction with the element “movement or expected movement”.
10. The levels of the phenomena remain fixed throughout the forecast period.
11. Only for SIGMET messages for volcanic ash.
12. To be used for two volcanic ash clouds or two centres of tropical cyclones simultaneously affecting the FIR concerned..
13. End of the message (as the SIGMET/AIRMET message is being cancelled)

AIRMET:- Not applicable in accordance with AFI Regional Air Navigation Agreement*

Table A6-1B. Template for special air-reports (uplink)

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

Note. — The ranges and resolutions for the numerical elements included in special air-reports are shown in Table A6-4 of this appendix.

<i>Element</i>	<i>Detailed content</i>	<i>Template^{1,2}</i>	<i>Examples</i>
Identification (M)	Message identification	ARS	ARS
Aircraft identification (M)	Aircraft radiotelephony call sign	nnnnnn	VA812 ³
Observed phenomenon (M)	Description of observed phenomenon causing the issuance of the special air-report ⁴	TS TSGR SEV TURB SEV ICE SEV MTW HVY SS VA CLD VA [MT nnnnnnnnn] MOD TURB MOD ICE	TS TSGR SEV TURB SEV ICE SEV MTW HVY SS VA CLD VA VA MT ASHVAL ⁵ MOD TURB MOD ICE
Observation time (M)	Time of observation of observed phenomenon	OBS AT nnnnZ	OBS AT 1210Z
Location (C)	Location (referring to latitude and longitude (in degrees and minutes)) of observed phenomenon	NnnnnWnnnnn NnnnnEnnnnn SnnnnWnnnnn SnnnnEnnnnn	or N2020W07005 or S4812E01036 or
Level (C)	Flight level <i>or</i> altitude of observed phenomenon	FLnnn <i>or</i> FLnnn/nnn <i>or</i> nnnnM (<i>or</i> [n]nnnnFT)	FL390 FL180/210 3000M 12000FT

Notes.

1. No wind and temperature to be uplinked to other aircraft in flight.
2. Fictitious call sign.
3. In the case of special air-report for volcanic ash cloud, the vertical extent (if observed) and name of the volcano (if known) can be used.
4. Fictitious location.

Table A6-2. Template for aerodrome warnings

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

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

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).

<i>Element</i>	<i>Detailed content</i>	<i>Templates</i>	<i>Examples</i>
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 nnnnnnnnnn <i>or</i> [HVY] TS <i>or</i> GR <i>or</i> [HVY] SN [nnCM] ³ <i>or</i> [HVY] FZRA <i>or</i> [HVY] FZDZ <i>or</i> RIME ⁴ <i>or</i> [HVY] SS <i>or</i> [HVY] DS <i>or</i> SA <i>or</i> DU <i>or</i> SFC WSPD nn[n]MPS MAX nn[n] (SFC WSPD nn[n]KT MAX nn[n]) <i>or</i> SFC WIND nnn/nn[n]MPS MAX nn[n] (SFC WIND nnn/nn[n]KT MAX nn[n]) <i>or</i> SQ <i>or</i> FROST <i>or</i> TSUNAMI <i>or</i> VA[DEPO] <i>or</i> TOX CHEM <i>or</i> <i>Free text up to 32 characters</i> ⁵	TC ANDREW HVY SN 25CM SFC WSPD 20MPS MAX 30 VA TSUNAMI
Observed or forecast phenomenon (M)	Indication whether the information is observed and expected to continue, <i>or</i> forecast	OBS [AT nnnnZ] <i>or</i> FCST	OBS AT 1200Z OBS
Changes in intensity (C)	Expected changes in intensity	INTSF <i>or</i> WKN <i>or</i> 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
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Notes.—

1. Fictitious location.
2. One phenomenon or a combination thereof phenomena.
3. Hoar frost *or* rime.

4. End of the message (as the aerodrome warning is being cancelled).

Table A6-3. Template for wind shear warnings

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

C = inclusion conditional, included whenever applicable.

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

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

Element	Detailed content	Template(s)	Example
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] <i>or</i> [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] <i>or</i> [SEV] WS IN APCH <i>or</i> [MOD] <i>or</i> [SEV] WS [APCH] RWYnnn <i>or</i> [MOD] <i>or</i> [SEV] WS IN CLIMB-OUT <i>or</i> [MOD] <i>or</i> [SEV] WS CLIMB-OUT RWYnnn <i>or</i> MBST IN APCH <i>or</i> MBST [APCH] RWYnnn <i>or</i> MBST IN CLIMB-OUT <i>or</i> 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 <i>or</i> reported and expected to continue, <i>or</i> forecast	REP AT nnnn nnnnnnnn <i>or</i> OBS [AT nnnn] <i>or</i> 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 (<i>or</i> nnn/nnKT) nnnM (nnnFT)- WIND: nnn/nnMPS (<i>or</i> nnn/nnKT) <i>or</i> nnKMH (<i>or</i> nnKT) LOSS nnKM (<i>or</i> nnNM) FNA RWYnn <i>or</i> nnKMH (<i>or</i> nnKT) GAIN nnKM (<i>or</i> 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
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Notes.—

1. Fictitious location.

2. Additional provisions.
3. End of the message (as the wind shear warning is being cancelled).

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

<i>Element as specified in Appendices 2 and 6</i>		<i>Range</i>	<i>Resolution</i>
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 and AIRMET 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

Cancellation of SIGMET

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

Cancellation of AIRMET

YUDD AIRMET 2 VALID
151650/151800 YUSO – YUDD
SHANLON FIR CNL AIRMET 1
151520/151800

Example A6-2. SIGMET message for tropical cyclone

YUCC SIGMET 3 VALID 251600/252200 YUDO –
YUCC AMSWELL FIR TC GLORIA PSN N2706 W07306 CB OBS AT 1600Z
WI 250NM OF TC CENTRE TOP FL500 NC FCST AT 2200Z TC CENTRE
PSN N2740 W07345

Meaning:

The third SIGMET message issued for the AMSWELL* flight information region (identified by YUCC Amswell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC; the message is valid from 1600 UTC to 2200 UTC on the 25th of the month; tropical cyclone Gloria at 27 degrees 6 minutes north and 73 degrees 6 minutes west; cumulonimbus was observed at 1600 UTC within 250 nautical miles of the centre of the tropical cyclone with top at flight level 500; no changes in intensity are expected; at 2200 UTC the centre of the tropical cyclone is forecast to be located at 27 degrees 40 minutes north and 73 degrees 45 minutes west.

* Fictitious location

Example A6-3. SIGMET message for volcanic ash

YUDD SIGMET 2 VALID 211100/211700 YUSO –
YUDD SHANLON FIR/UIR VA ERUPTION MT ASHVAL PSN S1500 E07348 VA CLD
OBS AT 1100Z APRX 50KM WID LINE BTN S1500 E07348 – S1530 E07642 FL310/450
INTSF FCST AT 1700Z APRX 50KM WID LINE BTN S1506 E07500 – S1518 E08112 –
S1712 E08330

Meaning:

The second SIGMET message issued for the SHANLON* flight information region (identified by YUDD Shanlon area control centre/upper flight information region) by the Shanlon/International* meteorological watch office (YUSO) since 0001 UTC; the message is valid from 1100 UTC to 1700 UTC on the 21st of the month; volcanic ash eruption of Mount Ashval* located at 15 degrees south and 73 degrees 48 minutes east; volcanic ash cloud observed at 1100 UTC in an approximately 50 km wide line between 15 degrees south and 73 degrees 48 minutes east, and 15 degrees 30 minutes south and 76 degrees 42 minutes east; between flight levels 310 and 450, intensifying at 1700 UTC the volcanic ash cloud is forecast to be located in an approximate 50 km wide line between 15 degrees 6 minutes south and 75 degrees east, 15 degrees 18 minutes south and 81 degrees 12 minutes east, and 17 degrees 12 minutes south and 83 degrees 30 minutes east.

* Fictitious location

Example A6-4. SIGMET message for radioactive cloud

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

Meaning:

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

* Fictitious location

Example A6-5. SIGMET message for severe turbulence

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

Meaning:

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

* Fictitious location

Example A6-6. AIRMET message for moderate mountain wave

YUCC AIRMET 2 VALID 221215/221600 YUDO –
YUCC AMSWELL FIR MOD MTW OBS AT 1205Z N48 E010 FL080 STNR NC

Meaning:

The second AIRMET message issued for the AMSWELL* flight information region (identified by YUCC Amwell area control centre) by the Donlon/International* meteorological watch office (YUDO) since 0001 UTC; the message is valid from 1215 UTC to 1600 UTC on the 22nd of the month; moderate mountain wave was observed at 1205 UTC at 48 degrees north and 10 degrees east at flight level 080; the mountain wave is expected to remain stationary and not to undergo any changes in intensity.

* Fictitious location

SCHEDULE 7

regulation 48

TECHNICAL SPECIFICATIONS RELATED TO AERONAUTICAL CLIMATOLOGICAL INFORMATION

PART I—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.

PART II—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.

PART III—CONTENT OF AERONAUTICAL CLIMATOLOGICAL INFORMATION

1. Aerodrome climatological tables

(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).

(2) Aerodrome climatological tables should include information required for the preparation of aerodrome climatological summaries in accordance with paragraph 2; below.

2. Aerodrome climatological summaries

(1) 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.

(2) Models of climatological summaries related to a) to e) are given in the Technical Regulations (WMO-No. 49), Volume II — Meteorological Service for International Air Navigation, Part III.

SCHEDULE 8

regulation 52(1)

TECHNICAL SPECIFICATIONS RELATED TO SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

PART I—MEANS OF SUPPLY AND FORMAT OF METEOROLOGICAL INFORMATION

- (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.
- (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.
- (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.

PART II—SPECIFICATIONS RELATED TO INFORMATION FOR PRE-FLIGHT PLANNING AND IN-FLIGHT REPLANNING

1. Format of upper-air gridded information

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

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

2. Format of information on significant weather

(1) Information on significant weather supplied by WAFCs for pre-flight and in-flight replanning shall be in the BUFR code form.

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

3. Specific needs of helicopter operations

(1) Meteorological information for pre-flight planning and in-flight replanning by operators of helicopters flying to offshore structures should include data covering the layers from sea level to flight level 100.

(2) 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 AFI regional air navigation agreement.

PART III—SPECIFICATIONS RELATED TO BRIEFING AND CONSULTATION

1. Information required to be displayed

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

PART IV - SPECIFICATIONS RELATED TO FLIGHT DOCUMENTATION

1. Presentation of information

(1) The material displayed should be readily accessible to the flight crew members or other flight operations personnel concerned.

(2) The flight documentation related to forecasts of upper wind and upper-air temperature and SIGWX phenomena shall be presented in the form of charts. For low-level flights, alternatively, GAMET area forecasts shall be used.

(3) Models of charts and forms for use in the preparation of flight documentation are given in Schedule 3. These models and methods for their completion are developed by the World Meteorological Organization (WMO) on the basis of relevant operational requirements stated by ICAO.

(4) 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.

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

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

(7) The location indicators and the abbreviations used should be explained in the flight documentation.

(8) 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 the Uganda Civil Aviation (Units of Measurement to be used in Air Ground operations), Regulations, 2020.

2. Charts in flight documentation

(1) Charts included in flight documentation should have a high standard of clarity and legibility and should have the following physical characteristics—

- (a) for convenience, the largest size of charts should be about 42×30 cm (standard size A3) and the smallest size should be about 21×30 cm (standard size A4). The choice between these sizes should depend on the route lengths and the amount of detail that needs to be given in the charts as agreed between the meteorological authorities and the users concerned;
- (b) major geographical features, such as coastlines, major rivers and lakes should be depicted in a way that makes them easily recognizable;
- (c) for charts prepared by computer, meteorological data should take preference over basic chart information, the former cancelling the latter wherever they overlap;
- (d) major aerodromes should be shown as a dot and identified by the first letter of the name of the city the aerodrome serves as given in Table AOP of the relevant 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 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.

(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.

(3) For short-haul flights, charts should be prepared covering limited areas at a scale of $1:15 \times 10^6$ as required.

(4) Set of charts to be provided include—

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

(5) 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;
- (b) they may also be expressed in pressure, altitude or, for low-level flights, height above ground level; and
- (c) all references to aerodrome meteorological conditions, such as height indications of the bases of clouds, shall be expressed in height above the aerodrome elevation.

3. Specifications related to low-level flights

(1) Specifications for low-level flights in chart form are as follows—

- (a) 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:

- (b) information from relevant SIGMET messages;
- (c) upper wind and upper-air temperature charts as given in Fifth Schedules; and
- (d) significant weather charts as given in Fifth Schedules.

(2) Specifications for low-level flights In abbreviated plain language

- (a) 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—
 - (i) SIGMET information; and
 - (ii) GAMET area forecasts.
- (b) An example of the GAMET area forecast is given in Fifth Schedules

**PART V—SPECIFICATIONS RELATED TO AUTOMATED
PRE-FLIGHT INFORMATION SYSTEMS FOR BRIEFING,
CONSULTATION, FLIGHT PLANNING AND FLIGHT
DOCUMENTATION**

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.

2. Detailed specifications of the systems

(1) 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 WMO, or based on a menu-driven user interface, or other appropriate mechanisms as agreed between the meteorological authority and the operators concerned; and
- (d) provide for rapid response to a user request for information.

(2) 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).

PART VI—SPECIFICATIONS RELATED TO INFORMATION FOR AIRCRAFT IN FLIGHT

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.

2. Information for in-flight planning by the operator

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

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

- (b) TAF and amended TAF;
- (c) SIGMET information and special air-reports relevant to the flight, unless the latter have been the subject of a SIGMET message;
- (d) upper wind and upper-air temperature information;
- (e) volcanic ash and tropical cyclone advisory information relevant to the flight; and
- (f) other meteorological information in alphanumeric or graphical form as agreed between the meteorological authority and the operator concerned.

(2) Guidance on the display of graphical information in the cockpit is provided in Doc 8896.

Mercator projection - Fixed areas of coverage of WAFS forecasts in chart form

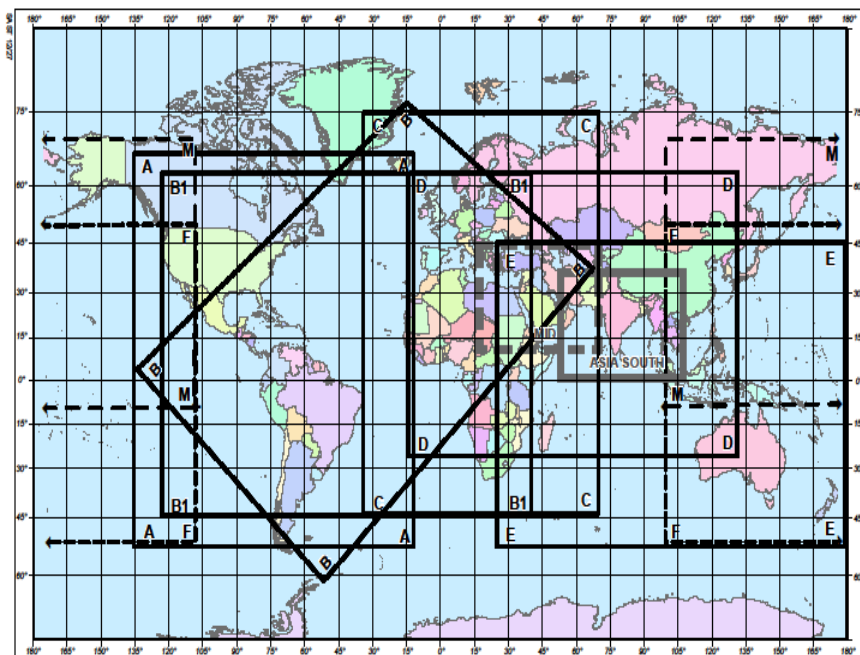


CHART	LATITUDE	LONGITUDE	CHART	LATITUDE	LONGITUDE
A	N6700	W13724	D	N6300	W01500
A	N6700	W01236	D	N6300	E13200
A	S5400	W01236	D	S2700	E13200
A	S5400	W13724	D	S2700	W01500
ASIA	N3600	E05300	E	N4455	E02446
ASIA	N3600	E10800	E	N4455	E18000
ASIA	0000	E10800	E	S5355	E18000
ASIA	0000	E05300	E	S5355	E02446
B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

Polar stereographic projection (northern hemisphere) Fixed areas of coverage of WAFS forecasts in chart form

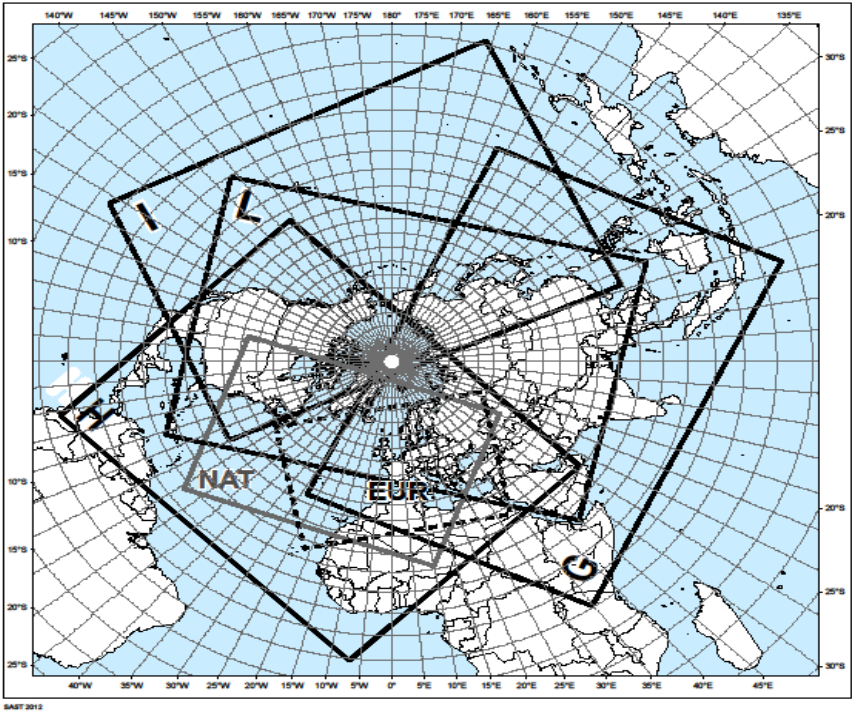


CHART	LATITUDE	LONGITUDE	CHART	LATITUDE	LONGITUDE
EUR	N4633	W05634	I	N1912	E11130
EUR	N5842	E06824	I	N3330	W06012
EUR	N2621	E03325	I	N0126	W12327
EUR	N2123	W02136	I	S0647	E16601
G	N3552	W02822	L	N1205	E11449
G	N1341	E15711	L	N1518	E04500
G	S0916	E10651	L	N2020	W06900
G	S0048	E03447	L	N1413	W14338
H	N3127	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)

Polar stereographic projection (southern hemisphere) -Fixed areas of coverage of WAFS forecasts in chart form

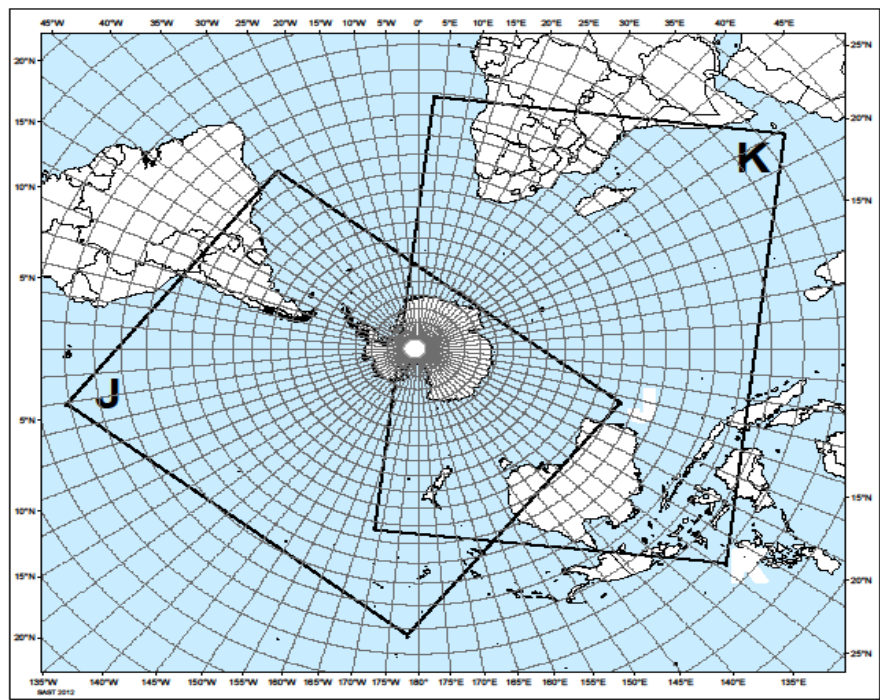


CHART	LATITUDE	LONGITUDE
J	S0318	W17812
J	N0037	W10032
J	S2000	W03400
J	S2806	E10717
K	N1255	E05549
K	N0642	E12905
K	S2744	W16841
K	S1105	E00317

Figure A8-3. Fixed areas of coverage of WAFS forecasts in chart form — Polar stereographic projection (southern hemisphere)

SCHEDULE 9

regulations 52, 57, 58 and 59

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

PART I - INFORMATION TO BE PROVIDED FOR AIR TRAFFIC SERVICES UNITS

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 and AIRMET information, wind shear warnings and alerts and aerodrome warnings;
- (c) any additional meteorological information agreed upon locally, such as forecasts of surface wind for the determination of possible runway changes;
- (d) information received on volcanic ash cloud, for which a SIGMET has not already been issued, as agreed between the meteorological and ATS authorities concerned; and
- (e) information received on pre-eruption volcanic activity and/or a volcanic eruption as agreed between the Meteorological and ATS authorities concerned.

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 and AIRMET information, wind shear warnings and alerts and appropriate special air-reports for the airspace with which the approach control unit is concerned and aerodrome warnings;
- (c) any additional meteorological information agreed upon locally;
- (d) information received on volcanic ash cloud, for which a SIGMET has not already been issued, as agreed between the meteorological and ATS authorities concerned; and
- (e) information received on pre-eruption volcanic activity and/or a volcanic eruption as agreed between the meteorological and ATS authorities concerned.

3. List of information for the area control centre and flight information centre

The following meteorological information shall be supplied, as necessary, to an area control centre or a flight information centre by its associated meteorological watch office—

- (a) METAR and SPECI, including current pressure data for aerodromes and other locations, TAF and trend forecasts and amendments thereto, covering the flight information region (FIR) or the control area (CTA) and, if required by the 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 and AIRMET 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 meteorological watch office (MWO), that office shall request the assistance of another meteorological office in supplying it;

- (d) information received on volcanic ash cloud, for which a SIGMET has not already been issued, as agreed between the meteorological and ATS authorities concerned;
- (e) information received concerning the release of radioactive material into the atmosphere, as agreed between the meteorological and ATS authorities concerned;
- (f) tropical cyclone advisory information issued by a tropical cyclone advisory centre in its area of responsibility;
- (g) volcanic ash advisory information issued by a volcanic ash advisory centre in its area of responsibility; and
- (h) information received on pre-eruption volcanic activity and/or a volcanic eruption as agreed between the meteorological and ATS authorities concerned.

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.

5. Format of information

- (1) Local routine reports, local special reports, METAR, SPECI, TAF, trend forecasts and 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.
- (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.

PART II—INFORMATION TO BE PROVIDED FOR SEARCH AND RESCUE SERVICES UNITS

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—

- (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. Information to be provided on request

(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) 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.

(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.

PART III—INFORMATION TO BE PROVIDED FOR AERONAUTICAL INFORMATION SERVICES UNITS

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;
- (b) information necessary for the preparation of NOTAM or ASHTAM including, in particular, information on—
 - (i) 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 Civil Aviation (Aeronautical Information)Regulations, 2020;
 - (ii) the occurrence of volcanic activity; and
 - (iii) release of radioactive materials into the atmosphere, as agreed between the meteorological and appropriate civil aviation authorities concerned; and
- (c) information necessary for the preparation of aeronautical information circulars including, in particular, information on:
 - (i) expected important changes in aeronautical meteorological procedures, services and facilities provided; and
 - (ii) effect of certain weather phenomena on aircraft operations.

SCHEDULE 10

regulation 60(1)

TECHNICAL SPECIFICATIONS RELATED TO REQUIREMENTS FOR AND USE OF COMMUNICATIONS

PART I—SPECIFIC REQUIREMENTS FOR COMMUNICATIONS

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 AFI regional air navigation agreement.

2. Grid point data for ATS and operators

(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.

(2) When upper-air data for grid points in digital form are made available to operators for flight planning by computer, the transmission arrangements should be as agreed between the world area forecast centre concerned, the meteorological authority and the operators concerned.

3. Meteorological bulletins in alphanumeric format

(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) 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.

(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;
- (d) if required, a three-letter indicator; and
- (e) Detailed specifications on format and contents of the heading are given in the Manual on the Global Telecommunication System (WMO-No. 386) and are reproduced in the Manual of Aeronautical Meteorological Practice (Doc 8896).

(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.

4. World area forecast system (WAFS) products

(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) 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.

(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.

(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 3 (2) of this schedule.

PART II—USE OF AERONAUTICAL MOBILE SERVICE COMMUNICATIONS

1. Content and format of meteorological messages

(1) The content and format of reports, forecasts and SIGMET information transmitted to aircraft shall be consistent with the provisions of Regulation 58.

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

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.

PART III—USE OF AERONAUTICAL DATA LINK SERVICE — D-VOLMET

1. Detailed content of meteorological information available for D-VOLMET

(1) The aerodromes for which METAR, SPECI and TAF are to be available for uplink to aircraft in flight shall be determined by regional air navigation agreement.

(2) The flight information regions (FIRs) for which SIGMET messages are to be available for uplink to aircraft in flight shall be determined by AFI regional air navigation agreement.

2. Criteria related to information to be available for D-VOLMET

(1) The latest available METAR, SPECI and TAF, and valid SIGMET should be used for uplink to aircraft in flight.

(2) TAF included in the D-VOLMET should be amended as necessary to ensure that a forecast, when made available for uplink to aircraft in flight, reflects the latest opinion of the aerodrome meteorological office concerned.

(3) If no SIGMET message is valid for an FIR, an indication of “NIL SIGMET” should be included in the D-VOLMET.

3. Format of information to be available for D-VOLMET

The content and format of reports, forecasts and SIGMET and AIRMET information included in D-VOLMET shall be consistent with the provisions of SIGMET and AIRMET preparations.

PART IV - USE OF AERONAUTICAL BROADCASTING SERVICE - VOLMET BROADCASTS

1. Detailed content of meteorological information to be included in VOLMET broadcasts

(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.

(2) The FIRs 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.

2. Criteria related to information to be included in VOLMET broadcasts

(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.

(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.

(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.

3. Format of information to be included in VOLMET broadcasts

(1) The content and format of reports, forecasts and SIGMET information included in VOLMET broadcasts shall be consistent with the provisions of Chapters 4, 6 and 7 of this Annex.

(2) VOLMET broadcasts should use standard radiotelephony phraseologies.

(3) 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.

SCHEDULE 11

regulation 16(2)

OPERATIONALLY DESIRABLE ACCURACY OF MEASUREMENT OR OBSERVATION

Note. — The guidance contained in this table relates to Part III — Supply, use, quality management and interpretation of meteorological information, and Part V - observation and reporting Meteorological elements.

Element to be observed

*Operationally desirable accuracy of measurement or observation**

Mean surface wind Direction:	$\pm 10^{\circ}$
Mean surface wind Speed:	± 0.5 m/s (1 kt) up to 5 m/s (10 kt) and $\pm 10\%$ 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; and $\pm 10\%$ between 600 m and 1500 m and \pm 20% above 1 500 m
Runway visual range	± 10 m up to 400 m; ± 25 m between 400 m and 800 m; and \pm 10% above 800 m
Cloud amount	± 1 okta
Cloud height	± 10 m (33 ft) up to 100 m (330 ft); and $\pm 10\%$ above 100 m (330 ft)

Air temperature and dew-point temperature $\pm 1^{\circ}\text{C}$

Pressure value (QNH, QFE) $\pm 0.5 \text{ hPa}$

* 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).

SCHEDULE 12

regulation 40(1)

OPERATIONALLY DESIRABLE ACCURACY OF FORECASTS

Note 1. — The guidance contained in this table relates to Part III - Supply, use, quality management and interpretation of meteorological information, and Part VII - 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.

<i>Element to be forecast</i>	<i>Operationally desirable accuracy of forecasts</i>	<i>Minimum percentage of cases within range</i>
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 (1500 ft) Occurrence or non-occurrence of BKN or CVC 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	90% of cases
	± 30% between 800 m and 10 km	
Precipitation	Occurrence or non-occurrence	90% of cases

*Element to be forecast**Operationally desirable
accuracy of forecasts**Mission percentage of
cases within range*

Cloud amount	One category below 450 m (1 500 ft)	90% of cases
Occurrence or non-occurrence of BEN or OVC between 450 m (1 500 ft) and 3 000 m (10 000 ft)		

Cloud height	± 30 m (100 ft) up to 300 m (1 000 ft)	90% of cases
± 30% between 300 m (1 000 ft) and 3 000 m (10 000 ft)		

FORECAST FOR TAKE-OFF

Wind direction	± 20°	90% of cases
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Wind speed	± 2.5 m/s (5 kt) up to 12.5 m/s (25 kt)	90% of cases
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Air temperature	± 1°C	90% of cases
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Pressure value (QNH)	± 1 hPa	90% of cases
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AREA, FLIGHT AND ROUTE FORECASTS

Upper-air temperature	± 2°C (Mean for 900 km (500 NM))	90% of cases
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Relative humidity	± 20%	90% of cases
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Upper wind	± 5 m/s (10 kt)	90% of cases
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(Modulus of vector difference for 900 km (500 NM))

Significant en-route	Occurrence or non-occurrence	80% of cases
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weather phenomena and cloud	Location: ± 100 km (60 NM)	70% of cases
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Vertical extent: ± 300 m (1 000 ft)	70% of cases
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Flight level of tropopause: ± 300 m (1 000 ft)	80% of cases
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Max wind level: ± 300 m (1 000 ft)	80% of cases
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(This guidance is illustrative and not intended to be a substitute for the law.)

SELECTED OUTSTANDING APPLICATIONS TO AMENDMENTS

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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 $\geq 30^\circ$ 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 $R\ 5(AB) = 5$ -minute mean runway visual range value during period AB and $R\ 5(BC) = 5$ -minute mean runway visual range value during period BC.
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”.

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.

SCHEDULE 14

regulation 23(6)

CONVERSION OF INSTRUMENTED READINGS INTO RUNWAY VISUAL RANGE AND VISIBILITY

1. The conversion of instrumented readings into runway visual range and visibility is based on Koschmieder's Law or Allard's Law, depending on whether the pilot can be expected to obtain main visual guidance from the runway and its markings or from the runway lights. In the interest of standardization in runway visual range assessments, this Attachment provides guidance on the use and application of the main conversion factors to be used in these computations.
2. In Koschmieder's Law one of the factors to be taken into account is the pilot contrast threshold. The agreed constant to be used for this is 0.05 (dimensionless).
3. In Allard's Law the corresponding factor is the illumination threshold. This is not a constant, but a continuous function dependent on the background luminance. The agreed relationship to be used in instrumented systems with continuous adjustment of the illumination threshold by a background luminance sensor is shown by the curve in Figure D-1. The use of a continuous function which approximates the step function such as displayed in Figure D-1 is preferred, due to its higher accuracy, to the stepped relationship described in paragraph 4.
4. In instrumented systems without continuous adjustment of the illumination threshold, the use of four equally spaced illumination threshold values with agreed corresponding background luminance ranges is convenient but will reduce accuracy. The four values are shown in Figure D-1 in the form of a step function; they are tabulated in Table D-1 for greater clarity.

Note 1.— Information and guidance material on the runway lights to be used for assessment of runway visual range are contained in the Manual of Runway Visual Range Observing and Reporting Practices (Doc 9328).

Note 2.— In accordance with the definition of visibility for aeronautical purposes, the intensity of lights to be used for the assessment of visibility is in the vicinity of 1 000 cd.

Table D-1. Illumination threshold steps

Condition	Illumination threshold (lx)	Background luminance (cd/m ²)
Night	8×10^{-7}	≤ 50
Intermediate	10^{-5}	51 – 999
Normal day	10^{-4}	1 000 – 12 000
Bright day (sunlit sky)	10^{-3}	$> 12\,000$

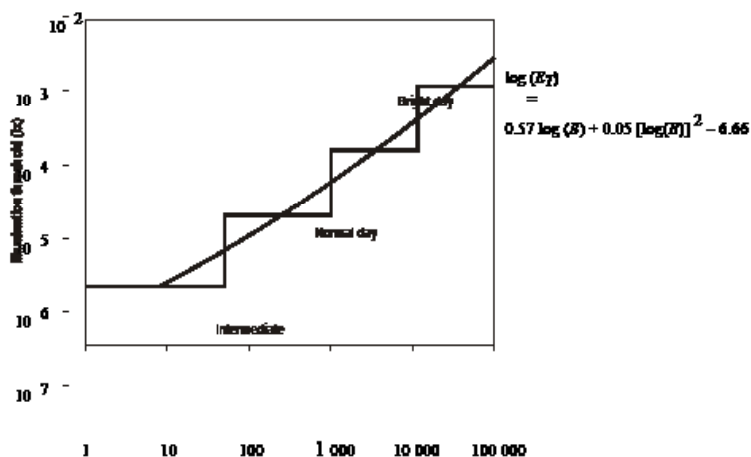


Figure D-1. Relationship between the illumination threshold E_T (lx) and background luminance (cd/m²)

GEN. EDWARD KATUMBA-WAMALA (MP)
Minister of Works and Transport

