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MINISTRY OF EARTH SCIENCES

INDIA METEOROLOGICAL DEPARTMENT

Manual on Meteorological Services for Aviation in India

4th Edition (2012)

Central Aviation Meteorological Division

India Meteorological Department

New Delhi- 110003

FOREWORD

India Meteorological Department is providing meteorological services for national and international air navigation through civil airports in India. These meteorological services are being provided as per the recommended and standard practices given by ICAO Annex-3, Meteorological service for International Air Navigation. The need for a consolidated manual on instructions for ready use by aviation meteorological offices was felt and hence the first edition of Manual on Meteorological Services for Aviation in India was brought out in 1977. Consequential to the changes in Annex-3, the second and third editions of the manual were published in 1998 and 2006 respectively. Since then many changes have been effected in various procedures pertaining to aviation meteorology. ICAO itself has adopted some amendments since the publication of the third edition of the manual.

Changes in the procedures, including Amendment 75 to the ICAO Annex-3 are incorporated in this edition. The contents are arranged in the same order as given in ICAO Annex-3.

Present edition, (fourth edition) contains all the instructions that are currently being used by Aviation Meteorological Offices. A number of Appendices, like, Format of Registers, Format of Hand Book pages, Templates for METAR/SPECI, and TAF, forecast verification procedure etc have been added for ready reference. This edition replaces all the previous editions.

Smt. Neetha K. Gopal, Meteorologist Grade- I, has the key role in updating the manual. The contribution of Smt. Shilpa Apte, S.A. and Smt. Vaishali K. Sripad, A.M-II, is also acknowledged.

(M.K. Bhatnagar)
Sc. F & Dy. Director General of Meteorology
(Aviation Services)
Central Aviation Meteorological Division , New Delhi March 2012

MANUAL ON METEOROLOGICAL SERVICES FOR

AVIATION IN INDIA

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CHAPTER 1

DEFINITIONS

Definitions:

When the following terms are used in the practices for Meteorological Service for national and international Air Navigation, they have the following meanings:

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

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

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

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

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

Aerodrome meteorological office. An office, located at an aerodrome, designated to provide meteorological service for air navigation.

Aerodrome reference point. The designated geographical location of an aerodrome

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

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

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

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

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

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

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

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

flight information region concerned or sub-area thereof. (Not issued in India at present)

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

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

Alternate aerodrome. An aerodrome to which an aircraft may proceed when it becomes either impossible or inadvisable to proceed to or to land at the aerodrome of intended landing. Alternate aerodromes include the following:

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

En-route alternate. An aerodrome at which an aircraft would be able to land after experiencing an abnormal or emergency condition while en route.

Destination alternate. An alternate aerodrome to which an aircraft may proceed shall it become impossible or inadvisable to land at the aerodrome of intended landing.

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

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

Approach and landing operations using instrument approach procedures. Instrument approach and landing operations are classified as follows:

Non-precision approach and landing operations. An instrument approach and landing, which utilises lateral guidance but does not utilise vertical guidance.

Approach and landing operations with vertical guidance. An instrument approach and landing which utilises lateral and vertical guidance but does not need the requirements established for precision approach and landing operations.

Precision approach and landing operations. An instrument approach and landing using precision lateral and vertical guidance with minima as determined by the category of operation.

Note: Lateral and vertical guidance refers to the guidance provided either by;

a) a ground-based navigation aid; or

b) computer generated navigation data.

Categories of precision approach and landing operations;

Category I (CAT I) operation. A precision instrument approach and landing with a decision height not lower than 60 m (200 ft) and with either a visibility not less than 800 m or a runway visual range not less than 550 m.

Category II (CAT II) operation. A precision instrument approach and landing with a decision height lower than 60 m (200 ft), but not lower than 30 m (100 ft), and a runway visual range not less than 300 m.

Category III A (CAT III A) operation. A precision instrument approach and landing with:

a) a decision height lower than 30 m (100 ft) or no decision height; and

b) a runway visual range not less than 175 m.

Category III B (CAT III B) operation. A precision instrument approach and landing with:

a) a decision height lower than 15 m (50 ft) or no decision height; and

b) a runway visual range less than 175 m but not less than 50 m.

Category III C (CAT III C) operation. A precision instrument approach and landing with no decision height and no runway visual range limitations.

Note: Where decision height (DH) and runway visual range (RVR) fall into different categories of operation, the instrument approach and landing operation would be conducted in accordance with the requirements of the most demanding category (e.g. an operation with a DH in the range of CAT III A but with an RVR in the range of CAT III B would be considered a CAT III B operation or an operation with a DH in the range of CAT II but with an RVR in the range of CAT I would be considered a CAT II operation).

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

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

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

ASHTAM. A special series of NOTAM notifying by means of a specific format, change in activity of a volcano, a volcanic eruption and/or volcanic ash cloud that is of significance to aircraft operations.

Automatic dependent surveillance (ADS). 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.

Aviation meteorological office. A general term used for the meteorological offices designated to provide meteorological service for air navigation.

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

Cloud of operational significance. 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.

CAMD. Central Aviation Meteorological Division

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

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

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

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

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

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

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

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

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

Flight level. A surface of constant atmospheric pressure, which is related to a specific pressure datum 1013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals.

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

a) when set to a QNH altimeter setting, will indicate altitude;
b) when set to a QFE altimeter setting, will indicate height above the QFE reference datum; and

c) when set to a pressure of 1013.2 hPa, may be used to indicate flight levels

Note 2 – The terms “height” and “altitude”, used in Note 1, indicate altimetric rather than geometric heights and altitudes.

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

GAMET area forecast. An area forecast in abbreviated plain language for low-level flights for a flight information region or sub-area thereof, prepared by the meteorological office designated by the meteorological authority concerned and exchanged with meteorological offices in adjacent flight information regions, as agreed between the meteorological authorities concerned. (Not issued in India at present).

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

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

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

Heliport. An aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters.

Human Factors principles. Principles which apply to aeronautical design, certification, training, operations and maintenance and which seek safe interface

between the human and other system components by proper consideration to human performance.

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

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

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

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

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

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

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

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

Minimum sector altitude. The lowest altitude which may be used which will provide a minimum clearance of 300 m (1000 ft) above all objects located in the area contained within a sector of a circle of 46 km (25 NM) radius centred on a radio aid to navigation.

NOTAM. A notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations.

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

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

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

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

Operator. A person, organisation or enterprise engaged in or offering to engage in an aircraft operation.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SIGMET information. Information issued by a meteorological watch office concerning the occurrence or expected occurrence of specified en-route weather phenomena, which may affect the safety of aircraft operations.

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

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

Displaced Threshold: A threshold not located at the extremity of a runway.

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

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

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

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

Visibility. Visibility for aeronautical purposes is the greater of:

a) the greatest distance at which a black object of suitable dimensions, situated near the ground, can be seen and recognised when observed against a bright background;
b) the greatest distance at which lights in the vicinity of 1000 candelas can be seen and identified against an unlit background.

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

Volcanic ash advisory centre (VAAC). A meteorological centre designated by regional air navigation agreement to provide advisory information to meteorological watch offices, area control centres, flight information centres, world area forecast centres and international OPMET data banks regarding the lateral and vertical extent and forecast movement of volcanic ash in the atmosphere following volcanic eruptions.

VOLMET. Meteorological information for aircraft in flight.

Data link – VOLMET (D-VOLMET). Provision of current aerodrome routine meteorological reports (METAR) and aerodrome special

meteorological reports (SPECI), aerodrome forecasts (TAF), SIGMET, special air-reports not covered by a SIGMET and, where available, AIRMET via data link.

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

World area forecast centre (WAFC). A meteorological centre designated to prepare and issue significant weather forecasts and upper-air forecasts in digital form on a global basis direct to States by appropriate means as part of the aeronautical fixed service.

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

Terms used with a limited meaning

The following terms are used with a limited meaning as indicated below:

a) to avoid confusion in respect of the term “service” between the meteorological service considered as an administrative entity and the service which is provided, “meteorological authority” is used for the former and “service” for the latter;
b) “provide” is used solely in connection with the provision of service;
c) “issue” is used solely in connection with the cases where the obligation specifically extends to sending out the information to a user;
d) “make available” is used solely in connection with cases where the obligation ends with making the information accessible to a user; and
e) “supply” is used solely in connection with cases where either c) or d) applies.

CHAPTER 2
GENERAL PROVISIONS

2.1 Objective, determination and provision of meteorological services

2.1.1 The objective of meteorological services for air navigation is to contribute towards the safety, economy, regularity and efficiency of air navigation.

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

2.1.3 The India Meteorological Department provides the necessary meteorological service for air navigation, both national and international, operating through civil aerodromes in India. The service is provided through Aerodrome Meteorological Offices (AMO) and Aeronautical Meteorological Stations (AMS) functioning at various airports. The meteorological service provided by the India Meteorological Department is based on the procedures laid down in the relevant International Civil Aviation Organisation's regulatory documents.

2.1.4 The India Meteorological Department complies with the requirement of the WMO in respect of qualification and training of meteorological personnel providing service for international air navigation. The meteorological personnel are trained at National Meteorological Training Institute,Pune, which is also a WMO Regional Training Centre (RTC).

2.1.5 The meteorological information supplied to the users listed in 2.1.2 shall be consistent with human factors and shall be in the forms, which requires a minimum interpretation by these users, as specified in the following chapters.

2.1.6 The meteorological branches of the Indian Air Force and Indian Navy also provide meteorological services for national as well as international air services operating through airfields controlled by them.

2.2 Supply, use and quality management of meteorological information

2.2.1 All AMOs/ AMSs shall maintain close liaison with operators and ATS personnel on matters, which affect the provision of meteorological service for national and international air navigation.

2.3 Notifications required from Operators

2.3.1 An operator requiring meteorological service or changes in existing meteorological service shall have to notify, sufficiently in advance, the meteorological office(s) concerned.

2.3.2 The meteorological authority shall be notified by the operator requiring service when:

a) new routes or new types of operation are planned;

b) changes of a lasting character are to be made in scheduled operations; and

c) other changes, affecting the provision of meteorological service, are planned.

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

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

a) of flight schedules;

b) when non-scheduled flights are to be operated; and

c) when flights are delayed, advanced or cancelled.

2.3.4 The notification to the aerodrome meteorological office 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 aerodrome(s);

d) alternate aerodromes needed to complete the operational flight plan;

e) cruising level;

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

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

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

2.3.5 The minimum required notice period is as follows:

(a) For national flights

At Aerodrome Meteorological Offices

At least 3 hours in advance of the time of departure of the flight.

At Aeronautical Meteorological Stations

At least 12 hours in advance of the time of departure of the flight.

(b) For international flights

i) At all Aerodrome Meteorological Offices	At least 3 hours in advance of the time of departure of the flight.
iii) At Aeronautical meteorological	At least 12 hours in advance of

Stations	the time of departure of the flight.

The above notice is required only in respect of non-scheduled flights. In the case of scheduled flights, the operators shall send the relevant schedules to the aviation meteorological offices sufficiently in advance for enabling the information to be supplied to all concerned offices and for making necessary arrangements.

2.4 Up-keep and maintenance of Aviation Meteorological offices.

2.4.1 The up-keep and maintenance of the briefing room and aviation meteorological office is very important and crucial. The briefing room shall always have a tidy look about it. The pilots regularly visit the meteorological office and a systematic display of all charts, satellite pictures, Radar pictures and other informative materials, is vital for their understanding of the weather. The latest charts and weather information have to be prominently displayed in the briefing room so that they are easily accessible to the persons visiting the briefing room.

2.4.2 Maintenance of registers

In order to streamline the routine activities of an aviation meteorological office, it is necessary to have certain registers maintained regularly. The list of registers to be maintained by MWOs, AMOs and AMSs are given in **Appendix A.** The format of various registers is given in **Appendix B.**

Carbon copies of METAR/ SPECI, where ever in use shall be destroyed after three months, if it is not required in connection with accident investigation and enquiries.

2.4.3 Updation of Handbook pages

The hand book pages which give the basic information about an aviation meteorological office are to be kept up to date. The hand book pages are to be prepared in the format given in the **Appendix C** and shall be maintained by CAMD**.** Any change in the information contained in the Hand book shall be communicated to CAMD without delay, so that the contents remain current.

2.4.4 Updation of AIP India:

The aviation meteorological offices shall also send the changes in services for amending the AIP India on a quarterly basis to CAMD.

2.4.5 Scrutiny of Aviation Forecasts:

The forecasts issued by AMOs shall be scrutinised by the AMOs-in-Charge on a routine basis in order to find out the procedural lapses. A random check of TAF, Local/Area forecast, TREND forecast, route forecast and Aerodrome warning of five consecutive days of a month shall be carried out by the AMOs-in-Charge. A register for noting the discrepancies and the remedial actions taken shall be maintained. A monthly statement of the same shall be submitted to DDGM (RMC) who will forward it to CAMD with his comments.

2.4.7 Routine reports:

The following routine reports shall be forwarded to CAMD:

S.No 1	Description of reports/returns 2	Originating office 3	Periodicity of report 5	Date on which statement to reach CAMD 6
	Statement verification of Aviation forecast	All A. M. Os	Monthly	By 10th of following month
	Statement of verification of Aerodrome Warning	All A. M. Os	Monthly	By10 th of following month
	Statement of verification of Trend Forecast	All A. M. Os	Monthly	By10 th of following month
	Statistics of Aviation Forecast	All A. M. Os	Monthly	By10 th of following month
	Delay in reception of Aviation Met. Messages	All A. M. Os	Quarterly	By10 th of following month
	Implementation of aviation circulars	All AMOs/ AMSs	Monthly	By10 th of following month
	Amendment to AIP India	All RMCs	Quarterly	After 15 days of quarter ending
	Half yearly TAF statement	All AMOs	Half Yearly	After 15 days of half Year ending

	Installations and working status of AMI	All AMOs and AMSs	Monthly	By 5th of following month
	List of in-charges of aviation met. Offices	All RMC's	Half Yearly	By 10 th of Jan and July Every year
	Changes in Handbook pages	All AMOs and AMSs	As and when required	----
	Random scrutiny of Forecasts	DDGM (RMC)	Monthly	15th of the following month
	List of officers for undertaking Familiarisation flight	RMC	Annual	By end of January every year

CHAPTER 3
WORLD AREA FORECAST SYSTEM AND METEOROLOGICAL OFFICES

3.1 World Area Forecast System (WAFS)

3.1.1 The objective of the World Area Forecast System is to supply meteorological authorities and other users with global aeronautical meteorological en-route forecasts in digital form. This objective is achieved through a comprehensive, integrated, worldwide and, as far as practicable, uniform system, and in a cost effective manner, taking full advantage of evolving technologies.

3.2 World Area Forecast Centers (WAFC)

3.2.1 Responsibilities of WAFC

a) to prepare gridded global forecasts of:
   1) upper wind;
   2) upper air temperature and humidity;
   3) geopotential altitude of flight levels;
   4) flight level and temperature of tropopause;
   5) direction, speed and flight level of maximum wind;
   6) cumulonimbus clouds;
   7) icing; and
   8) turbulence;

b) to prepare global forecasts of significant weather (SIGWX) phenomena;

c) to issue the forecasts referred to in a) and b) in digital form to meteorological authorities and other users.

d) to receive information concerning the accidental release of radioactive materials into the atmosphere from its associated WMO Regional

Specialised Meteorological Center (RSMC) for the provision of transport model products for radiological environmental emergency response, in order to include the information in significant weather forecasts; and

e) to establish and maintain contact with VAACs for the exchange of information on volcanic activity in order to coordinate the inclusion of information on volcanic eruptions in significant weather forecasts.

3.2.2 The forecasts of upper wind; 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 will be prepared four times a day by the WAFC and will 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 will be completed as soon as technically feasible, but not later than 6 hours after standard time of observation.

3.2.3 The grid point forecasts prepared by a WAFC comprise:

a) wind and temperature data for flight levels 50 (850 hPa), 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 240 (400 hPa), 270 (350hPa), 300 (300 hPa), 320 (275 hPa), 340 (250 hPa), 360 (225hPa), 390 (200 hPa), 450 (150 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), 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 centered at flight levels 60 (800hPa), 100 (700hPa), 140 (600 hPa), 180 (500 hPa), 240 (400 hPa) and 300 (300 hPa);

g) clear-air turbulence for layers centered 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 centered at flight levels 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 240 (400 hPa) and 300 (300 hPa); and

Note 1: Layers centered at a flight level referred to in (f) and (h) have a depth of 100 hPa.

Note 2: Layers centered at a flight level referred to in (g0 have a depth of 50 hPa.

Note3: The product from e to h are issued on a trial basis and is available through FTP service.

e) geopotential altitude data for flight levels 50 (850 hPa), 100 (700 hPa), 140 (600 hPa), 180 (500 hPa), 240 (400 hPa), 300 (300 hPa), 320 (275 hPa), 340 (250 hPa), 360 (225 hPa), 390 (200 hPa), 450 (150 hPa) and 530 (100 hPa).

3.2.4 The above grid point forecasts are being issued by a WAFC in binary code form using the GRIB code form prescribed by WMO. The grid point forecast are prepared in a regular grid with a horizontal resolution of 1.25° of latitude and longitude.

3.3 Significant weather (SIGWX) forecasts

3.3.1 General provisions

3.3.1.1 Forecasts of significant en-route weather phenomena are being prepared as SIGWX forecasts four times a day by WAFC. They are 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 is completed as soon as technically feasible, but not later than 9 hours after standard time of observation.

3.3.1.2 SIGWX forecasts are issued in binary code form using the BUFR code form prescribed by WMO.

3.3.2 Types of SIGWX forecasts

SIGWX forecasts are being issued as;

a) high- level forecasts for flight levels between 250 and 630; and

b) medium-level forecasts for flight levels between 100 and 250.

3.3.3 Items included in WAFC SIGWX forecasts

High-level and medium level forecasts of WAFC 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 34 knots;

b) severe squall lines;

c) moderate or severe turbulence (in cloud or clear air);

d) moderate or severe icing;

e) widespread sand storm / duststorm;

f) cumulonimbus cloud associated with thunderstorm and with a) to e);

Note.- Non-convective cloud areas associated with in-cloud moderate or severe turbulence and/or moderate or severe icing are to be included in SIGWX forecasts

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, at the side of the chart, the volcano eruption symbol, the name of the volcano, latitude/longitude, the date and time of first eruption, if known, and a reference to SIGMET and NOTAM or ASHTAM issued for the area concerned; and

j) information on the location of an accidental release of radioactive materials into the atmosphere, of significance to aircraft operations, comprising: the radio activity symbol at the site of the accident and, at the side of the chart, the radio activity symbol, latitude/ longitude of the site of the accident, date and time of the accident and a reminder to users to check NOTAM for the area concerned.

3.3.4 Criteria for including items in WAFC SIGWX forecasts

The following criteria are applied for SIGWX forecasts:

a) items a) to f) in 3.3.3 are included when expected to occur between the lower and upper level of the SIGWX forecast;

b) the abbreviation “CB” is included only when it refers to the occurrence or expected occurrence of cumulonimbus clouds:

1) affecting an area with a maximum spatial coverage of 50 per cent or more of the area concerned;

2) along a line with little or no space between individual clouds; or

3) embedded in cloud layers or concealed by haze.

c) 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;

d) where a volcanic eruption or an accidental release of radio active materials into the atmosphere warrants the inclusion of the volcanic activity symbol or the radioactivity 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

e) in the case of co-incident or the partial overlapping of items a) [tropical cyclones], i) [volcanic eruptions] and j) [accidental release of radioactive materials] in 3.3.3, the highest priority shall be given to item i), followed by item j) and a). The item with the highest priority is 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.

3.3.5 Notification of WAFC concerning significant discrepancies

Meteorological offices using WAFS BUFR data shall notify CAMD New Delhi and they in turn will notify the WAFC concerned immediately if significant discrepancies are detected or reported in respect of WAFS SIGWX forecasts concerning:

a) icing, turbulence, cumulonimbus clouds that are obscured, frequent, embedded or occurring at a squall line, and sandstorm/ duststorms; and

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

The WAFC receiving the message shall acknowledge its receipt to the originator, together with a brief comment on the report and any action taken, using the same means of communication employed by the originator. Guidance on reporting significant discrepancies is provided in **Appendix D.**

3.3.6 Use of WAFS products

Aerodrome meteorological offices shall use forecasts issued by the world area forecast centers in the preparation of flight documentation of international flights, whenever these forecasts cover the intended flight path in respect of time, altitude and geographical extent. In order to ensure uniformity and standardisation of flight documentation, the WAFS GRIB and BUFR data received shall be decoded into standard WAFS charts in accordance with provisions of Annex-3, and the meteorological content and identification of the originator of the WAFS forecasts shall not be amended.

3.4 Meteorological Offices

3.4.1 For the provision of meteorological service for air navigation, the India Meteorological Department has set up an aviation organisation consisting of **4** Meteorological Watch offices, **18** Aerodrome Meteorological Offices (inclusive of the 4 MWOs), and **54** Aeronautical Meteorological Stations. Tropical Cyclone Advisory Centre (TCAC) of ICAO is also functioning at IMD New Delhi.

3.4.2 The following are the responsibilities of Aerodrome Meteorological Offices;

(a) Preparation and/or obtaining forecasts, such as, output products of the world area forecast system, and other relevant information for flights operating from their aerodromes.

(b) Preparation and/or obtaining forecasts of local meteorological conditions.

(c) Keeping a continuous watch over the meteorological conditions over their local aerodrome as well as over other aerodromes served by their associated Aeronautical Meteorological Stations.

(d) Provision of briefing, consultation and flight documentation to flight crewmembers and/or other flight operations personnel.

(e) Supply of other meteorological information to aeronautical users.

(f) Display of available meteorological information.

(g) Exchange of meteorological information with other meteorological offices.

(h) Issue of landing and take-off forecasts.

(i) Supply of flight planning information.

(j) Supply of aerodrome forecasts of relevant aerodromes.

(k) Supply of forecasts to their associated Aeronautical Meteorological Stations for flights operating from their aerodromes.

(l) To issue aerodrome warnings for local aerodrome as well as for their associated Aeronautical Meteorological Stations.

(m) Supply information received on pre-eruptive volcanic activity, volcanic eruption or volcanic ash cloud to its associated air traffic services unit, aeronautical information service unit and other MWOs and AMOs.

3.4.3 The other meteorological information supplied under (e) above shall include, some or all of the following:

(a) Hourly/ half hourly current weather observations and special reports.

(b) RVR observations.

(c) Landing/ take-off reports on request for the required elements.

(d) Meteorological information for VOLMET broadcasts, ATIS broadcasts, VOR broadcasts, etc.
(e) Pressure data.
(f) Radar and Satellite Observations.
(g) SIGMETs of FIR of which the Aerodrome Meteorological Office is a part and SIGMETs of other FIRs.
(h) AIREPs available.
(i) METARs /SPECIs of other stations as appropriate.
(j) Low level wind shear and temperature inversions.

3.4.4 The Aeronautical Meteorological Stations are responsible for:

a) supply to aeronautical users, of current weather observations of their own stations and those of other stations as required, by obtaining them from the stations concerned.
b) providing documentation for flights originating from their stations after obtaining the forecasts from their associated Aerodrome Meteorological Office(s).
c) supply of TAF and aerodrome warnings to aeronautical users of their aerodrome after being received from their associated Aerodrome Meteorological Office.
d) supply of information received on pre-eruptive volcanic activity, volcanic eruption or volcanic ash cloud to aeronautical users.
e) Supply of SIGMET as and when received.

3.4.5 The following are the responsibilities of the Meteorological Watch Offices:

a) Maintain continuous watch of meteorological conditions affecting flight operations within its Flight Information Region (FIR).
b) Prepare SIGMET and other information relating to its FIR.

c) Exchange SIGMET information with other MWOs in the neighboring countries namely Bahrain, Iran, Israel, Jordan, Kuwait, Oman, Pakistan, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates, Yemen, Australia, Bangladesh, Bhutan, Combodia, China (Beijing), Guam (US), Indonesia, Peoples Democratic Republic of Lao, Malaysia, Maldives, Myanmar, Nepal, Phillipines, Russian Federation, Singapore, Sri Lanka, Thailand, Uzbekistan, Vietnam.

d) Supply SIGMET information and other meteorological information to associated air traffic services units, including SIGMET messages of other MWOs.

e) Disseminate their SIGMET information to other forecasting offices in India.

f) Supply information received on pre-eruptive volcanic activity, a volcanic eruption and volcanic ash cloud for which a SIGMET has not already been issued to its associated Flight Information Centres (FIC)/ Area Control Centers (ACC) and to its associated VAAC.

3.4.6 Boundaries of FIR and areas of responsibilities of MWOs in India coincide. FIR Map and aviation meteorological network is shown in **Appendix E.**

3.5 Tropical Cyclone Advisory Centre (TCAC)

3.5.1 The responsibility of TCAC is to:

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

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

1) meteorological watch offices in its area of responsibility (Mumbai, Kolkata, New Delhi, Colombo, Dhaka, Delhi,

Jakarta, Karachi, Kuala Lumpur, Chennai, Male, Tehran, Yangon, Abu Dhabi, Jeddah, Kuwait, Muscat, Sana'a, Bahrain, Emirates); and

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

3) world area forecast centres, international OPMET data banks, and centres designated for the operation of aeronautical fixed service satellite distribution systems; and

c) Issue updated advisory information to meteorological watch offices for each tropical cyclone, as necessary, but atleast every six hours.

3.5.2 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 34kts during the period covered by the advisory.

3.5.3 The advisory information on tropical cyclone shall be in accordance with the template shown in **Appendix F.** The advisory information from TCAC New Delhi can be obtained from the link www.imd.gov.in/section /nhac/dynamic/cyclone.htm.

CHAPTER 4
METEOROLOGICAL OBSERVATIONS AND REPORTS

4.1 Aviation meteorological offices and observations

4.1.1 The aviation meteorological offices functioning at the locations of 18 Aerodrome Meteorological Offices and 54 Aeronautical Meteorological Stations shall make routine observations at fixed intervals. The routine observations shall be supplemented by special observations whenever specified changes occur in respect of surface wind, visibility, runway visual range, present weather, clouds and/or air temperature.

4.1.2 All Aerodrome Meteorological Offices and Aeronautical Meteorological Stations are responsible for providing meteorological support to low-level flights and helicopter operations operating through their stations.

4.1.3 The aviation meteorological organisation chart is given as **Appendix G.**

4.1.4 Inspection of the aviation meteorological offices shall be carried out by DDGMs of RMCs at an interval of two years to ensure that a high standard of observation is maintained, that instruments and all their indicators are functioning correctly, and to check whether the exposure of the instruments has changed significantly. The inspection may also include forecasting service, telecommunication and upkeep and maintenance aspects of the office. Inspection reports shall be sent to CAMD, New Delhi.

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

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

4.2 Routine observations and reports

4.2.1 Routine observations shall be made by all aviation meteorological offices in India as per the schedule given in **Appendix H**

4.2.2 Reports of routine observations shall be issued as:

a) Local routine reports, only for dissemination at the aerodrome of origin, (intended for arriving and departing aircraft). These are issued to local ATC units on white paper in abbreviated plain language and identified by the prefix “MET REPORT”; and

b) METAR for dissemination beyond the aerodrome of origin, mainly intended for flight planning, and VOLMET broadcast. These are issued in coded form with the prefix “METAR”.

4.2.3 At aerodromes that are not operational throughout 24 hours, METAR shall be issued atleast one hour prior to the aerodrome resuming operations.

4.3 Special observations and reports.

4.3.1 Reports of special observations shall be issued as:

a) Local special reports, only for dissemination at the aerodrome of origin, (intended for arriving and departing aircraft). These

are issued on red colour paper to local ATC in abbreviated plain language and identified by the prefix “SPECIAL”

b) SPECI for dissemination beyond the aerodrome of origin, mainly intended for flight planning and VOLMET/ D-VOLMET broadcasts. These are in coded form and are identified by the prefix “SPECI”.

4.4 Format of meteorological report

4.4.1 Local routine (MET REPORT), and local special (SPECI) reports shall be issued in abbreviated plain language. Template for MET REPORT and SPECIAL is given in **Appendix I.**

4.4.2 METAR and SPECI shall be issued in the METAR and SPECI code forms. Template for METAR and SPECI is given in **Appendix J.**

4.4.3 In abbreviated plain language, ICAO approved abbreviations alone shall be used, together with required numerical values. Except for QNH/QFE, no other Q codes shall be used. Where ICAO abbreviations are not available, the full English term, in capital letters shall be used.

4.5 Contents of Reports

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

a) identification of the type of report; (MET REPORT/ SPECIAL, METAR / SPECI)

b) location indicator; (The ICAO location indicator of the reporting station, e.g.: VOMM, VECC)

c) time of the observation; (The day of the month and time of observation in hours and minutes UTC followed by the letter ‘Z’ in the form 042230Z)

d) surface wind direction and speed;

e) visibility;
f) runway visual range, when applicable;
g) present weather;
h) cloud amount, type (only for cumulonimbus and towering cumulus clouds at or near the aerodrome) and height of cloud base; or where measured vertical visibility;
i) air temperature and dew-point temperature;
j) QNH and, when applicable, QFE (QFE included only in local routine and special reports);
k) supplementary information.

4.6 Use of CAVOK

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

a) visibility, 10 km or more;
b) no cloud of operational significance;
c) no weather of significance to aviation as given in 4.9.5.4.3 and 4.9.5.4.4; then,

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”.

4.7 Criteria for issuance of local special reports and SPECI

Local special report and SPECI shall be issued whenever changes in accordance with the following criteria occur:

a) Surface Wind

i) When the mean surface wind direction has changed by 60^0 or more from that given in the latest report, the mean wind speed before and/or after the change being 10 knots or more;

ii) When the mean surface wind speed has changed by 10 knots or more from that given in the latest report;

iii) When the variation from the mean surface wind speed (gusts) has increased by 10 knots or more from that given in the latest report, the mean speed before and/or after the change being 15 knots or more.

b) Visibility

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:

800, 1500, 3000 or 5000 meters.

c) Runway Visual Range (RVR)

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:

150, 350, 600 or 800 metres.

d) Present Weather

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

freezing precipitation

moderate or heavy precipitation (including showers thereof)

thunderstorm (with precipitation)
duststorm
sandstorm
funnel cloud (tornado or waterspout)

(ii) When the onset or cessation of any of the following weather phenomena occurs:

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

e) Cloud

i) 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:

30, 60, 150, 300, or 450 m (100, 200, 500, 1000 or 1500 ft.)

ii) When the amount of a cloud layer below 450 m (1500 ft) changes:

a) from SCT or less to BKN or OVC; or
b) from BKN or OVC to SCT or less.

f) Vertical Visibility

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 300M (100, 200, 300, 1000FT)

g) Air temperature

When air temperature has increased by 2^0 C or more from that given in the latest report.

NOTES:

1) When a deterioration of one weather element is accompanied by an improvement in another element, a single SPECI / local special report shall be issued. It shall be treated as a deterioration report.

2) SPECI representing a deterioration in conditions shall be disseminated immediately after the observation. A SPECI representing a deterioration of one weather element and an improvement in another element shall be disseminated immediately after the observation. A SPECI representing an improvement in conditions shall be disseminated only after the improvement has been maintained for 10 minutes; it shall be amended before dissemination, if necessary, to indicate the conditions prevailing at the end of that 10 minute period.

3) Local Special Reports shall be transmitted to local air traffic services units as soon as the specified conditions occur, even if it represents an improvement in conditions. Local Special Reports shall also be made available to the operators and to other users at the aerodrome.

4.8 Additional Reports

4.8.1 This message is identified with the prefix “ADDITIONAL” and supplied on red colour paper. However, these are not disseminated outside the aerodrome of

origin. These are issued to local ATC units in addition to the local routine reports and local special reports.

4.8.2 ADDITIONAL reports shall be issued for changes in cloud base height and visibility by all aeronautical meteorological offices in India as per the following criteria:

Element	**Criteria**	***Issued by***
i) Cloud base	Whenever the height of base of cloud covering more than half the sky changes to or passes 90 or 120 metres (300 or 400 feet)	All stations equipped with ceilometers/ ceilographs.
ii) Visibility	Whenever visibility changes to or passes 2000 or 4000 metres.	By all aerodrome meteorological offices/ aeronautical meteorological stations recording routine observations.

4.9 Observing and Reporting of Meteorological elements

All the airports have been provided with automated / manual equipments for measuring or assessing and for monitoring and remote indicating of surface wind, visibility, runway visual range, air and dew-point temperatures and atmospheric pressure to support approach and landing and take-off operations. At Amritsar, Bangalore, Chennai, Guwahati, Jaipur, Mumbai, New Delhi, and Hyderabad airports, integrated automatic systems have been installed for acquisition, processing, dissemination and display in real time of the meteorological parameters.

The status of installation of various instruments at airports is given as **Appendix K**

4.9.1 Surface Wind

4.9.1.1 The mean direction and mean speed of surface wind shall be measured, as well as significant variations of the wind direction and speed, and reported in degrees true and knots respectively.

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

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

4.9.1.4 Siting and Display

4.9.1.4.1 Surface wind shall be observed at a height of approximately 10m (30 ft) above the ground.

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

4.9.1.5 Averaging

The averaging periods for wind observations shall be as follows:

Wherever instruments with averaging facility are installed:

(1) Two minutes for reports for Landing and Take-off and for inclusion in local routine and special reports and for wind displays in air traffic services units;

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

Note: A marked discontinuity occurs when there is an abrupt and sustained change in wind direction of 30^{o} or more, with a wind speed of 10 knots before or after the change, or a change in wind speed of 10 knots or more, lasting at least 2 minutes.

At other stations:

(1) In METAR and SPECI and in local routine and special reports

a) Ten minutes in the case of stations equipped with Dines PT or electrical anemographs

b) Three minutes at other stations.

(2) Reports for Take-off/Landing: 2 minutes

4.9.1.6 The averaging period for measuring variations from mean wind speed (gusts) reported in accordance with 4.9.2.2 (C), shall be 3 seconds for local routine and special reports and for METAR and SPECI and for wind displays used for depicting variations from the mean wind speed (gusts) in air traffic service units.

4.9.2 Reporting

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

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

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

b) variations from the mean wind direction during the past 10 minutes shall be reported as follows, if the total variation is 60^0 or more:

1) when the total variation is 60^0 or more and less than 180^0 and the wind speed is 3 knots or more, such directional variations shall be reported as the two extreme directions between which the surface wind has varied after indication of the mean wind direction and speed. For example “WIND 010/09KT VRB BTN 350/ AND 050/” (clockwise variation of

wind from 350º to 50º). In METAR/SPECI the same may be reported in the form “01009KT 350V050”.

2) when the total variation is 60^0 or more and less than 180^0 and the wind speed is less than 3 knots, the wind direction shall be reported as variable with no mean wind direction e.g.: In METAR as VRB02KT and in MET REPORT as WIND VRB2KT; or

3) when the total variation is 180^0 or more, the wind direction shall be reported as variable with no mean wind direction e.g.: In METAR as VRB28KT and in MET REPORT as WIND VRB28KT;

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 10 knots or more, the same shall be reported in the form “WIND 180/20KT MAX 35 MIN 10” in local reports and in the form “18020G35KT” in METAR/SPECI.

d) when a wind speed of less than 1 knot is reported, it shall be indicated as calm;

e) when a wind speed of 100 knots or more is reported it shall be indicated to be more than 99 knots; e.g.: 270/ABV99KT in local reports and 140P99KT in METAR/SPECI.

f) when the 10-minute period includes 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.

4.9.2.3 In METAR and SPECI:

a) The surface wind observations should be representative of conditions above the whole runway where there is only one

runway and the whole runway complex where there is more than one runway.

b) The wind should be reported in the form “(Wind direction) (Wind speed) (Significant speed variations) (Units of measurement) (Significant directional variations)” (e.g.: 02010G30KT 350V070. In the absence of significant directional variation and significant speed variation, the wind reported will be 02010KT)

c) In case there is more than one runway in operational use, the wind values of the sensor installed at the most frequently used runway may be used for reporting in METAR.

4.9.2.4 In local routine and special reports:

a) The wind should be reported in the form” (Name of the element) (Runway) (Runway section) (Wind Direction) (Wind speed) (Significant speed variations) (Significant directional variations) (Runway Section) (Wind direction) (Wind speed) (Significant speed variations) (Significant directional variations) (Runway Section) (Wind direction) (Wind speed) (Significant speed variations) (Significant directional variations)”. This sequence can be repeated for other runways also. The actual contents may vary as per the situation and the report may not have all the contents as given above.

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

Example: WIND RWY 27 TDZ 240/16KT MAX27 MNM10 END 250/14KT

c) when more than one runway is in operational 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. When there is more than one instrument installed on all such runways, all such values indicating the location of each instrument for all the runways should be reported.

Example: A wind of 11 knots from direction 190 degrees is recorded by the wind instrument located at the touch down zone of runway 18 and a wind of 11 knots speed from direction 140 degrees is recorded by another instrument located at the mid point of runway 14, the wind reported in the local report in the absence of any significant variations in the direction will be:

WIND RWY 18 TDZ 190/11KT

WIND RWY 14 MID 140/11KT

d) when variation from the mean wind direction are reported in accordance with 4.9.2.2 b) 2, the two extreme directions between which the surface wind has varied should be reported; and

e) when variation from the mean wind speed (gusts) are reported in accordance with 4.9.2.2 c), they should be reported as the maximum and minimum values of the wind speed attained.

4.9.2.5 In METAR / SPECI, when variations from the mean wind speed (gusts) are reported in accordance with 4.9.2.2 c), the maximum value of the wind speed attained should be reported.

Note: A marked discontinuity occurs when there is an abrupt and sustained change in wind direction of 30^0 or more with a wind speed of 10 knots before or

after the change, or a change in wind speed of 10 knots or more lasting at least 2 minutes.

4.9.3 Visibility

4.9.3.1 The horizontal visibility shall be observed by reference to objects or lights whose distance from the point of observation is known and shall be reported in meters or kilometers. At all stations, for METAR and SPECI, the visibility shall be the lowest observed around the point of observation. Where ever instruments are installed for assessment of visibility, in local routine and special reports, visibility along the runway(s) shall be reported together with the units of measurement used to indicate visibility.

4.9.3.2 Where ever instruments are installed for assessment of visibility, when local routine and special reports are used for departing aircraft, the visibility observations for these reports shall be representative of conditions along the runway; when local routine and special reports are used for arriving aircraft, the visibility observations for these reports shall be representative of touchdown zone of the runway.

4.9.3.3 In METAR and SPECI, when the visibility is not the same in different directions and the visibility in one or more directions is more than 50 percent above the lowest visibility, the lowest visibility observed shall be reported and its general direction in relation to the site of the meteorological station be indicated by reference to one of the eight points of the compass. For example, “VIS 1200M TO S”. If the lowest visibility is observed in more than one direction, then the most operationally significant direction shall be reported. Directional variations in visibility shall be reported when the lowest visibility is less than 1500 m and the visibility in another direction is more than 5000 m, for example “VIS 1200M TO S 6KM TO W”. Where such variations in visibility are observed in more than one direction, then the most operationally significant direction shall be

reported. When the visibility is fluctuating rapidly, and significant directional variations cannot be given, the lowest visibility shall be reported, with no indication of direction.

4.9.3.4 Whenever visibility in the take-off/ climb-out area (for aircraft taking off) or approach- landing area (for aircraft landing) is more than the minimum required for take-off / landing while the visibility reported (lowest in any direction) is less than the minimum, supplementary information may be given at the end of local routine report, giving the visibility in the take-off / climb-out area / approach - landing area. This is not to be given in the METARs. For this purpose, the minima for the different types of aircraft operating in a particular airport may be obtained from AAI / DGCA authority and kept with the Meteorological Observer. These minima may be updated whenever necessary.

These supplementary information need to be given only when any aircraft is about to land or take-off and when the visibility in the concerned areas is more than the minimum required for the aircraft while the reported visibility is less than the minimum.

4.9.3.5 Reporting

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

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

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

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

4.9.4 Runway visual range

4.9.4.1 Runway visual range shall be assessed on all runways intended for Category I, II and III instrument approach and landing operations including runways used for take-off and having high intensity edge lights and/or center line lights.

4.9.4.2 When instrumented systems are used, runway visual range shall be assessed at a height approximately 2.5m (7.5 ft) above the runway.

4.9.4.3 Runway visual range observations shall be made, and reported in current weather reports, throughout periods when either the horizontal visibility or the runway visual range is less than 1500m. Whenever the general visibility and / or RVR is from 1500 m to 2000 m, the RVR shall be included in the METAR/SPECI and in local routine and special reports as supplementary information under “RMK” group. This supplementary information shall not be disseminated internationally. If the horizontal visibility is 2000 m or less but RVR is more than 2000 m the same shall be reported as “RVR ABV 2000 M” as supplementary information, with indicator RMK.

4.9.4.4 Runway visual range assessments shall be representative of:

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

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

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

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

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

4.9.4.7 Where runway visual range is determined by human observers, runway visual range shall 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. The transmission of such reports shall normally be completed within 15 seconds after the termination of observation.

4.9.4.8 Averaging of RVR

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

a) 1 minute for local routine and special reports and for RVR displays in ATS units, and

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

Note: A marked discontinuity occurs when there is an abrupt and sustained change in runway visual range, lasting at least 2 minutes, which reaches or passes through the values included in criteria for the issuance of SPECI reports.

4.9.4.9 Reporting

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

4.9.4.9.2 The lower limit of RVR shall be considered as 50 meters and 2000 meters the upper limit. Outside these limits, local routine and special reports and METAR and SPECI shall merely indicate that the runway visual range is less than 50m or more than 2000m.

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

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

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

4.9.4.9.4 In local routine and special reports:

a) The units of measurement used shall be indicated;

b) RVR should be reported in the form “(Name of the element) (Runway) (Runway section) (RVR value) (Runway section) (RVR value) (Runway section) (RVR value)”

c) 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; (e.g.: RVR RWY 32 400M)

d) 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; (e.g.: RVR RWY 16 TDZ 600M MID 500M END 400M)

e) 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.
(e.g: RVR RWY 26 500M RWY 20 800M. In this case, RVR values represent the touchdown zones and hence the locations to which the values represent are not indicated.)

f) When there is more than one instrument installed on all such runways, all such values indicating the location of each instrument for all the runways should be reported.

4.9.4.9.5 In METAR and SPECI:

a) The RVR should be reported in the form “(Name of the element) (Runway) (RVR value) (RVR past tendency)”. (e.g.: R12/1100U),

b) Only the value representative of the touchdown zone should be reported and no indication of location on the runway shall be included; (e.g.: R32/0400) and

c) Where there is more than one runway available for landing, touchdown zone runway visual range values shall be included for all such runways, up to a maximum of four, and the runways to which the values refer shall be indicated. Parallel runways shall be distinguished by appending to D_RD_R letters L, C or R indicating the left, central or right parallel runway. (e.g.: R16L/0650 R17L/0450)

4.9.4.9.6 In METAR and SPECI when instrumented systems are used for the assessment of runway visual range, the variations in runway visual range during the 10-minute period immediately preceding the observation shall be indicated as follows:

a) 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, this shall be indicated. When the variation of the runway visual range values shows an upward or downward tendency this shall be indicated by the abbreviation “U” or “D” respectively. In circumstances when actual fluctuations during the 10-minute period indicate no distinct tendency this shall be reported using the abbreviation “N”. When indications of tendency are not available, no abbreviations shall be included;

4.9.4.9.7 Whenever the visibility become 1500m or less, all aviation forecasting offices shall take manual RVR observation if instrumental recording facility of RVR is not available or is not functioning. When the visibility is

expected to reach 1500m or fall below 1500m, the ATC shall be asked to provide transport with communication facility. An observer shall be sent to the observing point for RVR observations as soon as the transport is made available by ATC. The current runway end in use, Touch Down Zone (TDZ) shall be ascertained from ATC well in advance and the observer shall be sent to the corresponding observing point of runway in use to take RVR observations.

4.9.5 Present Weather

4.9.5.1 The present weather occurring at aerodrome and/or its vicinity shall be observed and reported as necessary.

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

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

4.9.5.4 Reporting

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

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

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

a	Precipitation	
	Drizzle	DZ

	Rain	RA
	Snow	SN
	Snow grains	SG
	Ice Pellets	PL
	Ice crystals (very small ice crystals in suspension also known as diamond dust) -Reported only when associated visibility is 5000 m or less.	IC
	Hail -Reported when diameter of largest hailstones is 5 mm or more	GR
	Small hail and/or snow pellets -Reported when diameter of largest hailstones is less than 5 mm	GS
b	Obscurations (Hydrometeors)	
	Fog -Reported when visibility is less than 1000 m, except when qualified by “MI”, “BC”, “PR” or “VC” (see 4.9.5.4.4 and 4.9.5.4.5)	FG
	Mist -Reported when visibility is at least 1000 m but not more than 5000 m.	BR
c	Obscuration (litho-meteors) -The following shall be used only when the obscuration consists predominantly of litho meteors and the visibility is 5000 m or less except “SA” when qualified by “DR” (see 4.9.5.4.4) and volcanic ash.	
	Sand	SA
	Dust (widespread)	DU
	Haze	HZ

	Smoke	FU
	Volcanic ash	VA
d	Other phenomena	
	Dust/sand whirls (dust devils)	PO
	Squall	SQ
	Funnel cloud (tornado or waterspout)	FC
	Duststorm	DS
	Sandstorm	SS

Note: As per the departmental publication 'Instructions to observers at the surface observatories', Part I (1987), a relative humidity of 75% shall be used to discriminate between Mist and Haze. For the same value of visibility, say 2000m, the weather phenomena is to be reported as Mist, if relative humidity is 75% or more. On the other hand, if the relative humidity is less than 75%, it has to be reported as Haze.

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

Thunderstorm TS

- Used to report a thunderstorm with rain "TSRA", snow "TSSN", hail "TSGR" or small hail and/or snow pellets "TSGS" or combinations thereof, for example, "TSRASN". 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.

Shower SH

- Used to report showers of rain "SHRA", snow

"SHSN", hail "SHGR", small hail and/or snow pellets "SHGS", or combinations thereof, for example "SHRASN". Showers observed in the vicinity of the aerodrome (see 4.9.5.4.5) shall be reported as "VCSH" without qualification regarding type or intensity of precipitation.

Freezing FZ

- Supercooled water droplets or precipitation, used only with FG, DZ and RA.

Blowing BL

- Used to report DU, SA or SN raised by the wind to a height of 2 m (6 ft) or more above the ground.

Low drifting DR

- Used with DU, SA or SN raised by the wind to less than 2 m (6 ft) above ground level.

Shallow MI

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

Patches BC

- Fog patches randomly covering the aerodrome.

Partial PR

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

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

	Local routine and local special reports	METAR and SPECI

Light	FBL	_
Moderate	MOD	(no indication)
Heavy	HVY	+

Used only with: DZ, GR, GS, PL, RA, SG and SN, (or in combination involving these present weather types; in these cases, intensity refers to precipitation in accordance with 4.9.5.4.6; DS and SS; (in the cases of DS and SS, only moderate and heavy intensities to be indicated). Light intensity shall be indicated only for precipitation.

Vicinity		VC
	- Not at the aerodrome but not further away than approximately 8 km from the aerodrome perimeter and used only in METAR and SPECI with DS, SS, FG, FC, SH, PO, BLDU, BLSA, BLSN, TS and VA when not reported under 4.9.5.4.4	

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

a) one or more up to a maximum of three of the present weather abbreviations given in 4.9.5.4.3 and 4.9.5.4.4 shall be used, as necessary, together with an indication, where appropriate, of the characteristics and intensity or proximity to the aerodrome, so as to convey a complete description of the present weather of significance to flight operations;

b) the indication of intensity or proximity as appropriate, shall be reported first followed respectively by the characteristics and the type of weather phenomena (e.g.: HVY TSRA); and

c) where two different types of weather are observed, they shall be reported in two separate groups, where the intensity or proximity

indicator refers to the weather phenomenon, which follows the indicator (e.g.: FBL DZ FG or FBL DZ VCFG). 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 (e.g.: HVY TSRASN or FBL SNRAFG).

4.9.6 Clouds

4.9.6.1 Cloud amount, cloud type and height of cloud base shall be observed and reported as necessary to describe the clouds of operational significance. When the sky is obscured, vertical visibility shall be observed and reported, where measured, in lieu of cloud amount, cloud type and height of cloud base. The height of cloud base and vertical visibility shall be reported in meters. In local routine and in local special reports, cloud heights may be given both in meters and feet.

4.9.6.2 Cloud observations for local routine and local special reports shall be representative of the approach area.

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

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

4.9.6.5 Siting

When instrumented systems are used for measurement of the cloud amount and the height of cloud base, representative observations shall be obtained by the use of sensors appropriately sited. For local routine and special report, in the case of aerodromes with precision approach runways, sensors for cloud amount and height of cloud base shall be sited to give the best practicable indications of the height of cloud base and cloud amount at the middle marker site of the instrument landing system or, at aerodromes where a middle marker beacon is not used, at a distance of 900 to 1200 m from the landing threshold at the approach end of the runway.

4.9.6.6 Display

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

4.9.6.7 Reporting

4.9.6.7.1 In local routine and special reports and in METAR and SPECI:, the height of cloud base shall be reported in steps of 30m (100ft) up to 3000m (10 000 ft). Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale. Cloud base heights more than 3000m need not be reported.

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

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

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

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

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

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

1) the lowest layer or mass, regardless of amount to be reported as FEW, SCT, BKN or OVC as appropriate;
2) the next layer or mass, covering more than 2/8 to be reported as SCT, BKN or OVC as appropriate;
3) the next higher layer or mass, covering more than 4/8 to be reported as BKN or OVC as appropriate; and
4) cumulonimbus and/or towering cumulus clouds, whenever observed and not reported in 1) to 3) above.

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

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

Note: Towering cumulus indicates cumulus congestus clouds of great vertical extent. In MET REPORT, direction of CB may be given in Supplementary information, as appropriate.

4.9.6.7.3 In local routine and local special reports:

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

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

4.9.7 Air temperature and Dew Point Temperature

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

4.9.7.2 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 complex.

4.9.7.3 Reporting

4.9.7.3.1 In local routine and local special report and in METAR and SPECI, the air temperature and the dew point temperature shall be reported in steps of whole degrees Celsius. Any observed value, which does not fit the reporting scale in use, shall be rounded to the nearest whole degrees Celsius, with observed values involving 0.5^{o}C rounded up to the next higher whole degree Celsius. For example, +2.5ºC shall be rounded up to +3ºC and -2.5ºC shall be rounded up to -2ºC.

4.9.7.3.2 In local routine and local special reports the air temperature shall be identified by “T” and the dew point temperature by “DP” in the form “T21 DP08”. For a temperature below 0^{o} Celsius, the value shall be preceded by “MS” in local routine and local special reports and by ‘M’ in METAR / SPECI in the form TMS08 and DPMS18 and M01/M10 respectively.

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

4.9.8 Atmospheric pressure

4.9.8.1 The atmospheric pressure shall be measured and QNH and QFE values shall be computed and reported in hectopascals (hPa).

4.9.8.2 The reference level for the computation of QFE shall be the aerodrome elevation. For non-precision approach runways, the thresholds of which are 2 metres or more below the aerodrome elevation, and for precision approach runways, the QFE, if required, shall refer to the relevant threshold elevation.

4.9.8.3 Reporting

4.9.8.3.1 For local routine and special reports and for METAR and SPECI, QNH and QFE shall be computed in tenths of hectopascals and reported therein in steps of whole hectopascals using four digits. Any observed value, which does not fit the reporting scale in use, shall be rounded down to the nearest lower whole hectopascal. For example, a QNH of 995.6hPa shall be reported as QNH 0995 in local routine and local special reports and Q0995 in METAR/ SPECI.

4.9.8.3.2 In local routine and special reports:

a) QNH and QFE shall be included on a regular basis:

b) The unit of measurement used for QNH and QFE values shall be included; and

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

4.9.8.3.3 In METAR and SPECI only QNH values shall be included.

4.9.8.4 Display

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

4.9.9 Supplementary Information

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

4.9.9.2 Reporting

4.9.9.2.1 In local routine and local special reports and in METAR and SPECI, the following recent weather phenomena, i.e. weather phenomena observed at the aerodrome during the period since the last issued routine report or last hour, whichever is the shorter, but not at the time of observation, shall be reported, up to a maximum of three groups, in accordance with the examples given below, in the supplementary information:

freezing precipitation	REFZDZ, REFZRA
moderate or heavy	REDZ, RESHRA, RERASN,

precipitation (including showers thereof)	RESHSN, RESG, REPL, RESHGR, RESHGS
blowing snow	REBLSN
duststorm or sandstorm	REDS, RESS
Thunderstorm	RETS, RETSRA, RETSSN, RETSGR, RETSGS
funnel cloud (tornado or water spout)	REFC
volcanic ash	REVA

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

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

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

For example: FC IN APCH, WS IN APCH, WS RWY 12, REFZRA, CB IN CLIMB –OUT, RETSRA

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

For example: Wind Shear WSRWY 03, WS ALL RWY.

4.9.10 Observations and reports of volcanic activity

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

a) message type, VOLCANIC ACTIVITY REPORT;
b) station identifier, location indicator or name of station;
c) Date/Time of message;
d) Location of volcano and name if known; and
e) Concise description of event including, as appropriate, level of intensity of volcanic activity, occurrence of an eruption and its date and time and the existence of a volcanic ash cloud in the area together with direction of ash cloud movement and height.

4.10 Dissemination of reports

4.10.1 Dissemination locally over the aerodrome

4.10.1.1 Local routine reports, and local special reports and additional reports shall be issued to local air traffic services units and shall also be made available to the operators and other users at the aerodrome.

4.10.2 Dissemination beyond the aerodrome

4.10.2.1 METAR and SPECI only are to be disseminated beyond the aerodrome of origin. Local routine, local special and additional reports are not to be disseminated beyond the aerodrome of origin.

4.10.2.2 METARs are disseminated as follows:

4.10.2.2.1 Only reports of international aerodromes and their alternates are disseminated outside India under the ROBEX scheme as per detailed instructions in the matter and over AFTN to concerned stations not forming a part of ROBEX scheme. In addition, METAR from a number of domestic aerodromes are also included in the regular ROBEX exchange as required by the users.

4.10.2.2.2 ROBEX Collection and Dissemination of METAR Bulletins

ROBEX centre	Aerodrome	**RODB/ ROBEX Centre.**	**AFTN Address**
Delhi	Delhi, Lucknow, Amritsar, Varanasi, Jaipur	**BANGKOK** BRISBANE SINGAPORE TOKYO	VTBBYPYX YBBBYPYX WSZZYPYM RJTDYPYX
		Kolkata Hong Kong Karachi Mumbai	VECCYPYX VHZZYPYX OPZZYPYX VABBYPYX
Kolkata	Kolkata, Patna, Dhaka, Chittagong, Kathmandu	**BANGKOK** BRISBANE SINGAPORE TOKYO	VTBBYPYX YBBBYPYX WSZZYPYM RJTDYPYX
		Colombo Delhi Hong Kong Karachi Mumbai	VCCCYPYX VIDPYPYX VHZZYPYX OPZZYPYX VABBYPYX

Mumbai	Ahmedabad, Mumbai, Nagpur, Hyderabad (VOHS& VOHY), Chennai, Tiruchirappalli, Thiruvananthapuram, Paro	**BANGKOK** BRISBANE SINGAPORE TOKYO	VTBBYPYX YBBBYPYX WSZZYPYM RJTDYPYX
		Abu Dhabi Bahrain Colombo Delhi Hong Kong Karachi Kolkata Tehran	OMZZYPYX OBZZYPYX VCCCYPYX VIDPYPYX VHZZYPYX OPZZYPYX VECCYPYX OIZZYPYX

4.10.2.2.3 Reports of other aerodromes are distributed internally to concerned stations over AAI AFTN and also over the departmental telecommunication channels according to operational requirements.

4.10.2.3 SPECI of aerodromes as per operational requirements is disseminated outside India over the AAI AFTN channels and over AFTN and departmental channels internally. SPECIs issued at routine time are included in the METAR ROBEX bulletins.

4.10.2.4 All meteorological offices shall make special efforts to obtain the relevant current weather reports of destination and alternate aerodromes required for briefing the pilots of scheduled air services by making optimum use of the departmental telecommunication channels.

4.10.3 Priorities for dissemination and filing time of reports over AAI AFTN:

4.10.3.1 Priorities for dissemination of meteorological messages through AFTN is given in Chapter 11, Communications.

4.10.3.2 METAR for transmission via the aeronautical fixed service facilities shall be filed not later than 5 minutes after the actual time of observation.

4.10.4 Further details on Regional Operational Meteorological (OPMET) Bulletin Exchange (ROBEX) scheme is available in the ROBEX Handbook which is published and kept up-to-date by the ICAO Bangkok Regional Office. It is available at www.bangkok.icao.int/edocs/index.html

CHAPTER 5
AIRCRAFT OBSERVATIONS AND REPORTS

5.1 Obligation of States

5.1.1 Arrangements have to be made with Indian Airlines and Air India and also with other airlines operating through Indian air space for the recording and reporting of aircraft meteorological observations as per provisions set out in the following paragraphs. For this purpose, the meteorological offices shall maintain close liaison with the airline operators. Arrangements have also to be made with appropriate air traffic services units so that the meteorological observations reported by aircraft in flight are delivered without delay to associated meteorological offices.

5.2 Aircraft observations

5.2.1 The following aircraft observations shall be made:

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

5.3 Routine aircraft observations

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

5.3.2 When voice communications are used, routine aircraft meteorological observations shall be recorded and reported by all international aircraft at the reporting points indicated in **Appendix-L (i).** National aircraft will record and report routine aircraft meteorological observations at the reporting points specified in **Appendix-L(ii).**

5.3.3 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 meteorological authorities and the helicopter operators concerned.

5.4 Routine aircraft observations – exemptions

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

5.4.1 When voice communications are used, an aircraft shall be exempted from making routine observations when:

a) the aircraft is not equipped with RNAV equipment; or
b) the flight duration is 2 hours or less; or
c) the aircraft is at a distance equivalent to less than one hour of flying time from the next intended point of landing; or
d) the altitude of the flight path is below 1500 metres (5000 ft.)

5.5 Special aircraft observations

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

a) moderate or severe turbulence; or
b) moderate or severe icing; or
c) severe mountain wave; or

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

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

f) heavy duststorm or heavy sandstorm; or

g) volcanic ash cloud; or

h) pre-eruption volcanic activity or a volcanic eruption.

5.6 Other non-routine aircraft observations

5.6.1 When other meteorological conditions not listed under 5.5.1, e.g., wind shear, are encountered and which, in the opinion of the pilot-in-command, may affect the safety or markedly affect the efficiency of other aircraft operations, the pilot-in-command shall advise the appropriate air traffic services unit as soon as practicable.

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

5.7 Reporting of aircraft observations during flight

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

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

5.7.3 Aircraft observations shall be reported as air-reports.

5.8 Relay of air-reports by ATS units

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

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

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

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

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

5.10 Content of air-reports

5.10.1 Routine air-reports by air- ground data link

5.10.1.1 When air-ground data link is used and ADS or SSR Mode S is being applied, the elements contained in routine air-reports shall be:

Message type designator
Aircraft identification

Data block 1

Latitude

Longitude

Level

Time

Data block 2

Wind direction

Wind speed

Wind quality flag

Temperature

Turbulence (if available)

Humidity (if available)

5.10.2 Special air reports by air ground data link

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

Message type designator

Aircraft identification

Data block 1

Latitude

Longitude

Level

Time

Data block 2

Wind direction

Wind speed

Wind quality flag

Temperature

Turbulence (if available)

Humidity (if available)

Data block 3

Condition prompting the issuance of a special air-report as per para 5.5.1 (SEV TURB or SEV ICE or SEV MTW or TS GR or TS or HVY SS or VA CLD or VA)

5.10.3 Routine air reports by voice communication

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

Message type designator	
Section 1 (Position information)	
	Aircraft identification
	Position or latitude and longitude
	Time
	Flight level or altitude
	Next position and time over
	Ensuing significant point
Section 2 (Operational information)	
	Estimated time of arrival
	Endurance

Section 3 (Meteorological information)	
	Air temperature
	Wind direction
	Wind speed
	Turbulence
	Aircraft icing
	Humidity (if available)

Special air-reports by voice communications

Message type designator	
Section 1 (Position information)	
	Aircraft identification
	Position or latitude and longitude
	Time
	Level or range of levels
Section 3 (Meteorological information)	
	Condition prompting the issuance of a special air-report as per para 5.5.1 (SEV TURB or SEV ICE or SEV MTW or TS GR or TS or HVY SS or VA CLD or VA)

5.11 Criteria for reporting

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

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

5.11.3 Wind speed: The wind speed shall be reported in knots, rounded to the nearest 1 knot. The units of measurement used for the wind speed shall be indicated.

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

5.11.5 Temperature: The temperature shall be reported to the nearest tenth of a degree Celsius.

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

5.11.6.1 Routine air-reports: The turbulence shall be reported during the en-route phase of the flight and shall refer to the 15- minute period immediately preceding the observation. Both the average and peak value of turbulence, together with the time of occurrence of the peak value to the nearest minute, shall be observed. The average and peak values shall be reported in terms of the cube root of EDR. The time of occurrence of the peak value shall be reported as indicated in the Table 1 below. The turbulence shall be reported during the

climb-out phase for the first 10 minutes of the flight and shall refer to the 30-second period immediately preceding the observation. The peak value of turbulence shall be observed.

Table 1 – Time of occurrence of the peak value to be reported

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

5.11.6.2 Interpretation of turbulence report

Turbulence shall be considered:

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

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

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

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

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

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

5.11.7 Humidity: The humidity shall be reported as the relative humidity, rounded to the nearest whole percent.

Note: The ranges and resolutions for the meteorological elements included in air-reports are shown in Table given below:

Ranges and resolutions for the meteorological elements included in air-reports

Elements specified above		Range	Resolution
Wind direction:	ºtrue	000-360	1
Wind speed	KT	00-250	1
Wind quality flag	(index)*	0 – 1	1
Temperature	ºC	-80 - +60	0.1
Turbulence: routine air-report	$m^{2/3}s^{-1}$	0 – 2	0.01
	(time of occurrence)*	0 – 15	1
Turbulence: special air-report	$m^{2/3}s^{-1}$	0-2	0.01
Humidity:	%	0 - 100	1
*Non-dimensional			

5.12 Exchange of air-reports

5.12.1 The meteorological watch offices shall assemble the routine air-reports received by voice communications and shall disseminate them to other MWOs. These reports shall also be disseminated to all the forecasting offices in India without delay.

5.12.2 The Meteorological Watch Office shall transmit without delay special air reports of pre-eruption volcanic activity, a volcanic eruption or volcanic ash cloud received to the associated VAACs.

5.12.3 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 to Meteorological Watch Offices, WAFCs, and other meteorological offices.

5.13 Responsibilities of World Area Forecast Centres

5.13.1 Air-reports received at WAFCs shall be further disseminated as basic meteorological data.

Note: The dissemination of basic meteorological data is normally carried out on the WMO global telecommunication system.

5.14 Format of air-reports

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

5.15 Specific provisions related to reporting wind shear and volcanic ash

5.15.1 Reporting of Wind Shear

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

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

5.16 Post-flight reporting of volcanic activity

5.16.1 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.

5.16.2 The completed report of volcanic activity received by a 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.

CHAPTER 6

FORECASTS

6.1 Interpretation and use of forecasts

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

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

6.2 Aerodrome forecasts

6.2.1 All Aerodrome meteorological offices in India shall issue aerodrome forecast for their own aerodromes and their associated Aeronautical Meteorological Stations. In the case of Aerodrome meteorological offices with restricted watch, the Aerodrome meteorological office at the Regional Centre or the associated Aerodrome meteorological office at the Meteorological Centre at the State Capital will assume the responsibility of issuing the relevant aerodrome forecast during the closed period of forecast watch of the concerned meteorological offices.

6.2.2 Forecasts of all other aerodromes are to be obtained from the meteorological office preparing the same. In case such a forecast cannot be obtained in time for provision of the required meteorological service, as a national practice, the office providing the service can issue a provisional forecast for the concerned aerodrome and such a forecast will be identified as a “Provisional Forecast” in any use made of it.

6.2.3 An aerodrome forecast shall consist of a concise statement of the expected meteorological conditions at an aerodrome for a specified period.

6.2.4 Aerodrome forecast and amendments thereto shall be issued only in accordance with the template given in **Appendix O** and disseminated in the TAF code form. TAF shall include the following information in the order indicated:

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

6.2.5 Aerodrome forecasts issued by a meteorological office are to be kept under continuous review in order to issue amendments as required. TAF that can not be kept under continuous review shall be cancelled. The length of the forecast messages and the number of changes indicated in the forecast shall be kept to a minimum.

6.2.6 All AMOs in India shall issue 30 hr TAF for the purpose of international flights. In addition to the 30 hr TAF, 9 hr TAF also is to be issued for serving the domestic flights and for VOLMET/ D-VOLMET broadcast. However, the 9 hr TAF shall not be exchanged/ disseminated internationally.

6.2.7 The 9 hr TAF shall be an extract of the 30 hr TAF. TEMPO groups included in the original 30 hr TAF are to be truncated at the end of the validity period of the extracted 9 hourly TAF, while BECMG groups crossing the end of the validity period are to be included in full. The inclusion of the BECMG group in full may sometimes cause the extension of the period of validity of the extracted aerodrome forecast by 3 hours.

6.2.8 The schedule of issuance of the 9 hour TAF and 30 hour TAF is as follows:

Based on Chart (UTC)	Time of Issue (UTC)	Period of validity (UTC)	
		9 hourly	30 hourly
1800	2100	00-09	00-06
2100	0000	03-12	-
0000	0300	06-15	06-12
0300	0600	09-18	
0600	0900	12-21	12-18
0900	1200	15-24	-
1200	1500	18-03	18-00
1500	1800	21-06	-

6.2.9 Special 9 hourly TAFs may be requisitioned to meet the specific need of any national flights, in case the routine 9 hourly TAFs do not meet the requirement. Such requisitions shall however be restricted to the minimum.

6.2.10 TAFs in respect of Aeronautical Meteorological Stations will be issued by the associated Aerodrome Meteorological Offices/ meteorological centers, to meet specific requirement of national and international flights.

6.2.11 TAFs shall be as precise and specific as possible, without including a number of change groups.

6.2.12 Responsibility of an Aerodrome Meteorological Office for issue of TAFs (including its own TAFs) during its closed period of forecasting watch will be taken over by the associated aerodrome meteorological office at Regional Centre/ Meteorological Centre, working 24 hours.

6.3 Inclusion of meteorological elements in TAF

6.3.1 Surface wind: In forecasting surface wind, the expected prevailing direction shall be given. When it is not possible to forecast a prevailing surface wind direction due to its expected variability, for example, during light wind conditions (less than 3kt) or thunderstorms, the forecast wind direction shall be indicated as variable using “VRB”. When the wind is forecast to be less than 1 knot, the forecast wind shall be indicated by the term “CALM”. When the forecast maximum wind speed (gust) exceeds the forecast mean wind speed by 10kt or more, the forecast maximum wind speed shall be indicated. When the wind speed of 100kts or more is forecast it shall be indicated to be more than 99kt.

6.3.2 Visibility: When the visibility is forecast to be less than 800 m it shall be expressed in steps of 50 m; when it is forecast to be 800 m or more but less than 5 km, in steps of 100 m; 5 km or more but less than 10 km in kilometer steps and when it is forecast to be 10 km or more it shall be expressed as 10 km except when conditions of CAVOK are forecast to apply.

6.3.3 Weather phenomena: One or more, up to a maximum of three, of the following weather phenomena or combinations thereof, together with their characteristics and, where appropriate, intensity, shall be forecast if they are expected to occur at the aerodrome:

-freezing precipitation
-freezing fog
-moderate or heavy precipitation (including showers thereof)
-low drifting dust, sand or snow
-blowing dust, sand or snow
-duststorm
-sandstorm
-thunderstorm (with or without precipitation)
-squall
-funnel cloud (tornado or waterspout)
-other weather phenomena given in 4.9.5.4.3 only if they are expected to cause a significant change in visibility.

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

6.3.4 Cloud: Cloud amount shall be forecast using the abbreviations “FEW”, “SCT,” “BKN” or “OVC” as necessary. When it is expected that the sky will remain or become obscured and clouds can not be forecast and information on vertical visibility is available at the aerodrome, the vertical visibility shall be forecast in the form “VV” followed by the forecast value of the vertical visibility. When several layers or masses of cloud are forecast, their amount and height of base shall be included in the following order:

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

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

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

d) cumulonimbus clouds and/or towering cumulus clouds, whenever forecast and not already included under a) to c) above.

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

6.4 Use of change group

6.4.1 The criteria used for the inclusion of change groups in TAF or for the amendment of TAF shall be based on the following:

a. when the mean surface wind direction is forecast to change by 60º or more, the mean speed before and/or after the change being 10 kt or more;

b. when the mean surface wind speed is forecast to change by 10 kt or more;

c. when the variation from the mean surface wind speed (gusts) is forecast to increase by 10 knots or more, the mean speed before and/or after the change being 15 knot or more;

d. diurnal changes of surface wind (onset of sea breeze etc.), even if the changes do not meet the above criteria.

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:

150, 350, 600, 800, 1500, 3000 or 5000m;

f. when any of the following weather phenomena or combinations thereof are forecast to begin or end or change in intensity:

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

g. when any of the following weather phenomena or combinations thereof are forecast to begin or end:

ice crystals

freezing fog

low drifting dust, sand or snow

blowing dust, sand or snow

thunderstorm (without precipitation)

squall

funnel cloud (tornado or waterspout)

h. 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:

30, 60, 150, 300 or 450 m (100, 200, 500, 1000 or 1500 ft);

i. when the amount of a layer or mass of cloud below 450 m (1500 ft) is forecast to change:

1) from NSC, FEW or SCT to BKN or OVC; or

2) from BKN or OVC to NSC, FEW or SCT;

j. 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 300m (100,200,500 or 1000ft)

6.4.2 When change groups are used to indicate changes in any element, other elements associated with it may be given only if these also constitute a significant change.

6.4.3 When a change in any of the elements given in 6.2.4 is required to be indicated in accordance with the criteria given in 6.4.1, the change indicators “BECMG” or “TEMPO” shall be used followed by the time period during which the change is expected to occur. The time period shall be indicated as the beginning and end of the period in whole hours UTC, for example, “BECMG 0608” (TAF code form) or “BECMG 06/08” (abbreviated plain language). Only those elements for which a significant change is expected shall be included following a change indicator. However, in the case of significant changes in respect of cloud, all cloud groups, including layers or masses not expected to change shall be indicated.

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

6.4.5 The change indicator “TEMPO” and the associated time group shall be used to describe expected frequent or infrequent temporary fluctuations in the meteorological conditions which reach or pass specified threshold values and last for a period of less than one hour in each instance and, in the aggregate, cover less than one-half of the forecast period during which the fluctuations are expected to occur, for example, “TEMPO 1214” (TAF code form) or “TEMPO 12/14” (abbreviated plain language). If the temporary fluctuation is expected to last one hour or longer, the change group “BECMG” shall be used in accordance with 6.4.3 or the validity period shall be subdivided in accordance with 6.4.4. The duration of the change group TEMPO shall not be same as the entire validity period of the TAF.

6.4.6 Where one set of prevailing weather conditions is expected to change significantly and more or less completely to a different set of conditions, the period of validity shall be subdivided into self-contained periods using the abbreviation “FM” followed immediately by a four-figure time group in whole hours and minutes UTC indicating the time the change is expected to occur, for example, “FM1800” (in both TAF code form and abbreviated plain language). The subdivided period following the abbreviation “FM” shall be self-contained and all forecast conditions given before the abbreviation shall be superseded by those following the abbreviation.

6.5 Use of probability groups

6.5.1 The probability of occurrence of an alternative value of a forecast element or elements shall be indicated, as necessary, by use of the abbreviation “PROB” followed by the probability in tens of per cent and the time period during which the alternative value(s) is (are) expected to apply. The probability information shall be placed after the element or elements forecast and be followed by the alternative value of the element or elements in the form, “1500 PROB30 1214 0800 FG” (TAF code form) or “VIS 1500M PROB30 12/14 800M

FG" (abbreviated plain language). The probability of a forecast of temporary fluctuations in meteorological conditions shall be indicated, as necessary, by use of the abbreviation "PROB" followed by the probability in tens of per cent, placed before the change indicator "TEMPO" and associated time group, in the form "PROB40 TEMPO 1517" (TAF code form) or "PROB40 TEMPO 15/17" (abbreviated plain language). A probability of an alternative value or change of less than 30 per cent shall not be considered sufficiently significant to be indicated. A probability of an alternative value or change of 50 per cent or more, for aviation purposes, shall not be considered a probability but instead shall be indicated, as necessary, by use of the change indicators "BECMG" or "TEMPO" or by subdivision of the validity period using the abbreviation "FM". The probability group shall not be used to qualify the change indicator "BECMG" nor the time indicator "FM"

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

6.6 Dissemination of TAF

6.6.1 30 hr TAF and amendments thereto shall be disseminated to International OPMET data banks and the centers designated by regional air navigation agreement for the operation of aeronautical fixed service satellite distribution systems.

ROBEX Collection and Dissemination of TAF Bulletins

ROBEX center	Aerodromes
Mumbai	Ahmedabad, Mumbai, Nagpur, Kolkata, Patna, Delhi, Lucknow, Amritsar, Varanasi, Jaipur, Colombo, Kathmandu, Cochin, Calicut, Hyderabad, Chennai, Tiruchirappalli, Thiruvananthapuram, Male, Gan

6.6.2 For service to national air navigation, only 9 hourly TAFs will be exchanged internally as per actual operational requirements.

6.6.3 Only 9 hourly TAFs will be issued to IAF and Naval meteorological offices.

6.6.4 Filing time of TAF

TAFs are to be issued 3 hours prior to the beginning of validity period. The 9 hourly TAF and 30 hourly shall be filed for departmental exchange 3 hours before the start of the validity period. However, the 30 hr TAF to international destination shall be filed only one hour before the beginning of validity period.

6.7 Landing Forecast

6.7.1 Landing forecasts issued in India as a routine shall be of trend type. These forecasts are intended to meet the requirements of local users and of aircraft within about one hour's flying time from the aerodrome.

6.7.2 All Aerodrome Meteorological Offices (except Safdarjung and Bhopal) shall issue TREND forecasts during the forecast watch hours and these are to be included in ROBEX bulletins and VOLMET broadcast by concerned Meteorological Offices. The AMSs at CIAL Kochi and Kozhikode shall also issue TREND forecasts.

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

6.8 Format of Trend forecast

6.8.1 The units and scale used in the trend forecast shall be the same as those used in METAR/ SPECI. Example of METAR with appended trend forecasts is given in **Appendix P.**

6.9 Inclusion of meteorological elements in trend forecasts

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

6.9.1.1 Surface wind

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

a) a change in the mean wind direction of 60^0 or more, the mean speed before and/or after the change being 10 kt or more;

b) a change in mean wind speed of 10 kt or more.

For example, an expected temporary fluctuation of surface wind from 250^o at 35 kt with maximum speed (gusts) to 50 kt throughout the period of the trend forecast shall be indicated in the form “TEMPO 25035G50KT” (METAR) and “TEMPO 250/35KT MAX50” (local routine report).

6.9.1.2 Visibility

When the visibility is expected to change to or pass through any one of the values 150, 350, 600, 800, 1500, 3000 or 5000 m the trend forecast shall indicate the change. For example, a temporary reduction throughout the period of the trend forecast of the visibility to 750 m in fog shall be rounded down to 700 m and indicated in the form “TEMPO 0700” (METAR) or “TEMPO VIS 700M” (local routine report).

6.9.1.3 Weather phenomena

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:

-freezing precipitation
-moderate or heavy precipitation (including showers thereof)
-thunderstorm (with precipitation)
-duststorm
-sandstorm
-other weather phenomena given in 4.9.5.4.3 only if they are expected to cause a significant change in visibility.

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

-ice crystals
-freezing fog
-low drifting dust, sand or snow
-blowing dust, sand or snow
-thunderstorm (without precipitation)
-squall
-funnel cloud (tornado or waterspout)

c) The total number of phenomena reported in (a) and (b) shall not exceed three.

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

For example, forecast temporary moderate thunderstorm with rain between 0300 and 0430 UTC shall be indicated in the form “TEMPO FM0300 TL0430 TSRA” (METAR) and “TEMPO FM0300 TL0430 MOD TSRA” (local routine report). An expected cessation at 1630 UTC, of significant weather, such as a thunderstorm, shall be indicated in the form “BECMG AT1630 NSW” (in both METAR and local routine report).

6.9.1.4 Clouds

When the height of the base of a cloud layer of BKN or OVC extent is expected to lift and change to or pass through one or more of the following values, or when the height of the base of a cloud layer of BKN or OVC extent is expected to lower and pass through one or more of the following values: 30, 60, 150, 300 and 450 m (100, 200, 500, 1000 and 1500 ft), the trend forecast shall indicate the change. When the height of the base of a cloud layer is below or is expected to fall below or rise above 450 m (1500 ft), the trend forecast shall also indicate changes in cloud amount from FEW, or SCT increasing to BKN or OVC, or changes from BKN or OVC decreasing to FEW, or SCT. When no clouds of operational significance are forecast and “CAVOK” is not appropriate, the abbreviation “NSC” shall be used.

6.9.1.5 Vertical visibility

When the sky is expected to remain or become obscured and vertical visibility observations are available at the aerodrome, and the vertical visibility is

forecast to improve and change to or pass through one or more of the following values, or when the vertical visibility is forecast to deteriorate and pass through one or more of the following values: 30, 60, 150, or 300m (100, 200, 500, or1000 ft), the trend forecast shall indicate the change.

6.10 Use of change indicators

6.10.1 When a change is expected to occur, the trend forecast message shall begin with one of the change indicators “BECMG” or “TEMPO”.

6.10.2 The change indicator “BECMG” shall be used to describe forecast changes where the meteorological conditions are expected to reach or pass through specified values at a regular or irregular rate. The period during which, or the time at which, the change is forecast to occur shall be indicated, using the abbreviations “FM”, “TL”, or “AT”, as appropriate, each followed by a time group in hours and minutes. When the change is forecast to begin and end wholly within the trend forecast period, the beginning and end of the change shall be indicated by using the abbreviations “FM” and “TL” respectively with their associated time groups. For example, for a trend forecast period from 1000 to 1200 UTC in the form, “BECMG FM1030 TL1130” (in both METAR and local routine report). 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, for example “BECMG TL1100” (in both METAR and local routine report). 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, for example “BECMG FM1100” (in both METAR and local routine report). 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, for example “BECMG AT1100” (in both

METAR and local routine report). 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.

6.10.3 The change indicator “TEMPO” shall be used to describe forecast temporary fluctuations in the meteorological conditions which reach or pass specified values and last for a period of less than one hour in each instance and, in the aggregate, cover less than one-half of the period during which the fluctuations are forecast to occur. The period during which the temporary fluctuations are forecast to occur shall be indicated, using the abbreviations “FM” and/or “TL”, as appropriate, each followed by a time group in hours and minutes. When the period of temporary fluctuations in the meteorological conditions is forecast to begin and end wholly within the trend forecast period, the beginning and end of the period of temporary fluctuations shall be indicated by using the abbreviations “FM” and “TL” respectively with their associated time groups, for example, for a trend forecast period from 1000 to 1200 UTC in the form “TEMPO FM1030 TL1130” (in both METAR and local routine report). 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, for example, “TEMPO TL1130” (in both METAR local routine report). 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, for example “TEMPO FM1030” (in both METAR and local routine report). 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.

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

6.10.5 Value of cloud base, visibility and wind, given by the instruments ceilometer, transmissometer and CWIS are not only to be reported in reports but also to be utilised in the preparation of trend forecasts.

6.10.6 Whenever reduction of visibility is indicated in trend forecasts appended to local routine reports/ local special reports/ additional reports, disseminated locally over the aerodrome, the reasons for such reduction in visibility shall also be specified in the trend part of the message.

6.10.7 To METARs included in ROBEX bulletins, trend forecast shall be appended in code form. Trend forecasts, other than those appended to METARs for inclusion in ROBEX scheme, are not disseminated beyond the aerodrome of origin.

6.10.8 Landing forecasts of self-contained type: On occasions when specific requests are received from aircraft for forecasts of landing conditions, an aerodrome forecast covering the expected period of landing shall be supplied. These forecasts will refer to a specified period of time and will contain information on expected conditions over the aerodrome in respect of the following elements:

a) Surface wind direction and speed and any variations thereof.
b) Temperature
c) Pressure (QNH)
d) Any other element, as required.

6.11 Forecasts for Take-off

6.11.1 Forecasts for take-off shall be prepared by all Aerodrome Meteorological Offices in India.

6.11.2 Forecasts for take-off shall refer to a specified period of time and shall contain information on expected conditions over the runway complex in respect of the following elements:

a) Surface wind direction and speed and any variations thereof
b) Temperature
c) Pressure (QNH)
d) Any other element, as required

6.11.3 Forecasts for take-off shall be supplied to operators and flight crew members on request within 3 hours before the expected time of departure.

6.11.4 Meteorological offices preparing forecasts for take-off shall keep the forecast under continuous review and when necessary, shall issue amendments promptly. The criteria for the issuance of amendments for forecast for take-off for surface wind direction and speed, temperature and pressure and any other element shall be consistent with the corresponding criteria for local special reports.

6.12 Area, Local and Route Forecasts, other than forecasts issued within the framework of the world area forecast system.

6.12.1 Area and Local Forecasts

6.12.1.1 Aerodrome Meteorological Offices in India shall issue Local forecasts for their own aerodromes and Area forecasts for the Aeronautical Meteorological Stations under their control, when required. These forecasts are issued for the use of low-level flights including helicopters. Both Local and Area forecasts shall be valid over the aerodrome and 100 NM around.

6.12.1.2 Local and Area forecasts are to be issued three times a day, where ATC watch is maintained for 24 hrs. Each forecast shall be valid for the next 8 hours as indicated below:

	Issued at (UTC)	Valid for (UTC)
i)	2130	2200 – 0600
ii)	0530	0600 – 1400
iii)	1330	1400 – 2200

6.12.1.3 At aerodromes, where the ATC maintains only restricted watch, Local and Area forecasts are to be issued to cover the ATC watch as follows:

	Issued at (UTC)	Valid for (UTC)
i)	At the commencement of ATC Watch	From the commencement of ATC watch to 0600
ii)	0530	0600 to 1400 or earlier if ATC watch closes earlier than 1400 or 0600-1600 if ATC watch closes at 1600

6.12.1.4 For aerodromes, where ATC watch extends beyond 1600 UTC, the third Area/Local forecast also is to be issued at 1400 UTC valid for the period 1400 UTC to the time of closing of the ATC watch period. For such offices, Local/ Area forecasts may be issued for the period 1400-2200UTC also, if required.

6.12.1.5 All the Aviation Met Offices shall follow the same format for Area and Local forecasts as given in **Appendix Q.**

6.12.1.6 The time groups in the forecast portion of Local/Area forecast shall follow 'HH' format (e.g. 06, 09, 10, 14 etc.).

6.12.2 Route forecasts

6.12.2.1 Route Forecasts shall contain upper winds, upper-air temperatures, significant en-route weather phenomena and associated clouds. The information included shall cover the flight operations for which they are intended in respect of time, altitude and geographical extent. The following en-route weather shall be included in the Route Forecast:

Tropical cyclone, severe line squall, hail, thunderstorm, marked mountain waves, widespread sandstorm or dust storm, or freezing rain.

6.12.3 All these forecasts are to be kept under constant review and amendments are to be issued as necessary. The amendments shall be issued when the following changes are expected.

Upper winds	Directional change of 30°or more with wind speed 30 knots or more before or after the change; changes in speed of 20 knots or more
Upper air temperature	Change of more than 5° Celsius
Aircraft icing and Turbulence	New expectation; intensity increasing; intensity decreasing from severe to light or from moderate to nil
Other significant en-route phenomena	New expectation; no longer expected

6.12.4 Route forecasts and amendments there to, shall be in the ROFOR code for exchange beyond the aerodrome. Over the aerodromes these are not disseminated.

6.12.5 The order of elements in area, and route forecasts (or amendments there to) in abbreviated plain language shall normally follow that of the corresponding

coded form of message. The terminology and units employed shall be consistent with those used in related aerodrome reports and forecasts. The identifier employed shall be “AREA FCST” or “ROUTE FCST”, respectively, preceded in the case of amendments by “AMD”.

6.12.6 The CAVOK procedure applied in TAF shall not be used in area, local and route forecasts.

6.13 Aviation statistics

All the AMOs shall submit monthly statistics of all forecasts and warnings issued by 5th of the following month to Central Aviation Meteorological Division (CAMD). The statistics is to be forwarded in the format provided at **Appendix R.**

6.14 Verification of aviation forecasts

6.14.1 Aviation forecasts are to be verified as per the criteria given in **Appendix S**. Examples and explanatory notes are also given in this appendix. The verification statements are to be prepared in the proforma given in the appendix. All elements in all forecasts, such as, in TAF, TREND forecast, Forecast for take-off and Area/Local forecast in a month are to be verified on a near real time basis. The forecasts are to be verified as “correct” and “incorrect” only. In cases of amended forecasts, both the original forecast and the amended forecast are to be verified as two independent forecasts.

6.14.2 Verification of Route/ flight forecast shall be done by selecting 5 days on which some weather has occurred. If sufficient number of days with weather is not available, 5 days may be selected randomly. All the elements in all the Route/ Flight forecasts issued on these 5 days are to be verified.

6.14.3 Monthly statement of verification are to be sent by e-mail, by 10th day of the following month to CAMD.

6.14.4 A review of all forecasts on two days will be done at CAMD on a regular basis. For this, all the forecasts on two days in every month are to be forwarded to CAMD by e-mail along with the verification statement.

CHAPTER 7

SIGMET INFORMATION, AERODROME WARNINGS AND WIND SHEAR WARNINGS

7.1 SIGMET Information

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

7.1.2 In India, SIGMET messages shall be issued by the MWOs at Mumbai, Kolkata, New Delhi and Chennai for the Flight Information Regions served by their associated Flight Information Centres. These messages shall then be passed on to the FIC / ACC and it is the responsibility of the FIC / ACC to communicate the information to aircraft-in-flight.

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

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

7.1.5 SIGMET messages concerning volcanic ash cloud and tropical cyclones shall be based on advisory information provided by the designated VAACs and TCACs, respectively.

7.1.6. SIGMET messages shall be disseminated to meteorological watch offices, WAFCs, International OPMET data banks and to other meteorological offices. SIGMET messages for volcanic ash shall also be disseminated to VAACs.

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

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

7.2 Specification related to SIGMET information

7.2.1 Format of SIGMET messages

7.2.2 SIGMET messages shall be prepared in abbreviated plain language, using ICAO approved abbreviations. The format and example are indicated in the template given as **Appendix T.**

7.2.3 Messages containing SIGMET information shall be identified as: “SIGMET”.

7.2.4 The sequence number referred to in the template shall correspond with the number of SIGMET messages issued for the flight information region since 0001 UTC on the day concerned, e.g., “5” will be related to the fifth SIGMET message issued by MWO since 0001 UTC on the day concerned.

7.2.5 In accordance with the template, only one of the following phenomena shall be included in a SIGMET message, using the abbreviations as indicated below:

At cruising levels (irrespective of altitude):

Thunderstorm		
-	Obscured	OBSC TS
-	Embedded	EMBD TS
-	Frequent	FRQ TS
-	squall line	SQL TS
-	obscured with hail	OBSC TSGR
-	embedded with hail	EMBD TSGR
-	frequent, with hail	FRQ TSGR
-	squall line with hail	SQL TSGR
Tropical cyclone		
-	tropical cyclone with 10-minute mean surface wind speed of 34 kt or more	TC (+ cyclone name)
Turbulence		
-	severe turbulence	SEV TURB
Icing		
-	severe icing	SEV ICE
-	severe icing due to freezing rain	SEV ICE (FZRA)
Mountain wave		
-	severe mountain wave	SEV MTW
Duststorm		
-	heavy duststorm	HVY DS
Sandstorm		
-	heavy sandstorm	HVY SS
Volcanic ash		

-	volcanic ash	VA (+volcano name, if known)
radioactive cloud		

7.2.6 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 above shall be included. SIGMET information concerning thunderstorms or a tropical cyclone shall not include references to associated turbulence and icing.

7.2.7 Criteria related to phenomena included in SIGMET messages.

7.2.7.1 An area of Thunderstorms and cumulonimbus clouds shall be considered:

a) obscured (OBSC) if it is obscured by haze or smoke or can not 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).

7.2.7.2 An area of thunderstorms shall be considered frequent (FRQ) if within that area there is little or no separation between adjacent thunderstorms with a maximum spatial coverage greater than 75 per cent of the area affected or

forecast to be affected, by the phenomenon (at a fixed time or during the period of validity).

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

7.2.7.4 Hail (GR) shall be used as further description of the thunderstorm, as necessary.

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

7.2.7.6 Turbulence shall be considered:

a) severe whenever the peak value of the cube root of eddy dissipation rate (EDR) exceeds 0.7; and
b) moderate whenever the peak value of the cube root of eddy dissipation rate (EDR) is above 0.4 and below or equal to 0.7.

7.2.7.7 Severe and moderate icing (ICE) shall refer to icing in other than convective clouds. Freezing rain (FZRA) shall refer to severe icing conditions caused by freezing rain.

7.2.7.8 A mountain wave (MTW) shall be considered:

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

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

7.2.8 SIGMET information, which is received from other MWOs, shall also be passed on to the local FIC in addition to the SIGMET information for its own FIR.

7.2.8.1 For inclusion in the VOLMET/ D-VOLMET broadcast, an indication of NIL SIGMET shall be transmitted to concerned VOLMET broadcast centre if no SIGMET message is valid for the flight information region under consideration. However, such information shall not be issued in the SIGMET template and shall not be disseminated to international destinations.

7.2.9 Separate additional SIGMET messages shall be issued to local ATC units whenever required, in respect of “light or moderate hail” and “moderate icing” for the use of light aircraft. These are not disseminated outside the aerodrome of issue.

7.2.10 The elements, turbulence and icing are assumed normally to be associated with an active thunderstorm area, tropical revolving storm and severe line squall. They need not, therefore, be specifically mentioned when SIGMET information is issued for active thunderstorm area, tropical revolving storm and severe line squall. However, they have to be mentioned when actually observed or reported by aircraft or warrant special attention. Also the occurrence of heavy hail with thunderstorm shall be indicated. In tropical areas during periods when thunderstorm activity is a frequent occurrence, SIGMET information relating to that phenomenon need be given only for intense or widespread thunderstorms. However in the interest of safety of air navigation, radar echoes presumed to be of thunderstorms of 50KM or more in length shall also be reported in SIGMET messages unless there are indications that the echoes are dying. The echoes

need not be a complete and solid mass but even if existing with breaks through which it is dangerous for aircraft to fly, such echoes shall be reported.

7.3. Aerodrome Warnings

7.3.1. General

7.3.1.1 Aerodrome Warnings shall be issued by Aerodrome Meteorological Offices functioning during the hours of 'forecasting watch' and shall give the concise information of meteorological conditions, which could adversely affect aircraft on the ground, including parked aircraft and the aerodrome facilities and services. In respect of aerodromes with Aeronautical Meteorological Stations, these warnings shall be issued by the associated Aerodrome Meteorological Office, if there is prior requisition, for the issue of warnings.

7.3.1.2 Apart from the aerodrome warnings issued, warnings for gliders, light aircraft and helicopters shall be issued separately and shall also be appended to local forecast when wind speed is expected to reach 17KT or more. They are to be issued with the prefix "Warnings for Light Aircraft" in abbreviated plain language. If necessary, local forecasts issued earlier may be amended to include this warning.

7.3.1.3 Reduction in visibility and lowering of cloud base associated with the warning elements shall not be mentioned in warnings.

7.3.1.4 Aerodrome warnings are issued only for the local aerodrome as they are meant for protection of the aircraft parked and aerodrome facilities. Hence, these are not to be disseminated beyond the aerodrome of origin. However, whenever conditions for issue of the warnings are anticipated, suitable amendments are to be issued to the relevant aerodrome forecasts.

7.3.1.5 Aerodrome warnings are issued in respect of all aerodromes where Aerodrome Meteorological Offices are functioning during the hours of 'forecasting watch'.

7.3.1.6 The warnings are to be passed on to local ATS units for further dissemination over the aerodrome to the operators, etc.

7.3.1.7 The aerodrome warnings for the expected occurrence of the phenomena shall be issued at least half to one hour prior to the expected occurrence of the warning elements. The period of warning shall preferably be short, not exceeding 4 hours. If the phenomena are expected to continue for a longer time, a fresh warning may be issued suitably.

7.3.1.8 Aerodrome warnings shall be cancelled when the phenomena are no longer occurring or are no longer expected to occur at the aerodrome. For example, if a warning for TS, valid for 4 hrs is issued and the TS passes over the station rapidly and no longer expected, a cancellation message shall be issued as per the template.

7.3.2. Format and contents

7.3.2.1. The aerodrome warnings shall be issued in accordance with the template given in **Appendix U** and shall be disseminated to all concerned.

7.3.2.2 The sequence number referred to in the template shall correspond with the number of aerodrome warnings issued for the aerodrome since 0001UTC on the day concerned.

7.3.2.3 In accordance with the template, aerodrome warnings shall relate to the occurrence or expected occurrence of one or more of the following phenomena:

1. Tropical cyclone:

(To be included if the 10 minute mean surface wind speed at the aerodrome is expected to be 34kts or more)

2. Thunderstorm
3. Hail
4. Snow

   (including the expected or observed snow accumulation)

5. Freezing precipitation
6. Hoar Frost or rime
7. Duststorm
8. Sandstorm
9 Rising sand or dust
10 Strong surface wind and gusts:

   (a) Speed expected to reach 30 KT or more even in gusts
   (b) Direction change rapidly by 45 degrees or more, wind speed before and after expected to be 20 KT or more.

11. Squall:

    Whenever expected, the expected direction and speed shall be indicated.

12. Frost
13. Volcanic ash
14. Tsunami

7.3.2.4 The use of text additional to the abbreviations listed in the template in Table 1 shall be kept to a minimum. The additional text shall be prepared in abbreviated plain language using approved ICAO abbreviations and numerical values. If no ICAO approved abbreviations are available, English plain language text shall be used.

7.3.2.5 Verification of Aerodrome warnings:

The expected/ forecast occurrence of the warning elements is to be verified as per the criteria given in **Appendix V.**

7.4 Wind shear warnings

7.4.1 Wind shear warnings shall be prepared by Aerodrome Meteorological Offices. 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. The warnings shall be prepared and disseminated for aerodromes where wind shear is considered a factor for aircraft safety. 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) shall not be considered restrictive.

7.4.2 Wind shear warning for arriving aircraft and/or departing aircraft shall be cancelled when aircraft reports indicate that wind shear no longer exists, or alternatively after an elapsed time of two hours.

7.4.3 Detection of wind shear

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

a) ground-based wind shear remote-sensing equipment, for example, Doppler Radar;
b) ground-based, wind shear detection equipment, for example, a system of surface wind and/or pressure sensors located in an array monitoring a specific runway or runways and associated approach and departure paths;
c) aircraft observations during the climb-out or approach phases of flight to be made in accordance with the provisions of Aircraft Observations and Reports; or

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

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

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

7.4.4 Format and dissemination of wind shear warning

Note: Information on wind shear is also to be included as supplementary information in local routine and special reports and METAR and SPECI in accordance with the respective templates.

7.4.5 Wind shear warnings shall be issued in accordance with the template in **Appendix W** and shall be disseminated in accordance with local arrangements to those concerned. The sequence number referred to in the template shall correspond with the number of wind shear warnings issued for the aerodrome since 0001 UTC on the day concerned.

7.4.6 The use of text additional to the abbreviations given in the template shall be kept to a minimum. The additional text shall be prepared in abbreviated plain language using approved ICAO abbreviations and numerical values. If no ICAO approved abbreviations are available, English plain language text shall be used.

7.4.7 Where microbursts are observed, reported by pilots, or detected by ground-based, wind shear detection or remote-sensing equipment, the wind

shear warning shall include a specific reference to microburst, for example, “WS WRNG MBST APCH RWY 26”.

7.4.8 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, shall be disseminated unchanged in the warning, for example, “WS WRNG B747 REPORTED MOD WS IN APCH RWY 34 AT 1510”.

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

Note 2: Pilots, when reporting wind shear, may use the qualifying terms “moderate”, “strong” or “severe”, based to a large extent on their subjective assessment of the intensity of the wind shear encountered.

CHAPTER 8
AERONAUTICAL CLIMATOLOGICAL INFORMATION

8.1 General provisions

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

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

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

8.2 Aerodrome climatological tables

8.2.1 Arrangements shall be made for collecting and retaining the necessary observational data and shall:

a) prepare aerodrome climatological tables for each regular and alternate international aerodrome; and
b) make available such climatological tables to an aeronautical user within a time period as agreed between the meteorological authority and that user.

8.3 Aerodrome climatological summaries

8.3.1 Aerodrome climatological summaries shall follow the procedures prescribed by the World Meteorological Organisation. The summaries shall be prepared using the model specified by the World Meteorological Organisation, and shall be published and kept up to date as necessary.

8.4 Copies of Meteorological Observational Data

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

8.5 Processing of Aeronautical climatological information

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

8.6 Exchange of Aeronautical climatological information

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

8.7 Content of Aeronautical climatological information

8.7.1 Aerodrome climatological tables

8.7.1.1 An aerodrome climatological table shall give:

a. Mean values and variations there from, including maximum and minimum values, of meteorological elements (for example, of air temperature); and /or

b. The frequency of occurrence of present weather phenomenon 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).

8.7.1.2 Aerodrome climatological tables shall include the information required for the preparation of aerodrome climatological summaries in accordance with 8.7.2

8.7.2 Aerodrome climatological summaries

8.7.2.1 Aerodrome climatological summaries shall cover:

a) frequencies of 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 height of 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 $5^{o}C$ at specified times; and

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

CHAPTER 9
SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

9.1 General Provisions

9.1.1 Aviation Meteorological Offices in India shall supply meteorological information to operators and flight crewmembers for:

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

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

9.1.3 Meteorological information supplied to operators and flight crewmembers shall be up to date and include the following information:

(a) forecasts of
    1) Upper wind and upper air temperature;
    2) flight level and temperature of tropopause;
    3) direction, speed and flight level of maximum wind; and
    4) SIGWX phenomena

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

displayed

(b) METAR and SPECI (including trend forecasts) 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, those not already used in the preparation of SIGMET;

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

(g) area forecast/ local forecast;

(h) aerodrome warnings for local aerodrome;

(i) meteorological satellite images; and

(j) ground- based weather radar information

9.1.4 Forecasts listed under 9.1.3 a) for supplying to international flights 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.

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

9.1.6 Charts generated from the digital forecasts provided by the WAFCs shall be made available, for fixed areas of coverage as specified by ICAO.

9.1.7 Where necessary, AMOs shall obtain reports and forecasts of other AMOs using auto retrieval methods from IMD's AMSSs and Regional OPMET Data Banks. If reports and forecasts are required on permanent basis, IMD's HQ office will coordinate with other concerned state authority.

9.1.8 The required information shall be supplied at the location of the meteorological office. The service shall normally be confined to flights originating within the country.

9.2 Means of supply and format of Meteorological information

9.2.1 Meteorological information shall be supplied to operators and flight crew members by one or more of the following, 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; or
e) display.

9.2.2 On-Line Briefing System (OLBS)

At the AMOs, the briefing is being provided through a web-based system, known as On-Line Briefing System (OLBS). The facility for operators and aircrew members to consultation, as necessary, with the meteorological office is also available at these offices.

9.2.3 The contents of OLBS are: (i) wind and temperature forecast charts for flight levels 50,100, 140, 180, 240, 300, 340, 390, 450, and 530, (ii) TAF of 9 hour and 30 hour validity, (iii) SIGWX Charts (National and WAFC), (iv) METAR of major airports, (v) Satellite image, Synoptic features, Route forecast in T3 format for low level flights, Local forecast/ Area forecast for all the airports in the FIR, Radar products, Take-off Data, and SIGMET Warnings.

9.2.4 Data for determination of the lowest usable flight level may also be supplied on request.

9.3 Information for operators for pre-flight planning and for in-flight re-planning

9.3.1 Meteorological information for pre-flight planning and in-flight re-planning by operators shall include any or all of the following, as required:

(a) current and forecast: upper winds, upper-air temperatures;

(b) tropopause height and temperature, and direction, speed and height of maximum wind;

(c) existing and expected significant en-route weather phenomena, jet stream information and amendments thereto;

(d) a forecast for take-off;

(e) METAR and, where available SPECI (including trend forecast) for the aerodrome of departure, take-off and en-route alternate aerodromes, the aerodrome of intended landing and destination alternate aerodromes;

(f) TAF and amendments thereto for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;

(g) SIGMET information and special air-reports relevant to the whole of the routes concerned, which are not already used in preparation of SIGMET.

(h) Volcanic ash and tropical cyclone advisory information relevant to the flight.

9.3.2 The upper wind and upper-air temperature information and the significant en-route weather information for pre-flight planning and in-flight re-planning by operators shall be supplied as soon as it becomes available, but not later than 3 hours before departure. Other meteorological information requested for pre-flight planning and in-flight re-planning by operators shall be supplied as soon as is practicable.

9.3.3 Meteorological information on pre-flight planning and in-flight re-planning by operators of helicopters flying to offshore structures shall include data covering the layers from the sea level to flight level 100.

9.4 Briefing, Consultation and Display

9.4.1 Briefing and/or consultation shall be provided on request, to flight crew members and/or other flight operations personnel. The purpose of briefing is 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 as relevant, either to explain and amplify the information contained in the flight documentation or in lieu of flight documentation.

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

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

9.4.4 The required briefing, consultation, display and/or flight documentation shall normally be provided by the Aerodrome Meteorological Office at the aerodrome of departure. If the meteorological office at the aerodrome of departure happens to be an Aeronautical Meteorological Station, that office will provide necessary flight documentation after obtaining the same from the associated Aerodrome Meteorological Office.

9.4.5 If an aircraft makes a stop at aerodromes at which briefing and documentation are not normally available for the flight, the following procedures will be followed:

a) If the meteorological office at such stop happens to be an Aerodrome meteorological office, it shall make available to the flight crew the most recent aerodrome forecasts available relevant to the flight and the most recent meteorological reports available relevant to the continuation of the flight. If fresh briefing and documentation is requested by the flight crew due to the delay in flight, etc., the meteorological office shall prepare and supply necessary documentation and provide briefing.

b) If the meteorological office at such halt happens to be an Aeronautical Meteorological Station, it shall make available the most recent meteorological reports available relevant to the continuation of the flight; if documentation is requested the same may be obtained from the associated Aerodrome Meteorological Office and provided.

9.4.6 The flight crew member or other flight operations personnel for whom briefing, consultation and/or flight documentation has been requested shall visit the meteorological office in person for receiving the necessary meteorological briefing three hours prior to the scheduled time of departure. Where local circumstances at an aerodrome make personal briefing or consultation not practicable, the meteorological office shall provide those services by telephone or other suitable telecommunication facilities.

9.4.7 Specific needs of low-level flights

Briefing and/or consultation for low-level flights including those in accordance with the visual flight rules, shall include meteorological information covering altitudes up to flight level 100 (or up to flight level 150 in mountainous areas or higher, when necessary). Particular mention shall be made of the occurrence or expected occurrence of any phenomena causing widespread

reduction of visibility to less than 5000 m, as well as the occurrence or expected occurrence of clouds, which may affect the flight. Information from relevant SIGMET message also may be provided.

9.5 Information required to be displayed

9.5.1 To assist the flight crewmembers and others concerned with the preparation of the flight and for use in briefing and consultation, the meteorological office shall display the latest available information as given in para 9.1.3 for ready access to the users.

9.6 Flight documentation

9.6.1 Flight documentation shall cover the whole route to be flown and comprise information listed below:

a) forecasts of:
   1) Upper wind and upper air temperature;
   2) SIGWX phenomena

b) METAR and SPECI (including trend forecasts) 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) SIGMET information, and appropriate special air-reports relevant to the whole route, those not already used in the preparation of SIGMET;

(e) volcanic ash and tropical cyclone advisory information relevant to the whole route (the information received from other meteorological offices shall be included in flight documentation without change); and

(f) area forecast/ local forecast;

9.6.2 METAR, SPECI, TAF, and SIGMET received from other meteorological offices shall be included in flight documentation without change.

9.6.3 The forms and the legend of charts included in flight documentation should be printed in English. Where appropriate, approved abbreviations shall be used. The units employed for each element shall be indicated.

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

9.6.5 Flight documentation shall normally be supplied as shortly before departure as is practicable. The documentation is to be handed over only to DGCA certified Flight Dispatcher/ Pilots.

9.6.6 For flight documentation of international flights, meteorological offices shall provide information received within the framework of WAFS. The flight documentation for national flights shall be presented in the form of charts, tabular forms or abbreviated plain language texts. TAF shall be presented in code form or abbreviated plain language texts. Examples of WAFC SIGWX Chart and upper air wind and temperature forecast are given in **Appendices X (i)** to **X (iii)**. Examples of route forecast in Met-T4 and Met-T3 forms and in ROFOR code form are given as **Appendix Y**. Examples of national SIGWX charts are given as **Appendix Z(i) and Z(ii)**.

9.6.7 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.

9.6.8 Whenever necessary and possible, the flight documentation shall be brought up-to-date, in writing or orally, before it is supplied to flight crewmembers. In cases where a need for amendment arises after flight documentation has been supplied, and before take-off of the aircraft, the meteorological office shall issue the necessary amendment or updated information to the operator or to the local air traffic services unit, for transmission to the aircraft.

9.6.9 Retention of Documentation

The meteorological offices shall retain information supplied to flight crewmembers as printed copies and as computer files, for a period of at least 180 days from the date of issue. This information shall be made available, on request, for inquiries or investigations and, for these purposes, shall be retained until the inquiry or investigation is completed. Log in details of briefing provided through OLBS is also to be retained in hard copy form as well as in the form of computer files.

9.6.10 Set of charts to be provided

9.6.10.1 The minimum number of charts for international flights between flight level 250 and flight level 630 shall include a high-level significant weather 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 based on the user's requirement.

9.6.10.2 Charts to be provided shall be generated from the digital forecasts provided by the WAFCs whenever these forecasts cover the intended flight path in respect of time, altitude and geographical extent.

9.6.11 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 be expressed in flight levels; or, for low-level flights, height above ground level; and

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

9.7 Procedures for supply of documentation

(a) for all international flights originating from AMOs, documentation shall be supplied in chart form, as obtained from WAFC. Chart form of documentation shall also be supplied to international flights originating from airports served by AMSs by obtaining the same from the associated AMOs.

(b) for all national flights documentation shall be supplied as follows:

i) For all national flights, national SIGWX charts along with WAFC upper wind and temperature charts shall be provided wherever FAX/ internet facility is available. At other stations, documentation shall be provided in Met.T-3 form for flights of 500 nautical miles or less and in Met.T-4 form for flights exceeding 500 nautical miles.

ii) For all services the forecasting office at the starting station shall provide documentation and briefing up to the next aerodrome of landing where a forecasting office (Civil/IAF) is functioning. The forecasting offices at such intermediate halts shall in turn, provide fresh briefing and documentation. For such of these flights whose duration of halt at intermediate stations is 75 minutes or less, through documentation and briefing, shall be provided by the forecasting offices at the starting station. Aviation Meteorological Offices at intermediate halts need not provide fresh documentation for such flights.

iii) Aviation Meteorological Offices at intermediate halts shall supply to the local air traffic control units, METARs/SPECIs of stations ahead on the route up to a distance of 2 hours flying time, so that the ATC can

transmit these observations directly to the aircraft. The required current weather observations shall be obtained on the departmental telecommunication channels and also on AFTN under DD priority.

iv) Briefing shall be provided by all the forecasting offices at intermediate halts whenever requested irrespective of whether documentation is provided or not as per preceding paragraphs.

v) Wind and temperature data required for flight planning purposes shall be provided by the starting station for the entire route as required.

vi) Forecasting offices at intermediate halts where documentation is provided may also supply flight planning information, if required, for the subsequent portion of the flight.

vii) Flight planning data shall be supplied for the levels specified by the different airlines for the different types of aircraft. Winds and temperature shall also be given for these levels in flight forecasts.

viii) For flights starting from an aerodrome with an Aerodrome Meteorological Office and returning from another aerodrome with an Aerodrome Meteorological Office, briefing and documentation for return flight also shall be provided by the Meteorological Office at the starting aerodrome. If the duration of the flight is covered by the validity period of WAFC products or the validity period of the national significant weather charts, fresh briefing or documentation need not be supplied to the aircraft for the return flights if the halt at the aerodrome is less than 75 minutes. However, briefing shall be provided at the aerodrome of return flight whenever requested by pilots.

Pilots are advised to get latest weather of the destination airport before they commence their return flight.

(c) Documentation shall be provided as follows in respect of flights terminating at aerodromes with aeronautical meteorological stations and returning from these as new flights:

i) Aerodrome meteorological offices at the starting stations shall provide through documentation for the return flight also if the flights are operating within the same region.

ii) In case of delayed flights, if sufficient notice is available the documentation for the return flight may be sent by ROFOR. If the station is connected by internet or has FAX facility, chart form of documentation may be provided after obtaining the same from the associated AMO.

iii) In case of flights for which ROFOR based on a later chart than the one on which the original forecast was based can be sent to the concerned aeronautical meteorological station for the return flight, the documentation shall be based on the latest ROFOR.

d) In case of flights originating in one region and terminating in another region, and starting from there as new flights, the documentation shall be provided on the basis of ROFOR/ national SIGWX charts and WAFC upper air wind and temperature charts supplied by the associated Aerodrome Meteorological Office in the region.

e) For all flights, an outlook of weather from the destination to one designated alternate shall be supplied along with the documentation, on request.

9.7.1 In respect of aircraft flights for which adequate notice is not available for preparation of necessary documentation, and in such cases where the flight crew insists on meteorological briefing without documentation, the following procedure shall be followed:

(1) The briefing shall cover the chief features of weather affecting the flight (including visibility, clouds, upper winds and temperature as required). All available METARs / SPECIs / RAREPs / SIGMETs etc. pertinent to the flight shall be shown to the crew receiving briefing.

(2) The details of briefing given as above shall be recorded under the heading “Main points of briefing”, in the briefing register in the column ‘Briefing Notes’.

(3) The briefing notes shall be recorded in the presence of the aircrew receiving briefing, who shall be requested to sign against the notes, in the appropriate column in the briefing register.

(4) The clearance form shall be signed by the Duty Officer with the remarks “Briefed Captain/Mr. ……. Documentation not provided for want of adequate notice”.

However, such oral briefings may be avoided as far as possible.

9.7.2 Flight Documentation: Upper wind and upper air temperature information for national flights

9.7.2.1 The upper wind and temperature forecast charts issued by WAFC shall be used along with the national SIGWX charts for the documentation of flights other than international flights.

9.7.2.2 In Tabular and Cross Section forms of forecasts, upper wind and upper air temperature information shall be given for the levels specified by the

operators, for not more than five levels. This information shall be given for route segments. Upper wind and upper air temperature charts for low level flights shall be supplied for points separated by not more than 500 km (300NM) and for atleast the following altitudes:

600, 1500 and 3000m (2000, 5000 and 10000 ft).

9.7.3 Flight Documentation: National significant weather charts

9.7.3.1 As a national practice IMD will produce a single SIGWX chart for the medium level (between FL 100 and FL 250) and for high level (between FL 250 and FL 630).

9.7.3.2 At present, all the MWOs are to prepare the SIGWX charts for their respective FIRs in respect of cloud areas and weather systems, and transmit to MWO Chennai, where the four charts shall be compiled for making a single chart. The input has to go to MWO Chennai within 6 hrs of the observation time.

9.7.3.3 Inclusion of 0 deg isotherm is necessary in the medium level chart.

9.7.3.4 The charts shall be prepared four times a day based on 00, 06, 12 and 18 UTC observations. The charts shall be issued 09 hours after the observation time. i.e. a chart based on 06 UTC observations will be issued and will be available for use by 1500 UTC.

9.7.3.5 The charts will have a validity of 24 hrs. The issue time and validity of the national SIGWX charts will be as follows:

Time of observation (UTC)	Time issue of chart (UTC)	Valid
00	09	00 of next day
06	15	06 of next day

12	21	12 of next day
18	03	18 of next day

9.7.3.6 All Height indications will be in Flight Levels and the wind speeds will be in Knots.

9.7.3.7 Contents of the National SIGWX charts

The elements to be included in the high-level and medium-level SIGWX forecasts are as follows:

a) tropical cyclone, provided that the maximum of the 10-minute mean surface wind speed is expected to reach or exceed 63 km/h (34kt);

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);

Note: Non-convective cloud areas associated with in-cloud moderate or severe turbulence and/or moderate or severe icing are to be included in the SIGWX forecasts.

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

j) Information on the location of an accidental release of radioactive materials into the atmosphere, of significance to aircraft operations

9.7.3.8 Criteria for including items in SIGWX forecasts

The following criteria shall be applied for high-level and medium level SIGWX forecasts:

a) items a) to f) in 9.7.3.7 shall only be included if expected to occur between the lower and upper level of the SIGWX forecast;

b) the abbreviation ‘CB’ shall only be included when it refers to the occurrence or expected occurrence of cumulonimbus clouds:
   1) affecting an area with a maximum spatial coverage of 50 percent or more of the area concerned; *(i.e. OCNL and FRQ)*
   2) along a line with little or no space between individual clouds (*SQL)*; or
   3) embedded in cloud layers *(EMBD)* or concealed by haze *(OBSC)*.

c) 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;

d) where a volcanic eruption or an accidental release of radioactive materials into the atmosphere warrants the inclusion of the volcanic activity symbol or the radioactivity symbol in SIGWX forecasts, the symbols shall be included on high-level and medium level SIGWX forecasts irrespective of the height to which the ash column or radioactive material is reported or expected to reach; and

e) in the case of co-incident or the partial overlapping of items a), i) and j) in 9.7.3.7, the highest priority shall be given to item i), followed by 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.

Note: Notations used in flight documentation are given in **Appendix AA.** Some useful ICAO abbreviations are given in **Appendix AB.**

9.7.3.9 Amendments to National SIGWX charts

9.7.3.9.1 Amendments/ alterations to the final national SIGWX chart prepared by MWO Chennai shall not be done by the individual offices. Amendments to significant weather chart could be made only if the following criteria are satisfied. Anticipated changes in the significant

weather forecast shall be communicated to MWO Chennai by respective MWOs and MWO Chennai will issue an amended chart.

a) *Aircraft icing and turbulence:* Newly expected occurrence; error in expected position of phenomena; intensity increasing; intensity decreasing from severe to light or nil, or from moderate to nil.

b) *Jet streams:* Newly expected occurrence or disappearance; error in expected position greater than 400 km; error in speed greater than 20 per cent; error in core height greater than 900 m (3000 ft.)

c) *Other significant en-route weather phenomena:* Newly expected occurrence; no longer expected.

9.7.3.9.2 In view of the difficulties in preparing and reissuing a chart, care shall be taken to keep the requests for amendments to a minimum.

9.7.4 Flight Documentation: Tabular and Cross Section form of forecasts (Met.T-3 or Met.T-4 form)

9.7.4.1 In flight documentation provided in Met. T-4 form the following information appropriate to the flight shall be included:

(a) significant features of synoptic situation;
(b) significant en-route weather phenomena (as specified in Para 9.7.4.3);
(c) clouds (amount and type of cloud);
(d) upper winds and upper air temperature information;
(e) surface pressure data, if required;
(f) height of 0^{o} Celsius isotherm;
(g) tropopause;
(h) surface visibility (only for flights below FL100).

9.7.4.2 In flight documentation provided in Met. T-3 form, the information given in flight forecasts will include:

(a) significant features of synoptic situation,
(b) significant weather as specified in Para 9.7.4.3;
(c) cloud (amounts, types and heights of bases and tops);
(d) surface visibility;
(e) surface pressure data, if required;
(f) height of 0^{o} Celsius isotherm;
(g) upper winds and upper air temperature information;
(h) general outlook

9.7.4.3 Information on significant weather included in Met T-4 and Met T-3 forms shall relate to the occurrence of:

1. *For high level flights*
   (a) thunderstorm
   (b) tropical cyclone
   (c) squall line
   (d) Hail
   (e) moderate or severe turbulence in cloud or clear air
   (f) marked mountain waves and associated downdraft
   (g) moderate or severe aircraft icing
   (h) freezing precipitation
   (i) widespread sandstorm/duststorm
2. *For low level flights (up to FL100)*
   (a) thunderstorm
   (b) tropical cyclone
   (c) squall line
   (d) Hail

(e) moderate or severe turbulence in cloud or clear air

(f) mountain waves and associated downdrafts

(g) aircraft icing

(h) freezing precipitation

(i) widespread sandstorm/dust storm

(j) fog

(k) precipitation

(l) other phenomena causing widespread reduction of visibility to less than 5000 meters.

9.7.5 Flight documentation: Aerodrome forecasts

9.7.5.1 The flight documentation shall in all cases include aerodrome forecasts for the aerodrome of departure, the destination aerodrome and for take-off, en-route and destination aerodromes and alternates.

9.7.5.2 The period of validity of the aerodrome forecast shall cover at least one hour before ETA at the destination and 2 hours after the ETA at the farthermost alternate.

9.7.5.3 Aerodrome forecasts received from other meteorological offices shall be included in flight documentation without change in substance.

9.7.5.4 A Meteorological Office providing documentation shall make all practicable efforts to obtain the forecasts from the office of issue. If the forecast is still not received, a provisional forecast shall be prepared by that office and included in the documentation. The aviation meteorological office shall inform the flight crew that the forecast is provisional and the fact shall be recorded in the aerodrome forecast form.

9.7.5.5 The aerodrome forecast included in all documentation in tabular or cross section form shall be in the abbreviated plain language form. Those included in chart form of documentation may be either in the abbreviated plain language form or in TAF code form.

9.8 Information for aircraft in flight

9.8.1 Meteorological information for use by aircraft in flight shall be supplied by a meteorological office to its associated air traffic services unit and through VOLMET/ D-VOLMET broadcasts. VOLMET/ D-VOLMET broadcasts are made only at Mumbai and Kolkata. Details of VOLMET/ D-VOLMET broadcasts are given in Para 11.15.1.

9.8.2 Supply of information requested by an aircraft in flight

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

9.8.3 Information for in-flight planning by the operator

Meteorological information, for planning by the operator for aircraft in-flight shall be supplied, on request, during the period of the flight and shall normally include any or all of the following:

(a) METAR and SPECI (including trend forecasts);
(b) TAF and amended TAF;
(c) SIGMET information and Special Air Reports relevant to the flight, which is not covered by a SIGMET message; and
(d) upper wind and upper air temperature information.
(e) volcanic ash and tropical cyclone advisory information

CHAPTER 10

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

10.1 Information for air traffic services units

10.1.1 All Aerodrome Meteorological Offices and Aeronautical Meteorological Stations shall after coordination with the air traffic services unit, supply, or arrange to supply of up-to-date meteorological information to the unit as necessary for the conduct of its functions**.**

10.1.2 Associated meteorological office for an aerodrome control tower or approach control office shall be an aerodrome meteorological office.

10.1.3 The four Meteorological Watch Offices at Mumbai, Delhi, Kolkata and Chennai will act as the associated meteorological office for their respective Flight Information Centers.

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

10.1.5 Information to be provided for Air Traffic Services Units

10.1.5.1 List of information for the aerodrome control tower

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

(a) local routine and special reports, additional reports, METAR and SPECI, TAF and trend forecasts and amendments thereto, for the aerodrome concerned;

(b) SIGMET information, wind shear warnings and aerodrome warnings;

(c) Any additional meteorological information required, such as reports for take-off or 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.

(e) Information received on pre-eruption volcanic activity and/or a volcanic eruption.

NOTE: If the associated meteorological office is an aeronautical meteorological station, information supplied will be limited to:

Local routine and special reports, additional reports, METAR and SPECI, reports for landing and take-off on request and aerodrome warnings, if any, available for the aerodrome concerned.

10.1.5.2 List of information for the Approach Control units

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

(a) Local routine and special reports, additional reports, METAR and SPECI (including current pressure data), TAF and trend forecasts and amendments thereto, for the aerodromes with which the approach control unit is concerned;

(b) SIGMET information, wind shear warnings and appropriate special air-reports for the airspace with which the approach control unit is concerned and aerodrome warnings;

(c) Any additional meteorological information like landing/take-off reports;

(d) Information received on volcanic ash cloud for which a SIGMET has not already been issued.

(e) Information received on pre-eruption volcanic activity and/or a volcanic eruption.

10.1.5.3 List of information for the Flight information centre and area control center

The following meteorological information shall be supplied, as necessary, to a flight information center or an area control center by its associated Meteorological Watch Office:

(a) METAR and SPECI, including current pressure data for aerodromes and other locations, TAF and trend forecasts and amendments thereto, covering the flight information region or the control area and, if required by the flight information centre or area control center, covering aerodromes in neighbouring flight information regions;

(b) Forecasts of upper winds, upper-air temperatures and significant en-route weather phenomena and amendments there to, particularly those which are likely to make operation under visual flight rules impracticable, SIGMET information and appropriate special air-reports for its own FIR or control area and, if required by the flight information center or area control center, for the neighboring FIRs;

(c) Any other meteorological information required by the flight information centre or area control centre to meet requests from aircraft in flight; if the information requested is not available in the associated meteorological watch office, that

office shall request the assistance of another meteorological office in supplying it;

(d) Information received on volcanic ash cloud for which a SIGMET has not already been issued.

(e) Information received concerning the accidental release of radioactive materials into the atmosphere.

(f) Tropical cyclone advisory information issued by a TCAC in its area of responsibility;

(g) Volcanic ash advisory information issued by a VAAC in its area of responsibility; and

(h) Information received on pre-eruption volcanic activity and/or a volcanic eruption.

10.1.5.4 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 flight information center or the area control center.

10.1.5.5 Format of information

Local routine and special reports, METAR and SPECI, additional reports, TAF and trend forecasts and SIGMET information, upper wind and upper-air temperature forecasts and amendments thereto shall be supplied to air traffic services units in the form in which they are prepared, disseminated to other meteorological offices or received from other meteorological offices.

10.2 Information for search and rescue units

The meteorological watch offices at Mumbai, Kolkata, New Delhi and Chennai, shall supply search and rescue units with the meteorological information they

require and maintain liaison with the search and rescue services unit throughout a search and rescue operation.

10.2.1 List of information

Information shall be supplied by Meteorological Watch Offices regarding meteorological conditions that existed in the last known position of a missing aircraft and along the intended route of that aircraft with particular reference to:

(a) significant en-route weather phenomena;
(b) cloud amount and type, particularly cumulonimbus, height indications of tops and bases;
(c) visibility and phenomena reducing visibility;
(d) surface wind and upper wind;
(e) state of ground, in particular, any snow cover or flooding;
(f) state of the sea, ice cover if any and ocean currents, if relevant to the search area; and
(g) sea- level pressure data.

10.2.2 Information to be provided on request

10.2.2.1 On request from the rescue coordination centre, the Meteorological Watch Office shall arrange to obtain details of the flight documentation, which was supplied to the missing aircraft, together with any amendments to the forecast, which were transmitted to the aircraft in flight.

10.2.2.2 To facilitate search and rescue operations, the MWO shall 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.

10.2.2.3 On request from the rescue coordination centre the MWO shall supply, or arrange for the supply of meteorological information required by ships undertaking search and rescue operations.

10.3 Information for aeronautical information services units

The aviation meteorological offices, in co-ordination with the civil aviation authority, shall arrange for the supply of up-to-date meteorological information to aeronautical information services units, for the conduct of their functions.

10.3.1 List of information

10.3.1.1 The following information shall be supplied, as necessary, to an aeronautical information services unit:

a) information on meteorological service for national and international air navigation, intended for inclusion in the Aeronautical Information Publication India;

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 relevant NOTAM.

ii) the occurrence of volcanic activity; (as per Para 3.3.3 (i) and 4.9.10); and

iii) accidental release of radio active materials into the atmosphere, (as per 3.3.3(j)); 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.

CHAPTER 11

Communication

11.1 All meteorological information required for service to Air Navigation in India shall be exchanged over the aeronautical fixed services channels maintained by the Civil Aviation Department in India. For the exchange of non-time critical operational meteorological information, the public internet, subject to availability and satisfactory operation.

11.2 No meteorological messages including METAR are to be passed on telephone to airlines operators/ users as the method is prone to errors. Users may be requested to log-in to IMD's On-Line Briefing System or may access the AAI's communication system for getting the latest meteorological information. However, in case of emergencies and if the latest METAR is not available in the above systems, the information may be given on telephone. All AMOs and AMSs shall monitor and ensure the availability of latest meteorological information in all the aviation communication systems.

11.3 In order to reduce mistakes in the meteorological messages, the station-in-charge shall make sure that the scrutiny of the meteorological messages is carried out routinely and appropriate corrective actions are taken. As far as possible, the station-in-charge/ aviation unit-in-charge shall make random check of the messages before dissemination.

11.4 In addition to exchange over AAI AFTN channels, the meteorological information shall also be exchanged among the concerned meteorological offices over the Automatic Message Switching System (AMSS), and other departmental telecommunication channels, such as, Telefax , internet etc.

11.5 WAFC products are disseminated to different meteorological offices through AMSS where available and in other meteorological offices through Internet or fax.

11.6 The meteorological information is exchanged locally over the aerodrome with the ATS units through one of the following methods:

i) AAI T/P drop circuit;
ii) Local Computer Network;
iii) Computer based display system;
iv) Telephone or Telefax; and
v) Messenger.

11.7 At every aerodrome in India, weather reports of alternates are to be obtained as a routine for each scheduled flight during a period of 2 hrs prior to ETA and 1 hr after ETA and these reports are to be made available to the ATC whenever the weather conditions at the airfield or its alternates are below minima. These reports shall normally be obtained over AFTN and the departmental telecommunication channels. In cases where efforts to obtain the reports on these channels fail, the AAI HF/RT channels and direct speech circuits shall be utilised for obtaining the required reports.

11.8 Meteorological information for airline operators will normally be made available at the location of the meteorological office. However at places where airlines are connected with the AAI T/P subscriber system or they have made arrangements for independent T/P connection or computer network connection with the meteorological office, the meteorological messages will be transmitted by these systems.

11.9 Required transit times of meteorological information

AFTN messages and bulletins containing operational meteorological information should achieve transit times of less than the following:

<table>
<tr><td colspan="2">SIGMET messages, volcanic ash and tropical cyclone advisory information and special air-reports</td><td>5 minutes</td></tr>
<tr><td colspan="2">Abbreviated plain-language amendments to significant weather and upper air forecasts</td><td>5 minutes</td></tr>
<tr><td colspan="2">Amended TAF and corrections to TAF</td><td>5 minutes</td></tr>
<tr><td>METAR</td><td rowspan="4">0-900 km
(500 NM)

more than 900 km
(more than 500 NM)</td><td rowspan="4">5 minutes

10 minutes</td></tr>
<tr><td>Trend forecasts</td></tr>
<tr><td>TAF</td></tr>
<tr><td>SPECI</td></tr>
</table>

11.10 Filing time of bulletins

Meteorological bulletin required for scheduled transmission over AFTN shall be filed regularly and at the prescribed scheduled times. METARs shall be filed for transmission not later than 5 minutes after the actual time of observations. 30 hour TAFs for international dissemination shall be filed for transmission one hour before the commencement of their period of validity.

11.11 Heading of bulletins

Meteorological bulletins containing operational meteorological information to be transmitted via the aeronautical fixed service facilities 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 date-time group; and

(d) if required, a three-letter indicator.

11.11.1 The identifier shall consist of four letters and two figures:

(a) first and second letters: data type designator;

(b) third and fourth letters: geographical designator;

(c) two figures: used to differentiate two or more meteorological bulletins which contain data in the same code and which originate from the same geographical area and have the same originating centre.

11.11.2 The date-time group shall consist of six figures with the first two figures indicating the day of the month and the following four figures indicating:

(a) for METARs / SPECIs, the time of observation in UTC;

(b) for aerodrome, route and area forecasts, the full hour in UTC (the last two digits shall always be 00) preceding the transmission time; for other forecasts, the standard time of observation in UTC on which the forecast is based;

(c) for other meteorological bulletins, such as SIGMET information, the time of origin in UTC of the text of the bulletin.

11.11.3 The three-letter indicator will identify delayed, corrected and amended meteorological bulletins as below:

RRA delayed bulletins

CCA corrected bulletins

AAA amended bulletins (check from the ICAO state letter)

If additional delayed, corrected or amended bulletins are necessary, they shall be identified by RRB, RRC, etc.; CCB, CCC, etc.; and AAB, AAC, etc.;

For these bulletins, the remainder of the heading shall be that of original bulletin.

11.11.4 WMO Headers used in India:

Message type	Originated by	WMO Heading TTAAii CCCC	Remarks
Tropical Cyclone Advisory	TCAC New Delhi	FKIN20 VIDP FKIN21 VIVP	Bay of Bengal Arabian Sea
Volcanic Ash Advisory	VAAC Darwin	FVAU01-06 ADRM	nil
TC SIGMET	MWOs	WCIN31	ICAO location indicator of MWO to be added appropriately
VA SIGMET	MWOs	WVIN31	-do-
WS SIGMET	MWPs	WSIN31	-do-
METAR	VABB VIDP VECC	SAIN31 SAIN32 SAIN33	SAIN31 Includes Chennai region also
SPECI		SPIN	
TAF	VABB	FTIN31 FTIN32	Mumbai, Kolkata& Delhi region TAFs of Chennai region & neighbouring countries

11.12 Structure of bulletins

Meteorological bulletins containing operational meteorological information to be transmitted via the aeronautical fixed telecommunication network (AFTN) shall be encapsulated in the text part of the AFTN message format.

11.13 Priorities for dissemination and filing time of reports over AAI AFTN

11.13.1 Priority for dissemination

Sl. No.	Message Types	Priority indicator
1	SIGMET information, special air-reports, AIRMET messages, volcanic ash and tropical cyclone advisory information and amended forecasts (Flight safety messages)	FF
2	Messages concerning forecasts, e.g. terminal aerodrome forecasts (TAFs), area and route forecasts (Meteorological Messages)	GG
3	Messages concerning observations and Reports, e.g. METAR, SPECI (Meteorological Messages)	GG
4	Messages concerning NOTAMs and SNOWTAMs (Aeronautical information services (AIS))	GG

Messages requesting information shall take the same priority indicator as the category of message being requested except where a higher priority is warranted for flight safety.

11.13.2 Order of priority

The messages with priority indicator FF shall be given higher priority than the messages with priority indicator GG in the aeronautical fixed telecommunication network.

11.14 World Area Forecast System

11.14.1 Where WAFS products are disseminated in chart form, the quality of the charts received shall be such as to permit reproduction in a sufficiently legible form for flight planning and documentation. Charts received shall be legible over 95 percent of their area.

11.15 Contents of VOLMET Broadcasts

11.15.1 VOLMET broadcasts are made at Mumbai and Kolkata and contain current aerodrome reports with appended trends, aerodrome forecasts and SIGMETs as detailed below in the specified order:

MUMBAI	**KOLKATA**
SIGMETs of	**SIGMETs of**
Mumbai	Kolkata
Chennai	Delhi
SPECI/ METAR of	**SPECI/ METAR of**
Mumbai	Kolkata
Ahmedabad	Delhi
Chennai	Dhaka
Colombo	Yangon
Karachi	Katmandu
Male	
TAFs of	**TAFs of**
Mumbai	Kolkata
Colombo	Delhi
Male	Ho-Chi-Minh

METARs include QNH / TEMP/ DP/ Trend Forecasts.

11.15.2 The SIGMET message shall be transmitted at the beginning of the broadcast or of a five-minute time block. An indication of '**NIL SIGMET'** shall be transmitted if no SIGMET message is valid for the flight information regions concerned.

11.15.3 When a report has not been received from an aerodrome in time for a broadcast, the latest available report shall be included in the broadcast together with the time of observation.

11.15.4 TAF included in scheduled VOLMET broadcasts shall have a period of validity of 9 hours; they shall be issued every 3 hours and shall be amended as necessary to ensure that a forecast, when transmitted, reflects the latest opinion of the meteorological office concerned.

APPENDIX

Appendix A

List of registers to be maintained by different types of offices

	Registers/ log books			
Sl. No.		MWO	AMO	AMS
1	Accident register	X	X	X
2	Registers for noting lapses, deficiencies, procedural mistakes etc.	X	X	
3	Current Weather Register	X	X	X
4	Briefing Register	X	X	X
5	De-briefing Register	X	X	
6	Aviation Action Diary (Routine)	X	X	
7	Aviation Action Diary (Non- Routine)	X	X	
8	In-flight and Post-flight report register	X	X	
9	Aviation Log book	X	X	X
10	FIR Warning/ SIGMET Register	X		
11	Aerodrome Warning Register	X	X	
12	Register for coded ROFORs, TAFs etc.	X	X	
13	Verification of Aviation Forecasts	X	X	
14	Register regarding Implementation of instructions and circulars	X	X	X
15	NOTAM Register	X	X	X
16	Radar Scope Observation Register	X	X	
17	METAR Plotting Register (*Format not provided)*	X	X	At AMSs where TREND forecast is issued

Appendix B

Format of Registers

India Meteorological Department

FIR Warning/ SIGMET Register

……Airport

From (Year/Month/ Date) To (Year/Month/ Date) **Page No.**

Serial Number	Date and time of issue	Phenomenon for which SIGMET is issued	Text of the warning	Name, Designation and signature of the issuing officer	Remarks

Note: (1) Entry regarding 'NIL SIGMET is also to be made in the register.
(2) This register may be maintained by AMOs and AMSs to keep account of the SIGMETs received by them.

India Meteorological Department

Aerodrome Warning/ Warning for Light Aircraft/ Wind Shear Warning Register

……Airport

From (Year/Month/ Date) To (Year/Month/ Date) **Page No.**

Date and time of issue	Serial Number	Phenomenon for which Warning is issued	Text of the warning	Name, Designation and signature of the issuing officer	The forecasts amended	Any other remarks

India Meteorological Department
Register for ROFOR/ 9 hr TAF/ 30 hr TAF
……Airport

From (Year/Month/ Date) To (Year/Month/ Date) **Page No.**

Date and time of issue	Type of message	Text of the message	Name, Designation and signature of the issuing officer	Remarks

Note: (1) In view of the availability of typed messages, it is not necessary to maintain the old TAFOR/ ARFOR register (MET T-9/ OBS 466).
(2) It is also not necessary to enter the text of all routine TAFs and ROFORs. Only when special TAF/ ROFOR/ ARFOR are issued text of the message is to be entered.
(2) In column "Type of message", entry may be made as 'ROFOR', '9 hr TAF', or '30 hr TAF'

India Meteorological Department
Aviation Log Book

……Airport

From (Year/Month/ Date) To (Year/Month/ Date) **Page No.**

Date and Time	Details of information supplied	To whom supplied	Mode of communication	Remarks and signature of the Duty Officer

Note: Particulars of all information supplied to any party on special request may be entered in this register.

India Meteorological Department

Register for noting lapses, deficiencies and procedural mistakes

……Airport

From (Year/Month/ Date) To (Year/Month/ Date) **Page No.**

Sl No.	Date, Time and Type of message	Discrepancy noticed	Reference para of manual, code book, and other guidance material	Designation and signature of the officer notifying the discrepancy	Remarks and sign of the concerned officer in regard to the compliance of the correct procedure

Note: AMOs may call for the sample messages from AMSs for scrutiny and maintain a record of that.

India Meteorological Department

Register for Verification of Aviation Forecasts

……Airport

From (Year/Month/ Date) To (Year/Month/ Date) **Page No.**

Type of forecast	Date and period of validity	Actual charts based on which the forecast was issued	Forecast Significant Weather	Realised Significant Weather	Accuracy	Remarks

Note: (1) The random verification of forecasts may be done preferably on days when weather occurred.
(2) The quarterly statement of verification of forecasts should be an extract of this register.

India Meteorological Department
NOTAM Register
……Airport

From (Year/Month/ Date) To (Year/Month/ Date) **Page No.**

Sl No.	Date and Time of issue	Subject	Text of the message	Copies given to	Remarks

India Meteorological Department
Aviation Action Diary- I (Routine)
……Airport

From (Year/Month/ Date) To (Year/Month/ Date) **Page No.**

Sl. No	Date and Time of issue	Name of forecast/ warning/ bulletin	Validity	Issued for station/ region	Addresses	Mode of dissemination	Remarks/ signature of D.O
"A" Duty							
"B" Duty							
"C" Duty							

Note: (1) In this register entries may be made of all the routine ,like, TAFs, ROFORs, Area Forecasts, Local forecasts etc., for own aerodrome as well for the associated aerodromes. The addresses to which the messages are routinely sent may be given in the first page of the register. They need not be repeated daily.
(2) If the schedule of work remains the same, entries need not be made daily. Whenever there is a change in the schedule, it is to be entered in the register and signature of the Duty officer may be obtained at the end of the month

India Meteorological Department

In-flight/ Post flight Register

……Airport

From (Year/Month/ Date) To (Year/Month/ Date) **Page No.**

Date	Sl. No.	Name of Airlines	No. of in-flight reports		No. of post flight reports	
			Expected	Received	Expected	Received
	1	2	3	4	5	6

India Meteorological Department

Instructions / Circulars Implementation Register

……Airport

From (Year/Month/ Date) To (Year/Month/ Date) **Page No.**

Circulars/ instructions with DDGM (WF) UOI No. and date	Date of Implementation/ action completed	If not implemented, reason for the same	Remarks
1	2	3	4

India Meteorological Department
Aviation Action Diary- II (Non- Routine)
……Airport

From (Year/Month/ Date) To (Year/Month/ Date) **Page No.**

Date: Day of week: Shift:

Sr. No.	Time of receipt of intimation	Particulars of items of work				Parties to whom information is to be supplied				Actual time of issue	Remarks and signature of Duty Officer
		Message	Station	Route	Period	Station	Airline	Mode	Priority		

Note: Entries in this register may be restricted to documentation supplied to non-scheduled flights.

India Meteorological Department

Radarscope observation register

……Airport

From (Year/Month/ Date) To (Year/Month/ Date) **Page No.**

Date	Time of observation UTC	Range of Radar scope (N. miles)	Character istics	Description (AZ_1 / R_1 AZ_2 / R_2)	Intensity of Echo	Tendency of Echo	Stage of Echo	Duration / speed	Altitude	Signature of Radar Asst.	Signature of Duty officer if no Echos	Remarks

India Meteorological Department

CURRENT WEATHER REGISTER

……Airport

From (Year/Month/ Date) To (Year/Month/ Date) **Page No.**

Date : ……..

Hours GMT	Wind			Visibility		Weather	Individual Cloud Layers				Temperature		
	Direction	Mean wind speed (Knots)	Extreme wind speed (Knots)	Horizontal visibility	Runway Visual Range in Meters Number of runway to which it refers	Significant Weather	Ns/CC hshshs	Ns/CC hshshs	Ns/CC hshshs	Ns/CC hshshs	Dry bulb (0.1℃)	Wet Bulb (0.1℃)	Dew Point (0.1℃)
GGgg	ddd	ff	fmfm _____ fnfn	VVVV	$V_RV_RV_RV_R D_R D_R$	W′ W′					T′′T′		$T'_dT'_d$
1	2	3	4	5	6	7	8	9	10	11	12	13	14
			____										
			_____										
			_____										
			_____										

Pressure 0.1mb (.001")				Additional information (not to be coded in METAR / SPECI reports)				For stations reporting 2 minutes Mean Wind			Observer's Initials
Attached thermometer °A / ° C Bar as read	QFE	QFF	QNH	Total amount of all clouds	Present Weather	Past Weather	Supplementary Information	Direction	Mean Speed (Knots)	Maximum Speed (Knots) / Minimum Speed (Knots)	
			$P_HP_HP_HP_H$	N	WW	W		Ddd	ff	$f_m f_m$ / $f_n f_n$	
15	16	17	18	19	20	21	22	23	24	25	26
———											
———											
———											
———											

India Meteorological Department

BRIEFING REGISTER

……Airport

From (Year/Month/ Date) To (Year/Month/ Date) **Page No.**

Date: ……..

Sr. No.	Date	Route	E.T.D.	*Name of Airline*	Call sign of the Aircraft	Time of briefing	Briefing Notes	Name and Designation of the person receiving briefing and documentation	Signature of the person receiving briefing and documentation	Signature of Duty Officer (with remarks if any)

Note: At stations where On Line Briefing System is functioning, details of the logins by the users may be maintained.

India Meteorological Department

DEBRIEFING REGISTER

……Airport

From (Year/Month/ Date) To (Year/Month/ Date) **Page No.**

Date:

Sr. No.	Date and time of Debriefing	Route and period of flight	Name of airline and call sign of Aircraft	Flight level	Debriefing notes	Remarks, if any (Indicate whether flight cross section handed in)	Signature of Debriefing Officer

India Meteorological Department
Aircraft Accident/ Incident Investigation Register
……Airport

From (Year/Month/ Date) To (Year/Month/ Date) **Page No.**

S.No.	Date, Time Place, region of accident	Name of airline/ Flying club	Call sign of aircraft	Route Followed	Details of Accident	First information report received from at time	C.W. Observation recorded as required
1	2	3	4	5	6	7	8

Details of MET services rendered	List of documents withdrawn/sealed	Details of copies taken/ and particulars of parties to whom supplied	Details of action taken /findings of R.M.C communicated to DDGM(WF)/DGM	Signature of Met I/C Officer I/C	Remarks
9	10	11	12	13	14

Appendix C

FORMAT OF HAND-BOOK OF AVIATION METEOROLOGICAL OFFICE

I. GENERAL

1. Name of the Office :
2. Type : AMO / AMS
3. Controlling Regional Office :
4. Date of establishment :
5. Brief history (attach separate sheet, if required):
6. ICAO Location Indicator :
7. Location of the Office I Latitude/ Longitude
   II Height above mean sea level
   III Departmental / AAI building

		Name	Distance from the office
i)	Nearest Railway station		
ii)	Post Office		
iii)	Telegraphic Office		
iv)	ATC		
v)	Wireless station		

8. Telephone Numbers :
9. Fax No. if any :
10. E-mail address :
11. Postal address :
12. Usual mode of conveyance between railway station and airport
13. Average No. of flights per week : (i) National :
    (ii) International :
14. Mode of message passing from M.O. to ATC
15. Working hours of the met. office :
16. Watch hours of ATC :
17. Mode of communication between Met. Office and ATC Room:
    and communication control room:
18. Designation of Officer-In-charge of
    A Aerodrome :
    B communication Control room :
19. Information regarding guest room accommodation.
20. Office Vehicle :
21. Whether visibility landmarks (day and night) are of adequate resolution and density
22. Distance of observatory from met office
21. Location of RADAR unit / slave display :
22. How the satellite pictures are received :

STAFF AND WORK

1. Constituent sections and items of work

Section	Items of work	No. of staff

2. Total staff position as on **30-09-2008** and their allotted work. (Give details of Roster for each post clearly indicating duty timings in a separate sheet)

Designation/ Training completed	No. of posts		Section	Work in brief
	Sanction	Actual		
Director				
Met.I				
Met.II				
AM-I				
AM-II				
S.A.				
S.O.				
Steno				
L.A.				
M.A.				
Peon				

ACCOMMODATION

1. Office :
   i) Total area :
   ii) No. of rooms :
   iii) Furniture available :
2. Residence

   i) Distance of Official Quarters with reference to the office:
   ii) Staff provided with official accommodation:

Gr. A.

Designation:	Director	Met.I	Met.II	A.M-I	AM-II
Type/No. of Quarters/ Provided by AAI/Dept./Any other agency :					

Gr. B

Designation:	S.A.
Type/No. of Quarters/Provided by AAI/Dept./Any other agency :	

Gr. C

Designation	S.O.	Steno	L.A.
Type/No. of Quarters/ Provided by AAI/Dept./Any other agency :			

Gr. D

Designation	M.A.	Peon
Type/No. of Quarters/ Provided by AAI/Dept./Any other agency :		

3. Approximate average distance at which the remaining staff reside:

4. Transport facilities available for staff residing at a distance:

INSTRUMENTS AND OBSERVATIONS

1. Location of the Observatory relative to M.O.:

2. Instruments at Observatory:

Instrument Name and type	Serviceability/ Remarks

3. Instruments at Airfield:

Instrument Name and type	Serviceability/ Remarks

4. Details of observation:

Type of observation (the parameters observed may be given separately)	Method of observation (Manual/ Instrumental)	Frequency of observation
a) Surface (temp, wind etc.) b) Current weather c) Pilot balloon d) Rawin e) Radiosonde f) Weather radar i) Ceilometer j) RVR		

5. Remarks on the serviceability/ Accuracy/ dependability of the various Instruments (occasional brief un serviceability need not be mentioned)

EXCHANGE OF MESSAGES

I. TRANSMISSION

Type of Messages	Hours	Addresses	Mode of transmission
i) METARs a) Plain language b) Coded (Appendix I)			
ii) SPECIS a) Plain language b) Coded (Appendix II)			

iii) TAFs	Format enclosed (Appendix III)
iv) SIGMETs	Format enclosed (Appendix IV)

II. RECEPTION

Type of Messages	Hours	Addresses	Mode of Reception
i) METARs a)Plain language b)Coded (Appendix V)			
ii) SPECIS a)Plain language b)Coded (Appendix V)			

iii) TAFs	Format enclosed (Appendix VI)
iv) ROFOR	Format enclosed (Appendix VII)
v) SIGMET	Format enclosed (Appendix VIII)

DISPLAY, BRIEFING, DEBRIEFING AND SUPPLY OF METEOROLOGICAL INFORMATION TO LOCAL ATC

Items on display	Tick (✓) in appropriate places
a) Current Charts	
b) Normal Charts	
c) METARs/ SPECIs	
d) SIGMET	
e) Satellite information	
f) Radar information	
g) Local forecasts	
h) Air reports	
i) Autographic charts	
j) Visibility land-marks	

2. Arrangements for briefing:

3. Items of Met. Information supplied to local ATS Units

4. Supply of Met. Information to operators/ local representatives

Type of message	Plain language/ Coded	Frequency	Supplied to	Mode of supply

COMMUNICATIONS

1. Landline

a) Location of Telegraph Office	
b) Hours of watch kept by T.O.	
Telephone numbers Weather STD facilities available	 STD code

2. **TELEPRINTER/ FAX etc**.

	TELE PRINTER/ PC	FAX	V SAT Date of installation	World space system /AMSS	VHF set	Any other equipment	Work station
a) Location Make /Model / S.No.							
b) Hours of watch							
c) Number of machines (and their connections) (Appendix IX)							
d) Whether links exclusive or Common user							
e) Number of staff							

3. Exclusive Aeronautical Met. Channels

Type of channel	Station to which connected

MISCELLANEOUS

1. List of Registers maintained for aviation work.
2. List of ICAO, WMO and up to date Departmental publications available at the office:
3. i)Name and details of newspapers and Journals (Technical/ non-technical) received.

   a) Subscribed :
   b) Complimentary :

4. Any flying clubs at the station : Yes/No

5. a) Facilities provided for those clubs :
   b) How messages are transmitted :

6. Is training in Meteorology given to
   i) Pilots : Yes/No
   ii) Aerodrome Officers : Yes/No

IX. CHARTS

1. Observations charted and charts in use –
2. Whether an auto plotter is available?

Type of chart	Area covered	Hours of the chart GMT	No. of the chart used	Plotting completed by time	Analysis completed by time
Surface					
Pilot					
Constant Pressure					
Change					

3. How are the following plotted

   a. METAR :
   b. SPECI :
   c. Ships observations :
   d. Aircraft reports :
   e. Radar observation :
   f. Satellite information :

X. ANALYSIS

1. Type of Analysis of CP charts

a) Contour b)	Intervals of iso-lines
c) Isotherms d)	
e) Isotach/Jet stream f)	

2. Supplementary charts

a) Wind vector charts:

b) Thickness charts:

c) Max. wind / Tropopause:

XI. RECEPTION OF CHARTS

1. Whether facsimile reception available : Yes/No

2. Type of charts being received : Appendix X

3. Quality of reception :

4. Use of facsimile charts :

APPENDIX I

List of addresses to which METARs are sent by WT/TP

Addresses	Periods	Mode of Transmission

APPENDIX II

List of addresses to which SPECIS are sent by WT

APPENDIX III

STATEMENT OF ROUTINE 9 HOURLY AND 24 HOURLY AERODROME FORECASTS ISSUED

S.No.	Station for which issued	Time of issue (Z)	Validity period (Z)	Frequency of issue	Station to which disseminated	Remarks (purpose for which TAF is issued)

APPENDIX IV

List of addresses to which SIGMETs are sent

Period of validity	Address	Mode of Transmission

APPENDIX V

Reception of METARs/SPECIs

Hours	Address	Mode of Transmission

APPENDIX VI

List of TAFs received

Period of validity	Address from	Mode of Transmission

APPENDIX VII

List of routine **ROFOR/ARFOR** received

ROFOR/ARFOR	Period of validity	Originating Office	Mode of Transmission

APPENDIX VIII

List of address from which SIGMETs are received

APPENDIX IX

Number of Teleprinter Machines with their numbers and connections

S.No.	Number of the T/P Machine	Channels connected to

APPENDIX X

List of facsimile charts received

Type of charts	Time of Observation (UTC)	Time of Transmission

APPENDIX D

GUIDANCE ON REPORTING SIGNIFICANT DISCREPANCIES IN WAFC SIGWX CHARTS

1. Purpose of the report

a) To permit the meteorological offices to inform the WAFCs about significant discrepancies on significant weather (SIGWX) forecasts issued by WAFCs.

b) To report significant discrepancies efficiently and unambiguously, and only when an amendment to the SIGWX forecast is required.

Note. If a meteorological office finds a discrepancy, or a recurrent discrepancy, that does not necessitate an amendment to the SIGWX according to Annex 3, it has the option to inform the WAFC concerned by using route forecast (ROFOR) messages.

2. Usefulness of the report for the WAFCs

WAFC benefits from the notification by:

a) being informed of possible discrepancies;

b) analyzing the proposal coming from a meteorological office;

a) re-initiating the forecasts model, if appropriate, taking into account the proposal; or

b) sending an amendment for the SIGWX forecast concerned.

3. Steps to be followed by a meteorological office

a) WAFS SIGWX forecast is received by a meteorological office;

b) a meteorological office detects a significant discrepancy, in accordance with the criteria for the amendment of SIGWX forecasts in Para 3.2.3 of

'Manual on Meteorological Services for Aviation in India' (see also the attachment to this Appendix); no other differences shall be reported;

c) the meteorological office describes the significant discrepancy using the following rules:

1) a notification of significant discrepancy concerning a forecast shall be elaborated and sent between six and nine hours before the commencement of the validity period of the forecast;

2) the notification is to be sent only to the WAFC concerned;

3) the notification is to be sent via e-mail or fax using the following e-mail addresses or fax numbers:

Centre	Fax Number	E-Mail Address
WAFC Washington	+1 816 880 0652	jhenderson@awc.kc.noaa.gov.
WAFC London	+44 1344 854919	floorman@metoffice.com

4) the notification of significant discrepancies shall be prepared using the form in the attachment to this Appendix;

5) the notification is to be written in English.

4. Steps to be followed by a WAFC

a) The WAFC concerned acknowledges the receipt of the notification of the significant discrepancy to the meteorological office that originated it, together with a brief comment thereon and any action taken, using the same means of communication employed by the meteorological office; and

b) if necessary, the WAFC issues an amendment for the SIGWX forecast concerned.

Attachment

Form to be used for the notification of a significant discrepancy on significant weather forecast

Forecast Involved

Originating WAFC	
ICAO Area	
Flight Level	
Validity Time	
Validity Date	

Description Of The Discrepancy (IES)

(Error in expected position or intensity of phenomena; new expected phenomena.)

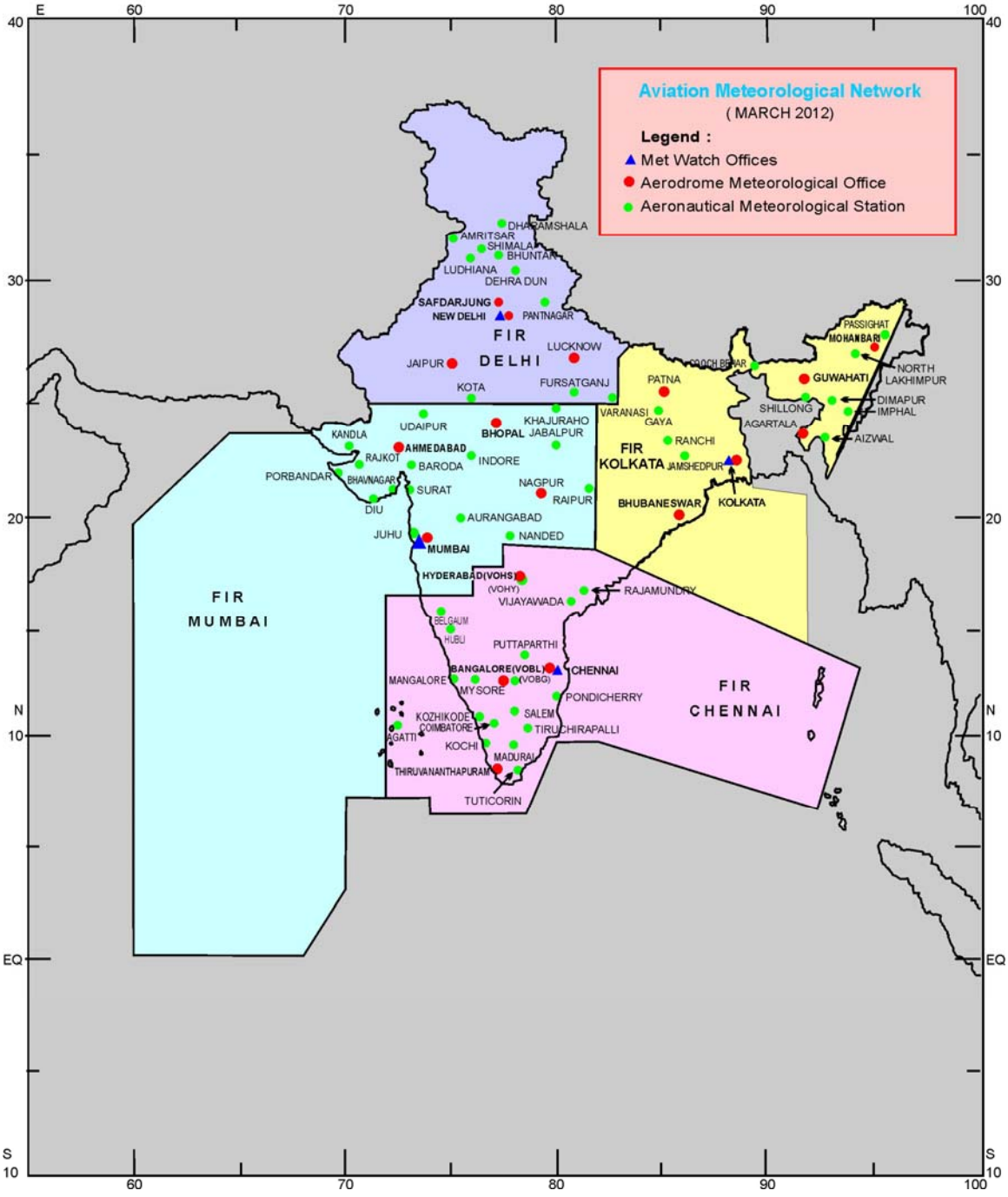
	WAFC Forecast			Proposal			
Phenomena	FL	Position	Intensity	FL	Position	Intensity	Reference
Turbulence							
Icing							
Cumulonimbus							
Sandstorms							
Duststorms							
Volcanic activity							
Radioactive material into the atmosphere							

Note: The column “Reference” is to specify, for example, the observation, aircraft report or the forecast model field that directed the meteorological office to inform of a significant discrepancy. A copy of this information may be added to the form, if necessary.

Appendix E

India Meteorological Department

Aviation Meteorological Network



Appendix F

Template for Tropical Cyclones advisory messages

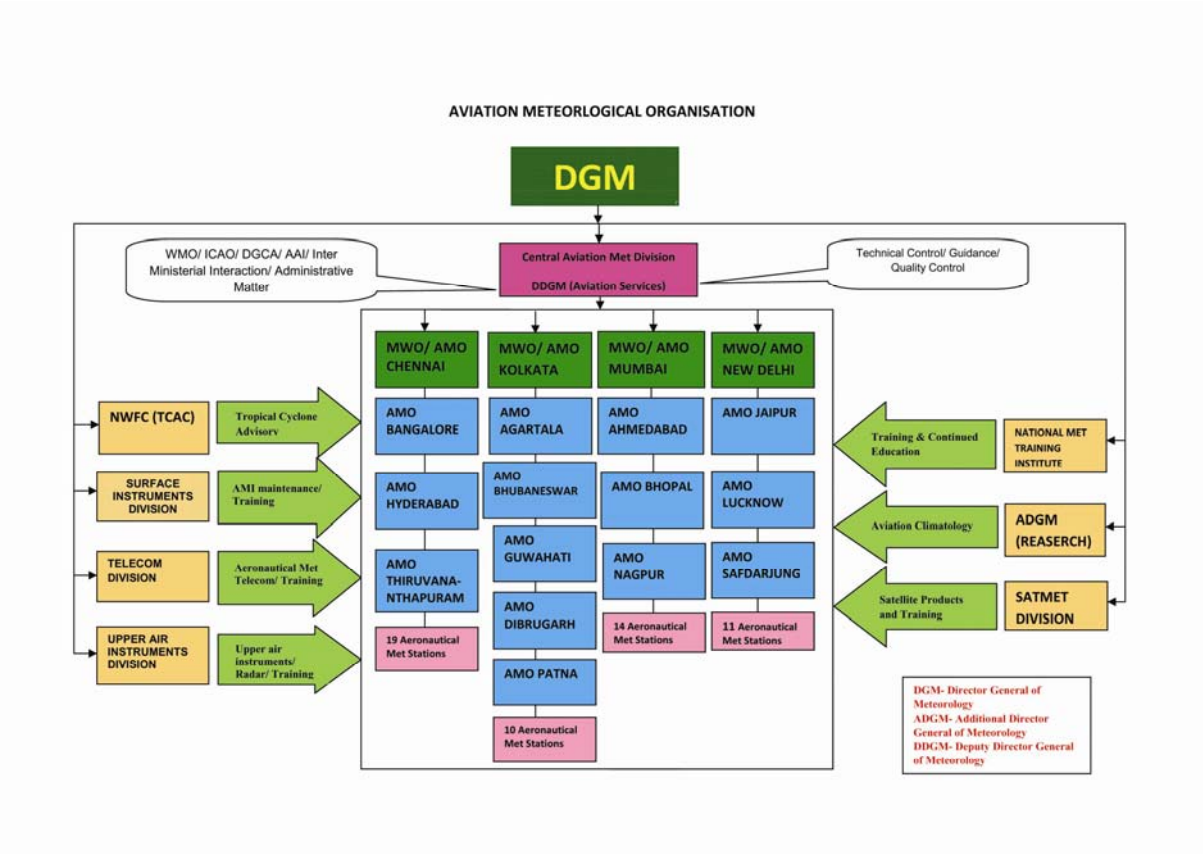
Note 1: All the elements are mandatory
Note 2: Inclusion of a “colon” after each element heading is mandatory
Note 3: The numbers 1 to 19 are included only for clarity and they are not part of the advisory message, as shown in the example.

Element		Detailed content	Template(s)		Example	
1	Identification of the type of message	Type of message	TC ADVISORY		TC ADVISORY	
2	Time of origin	Year, Month, day and time in UTC of issue	DTG:	nnnnnnnn/nnnnZ	DTG:	20040925/1600Z
3	Name of TCAC	Name of TCAC (location indicator or full name)	TCAC:	nnnn *or* nnnnnnnnnn	TCAC: TCAC:	YUFO* MIAMI * Fictitious location
4	Name of Tropical cyclone	Name of tropical cyclone or “NN” for unnamed tropical cyclone	TC:	nnnnnnnnnnnn *or* NN	TC:	GLORIA
5	Advisory number	Advisory number (starting with “01” for each cyclone)	NR:	nn	NR:	01
6	Position of the center	Position of the centre of the tropical cyclone (in degrees and minutes)	PSN:	Nnn(nn) *or* Snn(nn) Wnnn(nn) *or* Ennn(nn)	PSN:	N2706 W07306
7	Direction and speed of movement	Direction and speed of movement given in sixteen compass points and knot (kt), respectively, or moving slowly (<3kt) or stationary (<1kt)	MOV:	N nnKT or NNE nnKT or NE nnKT or ENE nnKT or E nnKT or ESE nnKT or SE nnKT or SSE nnKT or S nnKT or SSW nnKT or SW nnKT or WSW nnKT or W nnKT or WNW nnKT or NW nnKT or NNW nnKT or SLW or STNR	MOV:	NW 10KT
8	Central pressure	Central pressure (in hPa)	C:	nnnHPA	C:	965HPA
9	Maximum surface wind	Maximum surface wind near the centre (mean over 10 minutes, in kt)	MAX WIND:	nn[n]KT	MAX WIND:	45KT
10	Forecast of center position (+6 HR)	Day and time (in UTC) (6 hours from the “DTG” given in	FCST PSN +6 HR:	nn/nnnnZ Nnn(nn) or Snn(nn)	FCST PSN +6 HR:	25/2200Z N2748 W07350

		item 2); Forecast position (in degrees and minutes) of the center of the tropical cyclone		Wnnn(nn) or Ennn(nn)		
11	Forecast of maximum 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)KT	FCST MAX WIND + 6 HR:	45KT
12	Forecast of centre position (+12 HR)	Day and time (in UTC) (12 hours from the “DTG” given in item 2); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +12 HR:	nn/nnnnZ Nnn(nn) or Snn(nn) Wnnn (nn) or Ennn(nn)	FCST PSN +12 HR:	26/0400 Z N2830 W07430
13	Forecast of maximum surface wind (+12 HR)	Forecast of maximum surface wind (12 hours after the “ DTG” given in item 2)	FCST MAX WIND +12 HR:	nn(n)KT	FCST MAX WIND +12 HR:	45KT
14	Forecast of centre position (+18 HR)	Day and time (in UTC) (18 hours from the “DTG” given in item 2); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +18 HR:	nn/nnnnZ Nnn(nn) or Snn(nn) Wnnn(nn) or Ennn(nn)	FCST PSN + 18HR:	26/1000Z N2852 W07500
15	Forecast of maximum surface wind (+18 HR)	Forecast of maximum surface wind (18 hours after the “DTG” given in Item2)	FCST MAX WIND +18 HR:	nn(n)KT	FCST MAX WIND +18 HR:	43KT
16	Forecast of center position (+24 HR)	Day and time (in UTC) (24 hours from the “DTG” given in item 2); Forecast position (in degrees and minutes) of the centre of the tropical cyclone	FCST PSN +24 HR:	nn/nnnnZ Nnn(nn) or Snn(nn) Wnnn(nn) or Ennn(nn)	FCST PSN +24 HR:	26/1600Z N2912 W07530
17	Forecast of maximum surface wind (+24 HR)	Forecast of maximum surface wind (24 hours after the “DTG” given in item 2)	FCST MAX WIND +24 HR:	nn(n)KT	FCST MAX WIND +24HR:	40KT
18	Remarks	Remarks, as necessary	RMK:	Free text up to 256 characters or NIL	RMK:	NIL
19	Expected time of issuance of next advisory	Expected year, month, day and time (in UTC) of issuance of next advisory	NXT MSG:	[BFR] nnnnnnnn/nnnnZ or NO MSG EXP	NXT MSG:	20040925/2000Z

Appendix G

IMD Aviation Organisation Chart



Appendix H

AVIATION METEOROLOGICAL OBSERVATORIES AND SCHEDULE OF REPORTS

Name of Station/ Location Indicator 1.	Type and Frequency of Observations 2.	Type of MET reports and supplementary information included 3.	Hours of Operation/ Type of station 4.
1. Agartala/ VEAT	Hourly+half hourly from 2300-0730	METAR/SPECI/TREND	H24
2. Agatti /VOAT	Hourly+half hourly during HO	METAR/SPECI	HO / A
3. Ahmedabad/ VAAH	Half hourly	METAR/SPECI/TREND	H24
4. Aizwal (Lengpui)/ VEAZ	Half hourly during HO	METAR/SPECI	HO / B
5. Amritsar/ VIAR	Hourly+half hourly	METAR/SPECI	H24 / C
6. Aurangabad/ VAAU	Hourly+half hourly from 0030-0530 hrs	METAR/SPECI	H24
7. Bangalore (Devanahalli)/VOBL	Half hourly from 2330-1300 hrs HO	METAR/SPECI/TREND	H24
8. Bangalore(HAL) /VOBG	Hourly+half hourly from 0000-1800 hrs	METAR/SPECI/TREND	H24 / C
9. Belgaum /VOBM	Hourly+half hourly during HO	METAR/SPECI	H24 / A
10. Bhavnagar/ VABN	Hourly+half hourly from 0630-0800 hrs	METAR/SPECI	HJ
11. Bhopal (Bairagarh)/ VABP	Hourly+half hourly during HO	METAR/SPECI	H24
12. Bhubaneshwar /VEBS	Hourly+half hourly HO	METAR/SPECI/TREND	H24
13. Coimbatore/ VOCB	Half hourly during HO	METAR/SPECI	H24 / C
14. Calicut(Kozhikode) /VOCL	Half hourly during HO	METAR/SPECI/TREND	H24 / C
15. Chennai / VOMM	Half hourly	METAR/SPECI/TREND	H24
16. Cooch- Behar// VECO	Hourly+ half hourly	METAR/SPECI	HJ / B
17. Dehradun /VIDN	A/R	METAR/SPECI	HJ /A
18. Delhi /VIDP	Half hourly	METAR/SPECI/TREND	H24
19. Delhi (SFD)/ VIDD	Hourly+half hourly	METAR/SPECI	HJ / B
20. Dimapur/ VEMR	Hourly+half hourly	METAR/SPECI	HJ / B
21. Diu / VADU		METAR/SPECI	HJ / C
22. Fursatganj (Raibarelly)/ VIRB	A/R	METAR/SPECI	HJ /B
23. Gaggal (Dharamsala)/ VIGG	Hourly+half hourly during 1030- 1600 hrs	METAR/SPECI	
24. Gaya / VEGY	Half hourly in HJ	METAR/SPECI	HJ / B
25. Guwahati/ VEGT	Hourly+half hourly	METAR/SPECI/TREND	H24
26. Hubli/ VOHB	Hourly+ half hourly during HO	METAR/SPECI	HO
27.Hyderabad (Shamshabad)/ VOHS	Hourly+ half hourly during HO	METAR/SPECI/TREND	H24
28. Hyderabad/ VOHY	Hourly+half hourly during HO	METAR/SPECI/TREND	H24 / C
29. Imphal /VEIM	Hourly+half hourly during HO	METAR/SPECI	HJ / C
30. Indore /VAID	Hourly+half hourly during HO	METAR/SPECI	H24
31. Jabalpur/ VAJB	Hourly	METAR/SPECI	HS
32. Jaipur /VIJP	Hourly+half hourly during HO	METAR/SPECI	H24
33. Jamshedpur/ VEJS	Hourly+half hourly during HO	METAR/SPECI	HJ / B
34. Kandla / VAKE	A/R	METAR/SPECI	HJ
35. Kochi/ VOCI	Half hourly	METAR/SPECI/TREND	H24 / C
36. Khajuraho/ VAKJ	Hourly	METAR/SPECI	HJ
37 Kolkata /VECC	Half hourly	METAR/SPECI/TREND	H24
38. Kota / VIKO	Hourly	METAR/SPECI	HJ / B
39. Kulu (Bhuntar)/ VIBR	Hourly+half hourly	METAR/SPECI	HJ / A
40. North Lakhimpur/ VELR	Hourly+half hourly during HO	METAR/SPECI	HJ / C
41. Ludhiana /VILD	A/R	METAR/SPECI	HJ / A

42. Lucknow /VILK	Hourly+half hourly during HO	METAR/SPECI/TREND	H24
43. Madurai/ VOMD	Hourly+half hourly during HO	METAR/SPECI	HO / C
44. Mangalore (Bajpe)/ VOML	Hourly+half hourly during HO	METAR/SPECI	HJ / C
45. Mohanbari /VEMN	Half hourly	METAR/SPECITREND	H24
46. Mumbai (Santacruz)/ VABB	Half hourly	METAR/SPECI/TREND	H24
47. Mumbai (Juhu) / VAJJ	Hourly+half hourly during HO	METAR/SPECI	HJ
48. Mysore/ VOMY	Hourly+half hourly during HO	METAR/SPECI	HO
49. Nanded/ VAND	Hourly+Half hourly during HO	METAR	
50. Nagpur /VANP	Hourly+half hourly to meet operational requirements	METAR/SPECI/TREND	H24
51. Pantnagar/ VIPT	A/R	METAR/SPECI	HJ / A
52. Pasighat /VEPG	Hourly+half hourly	METAR/SPECI	HJ / B
53. Patna /VEPT	Hourly+half hourly during HO	METAR/SPECI/TREND	H24
54. Pondicherry /VOPC	Hourly+half hourly during HO	METAR/SPECI	HO / A
55. Porbandar/ VAPR	Hourly+half hourly during HO	METAR/SPECI	HJ
56.Puttaparthi/ VOPN			
57. Raipur /VARP	Hourly+half hourly during HO	METAR/SPECI	0300-1230
58. Rajahmundry/ VORY	Hourly+half hourly during HO	METAR/SPECI	HO / A
59. Rajkot /VARK	Hourly+half hourly during HO	METAR/SPECI	H24
60. Ranchi /VERC	Hourly+half hourly during HO	METAR/SPECI	HJ / B
61. Salem /VOSM	Hourly+half hourly during HO	METAR/SPECI	HO
62. Shimla/ VISM	Hourly+ half hourly during 0800- 1500 hrs	METAR/ SPECI	
63. Shillong (Barapani)/ VEBI	Hourly+half hourly during HO	METAR/SPECI	HJ / B
64. Surat /VASU	A/R	METAR/SPECI	HJ
65. Tiruchirapalli/ VOTR	Hourly+half hourly during HO	METAR/SPECI	H24 / A
66. Tirupati/ VOTP	Hourly+half hourly during HO	METAR/SPECI	HO /. B
67. Thiruvananthapuram/VOTV	Hourly+half hourly during HO	METAR/SPECI/TREND	H24
68. Tuticorin /VOTK	A/R	METAR/SPECI	HJ / A
69. Udaipur /VAUD	Hourly+half hourly during HO	METAR/SPECI	HJ / B
70. Vadodara (Baroda)/ VABO	Hourly+half hourly during HO	METAR/SPECI	HJ
71. Varanasi /VABN	Hourly+half hourly during HO	METAR/SPECI	H24
72.Vijaywada (Gannavaram)/ VOBZ	Hourly+half hourly during HO	METAR/SPECI	HJ / A

Notes

1. Hourly observations are recorded at:

   i) Ahmedabad, Mumbai, Hyderabad, Chennai, Nagpur, Tiruchirapalli and Thirivananthapuram at HH + 40 min. and HH + 10 min.

   ii) Kolkata and Patna at HH + 50 min. and HH + 20 min.

   iii) Delhi, Lucknow, Amritsar, Varanasi and Jaipur at HH+30 min. and HH+00

   iv) At all other stations: HH + 00 min.

   HH = Full hour UTC

2. Half-hourly observations are recorded half-an-hour after the hourly observations, mentioned in Note 1 above.

3. SPECI’s and ADDITIONAL REPORTS are prepared whenever warranted, throughout the hours of watch.

ABBREVIATION AND LEGEND

H24: Continuous day & night service.
HO: Service available to meet operational requirement.
HJ: Observations from Sunrise to Sunset.
HS: Service available during hours of scheduled operations
A/R: As and when required.
A AMS upto 7hrs watch
B AMS upto 14hrs watch
C AMS round the clock watch.

Appendix I

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.

Element	Detailed content	Template(s)			Examples
Identification of the type of report (M)	Type of report	MET REPORT or SPECIAL			MET REPORT SPECIAL
Location indicator (M)	ICAO location indicator (M)	Nnnn			VABB
Time of the observation (M)	Day and actual time of the observation in UTC	nnnnnnZ			221630Z
Surface wind (M)	Name of the element (M)	WIND			WIND 240/8KT WIND RWY 18 TDZ 190/11KT WIND VRB2KT WIND CALM WIND VRB BTN 350/AND 050/2KT WIND 270/ABV 99KT WIND 020/10KT VRB BTN 350/AND 070/ WIND RWY 14R MID 140/11KT
	Runway(O)2	RWY nn[L] or RWY nn[C] or RWY nn[R]			
	Runway section (O)3	TDZ			
	Wind direction (M)	nnn/	VRB BTN nnn/ AND nnn/ or VRB	C A L M	
	Wind speed (M)	[ABV] n[n]KT			
	Significant speed variations(C)4	MAX [ABV] nn [n] MNM n [n]			
	Significant directional variations(C) 5	VRB BTN nnn/ AND nnn/	--		
	Runway Section(O)3	MID			
	Wind Direction(O)3	nnn/	VRB BTN nnn/ AND nnn/ or VRB	C A L M	
	Wind speed(O)3	[ABV] n[n]KT			
	Significant speed variations(C)4	MAX [ABV]nn[n] MNM n [n]			
	Significant directional variations(C)5	VRB BTN nnn/AND nnn/	-		
	Runway Section(O)3	END			WIND RWY 27 TDZ 240/16KT MAX27 MNM10 END 250/14KT
	Wind Direction(O)3	nnn/	VRB BTN nnn/ AND nnn/ or VRB	C A L M	
	Wind speed(O)3	[ABV] n[n]KT			
	Significant speed variations(C)	MAX [ABV]nn[n] MNM n [n]			
	Significant directional variations (C)	VRB BTN nnn/AND nnn	-		
Visibility(M)	Name of the element (M)	VIS		C A V O K	VIS 350M CAVOK VIS 7KM VIS 10KM VIS RWY 09 TDZ 800M END 1200M
	Runway (O)2	RWY nn[L] or RWY nn[C] or RWY nn[R]			
	Runway section (O)3	TDZ			
	Visibility (M)	nn[n][n]M or n[n]KM			

	Runway section (O)3	MID				
	Visibility (O)3	nn[n][n]M or n[n]KM				
	Runway section (O)3	END				VIS RWY 18C TDZ 6KM RWY 27 TDZ 4000M
	Visibility (O)3	nn[n][n]M or n[n]KM				
RVR (C)	Name of the element (M)	RVR				RVR RWY 32 400M RVR RWY 20 1600M
	Runway (C)	RWY nn[L] or RWY nn[C] or RWY nn[R]				
	Runway section (C)	TDZ				
	RVR (M)	[ABV or BLW] nn[n][n]M				RVR RWY 10L BLW 50M RVR RWY 14 ABV 2000M RVR RWY 10 BLW 150M RVR RWY 12 ABV 1200M
	Runway section (C)	MID				RVR RWY 12 TDZ 1100M MID ABV 1400M
	RVR (C)	[ABV or BLW] nn[n][n]M				
	Runway section (C)	END				RVR RWY 16 TDZ 600M MID 500M END 400M RVR RWY 26 500M RWY 20 800M
	RVR (C)	[ABV or BLW] nn[n][n]M				
Present weather (C)	Intensity of present weather (C)	FBL or MOD or HVY	-			
	Characteristics and type of present weather (C)	DZ or RA or SN or SG or PL or DS or SS or FZDZ or FZRA or SHGR or SHGS or SHRA or SHSN or TSGR or TSGS or TSRA or TSSN	IC or FG or BR or SA or DU or HZ or FU or VA or SQ or PO or FC or TS or BCFG or BLDU or BLSA or BLSN or DRDU or DRSA or DRSN or FZFG or MIFG or PRFG			MOD RA HZ HVY TSRA FG HVY DZ VA FBL SN MIFG HVY TSRASN FBL SNRA FBL DZ FG HVY SHSN BLSN
Cloud (M)	Name of the element (M)	CLD				
	Runway (O)2	RWY nn[L] or RWY nn[C] or RWY nn[R]				
	Cloud amount (M) or vertical visibility (O)	FEW or SCT or BKN or OVC	OBSC	NSC		CLD NSC CLD SCT 300M OVC 600M (CLD SCT 1000FT OVC 2000FT) CLD OBSC VER VIS 150M (CLD OBSC VER VIS 500FT)
	Cloud type (C)	CB or TCU	-			CLD BKN TCU 270M (CLD BKN TCU 900FT)
	Height of cloud base or the value of vertical visibility(C)	nn[n][n]M(or nnn[n]FT)	[VER VIS nn[n]M(or VER VIS nnn[n]FT)]			CLD RWY 08R BKN 60M RWY 26 BKN 90M (CLD RWY 08R BKN 200FT RWY 26 BKN 300FT)

Air temperature (M)	Name of the element (M)	T				T17
	Air temperature (M)	[MS]nn				TMS08
Dew –point temperature (M)	Name of the element (M)	DP				DP15
	Dew-point temperature (M)	[MS]nn				DPMS18
Pressure values (M)	Name of the element (M)	QNH				QNH 0995HPA QNH 1009HPA
	QNH (M)	nnnnHPA				
	Name of the element (O)	QFE				
	QFE (O)	[RWY nn[L] or RWY nn[C] or RWY nn[R]]nnnnHPA [RWY nn[L] or RWY nn[C] or RWY nn[R] nnnnHPA]				QNH 1022HPA QFE 1001HPA QNH 0987HPA QFE RWY 18 0956HPA RWY 24 0955HPA
Supplementary information (C)	Significant meteorological phenomena(C)	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 FC13				FC IN APCH WS IN APCH 60M-WIND: 360/25KT WS RWY 12
	Location of the phenomenon(C)	IN APCH[nnnM-WIND nnn/nnKT] or IN CLIMBOUT[nnnM-WIND nnn/nnKT] or RWY nn[n]				
	Recent weather(C)	REFZDZ or REFZRA or REDZ or RE[SH]RA or RERASN or RE[SH]SN or RESG or RESHGR or RESHGS or REBLSN or RESS or REDS or RETSRA or RETSSN or RETSGR or RETSGS or REFC or REPL or REVA or RETS				REFZRA CB IN CLIMB-OUT RETSRA
Trend Forecast (O)	Name of the element (M)	TREND				
	Change indicator (M)	NOSIG	BECMG or TEMPO			TREND NOSIG TREND BECMG FEW 600M
	Period of change (C)		FMnnnn *and/or* TLnnnn or ATnnnn			
	Wind (C)		nnn/ [ABV] n[n]KT [MAX[ABV]nn]			TREND TEMPO 250/35KT MAX 50
	Visibility (C)		VIS nn[n][n]M or VIS n[n]KM		C A V O K	TREND BECMG AT1800 VIS 10KM NSW TREND BECMG TL1700 VIS 800M FG TREND BECMG FM1030 TL1130 CAVOK
	Weather phenomenon: intensity (C)		FBL or MOD or HVY	-	NSW	TREND TEMPO TL1200 VIS 600M BECMG AT1230 VIS 8KM NSW CLD NSC
	Weather phenomenon: characteristics and type(C)		DZ or RA or SN or SG or PL or DS or SS or FZDZ or FZRA or SHGR or SHGS or SHRA or SHSN or TSGR or TSGS or TSRA or TSSN	IC or FG or BR or SA or DU or HZ or FU or VA or SQ or PO or FC or TS or BCFG or BLDU or BLSA or BLSN or DRDU or DRSA or DRSN or FZFG or MIFG or PRFG		TREND TEMPO FM0300 TL0430 MOD FZRA TREND BECMG FM1900 VIS 500M HVY SNRA TREND BECMG FM1100 MOD SN TEMPO FM1130 BLSN
	Name of the element (C)		CLD			

	Cloud amount and vertical visibility (C)		FEW or SCT or BKN or OVC	OBSC	NSC		TREND BECMG AT1130 CLD OVC 300M TREND TEMPO TL1530 HVY SHRA CLD BKN CB360M
	Cloud type (C)		CB or TCU	-			
	Height of cloud base or the value of vertical visibility (C)		nn[n][n]M	[VER VIS nn[n]M]			

Notes-

1. Fictitious location.
2. Optional values for one or more runways.
3. Optional values for one or more sections of the runway.

Appendix J

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.

Element	Detailed content	Template(s)				Examples
Identification of the type of report (M)	Type of report (M)	METAR or SPECI				METAR SPECI
Location indicator (M)	ICAO location indicator (M)	Nnnn				VABB
Time of the observation (M)	Day and actual time of the observation in UTC (M)	nnnnnnZ				221630Z
Surface wind (M)	Wind direction (M)	Nnn	VRB			24008KT VRB02KT
	Wind speed (M)	[P]nn[n]				19011KT 00000KT 140P99KT
	Significant speed variations (C)	G[P]nn[n]				12006G18KT 24016G27KT
	Units of measurement(M)	KT				
	Significant directional variations(C)	nnnVnnn	-			02010KT 350V070
Visibility (M)	Minimum visibility (M)	nnnn			C A V O K	0350 CAVOK 7000 9999
	Direction of the minimum visibility(C)	N or NE or E or SE or S or SW or W or NW				0800E
	Maximum visibility(C)	nnnn				1100SE 7000NW 1200S 6000W
	Direction of the maximum visibility(C)	N or NE or E or SE or S or SW or W or NW				
RVR (C)	Name of the element (M)	R				R32/0400 R12R/1700 R10/M0050 R14L/P2000
	Runway (M)	nn[L]/or nn[C]/or nn[R]/				R16L/0650 R16C/0500 R16R/0450 R17L/0450
	RVR (M)	[P or M]nnnn				R12/1100U R26/05500N R20/0800D
	RVR past tendency(C)	U,D or N				
Present weather (C)	Intensity or proximity of present weather (C)	-or+	---	VC		
	Characteristics and type of present weather (M)	DZ or RA or SN or SG or PL or DS or SS or FZDZ or FZRA or SHGR or SHGS or SHRA or SHSN or TSGR or TSGS or TSRA or TSSN	IC or FG or BR or SA or DU or HZ or FU or VA or SQ or PO or FC or TS or BCFG or BLDU or BLSA or BLSN or DRDU or DRSA or DRSN or FZFG or MIFG or PRFG	FG or PO or FC or DS or SS or TS or SH or BLSN or BLSA or BLDU or VA		RA HZ VCFG +TSRA FG VCSH +DZ VA VCTS -SN MIFG VCBLSA +TSRASN -SNRA DZ FG +SHSN BLSN
Cloud (M)	Cloud amount and height of cloud base or vertical visibility (M)	FEWnnn or SCTnnn or BKNnnn or OVCnnn	VVnnn or VV///	NSC		FEW015 VV005 OVC030 VV/// NSC SCT010 OVC020

							BKN009TCU
	Cloud type (C)	CB or TCU	-				SCT008 BKN025CB
Air and dew-point temperature (M)	Air and dew-point temperatures (M)	[M]nn/[M]nn					17/10 02/M08 M01/M10
Pressure values (M)	Name of the element (M)	Q					Q0995 Q1009 Q1022 Q0987
	QNH (M)	Nnnn					
Supplementary information (C)	Recent weather (C)	REFZDZ or REFZRA or REDZ or RE[SH]RA or RERASN or RE[SH]SN or RESG or RESHGR or RESHGS or REBLSN or RESS or REDS or RETSRA or RETSSN or RETSGR or RETSGS or RETS or REFC or REVA or REPL					REFZRA RETSRA
	Wind shear (C)	WS Rnn[l] or WS Rnn[C] or WS Rnn[R] or WS ALL RWY					WS R03 WS ALL RWY WS R18C
Trend forecast (O)	Change indicator (M)	NOSIG	BECMG or TEMPO				NOSIG BECMG FEW020
	Period of change (C)		FMnnnn *and/or* TLnnnn or ATnnnn				
	Wind (C)		nnn[P]nn[G[P]nn]KT				TEMPO 25036G50KT
	Visibility (C)		nnnn			C A V O K	BECMG FM1030 TL1130 CAVOK
							BECMG TL1700 0800 FG
							BECMG AT1800 9000 NSW
	Weather phenomenon: Intensity (C)		- or +	-	N S W		BECMG FM1900 0500 +SNRA
	Weather phenomenon: characteristics and type(C)		DZ or RA or SN or SG or PL or DS or SS or FZDZ or FZRA or FC[1] SHGR or SHGS or SHRA or SHSN or TSGR or TSGS or TSRA or TSSN	IC or FG or BR or SA or DU or HZ or FU or VA or SQ or PO or FC or TS or BCFG or BLDU or BLSA or BLSN or DRDU or DRSA or DRSN or FZFG or MIFG or PRFG			BECMG FM1100 SN TEMPO FM1130 BLSN TEMPO FM0330 TL0430 FZRA
	Cloud amount and height of cloud base *or* vertical visibility (C)		FEWnnn or SCTnnn or BKNnnn or OVCnnn	VVnnn or VV///	N S C		TEMPO TL 1200 0600 BECMG AT1200 8000 NSW NSC BECMG AT1130 OVC010
	Cloud type (C)		CB or TCU	-			TEMPO TL1530 +SHRA BKN012CB

Notes-

1. Heavy used to indicate tornado or water spout; moderate (no qualifier) to indicate funnel cloud not reaching the ground

Appendix K

STATUS OF INSTALLATION OF AIRPORT METEOROLOGICAL INSTRUMENTS

(as on March 2012)

S.No	Name of Airport	CWIS	DIWE (Digital)	Transmi-ssometer	Laser Ceilo meter	IAAMS	Remarks
1.	Agartala		√		√		
2	Agatti		√				
3.	Ahmedabad	√	√				
4	Aizwal		√				
5.	Amritsar			√		√	
6	Aurangabad		√				
7.	Babatpur (Varanasi)		√				
8.	Bangalore (HAL)	√	√				
9.	Barapani (Shillong)		√				
10.	Baroda (Vadodara)		√				
11	Begumpet (Hyderabad)	√					
12	Belguam (Sambra)		√				
13	Bhuntar (Kullu)		√				
14.	Bhavnagar		√				
15.	Bhopal (Bairagarh)		√				
16.	Bhubaneshwar		√				
17.	BIAL (09), Bangalore	√		TELVENT			
18	BIAL (27), Bangalore					√	
19.	Calicut (10)(Karipur)		√				
20	Calicut (28)	√					
21.	Chennai (07)				√	√	
	Chennai (25)	√		TELVENT			
22.	Coimbatore		√				
23.	Cooch Behar		√				
24.	PBO Dabok (Udaipur)		√				
25.	Diu	√					

26	Dimapur		√				
27.	Gannavaram (Vijaywada)		√				
28.	Gaya		√				
29.	Gondia	√	√				
30.	Guwahati				√	√	
31.	Hubli		√				
32.	Imphal		√				
33.	Indore		√				
34.	Jaipur		√	TELVENT		√	
35.	Jamshedpur		√				
36.	Jharsuguda		√				
37.	Juhu (Mumbai)	√					
38.	Kailashahar		√				
39.	Kandla		√				
40	Kangra (Gaggal)		√				
41.	Keshod (Veraval)		√				
42	Khajuraho		√				
43.	CIAL, Kochi R 27	√					
	CIAL, Kochi R 09		√				
44.	Kolkata (01R)	√		VAISALA			
	Kolkata (MID)			VAISALA			
	Kolkata (19L)	√		VAISALA	√		
45	Lilabari	√					
46.	Lucknow (27)	√		DRISHTI	√		
	Lucknow (MID)			TELVENT			
47.	Madurai		√				
48.	Mangalore (Bajpe)		√				
49.	Mohanbari (Dibrugarh)		√				
50.	Mumbai (09)					√	
	Mumbai (27) I					√	
	Mumbai (14) I					√	
51	Mysore		√				
52.	Nagpur (Sonegoan)	√	√				
53	Nanded	√	√				

54.	New Delhi (28)(Palam)	√		FLAMINGO	√		
	New Delhi (MID)			FLAMINGO			
	New Delhi (10)	√		FLAMINGO			
	New Delhi (27)					√	
	New Delhi (09)			TELVENT			
	New Delhi (29)			DHRISTI		√	
	New Delhi (MID)					√	
	New Delhi (11)			DHRISTI		√	
55.	Patna		√				
56.	Porbandar		√				
57.	Raipur		√				
58.	Rajahmundry		√				
59.	Rajkot		√				
60.	Ranchi		√				
61.	Safdarjung		√				
62.	Shamshabad	√		TELVENT		√	
63	Shimla		√				
64	Surat		√				
65.	Tirupathi		√				
66.	Thiruvananthapuram	√					
67.	Trichy (27) I		√				
68.	Tuticorin		√				

IAAMS - Integrated Automated Aviation Meteorological System

APPENDIX L (i)

INTERNATIONAL ROUTES AND METEOROLOGICAL REPORTING POINTS

ROUTE	FIR	REPORTING POINT DESIGNATOR/ FIVE LETTER NAME CODE	CO-ORDINATES	
			LATITUDE	LONGITUDE
G424/G450	MUMBAI	ALATO	N134044.8	E0634402.0
A451	MUMBAI	ANGAL	N161404.1	E0600003.8
B466/A585	CHENNAI	ANOKO	N070818.9	E0942448.6
B466	CHENNAI	APASI	N075427.7	E0923842.3
B459	MUMBAI	ATEMA	N050007.1	E0622040.6
R472	KOLKATA	ATOGA	N251601.9	E0900101.5
B466	CHENNAI	AVNOS	N114528.5	E0832135.2
B466W/B466E	CHENNAI	BELLARY	N150959.4	E0765250.0
A462	KOLKATA	BEMAK	N225538.6	E0885356.2
G472/N895	KOLKATA	BUBKO	N191103.7	E0883950.5
A599	KOLKATA	CHILA	N222303.0	E0924455.5
B459	MUMBAI	CLAVA	N014038.0	E0600003.6
R456	MUMBAI	DONSA	N143518.5	E0651533.3
A452/G465	MUMBAI	ELKEL	N014907.9	E0691059.5
P628	CHENNAI	IGREX	N0494328.0	E0942500.0
R456	MUMBAI	KITAL	N200300.0	E0601800.0
R456	MUMBAI	ESMIT	N0943401.9	E0691019.5
A451	MUMBAI	LEMAX	N173703.6	E0654701.1
P762	CHENNAI	LULDA	N122345.0	E0942500.0
M770	KOLKATA	MEPEL	N160200.0	E0920000.0
N563	CHENNAI	MEMAK	N060000.0	E0930500.0
A474/G465	MUMBAI	MONTO	N000008.4	E0653255.2
A474	MUMBAI	MURUS	S055950.2	E0631945.2
G450	MUMBAI	NIPAD	N2205217.5	E0815953.4
G450	MUMBAI	ORLID	N111705.5	E0600003.7
A791W/A791 /A474	MUMBAI	PRATAPGARH	N240147.6	E0744502.8
A456	DELHI	RABAN	N313532.0	E0743450.6

L301	MUMBAI	RASKI	N230330.0	E0635200.0
L301	KOLKATA	RINDA	N153500.0	E0920000.0
G472/N895	KOLKATA	SAGOD	N175548.2	E0915949.1
A466	DELHI	SAMAR	N312047.1	E0743356.7
A791E/G208W/ G472W	MUMBAI	SASRO	N240416.6	E0705958.6
A791W	MUMBAI	TASOP	N251407.2	E0704458.7
G452	DELHI	TIGER	N282850.1	E0721453.9
B459	MUMBAI	UBDOR	N100005.8	E0655554.0
R460	DELHI	VARANASI	N252714.5	E0825133.8
G208E/G472E	MUMBAI	VASLA	N233116.7	E0705958.6
G424	MUMBAI	VUTAS	N091206.1	E0600003.7

Ref. AIP INDIA GEN 3.5-7

APPENDIX L(ii)

NATIONAL ROUTES AND METEOROLOGICAL REPORTING POINTS

ROUTES	REPORTING POINTS
Mumbai - Kolkata	(1) Aurangabad (2) Nipad
Mumbai – Delhi	Mandasor
Mumbai – Chennai	Bellary
Mumbai – Thiruvananthapuram	Dabolim
Mumbai – Cochin	Dabolim
Kolkata – Chennai	SANON
Kolkata – Port Blair	SUSBA
Delhi – Kolkata	KUSMI
Delhi – Madras	(1) Bhopal (2) Gulbarga
Delhi – Hyderabad – Bangalore	Bhopal
Delhi – Srinagar	Pathankot

APPENDIX - M

FORMAT OF VOLCANIC ACTIVITY REPORT

Aircraft identification
(as per item 7 Pilot-in- Dep.from…….Date…….Time…… UTC
Operator of flight plan)…….command ……Arr. at …… Date ……Time…….UTC

	Addressee	
		AIREP SPECIAL
SECTION 1	1. Aircraft identification	
	2. Position	
	3. Time	
	4. Flight level or altitude	
	5. Volcanic activity observed at (position or bearing and distance from aircraft)	
	6. Air temperature	
	7. Spot wind	
	8. Supplementary information (Brief description of activity including vertical and lateral extent of ash cloud, horizontal movement, rate of growth, etc. as available)	
SECTION 2	The following information is not for transmission by RTF	
	TICK √ THE APPROPRIATE BOX	
	9. Density of ash cloud……	(a) wispy ☐ (b) moderate dense ☐ (c) very dense ☐
	10. Colour of ash cloud……..	(a) white ☐ (b) light grey ☐ (c) dark grey ☐ (b) black ☐
	11. Eruption……	(a) continuous ☐ (b) intermittent ☐ (c) not visible ☐
	12.Position of activity……	(a) summit ☐ (b) side ☐ (c) single ☐ (d) multiple ☐ (e) not observed ☐
	13. Other observed features of eruptic	(a) lightning ☐ (b) glow ☐ (c) large rocks ☐ (d) ash fallout (e) mushrooming cloud ☐ (f) nil ☐
	14. Effect on aircraft…….	(a)communications ☐ (b) nav.systems ☐ (c) engines ☐ (d) pitot static ☐ (e) windscreen ☐ (f) windows ☐ (g) nil ☐
	15. Other effects……	(a) turbulence ☐ (b) St.Elmos Fire ☐ (c) fumes ☐ (b) ash deposits ☐
	16. Other information…….	Add any information considered useful
	A	

Appendix N

OPERATIONALLY DESIRABLE ACCURACY OF FORECASTS
(Basis: Annex-3, 16th edition)

Element to be forecast	Operationally desirable accuracy of forecasts	Minimum percentage of cases within range
TAF		
Wind Direction	± 20°	80%of cases
Wind speed	± 10 km/h (5kt)	80% of cases
Visibility	± 200 m up to 800m ± 30% between 800 m and 10 km	80% of cases
Precipitation	Occurrence or non-occurrence	80%of cases
Cloud amount	One category below 450m (1500 ft) Occurrence or non-occurrence of BKN or OVC between 450 m (1500 ft) and 3000 m (10000 ft)	70%of cases
Cloud height	± 30 m (100 ft) up to 300m (1000 ft) ± 30% between 300m (1000 ft) and 3000m (10000 ft)	70% of cases
TREND FORCAST		
Wind Direction	± 20°	90%of cases
Wind speed	±10 km/h (5kt)	90% of cases
Visibility	± 200 m up to 800m ± 30% between 800 m and 10 km	90% of cases
Precipitation	Occurrence or non-occurrence	90%of cases
Cloud amount	±One category below 450m (1500 ft) Occurrence or non-occurrence of BKN or OVC between 450 m (1500 ft) and 3000 m (10000 ft)	90%of cases
Cloud height	± 30 m (100 ft) up to 300m (1000 ft) ± 30% between 300m (1000 ft) and 3000m (10000 ft)	90% of cases
FORECAST FOR TAKE-OFF		
Wind Direction	± 20°	90%of cases
Wind speed	±10 km/h (5kt) up to 50 km/h (25 kt)	90% of cases
Air Temperature	± 1°C	90%of cases
Pressure value (QNH)	± 1 hPa	90%of cases

AREA/ LOCAL FORECASTS		
Upper-air temperature	± 2°C (Mean for 100 NM)	90%of cases
Upper wind	± 20 km/h (10 kt)	90%of cases
Significant weather phenomena and cloud	Occurrence or non-occurrence within 100NM area Vertical extent: ± 300 m (1000 ft)	80% of cases 70%of cases
ROUTE/ FLIGHT FORECASTS		
Upper-air temperature	± 2°C (Mean for 900 km (500 NM))	90% of cases
Upper wind	Direction: ± 30°	90% of cases
	Speed: ± 10 kts	90% of cases
Significant en-route weather phenomena and cloud	Occurrence or non-occurrence	80% of cases
	Location: ± 100 km (60 NM)	70% of cases
	Vertical extent: ±300 m (1000 ft)	70% of cases
	Flight level of tropopause: ±300 m (1000 ft)	80% of cases
	Max wind level: ±300 m (1000 ft)	70% of cases
SIGMET		
Significant en-route weather phenomena	Occurrence or non-occurrence	80% of cases
	Location: ± 100 km (60 NM)	70% of cases
	Vertical extent: ±300 m (1000 ft)	70% of cases
	Expected changes in intensity: Occurrence or non-occurrence of the same category (INTSF or WKN or NC)	70% of cases

Appendix O

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

Elements	Detailed content	Template		Examples	
Identification of the type of forecast (M)	Type of forecast (M)	TAF or TAF AMD		TAF TAF AMD	
Location indicator (M)	ICAO location indicator (M)	Nnnn		VABB	
Time of issue of forecast (M)	Day and Time of issue of the forecast in UTC (M)	nnnnnnZ		160000Z	
Days and period of validity of forecast (M)	Days and period of the validity of the forecast in UTC (M)	nnnn/nnnn		1606/1615 0812/0918	
Surface wind (M)	Wind Direction (M)	nnn or VRB		24008KT VRB02KT 19011KT 00000KT 140P99KT 12006G18KT 24016G27KT	
	Wind speed (M)	(P)nn(n) (P *indicates that the forecast wind speed is more than 99 knots. There is no aeronautical requirement to report surface winds of 100 knots or more; however, provision has been made by giving "(n)" for reporting wind speeds up to 199 knots for non-aeronautical purposes, as necessary)*			
	Significant speed variations (C)	G(P)nn(n) *"G" Indicates the forecast maximum wind speed (gust)*			
	Units of measurement (M)	KT			
Visibility (M)	Minimum visibility (M)	Nnnn		C A V O K	0350 CAVOK 7000 9000 9999
Weather (C)	Intensity of weather phenomena (C)	- or +			
	Characteristics and type of weather phenomena (C)	DZ or RA or SN or SG or PL or DS or SS or FZDZ or FZRA or SHGR or SHGS or SHRA or SHSN or TSGR or TSGS or TSRA or TSSN	IC or FG or BR or SA or DU or HZ or FU or VA or SQ or PO or FC or TS or BCFG or BLDU or BLSA or BLSN or DRDU or DRSA or DRSN or FZFG or MIFG or PRFG		RA HZ +TSRA FG -FZDZ PRFG +TSRASN SNRAFG

<table>
<tr><td rowspan="2">Cloud (M)</td><td>Cloud amount and height of base or vertical visibility (M)</td><td>FEWnnn
or
SCTnnn or
BKNnnn or
OVCnnn</td><td>VVnnn
or
VV///</td><td>NSC</td><td></td><td>FEW010 VV005
OVC020 VV///

SCT005 BKN012

SCT008 BKN025CB
NSC</td></tr>
<tr><td>Cloud type (C)</td><td>CB or TCU</td><td>--</td></tr>
<tr><td rowspan="8">Expected significant changes to one or more of the above elements during the period of validity (C)</td><td>Change or probability indicator (M)</td><td colspan="5">PROB30 (TEMPO) or PROB40 (TEMPO) or BECMG or TEMPO or FM</td><td rowspan="8">TEMPO 0815/0818
25035G50KT

TEMPO 2212/2214
17012G25KT 1000 TSRA
SCT010CB BKN 020

BECMG 3010/3011 00000KT
2400 OVC010

PROB30 1412/1414 0800 FG

BECMG 1412/1414 RA

TEMPO 2503/2504 FZRA

TEMPO 0612/0615 BLSN

PROB40 TEMPO 2923/3001
0500 FG</td></tr>
<tr><td>Period of occurrence or change (M)</td><td colspan="5">nnnn/nnnn</td></tr>
<tr><td>Wind (C)</td><td colspan="5">nnn(P)nn(G(P)nn)KT
or
VRBnnKT
((P indicates that the forecast wind speed is more than 99 knots)
“G” Indicates the forecast maximum wind speed (gust)</td></tr>
<tr><td>Minimum visibility (C)</td><td colspan="4">Nnnn</td><td rowspan="5">CAVOK</td></tr>
<tr><td>Weather phenomena: intensity (C)</td><td>- or +</td><td></td><td>NSW</td></tr>
<tr><td>Weather phenomena: characteristics and type (C)</td><td>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</td><td>IC or FG or BR or SA or DU or HZ or FU or VA or SQ or PO or FC or TS or BCFG or BLDU or BLSA or BLSN or DRDU or DRSA or DRSN or FZFG or MIFG or PRFG</td><td></td></tr>
<tr><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2"></td><td rowspan="2"></td></tr>
<tr><td rowspan="2">Cloud amount and height of base or vertical visibility (C)</td><td rowspan="2">FEWnnn or
SCTnnn or
BKNnnn or
OVCnnn</td><td rowspan="2">VVnnn
Or
VV///</td><td rowspan="2">NSC</td><td rowspan="2">FM051230 15008KT 9999
BKN020

BECMG 1618/1620 8000
NSW NSC
BECMG 2306/2308
SCT015CB BKN020</td></tr>
<tr><td>Cloud type (C)</td><td>CB or TCU</td><td>--</td></tr>
</table>

APPENDIX P

EXAMPLES OF SOME OPERATIONAL MESSAGES :

1) CURRENT WEATHER OBSERVATIONS :
a) METAR
METAR VOMM 032110Z 32003KT 4000 HZ SCT020 BKN100 23/20 Q1008 TEMPO 3000 HZ

MET REPORT VOMM 032110Z WIND 320/3KT VIS 4000M HZ CLD SCT 2000FT (600M) BKN 10000FT (3000M) T23 DP20 QNH 1008HPA TREND TEMPO VIS 3000M HZ

Meaning :
Local routine weather report for Chennai airport issued on 3rd of the month at 2110 UTC, surface wind direction 320 degrees and wind speed 3 knots, visibility 4000 Metres, present weather is Haze, scattered clouds at 2000 feet (600 metres) and broken clouds at 10000 feet, air temperature 23 °C, dew point temperature 20 °C, QNH 1008 hPa, Trend during next 2 hours is temporary reduction of visibility to 3000 metres in Haze.

b) SPECI : (For reduction in visibility)
SPECI VOMM 032133Z 00000KT 3000 HZ SCT020 BKN100 23/23 Q1007 TEMPO 2000 BR

SPECIAL VOMM 032133Z WIND CALM VIS 3000M HZ CLD SCT 2000FT (600M) BKN 10000FT (3000M) T23 DP23 QNH 1007HPA TREND TEMPO VIS 2000M BR

Meaning :
Local special weather report for Chennai airport issued on 3rd of the month at 2133 UTC, surface wind calm, visibility 3000 metres, present weather is Haze, scattered clouds at 2000 feet (600 metres) and broken clouds at 10000 feet, air temperature 23°C, dew point temperature 23° C, QNH 1007 hPa, Trend during next 2 hours is visibility reducing to 2000 metres for a period of less than one hour in Mist.

c) ADDITIONAL : (for reduction of visibility to 2000m)
Coded form not given as ADDITIONAL is meant for local use only.

ADDITIONAL VOMM 032150Z WIND CALM VIS 2000M BR CLD SCT 2000FT (600M) BKN 10000FT (3000M) T23 DP23 QNH 1008HPA TREND NOSIG

Meaning :
Local additional weather report for Chennai airport issued on 3rd of the month at 2150 UTC, surface wind calm, visibility 2000 metres, present weather is Mist, few clouds at 2000 feet (600 metres) and broken clouds at 10000 feet (3000 metres), air temperature 23°C, dew point temperature 23° C, QNH 1008 hPa, Trend during next 2 hours is no significant change

2) TC ADVISORY :

TC ADVISORY
DTG: 20101105/1800Z
TCAC: NEW DELHI
TC: JAL
NR: 03
PSN: N1000 E08630
MOV: NW 8KT
C: 994 HPA
MAX WIND: 50KT
FCST PSN+6HR: 06/0000Z N1000 E08600
FCST MAX WIND+6HR: 55KT
FCST PSN+12HR: 06/0600Z N1000 E08530
FCST MAX WIND+12HR 60 KT
FCST PSN+18HR: 06/1200Z N1030 E08500
FCST MAX WIND+18HR: 60 KT
FCST PSN+24HR: 06/1800Z N1100 E08400
FCST MAX WIND+24HR: 65 KT
NXT MSG: 20101106/0000Z

TOO:060230 HRS. IST

TC SIGMET :

WCIN31 VOMM 060400
VOMF SIGMET 2 VALID 060400/060800 VOMM -
VOMF CHENNAI FIR TC JAL OBS AT 1800Z N1000 E08630 CB TOP FL450 WI 200NM OF CENTRE MOV NW 8KT INTSF FCST 0600Z TC CENTRE N1000 E08530

APPENDIX Q

TEMPLATE FOR AREA/ LOCAL FORECAST

MET.T-2

INDIA METEOROLOGICAL DEPARTMENT

METERROROLOGICAL OFFICE *XXXX AIRPORT*

LOCAL / AREA FORECAST *FOR VXXX AND 100 NM AROUND*

from *0600* hours UTC *2010-10-26* date
till *1400* hours UTC *2010-10-26* date

Time of Origin *2010-10-26 hours 0530 UTC*

SURFACE WIND : *020/10KT MAX20 BECMG 11/13 VRB/02KT*

UPPER WIND

16000M	100 / 15	-78	4500M	050 / 10	+03
13500M	120 / 20	-68	3000M	020 / 10	+10
12000M	110 / 20	-55	2100M	050 / 05	+15
10500M	090 / 20	-43	1500M	050 / 05	+20
9000M	070 / 15	-32	900M	020 / 05	+25
7500M	070 / 20	-15	600M	020 / 05	+27
6000M	070 / 15	-04	300M	020 / 05	+28

WEATHER: *HZ TEMPO 09 / 14 MOD TSRA(.) TEMPO 09/14 SEV TURB AND MOD ICING IN CB*

VISIBILITY: *4000M IN HZ TEMPO 09 / 14 3000M IN MOD TSRA*

CLOUD *SCT SC* $\frac{450}{600}$ *M* *BKN AC* $\frac{2400}{2700}$ *M* *TEMPO 09 / 14*

BKN ST $\frac{240}{}$ *M* *SCT SC* $\frac{360}{540}$ *M* *ISOL CB* $\frac{900}{7000}$ *M*

FREEZING LEVEL: *4800M*

ADDITIONAL NOTES: *TEMPO 09 / 14 SEV TURB AND MOD ICING IN CB*

WARNING: VISIBILITY LIKELY 4000M IN HZ AND 3000M IN MOD TSRA BETWEEN 09/14 MOD TSRA LIKELY BETWEEN 09/14 WHEN LOW CLOUD BASE 240 M WITH 5 OKTA OR MORE LIKELY.

WARNING FOR LIGHT AIRCRAFT: WIND SPEED MAY REACH 20KTS IN GUST WITH DIRECTION FROM 020

Sunrise *27/ 0643EF* Sunset *26/ 1729EF* Moonrise *27 / 0834EF* Moonset *26/ 1841EF*
Phase of Moon Issued at *0530* hrs. UTC *2010-10-26*

"All heights are above M.S.L."

Meteorological Officer

Appendix R

Format for Monthly Aviation Statistics

Name of AMO:

Month/ Year:

S.N.	Type of forecast/ Warning	Number of forecasts/ Warnings
1	**Scheduled Flight F/C**	
	i) Met T3/T4	
	ii) Chart Form	
	iii) Online briefing	
2	**Unscheduled Flight F/C**	
	i) Oral	
	ii) Met T3/T4	
	iii) Chart Form	
3	**Route F/C**	
4	**Aerodrome F/C**	
5	**Trend F/C**	
6	**Aerodrome Warning**	
7	**Local F/C**	
8	**Area F/C**	
9(a)	**SIGMET- Weather**	
9(b)	**SIGMET-NIL**	
10	**Total**	
11	**De-briefings**	

Appendix S

VERIFICATION PROCEDURES OF FORECAST WITH EXAMPLES

1. TAF

1.1. Wind direction: A forecast wind direction is considered correct if the actual value is within ±20º of the forecast value.

e.g: If the forecast wind direction is 100º and the actual value is in between 80º and 120º, then the forecast may be considered as correct.

Minimum percentage of cases within range is 80% of cases. That means, out of 100 forecasts for wind direction at least on 80 occasions, the forecast should be correct.

1.2. Wind speed: A forecast wind speed is considered correct if the actual value is within ±5kts of the forecast value.

e.g: If the forecast wind speed is 15kts and the actual value is in between 10 and 20kts, then the forecast may be considered as correct.

Minimum percentage of cases within range is 80% of cases. That means, out of 100 forecasts for wind speed at least on 80 occasions, the forecast should be correct.

1.3. Visibility:-

a) A forecast visibility is considered correct if the actual value is within ±200m upto 800m.

e.g: If the forecast visibility is 600m and the actual value is in between 400 and 800m then the forecast may be considered as correct.

b) The forecast visibility is considered correct If the actual value is within ±30% of the forecast value in the visibility range of 800m to 10km.

e.g: If the forecast visibility is 1000m and if the actual value is in between 700m and 1300m, then the forecast may be considered as correct.

Minimum percentage of cases within range is 80% of cases. That means, out of 100 forecasts for visibility at least on 80 occasions, the forecast should be correct.

1.4. Precipitation: A forecast precipitation is considered correct when occurrence or non-occurrence of precipitation is observed.

e.g: If a heavy precipitation is forecast and heavy precipitation observed then the forecast may be considered as correct. Similarly, if moderate precipitation is forecast and moderate precipitation observed then also the forecast can be considered correct. Conversely, if precipitation is forecast and no precipitation observed, then the forecast is to be taken as incorrect.

Minimum percentage of cases within range is 80% of cases. That means, out of 100 forecasts for precipitation at least on 80 occasions, the forecast should be correct.

1.5. Cloud amount:-

a) The forecast cloud amount is considered correct when the actual value is within one category when the cloud base height is below 450m

e.g: When the cloud amount is forecast is to be SCT for cloud with base height below 450m, the forecast may be considered as correct, if the observed value is of the category FEW, SCT or BKN.

b) If the forecast cloud amount is considered correct for clouds between 450m and 3000m if occurrence or non-occurrence of BKN or OVC is observed.

e.g: If the forecast cloud amount is BKN for a cloud of base height 2000m and if BKN cloud is observed the forecast can be considered as correct. On the contrary, if OVC is forecast and SCT is observed, then the forecast is to be taken as incorrect.

Minimum percentage of cases within range is 70% of cases. That means, out of 100 forecasts for cloud amount at least on 70 occasions, the forecast should be correct.

1.6. Cloud height:-

a) The forecast cloud height is considered correct when the actual value is within ±30m for cloud base heights upto 300m

e.g: If the forecast cloud height is 200m and if actual value is in between 170m and 230m then the forecast may be considered as correct.

b) The forecast cloud height is considered correct if the actual value is ±30% of the forecast value for cloud heights between 300m and 3000m.

e.g: If the forecast cloud height is 1000m and if the observed value is in between 700m and 1300m then the forecast may be considered as correct.

Minimum percentage of cases within range is 70% of cases. That means, out of 100 forecasts for cloud height at least on 70 occasions, the forecast should come correct.

2. TREND FORECAST

2.1. Wind Direction: The verification criterion and example is the same as that given in 1.1. However, the minimum percentage of cases within range is 90% of cases.

2.2. Wind speed: The verification criterion and example is the same as that given in 1.2. However, the minimum percentage of cases within range is 90% of cases.

2.3. Visibility: The verification criterion and example is the same as that given in 1.3. However, the minimum percentage of cases within range is 90% of cases.

2.4. Precipitation: The verification criterion and example is the same as that given in 1.4. However, the minimum percentage of cases within range is 90% of cases.

2.5. Cloud amount: The verification criterion and example is the same as that given in 1.5. However, the minimum percentage of cases within range is 90% of cases.

2.6. Cloud height: The verification criterion and example is the same as that given in 1.6. However, the minimum percentage of cases within range is 90% of cases.

3. FORECAST FOR TAKE-OFF

3.1. Wind Direction: The verification criterion and example is the same as that given in 1.1. However, the minimum percentage of cases within range is 90% of cases.

3.2. Wind speed: A forecast wind speed is considered correct if the actual value is within ±5kts. The forecast needs to be verified only for wind values upto 25kts.

e.g: If the forecast wind speed is 15kts and the actual value is in between 10kts and 20kts, then the forecast may be considered as correct.

Minimum percentage of cases within range is 90% of cases.

3.3. Air Temperature: An air temperature forecast is considered correct when the actual value is within ±1°C of the forecast temperature.

e.g.: If the forecast air temperature is 20°C and actual value is in between 19°C and 21°C, then the forecast may be considered as correct.

Minimum percentage of cases within range is 90% of cases.

3.4. Pressure value (QNH): A forecast pressure value is considered correct when the actual pressure value is within ±1hPa of the forecast value.

e.g: If the forecast pressure value is 1015hPa and actual value is in between 1014hPa and 1016hPa then the forecast may be considered as correct.

Minimum percentage of cases within range is 90% of cases.

4. AREA/ LOCAL FORECAST

4.1. Upper air temperature: A forecast upper air temperature is considered correct if the actual value is within ±2ºC of the forecast value. Here the value is to be taken as the mean for 100NM area around the aerodrome.

e.g: If the forecast upper air temperature is 10ºC and actual value is in between 8ºC and12ºC, then the forecast may be considered as correct.

Minimum percentage of cases within range is 90% of cases.

4.2. Upper wind: A forecast upper wind is considered correct if the actual value is within ±10kts of the forecast value.

e.g: If the forecast upper wind is 30kts and the actual value is in between 20kts and 40kts then the forecast may be considered as correct.

Minimum percentage of cases within range is 90% of cases.

4.3 Significant weather phenomena and cloud:

a) Significant weather phenomena and cloud are considered correct with regards to the occurrence or non-occurrence of weather phenomena within 100NM area.

e.g. If a significant weather phenomena was forecast and if it occurs then the forecast may be considered as correct. Conversely, if no significant weather was forecast and none observed, then also

the forecast can be taken as correct. Similar is the case with cloud also.

Minimum percentage of cases within range is 80% of cases.

b) The forecast vertical extent of cloud is considered correct if the actual value is within ±300m (1000ft) of the forecast value.

e.g. If the vertical extent of cloud was forecast to be 4000m and if the actual value is observed to be between 3700 and 4300m, then the forecast may be considered as correct.

Minimum percentage of cases within range is 70% of cases.

5. ROUTE/ FLIGHT FORECASTS

This verification method mainly follows ICAO norms, except for the upper wind, which follows the old instruction. For the verification of the route forecast, the following may kindly be borne in mind:

i) When the wind direction is out by more than 90^{o} the speed is considered as 'wrong' except when both the forecast and actual wind speeds are less than 10 kts.

ii) When the actual wind speed is more than 60 kts, the above mentioned range for speed shall be taken as 15 knots.

iii) The observation that fall within 50 kilometers on either side of the route may also be considered for verifying a route forecast.

iv) Observations during the entire validity period are to be taken into account.

v) If the route contains different sections, then verification is to be done for each section.

6. SIGMET

There are no ICAO approved criteria for verification of SIGMET Warnings. However, based on the ICAO criteria for Area forecast, this set of instructions has been formulated. SIGMET for Tropical Cyclones and Volcanic Ash need not be verified as they are issued following Advisories of the respective centers.

Appendix

Forecast verification Statement Proforma

Results of verification for the month of ----------

Name of AMO/AMS----------

Name of forecast	Elements		% of cases within range (% correct)
TAF	Wind direction		
	Wind speed		
	Visibility		
	Precipitation		
	Cloud amount		
	Cloud height		
	Air temperature		
TREND Forecast	Wind direction		
	Wind speed		
	Visibility		
	Precipitation		
	Cloud amount		
	Cloud height		
Forecast for take-off	Wind direction		
	Wind speed		
	Air temperature		
	Pressure value(QNH)		
Area/ Local forecasts	Upper air temperature		
	Relative humidity		
	Upper wind		
	Significant weather phenomena		
	Cloud		
Route/ Flight forecasts	Upper-air temperature		
	Upper wind (Direction)		
	Upper wind (speed)		
	Significant en-route weather phenomena	Occurrence or non-occurrence	
		Location	
		Vertical extent	
		Flight level of tropopause	
		Max wind level	
	Cloud	Occurrence or non-occurrence	
		Location	
		Vertical extent	

SIGMET	Significant weather phenomena	Occurrence or non-occurrence	
		Location	
		Vertical extent	
		Expected changes in intensity	

Appendix T

TEMPLATE FOR SIGMET MESSAGES

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

Elements as specified	Detailed contents	Templates	Examples
		SIGMET	
Location indicators of FIR(**M**)	ICAO location indicator of the ATS unit serving the FIR to which the SIGMET refers (**M**)	Nnnn	VECF VOMF VIDF VABF
Identification (**M**)	Message identification and sequence number (**M**)	SIGMET (nn)n	SIGMET 5
Validity period (**M**)	Date-time groups indicating the period of validity in UTC(**M**)	VALID nnnnnn/nnnnnn	VALID 221215/221600 VALID 101520/101800 VALID 251600/252200
Location indicator of MWO (**M**)	Location indicator of MWO originating the message with a separating hyphen (**M**)	nnnn --	VECC --- VOMM --- VIDP --- VABB ---
Name of FIR	Location indicator and name of the FIR for which the SIGMET is issued(**M**)	nnnn nnnnnnnnnn FIR	VECF KOLKATA FIR VOMF CHENNAI FIR VIDF DELHI FIR VABF MUMBAI FIR

Phenomena (**M**)	Description of phenomenon causing the issuance of SIGMET (**C**)	OBSC TS (GR) EMBD TS (GR) FRQ TS (GR) SQL TS (GR) TC nnnnnnnnnn or NN [6] SEV TURB SEV ICE SEV ICE (FZRA) SEV MTW HVY DS HVY SS (VA ERUPTION) [MT] [nnnnnnnnnn] PSN Nnn(nn) or Snn(nn) Ennn(nn) or Wnnn(nn)) VA CLD RDOACT CLD	SEV TURB FRQ TS OBSC TSGR EMBD TSGR *TC GLORIA *[Fictitious name] TC NN *VA ERUPTION MT ASHVAL PSN S15 E073 VA CLD SEV ICE RDOACT CLD *[Fictitious location]
Observed or forecast phenomena (**M**)	Indication whether the information is observed and expected to continue, or forecast (**M**)	OBS (AT nnnnZ) FCST [AT nnnnZ]	OBS AT 1210Z OBS FCST AT 1815Z
Location (**C**)[7]	Location (referring to latitude and longitude (in degrees and minutes) or locations or geographic features well-known internationally)	Nnn(nn) Wnnn(nn) or Nnn(nn) Ennn(nn) or Snn(nn) Wnnn(nn) or Snn(nn) Ennn(nn) or N OF Nnn(nn) or S OF Nnn(nn) or N OF Snn(nn) or S OF Snn(nn) or (AND) W OF Wnnn (nn) or E OF Wnnn (nn) or W OF Ennn (nn) or E OF Ennn (nn) or (N OF, NE OF, E OF, SE OF, S OF, SW OF, W OF, NW OF) (LINE) Nnn(nn) or Snn(nn) Wnnn(nn) or Ennn(nn) – Nnn(nn) or Snn(nn) Wnnn(nn) or Ennn(nn)	S OF N54 N OF N50 N2020 W07005 AT YUSB[3] N2706 W07306 N48 E010 N OF N1515 AND W OF E13530 W OF E 1554 N OF LINE S2520 W11510-S2520 W12010 WI N6030 E02550 – N6055 E02500 – N6050 E02630

		or (N OF, NE OF, E OF, SE OF, S OF, SW OF, W OF, NW OF, AT) nnnnnnnnnnn or WI 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))	[WI-within]
Level (**C**)[7]	Flight level or altitude and extent (**C**) [3]	[SFC/]FLnnn or [SFC/]nnnnM (or [SFC/]nnnnFT) or FLnnn/nnn or TOP FLnnn or [TOP] ABV FLnnn or[1] CB TOP (ABV) FLnnn WI nnnKM OF CENTRE (or CB TOP (ABV) FLnnn WI nnnNM OF CENTRE) or CB TOP (BLW) FLnnn WI nnnKM OF CENTRE (or CB TOP (BLW) FLnnn WI nnnNM OF CENTRE) or[2] FLnnn/nnn (APRX nnnKM BY nnnKM) (nnKM WID[£] LINE[4] 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))) (or FLnnn/nnn (APRX nnnNM BY nnnNM) (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))	FL 180 FL050/080 TOP FL390 SFC/FL070 TOP ABV FL100 FL310/450 CB TOP FL500 WI 270KM OFCENTRE (CB TOP FL500 WI 150NM OF CENTRE) FL310/350 APRX 220KM BY 35KM FL390

		(-Nnn(nn) or Snn(nn) Wnnn(nn) or Ennn(nn)))) [WID£ - width]	
Movement or expected movement (**C**)[7]	Movement or expected movement (direction and speed) with reference to one of the sixteen points of compass, or stationary (**C**)	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 SSE [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 E 40KMH (MOV E 20KT) MOV SE STNR
Changes in intensity (**C**)[7]	Expected changes in intensity (**C**)	INTSF or WKN or NC	WKN
Forecast position (**C**) [3,7]	Forecast position of volcanic ash cloud or the center of the TC at the end of the validity period of the SIGMET message (**C**)	FCST nnnnZ TC CENTRE Nnn(nn) or Snn(nn) Wnnn(nn) or Ennn(nn) or FCST nnnnZ VA CLD APRX (nnKM WID LINE 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)	FCST 2200Z TC CENTRE N2740 W07345 FCST 1700Z VA CLD APRX S15 E075 – S15 E081 – S17 E083 – S18 E079 – S15 E075

		(– Nnn(nn) or Snn(nn) Wnnn(nn) or Ennn(nn)) (– Nnn(nn) or Snn(nn) Wnnn(nn) or Ennn(nn)) [AND] [8]	
Cancellation of SIGMET (**C)** [5]	Cancellation of SIGMET referring to its identification	CNL SIGMET (nn)n nnnnnn/nnnnnn or CNL SIGMET (nn) n nnnnnn/nnnnnn (VA MOV TO nnnn FIR)	CNL SIGMET 2 101200/101600[5] CNL SIGMET 3 251030/251430 VA MOV TO *YUDO FIR[5] *[Fictitious location]

Notes -

1 Only for SIGMET messages for tropical cyclones.
2 Only for SIGMET messages for volcanic ash.
3 Only for SIGMET messages for volcanic ash cloud and tropical cyclones.
4 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.
5 *End of the message (as the SIGMET message is being cancelled*)
6 Used for unnamed tropical cyclones
7 In the case of the same phenomenon covering more than one area within the FIR, these elements can be repeated, as necessary.
8 To be used for two volcanic ash clouds or two centers of tropical cyclones simultaneously affecting the FIR concerned.

Note*--severe icing and severe turbulence (SEV ICE, SEV TURB) associated with thunderstorms, cumulonimbus clouds or tropical cyclones should not be included.*

Appendix U

Template for aerodrome warnings

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

Element	Detailed content	Template	Example
Location indicator of the aerodrome(M)	Location indicator of the aerodrome	nnnn	VABB
Time of issue (M)	Day and time of issue of the warning in UTC	nnnnnnZ	110300Z
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 110330/110630
IF THE AERODROME WARNING IS TO BE CANCELLED, SEE DETAILS AT THE END OF THE TEMPLATE.			
Phenomenon(M)[1]	Description of phenomenon causing the issuance of the aerodrome warning	TC nnnnnnnnnn or [HVY] TS or GR or [HVY] SN [nnCM][2] or [HVY] FZRA or [HVY] FZDZ or RIME[3] or [HVY] SS or [HVY] DS or SA or DU or SFC WSPD nn[n]KT MAX nn[n]or SQ or FROST or TSUNAMI or VA or Free text up to 32 characters[4]	TC PHYAN HVY SN 25CM SFC WSPD 40KT MAX 60 VA TSUNAMI
Observed or forecast phenomenon(M)	Indication whether the information is observed and expected to continue, or forecast	OBS [AT nnnnZ] or FCST	OBS AT 1200Z OBS FCST
Changes in intensity(C)	Expected changes in intensity	INTSF or WKN or NC	WKN
OR			
Cancellation of aerodrome warning[5]	Cancellation of aerodrome warning referring to its identification	CNL AD WRNG [n]n nnnnnn/nnnnnn	CNL AD WRNG 2 211230/211530[5]

Notes:

1. One phenomenon or a combination there of, in accordance with para 2.3.
2. In accordance with para 2.3.
3. Hoar frost or rime in accordance with para 2.3.
4. In accordance with 2.5.
5. End of the message (as the aerodrome warning is being cancelled).

Appendix V

Verification of aerodrome warnings

1 ***General:*** Only the expected/ forecast occurrence of the warning elements is to be verified. There shall only be “correct” and “incorrect” categories. There shall not be ‘partially correct’ category as per this criterion. All the aerodrome warnings issued by the station are to be verified. For each element, a minimum of 80% of cases percentage within range shall be considered desirable/ satisfactory. That means, out of 100 forecasts of an element, at least on 80 occasions, the forecast shall be correct.

2 ***Criteria for verification:***

a) ***Weather phenomena***: Occurrence or non-occurrence.

If in the aerodrome warning, a weather phenomena is expected to affect the aerodrome and if it occurs, then warning is to be considered as correct. In case of expected occurrence of thunderstorms, if lightning is observed or thunder is heard, the warning may be taken as correct. If, CB is observed at the station, then also the warning may be taken as correct.

b) ***Surface wind***: For “Strong surface wind and gusts”, and for “Squall”

Speed: ± 5 knots; ie., when the deviation of the forecast speed from the observed speed is 5 knots, the warning may be taken as correct. Otherwise it may be taken as wrong.

Wind Direction: ± 30°; the warning may be taken as correct when the expected direction differs from the actual direction by 30° or less.

In cases of aerodrome warning for rapid wind direction change by 45 degrees or more of wind with a speed of 20 KT or more, the occurrence of the event may be taken as “correct” and non-occurrence as “wrong”.

Table: Proforma for preparation of verification statement

Element		Warning no 1	Warning no 2	……..	Warning no. N	% of cases within range or occurrence (% correct)
Tropical cyclone						
Thunderstorm						
Hail						
Snow						
Freezing precipitation						
Hoar Frost or rime						
Duststorm						
Sandstorm						
Rising sand or dust						
Strong surface wind and gusts	Speed					
	Direction change					
Squall	Direction					
	speed					
Frost						
Volcanic ash						
Tsunami						

Appendix W

Template for wind shear warnings

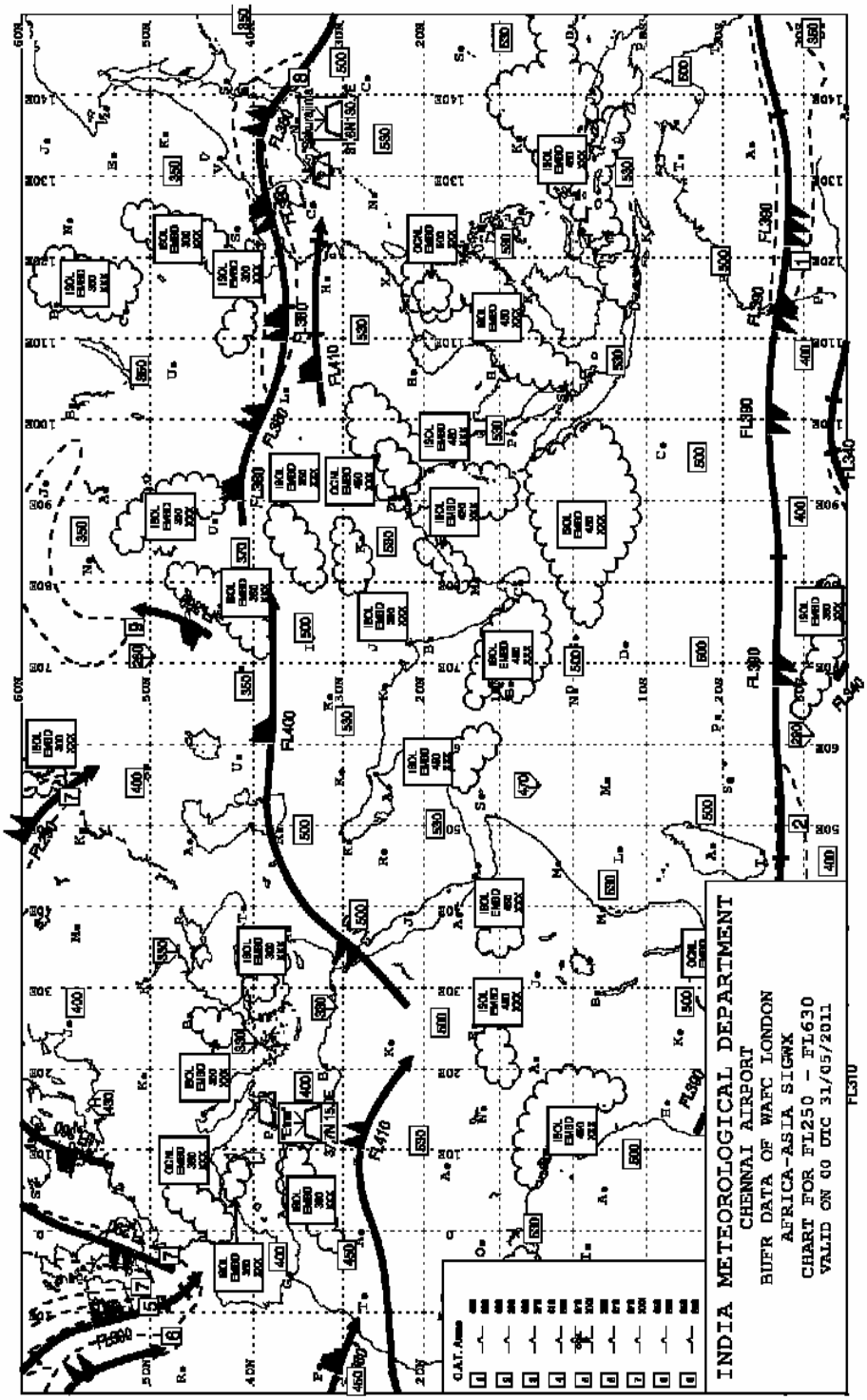
Key:
M = inclusion mandatory, part of every message;
C = inclusion conditional, included whenever applicable.
Note 1.— The ranges and resolutions for the numerical elements included in wind shear warnings are shown in Table A6-4 of this appendix.
Note 2.— The explanations for the abbreviations can be found in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes *(PANS-ABC, Doc 8400).*

Element	*Detailed content*	*Template*	*Example*
Location indicator of the aerodrome (M)	Location indicator of the aerodrome	nnnn	VABB
Identification of the type of message (M)	Type of message and sequence number	WS WRNG [n]n	WS WRNG 1
Time of origin and validity period (M)	Day and time of issue and, where applicable, validity period in UTC	nnnnnn [VALID TL nnnnnn] *or* [VALID nnnnnn/nnnnnn]	211230 VALID TL 211330 221200 VALID 221215/221315
IF THE WIND SHEAR WARNING IS TO BE CANCELLED, SEE DETAILS AT THE END OF THE TEMPLATE			
Phenomenon (M)	Identification of the phenomenon and its location	[MOD] *or* [SEV] WS IN APCH *or* [MOD] *or* [SEV] WS [APCH] RWYnnn *or* [MOD] *or* [SEV] WS IN CLIMB-OUT *or* [MOD] *or* [SEV] WS CLIMB-OUT RWYnnn *or* MBST IN APCH *or* MBST [APCH] RWYnnn *or* MBST IN CLIMB-OUT *or* MBST CLIMB-OUT RWYnnn	WS APCH RWY12 MOD WS RWY34 WS IN CLIMB-OUT MBST APCH RWY26 MBST IN CLIMB-OUT
Observed, reported or forecast phenomenon (M)	Identification whether the phenomenon is observed or reported and expected to continue or forecast	REP AT nnnn nnnnnnnn *or* OBS [AT nnnn] *or* FCST	REP AT 1510 B747 OBS AT 1205 FCST
Details of the phenomenon (C)[1]	Description of phenomenon causing the issuance of the wind shear warning	SFC WIND: nnn/nnKT nnnM(nnnFT)-WIND: nnn/nnKT or nnKT ASPEEDL nnNM FNA RWYnn or nnKT ASPEEDG nnNM FNA RWYnn	SFC WIND: 320/10KT 200FT-WIND: 360/25KT 30KT ASPEEDL 2NM FNA RWY13
OR			
Cancellation of wind shear warning[2]	Cancellation of wind shear warning referring to its identification	CNL WS WRNG [n]n nnnnnn/nnnnnn	CNL WS WRNG 1211230/2113303

Note.—
1. Additional provisions as 6.2.3.(Annex 3)
2. End of the message (as the wind shear warning is being cancelled).

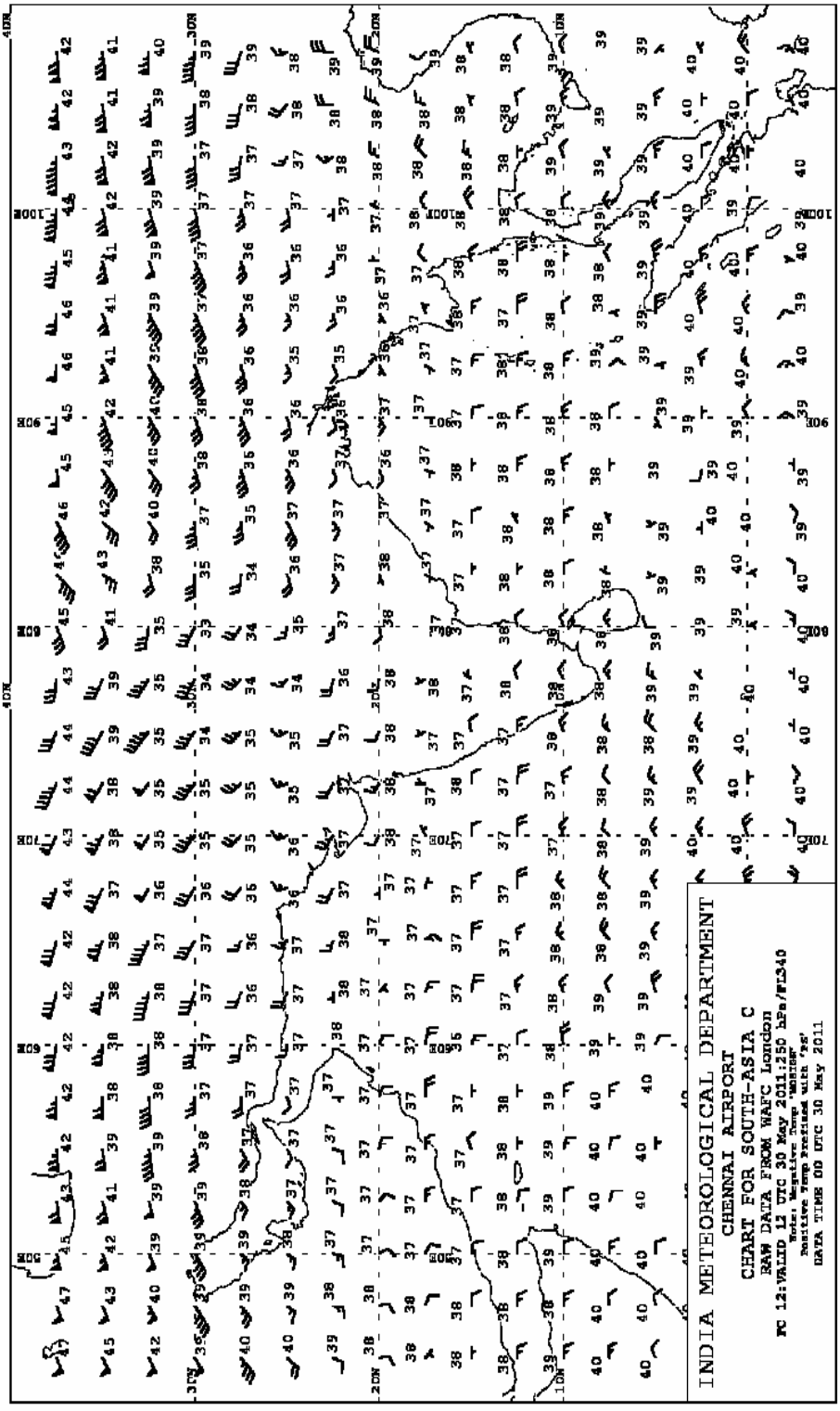
APPENDIX X (i)

EXAMPLE OF WAFC SIGWX CHART

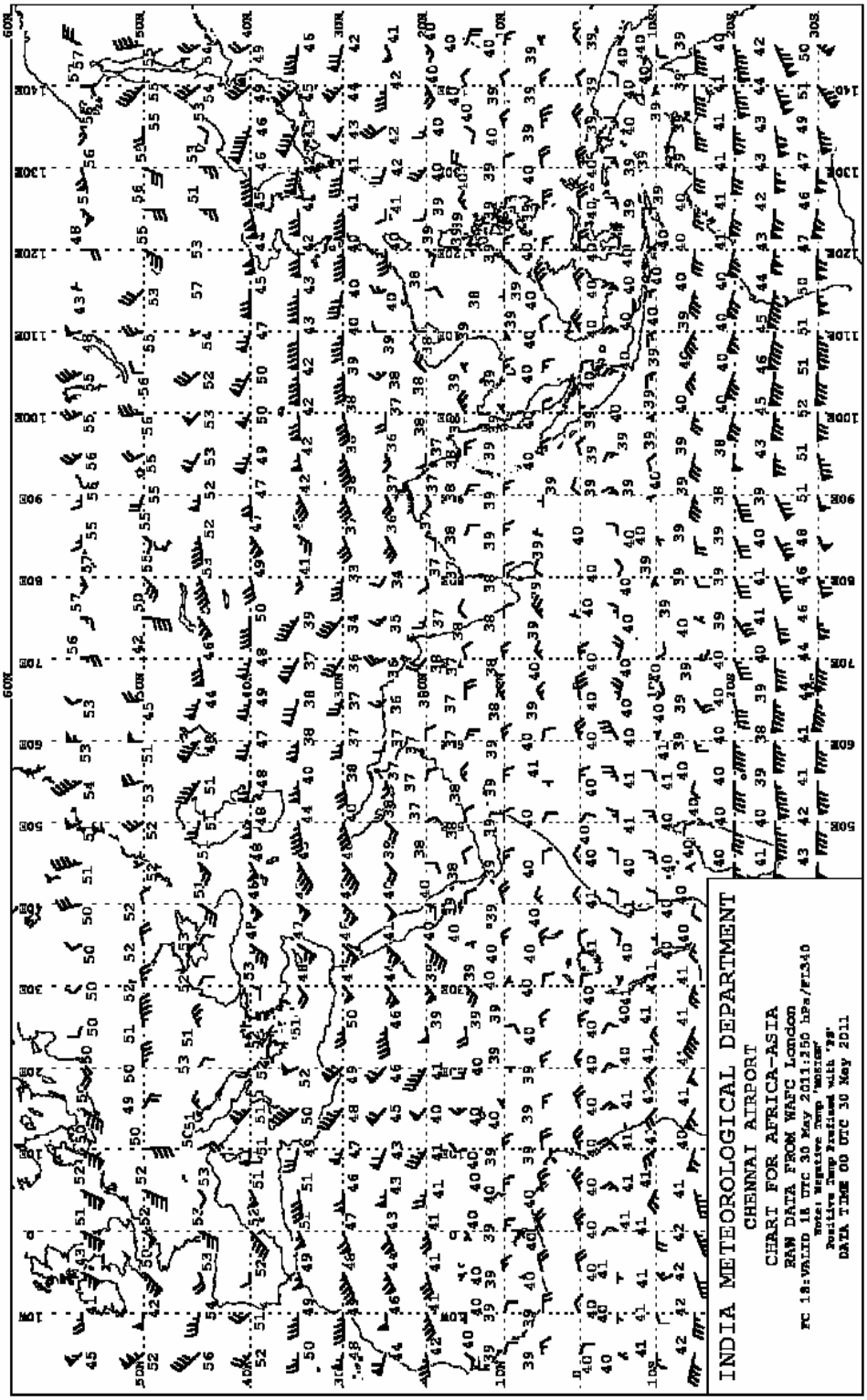


Appendix X (ii)

Examples of WAFC Wind and Temperature Chart



Appendix X (iii)



Appendix Y(i)

India Meteorological Department

Met. T-3

Serial No. _____

Flight No. VT-NAV

Route : VOMM - KRISHNAPATNAM. Issued by Class I Meteorological Office at Chennai at 0800 UTC 20110530. by NE

उड़ान पूर्वानुमान / FLIGHT FORECAST

मार्ग Route VOMM - KRISHNAPATNAM बरास्ता Via _____ वायु की अनुमानित वास्तविक गति Assumed True Air speed _____ नाट Kts.

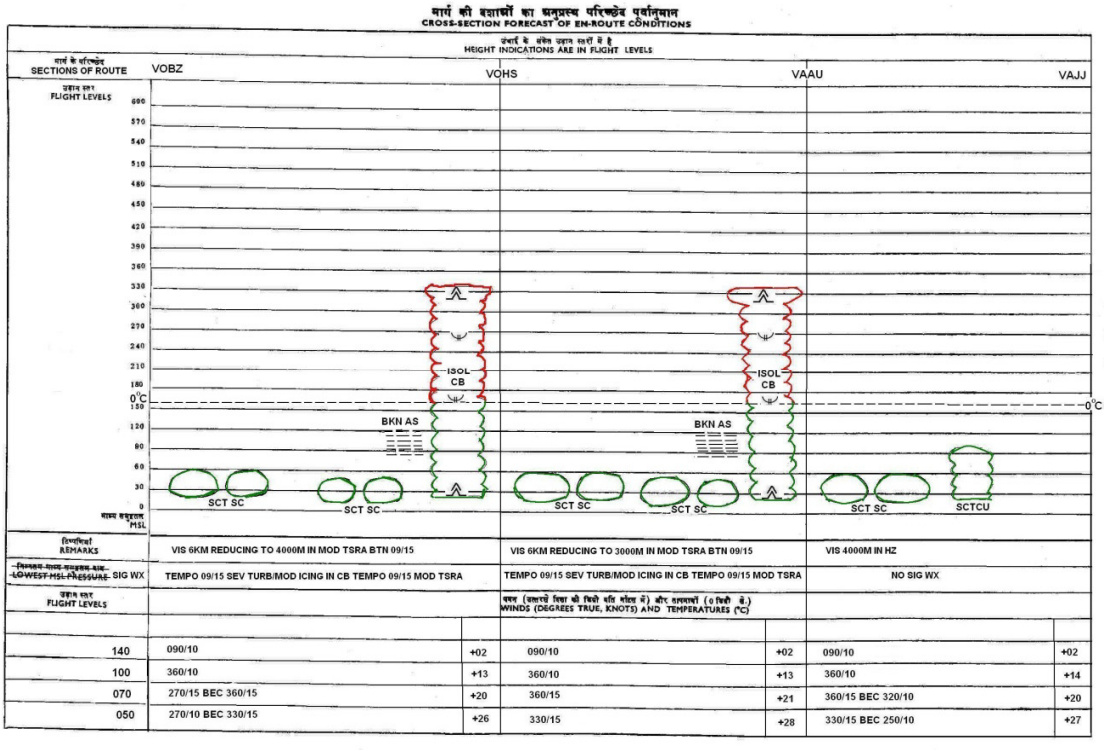
छूटने के लिए मान्य Valid for departure 1000 (समय यु. टी. सी. और तारीख) (Time U.T.C. and Date) 20110530 पहुँचने के लिए मान्य Valid for arrival 1400 (समय यु.टी.सी.और दिनांक) (Time U.T.C. and Date) 20110530

मौसम स्थिति के विशेष लक्षण / Special Features of Meteorological Situation.

ऊपरी वायु / Upper wind (वास्तविक डिग्री व नाट) और तापमान (में) (Degree true and knots) and Temperatures (°C)	मार्ग के सैक्शन (क्षेत्र सं अक्षांश और देशान्तर या भौगोलिक सूचक) SECTION OF ROUTE (ZONE Nos., LATITUDE AND LONGITUDE OR GEOGRAPHICAL INDICATORS) VOMM — KRISHNAPATNAM	
उड़ान स्तर FLIGHT LEVELS 050	240/10	+26
030	270/10	+30
020	240/10	+32
010	230/10	+34
निम्नतम परत / LOWEST LAYER मात्रा और किस्म / AMOUNT AND TYPE	SCT SC ISOL CB	
उड़ान स्तर FLIGHT LEVELS आधार पर / of Base	020 025	
शिखर पर / of top	060 300	
बादल / CLOUD		
उच्चतर परत / HIGHER LAYER		
मात्रा और किस्म / Amount and Type	BKN AC	
उड़ान स्तर FLIGHT LEVELS आधार पर / of Base	100	
शिखर पर / of top	120	
सतह दृश्यता / SURFACE VISIBILITY	6KM REDUCING TO 4000M IN FBL TSRA	
सार्थक मौसम / SIGNIFICANT WEATHER	SEV TURB IN CB/ FBL TSRA	
0° से. की समतापीय उड़ान स्तर FLIGHT LEVELS OF 0°C ISOTHERM	160	
न्यूनतम माध्य समुद्रतल का दाब LOWEST MSL PRESSURE	—	
टिप्पणियाँ / REMARKS		

Appendix Y(ii)

Met T4 for long haul (exceeding 500 nm) low level flights



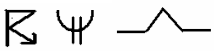
NOTES:

1) 0° C isotherm is to be drawn as a dashed line in blue or black and labeled 0° C on either end.

2) Cloud amounts are to be indicated as SCT, BKN or OVC for all clouds other than CBs. For CBs the terms ISOL, OCNL, or FRQ are to be used to indicate the frequency of occurrence. The above terms are to be written either within the cloud or above it in capital letters. Cloud types are to be indicated after the terms SCT, ISOL, etc.

3) The portion of the cloud depicted below the 0^0 C isotherm is to be shaded green while the portion above 0^0 C isotherm is to be shaded red

4) The following symbols are to be depicted in blue or black



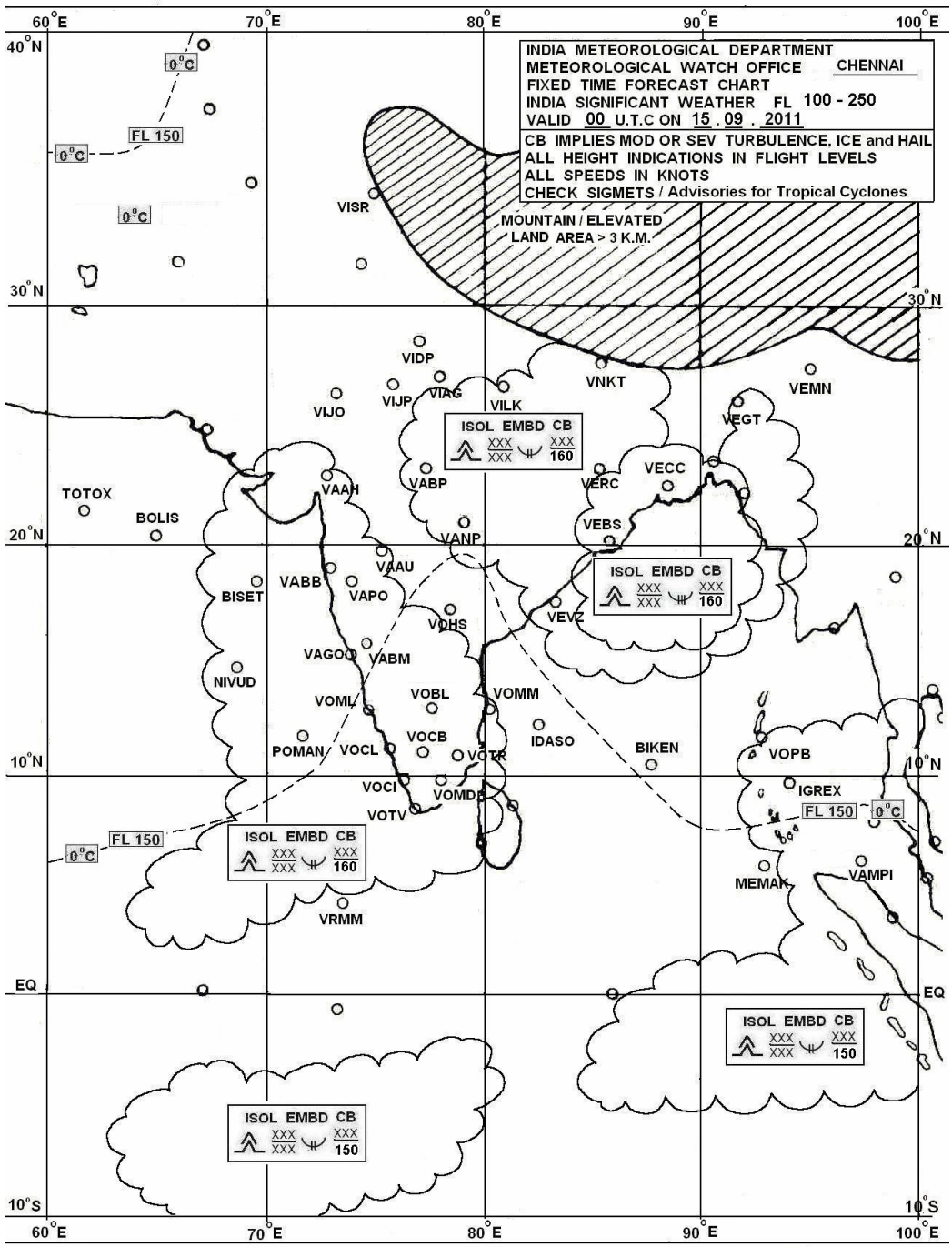
Appendix Y(iii)

Route Forecast (ROFOR) (FOR DECODING INTO T4 FORM)

ROFOR 150300Z 150615 KT VOBZ VAJJ 03VOHS 6000 3SC020 7060160 405026 27010 BEC 33015 407020 27015 BEC 36015 410013 36010 414002 09010 TEMPO 0915 4000 TSRA 4SC015 7050/// ICB025 7340/// 651509 652402 580250 7AS080 7120/// 03VAAU 6000 3SC020 7060160 405028 33015 707021 36015 410013 36010 414002 09010 TEMPO 0915 3000 TSRA 4SC015 7050/// 1CB025 7340/// 651509 652402 580250 7AS080 7120/// 03VAJJ 4000 HZ 3SC020 7060160 3CU025 7100/// 405027 33015 BEC 25010 407020 36015 BEC 32010 410014 36010 414002 09010 (.)

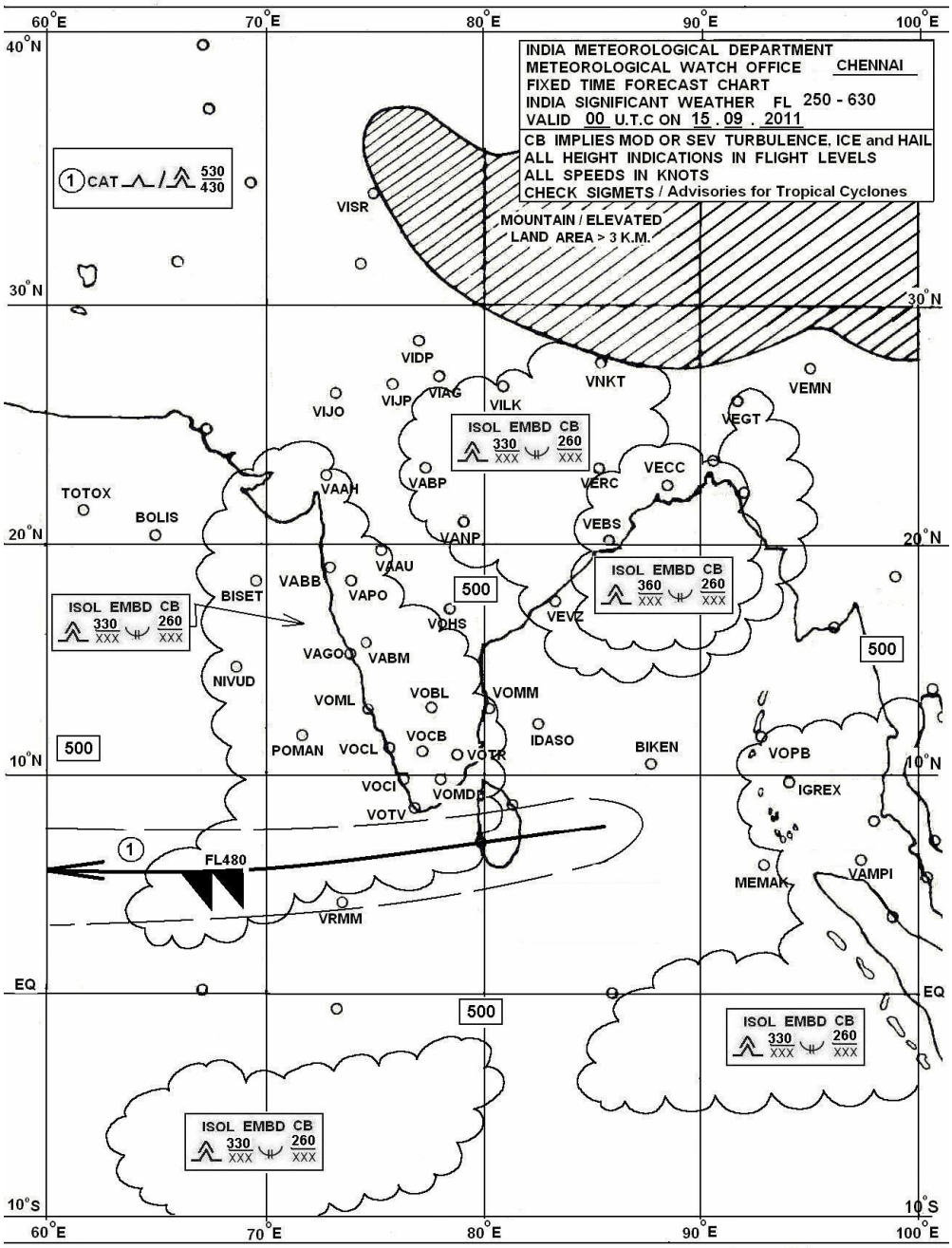
Appendix Z (i)

NATIONAL SIGWX CHART- MIDDLE LEVEL



Appendix Z (ii)

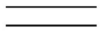
NATIONAL SIGWX CHART- HIGH LEVEL



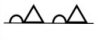
APPENDIX AA

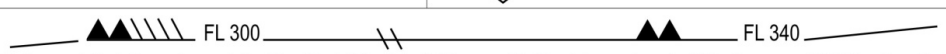
NOTATIONS USED IN FLIGHT DOCUMENTATION

WEATHER SYMBOLS

	Thunderstorm		Drizzle
	Tropical cyclone		Rain
	Severe squall line		Snow
	Moderate turbulence		Shower
	Severe turbulence		Widespread blowing snow
	Mountain waves		Severe sand or dust haze
	Slight aircraft icing		Widespread sandstorm or duststorm
	Moderate aircraft icing		Widespread haze
	Severe aircraft icing		Widespread mist
	Widespread fog		Widespread smoke
	Hail		Freezing precipitation
	Volcanic eruption	CAT	Clear Air Turbulence
	Visible ash cloud		Radiaoactive materials in the atmosphere
	Mountain obstruction		

FRONTS, CONVERGENCE ZONES & OTHER SYMBOLS

	Cold front at the surface		Quasi-stationary front at the surface
	Warm front at the surface		Quasi-stationary front above the surface
	Occluded front at the surface		Freezing level
	Occluded front above the surface		Convergence line
	Position speed & level of max wind		Inter-tropical convergence zone
	Tropopause High		State of the sea
	Tropopause Low		Sea surface Temperature
	Tropopause Level		Widespread strong surface wind



- Wind arrows indicate the maximum wind in jet and the fight level at which it occurs. Significant changes (speed of 20 knots or more. 3000 ft (less if practicable in flight level) are marked by the double bar. In the example at the double bar the wind speed is 225 km/h (120 kt)
- The heavy line delineating the jet axis begins / ends at the points where a wind speed of 150 km/h (80 kt)is forecast.
- This symbol refers to widespread surface wind speeds exceeding 60 km/h (30 kt)

BOUNDARIES

	Boundaries of Significant weather		CAT Boundary

Severe squall line symbol: In flight documentation for flights operating up to FL 100. This symbol refers to “squall line”.

Radioactive materials in the atmosphere symbol: The following information shall be included at the side of the chart: radioactive material symbol; latitude/longitude of the accident site; date and time of accident; check NOTAM for further information.

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

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

Visible ash cloud symbol: Visible ash cloud symbol applies only to model VAG not to SIGWX charts.

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

3. Abbreviations used to describe clouds

3.1 Type

CI = Cirrus AS = Altostratus ST = Stratus

CC = Cirrocumulus NS = Nimbostratus CU = Cumulus

CS = Cirrostratus SC = Stratocumulus

CB= Cumulonimbus

AC = Altocumulus

3.2 Amount

Clouds except CB

SKC = sky clear (0/8)

FEW = few (1/8 to 2/8)

SCT = scattered (3/8 to 4/8)

OVC = overcast (8/8)

CB only

ISOL = individual CBs (isolated)

OCNL = well-separated CBs (occasional)

FRQ = CBs with little or no separation (frequent)

EMBD = CBs embedded in layers of clouds or concealed by haze (embedded)

3.3 Heights

Heights are indicating on SWH and SWM charts in flight levels (FL), top over base.

When XXX is used, tops or bases are outside the layer of the atmosphere to which the chart applies.

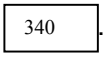
In SWL charts:

i) Heights are indicated as altitudes above mean sea level;

ii) The abbreviation SFC is used to indicate ground level.

4. Depicting of lines and systems on specific charts

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

Scalloped line	demarcation of areas of significant weather
Heavy broken line	delineation of area of CAT
Heavy solid line Interrupted by wind arrow and flight level	position of jet stream axis with indication of wind direction position of jet stream axis with indication of wind direction, speed in kt and height in flight level. The vertical extent of the jet stream is indicated (in flight levels) below the flight level, e.g. FL 270 accompanied by + 20 / -30 indicates that the height of the jet extends from FL 240 to FL 290.
Figures on arrows	Speed in kt of movements of frontal systems
Flight levels inside small rectangle	height in flight levels of tropopause at spot locations e.g..  . Low and high points of the tropopause trpography are indicated by the letters L or H, respectively inside a pentagon with the height in flight level.

APPENDIX AB

Some useful ICAO abbreviations

AAL	**Above aerodrome level**	**LOC**	**Local or locally or location or located**
ABT	**About**	**LONG**	**Longitude**
ABV	**Above**	**LV**	**Light and variable**
AC	**Altocumulus**	**LVL**	**Level**
ACC	**Area Control Centre**	**LYR**	**Layer or layered**
ACFT	**Aircraft**	**MAR**	**March**
ACT	**Active or Activated or activity**	**MAX**	**Maximum**
ADDITIONAL	**Additional meteorological information**	**MAY**	**May**
AGL	**Above ground level**	**METAR**	**Aviation local routine report**
AGN	**Again**	**MI**	**Shallow**
AIREP	**Air- report**	**MIFG**	**Shallow fog**
ALT	**Altitude**	**MIN**	**Minutes**
ALTN	**Alternate(Aerodrome)**	**MNM**	**Minimum**
AMD	**Amend or amended**	**MOD**	**Moderate**
AMSL	**Above mean sea level**	**MON**	**Monday**
AND	**And**	**MOV**	**Move or moving or movement**
APR	**April**	**MS**	**Minus**
APRX	**Approximate or approximately**	**MSL**	**Mean sea level**
ARFOR	**Area forecast**	**MT**	**Mountain**
AS	**Altostratus**	**MTW**	**Mountain waves**
AT	**At (followed by time)**	**MWO**	**Meteorological watch office**
ATC	**Air Traffic Control**	**N**	**North or northern latitude**
ATIS	**Automatic Terminal Information Service**	**NC**	**No change**
AUG	**August**	**NE**	**North east**
AVG	**Average**	**NM**	**Nautical Miles**

BASE	**Cloud base**	**NNE**	**North north east**
BC	**Patches**	**NNW**	**North north west**
BCFG	**Fog patches**	**NOSIG**	**No significant change**
BFR	**Before**	**NOV**	**November**
BKN	**Broken**	**NS**	**Nimbostratus**
BL	**Blowing**	**NSC**	**Nil significant cloud**
BLO	**Below clouds**	**NSW**	**No significant weather**
BLSN	**Blowing snow**	**NW**	**North-west**
BLW	**Below**	**NW**	**North west**
BR	**Mist**	**OBS**	**Observe or observed or observation**
BTL	**Between layers**	**OBSC**	**Obscure or obscured or obscuring**
BTN	**Between**	**OCNL**	**Occasional or occasionally**
BY	**By**	**OCT**	**October**
C	**Degree Celsius(Centigrade)**	**OF**	**Of (place)**
CAT	**Clear Air Turbulence**	**OPMET**	**Operational meteorological (Information)**
CAVOK	**Visibility, cloud and present weather better than prescribed values or conditions**	**OTLK**	**Outlook**
CB	**Cumulonimbus**	**OVC**	**Overcast**
CC	**Cirrocumulus**	**PO**	**Dust/sand whirls**
CI	**Cirrus**	**PROB**	**Probability**
CLD	**Cloud**	**PROV**	**Provision**
CNL	**Cancel or cancelled**	**PS**	**Plus**
CNS	**Continuous**	**PSN**	**Position**
COND	**Condition**	**QFE**	**Atmospheric pressure at aerodrome elevation**
CONT	**Continue or continued**	**QNH**	**Altimeter subscale when on the ground**
COR	**Correct or correction or corrected**	**RA**	**Rain**

COT	**At the cost**	**RAPID**	**Rapid or rapidly**
COV	**Cover or covered or covering**	**RASH**	**Rain showers**
CS	**Cirrostratus**	**RASN**	**Rain and snow or showers or rain and snow**
CTA	**Control Area**	**RDOACT**	**Radioactive**
CU	**Cumulus**	**RE**	**Recent**
CUF	**Cumuliform**	**REF**	**Reference to or referred to**
DEC	**December**	**RMK**	**Remark**
DEG	**Degrees**	**ROBEX**	**Regional OPMET bulletin exchange**
DEV	**Deviation or deviating**	**ROFOR**	**Route forecast**
DIF	**Diffuse**	**RTE**	**Route**
DIST	**Distance**	**RVR**	**Runway visual range**
DP	**Dew point**	**RWY**	**Runway**
DPT	**Depth**	**S**	**South or southern latitude**
DR	**Low Drifting**	**SAT**	**Saturday**
DRG	**During**	**SC**	**Stratocumulus**
DS	**Dust storm**	**SCT**	**Scattered**
DTRT	**Deteriorate or deteriorating**	**SE**	**Southeast**
DU	**Widespread dust**	**SEV**	**Severe**
DUC	**Dense upper cloud**	**SFC**	**Surface**
DUR	**Duration**	**SG**	**Snow grains**
DZ	**Drizzle**	**SH**	**Showers**
E	**East or Eastern**	**SIGMET**	**Information concerning en-route weather phenomena which may affect the safety of aircraft operations**
ELEV	**Elevation**	**SIGWX**	**Significant weather**
EMBD	**Embedded in a layer**	**SIMUL**	**Simultaneous or simultaneously**
ENE	**East north east**	**SKC**	**Sky clear**
ENR	**En-route**	**SLW**	**Slow**
ERUPTION	**Eruption (indicating volcanic**	**SN**	**Snow**

	eruption)		
ESE	**East south east**	**SNSH**	**Snow showers**
EST	**Estimate or estimated**	**SPECI**	**Aviation local special report**
ETD	**Expected time of departure**	**SQ**	**Squall**
EXC	**Except**	**SQL**	**Squall Line**
EXP	**Expect or expected or expecting**	**SS**	**Sandstorm**
EXTD	**extend or Extending**	**SSE**	**South south east**
FBL	**Light**	**SSW**	**South south west**
FC	**Funnel cloud**	**ST**	**Stratus**
FCST	**Forecast**	**STF**	**Stratiform**
FEB	**February**	**STN**	**Station**
FEW	**Few**	**STNR**	**Stationary**
FIC	**Flight information centre**	**SUN**	**Sunday**
FIR	**Flight information region**	**SW**	**South west**
FL	**Flight level**	**T**	**Temperature**
FLUC	**Fluctuating or fluctuation or fluctuated**	**TAF**	**Aerodrome forecast**
FM	**From**	**TC**	**Tropical cyclone**
FREQ	**Frequency**	**TCU**	**Towering cumulus**
FRI	**Friday**	**TDO**	**Tornado**
FRQ	**Frequent**	**TEMPO**	**Temporary or temporarily**
FST	**First**	**TEND**	**Trend or tending to**
FST	**Hours**	**THU**	**Thursday**
FU	**Smoke**	**TIL**	**Until**
FU	**Hurricane**	**TO**	**To (place)**
FZ	**Freezing**	**TOP**	**Cloud top**
FZ	**Heavy**	**TROP**	**Tropopause**
FZDZ	**Freezing Drizzle**	**TS**	**Thunderstorm (in aerodrome reports and forecasts, TS used alone means, thunder heard but no**

			precipitation at the aerodrome)
FZFG	**Freezing fog**	**TSGR**	**Thunderstorm with hail**
FZRA	**Freezing rain**	**TSSS**	**Thunderstorm with Dust storm or sandstorm**
GND	**Ground temperature**	**TUE**	**Tuesday**
GR	**Hail or soft hail**	**TURB**	**Turbulence**
GRADU	**Gradual or gradually**	**UTC**	**Coordinated Universal time**
GRID	**Processed meteorological data in the form of grid point values**	**VA**	**Volcanic ash**
HVY	**Heavy**	**VALID**	**Valid**
HZ	**Haze**	**VIS**	**Visibility**
ICE	**Icing**	**VOLMET**	**Meteorological information for aircraft in flight**
IMPR	**Improve or improving**	**VRB**	**Variable**
INC	**In cloud**	**W**	**West or western longitude**
INTSF	**Intensify or intensifying**	**WAFC**	**World area forecast centre**
INTST	**Intensity**	**WDSPR**	**Wide spread**
ISOL	**Isolated**	**WED**	**Wednesday**
JAN	**January**	**WI**	**Within**
JTST	**Jet stream**	**WID**	**Width**
JUL	**July**	**WKN**	**Weaken or weakening**
JUN	**June**	**WNW**	**West north west**
KM	**Kilometers**	**WRNG**	**Warning**
KMH	**Kilometer per hour**	**WS**	**Wind shear**
KT	**Knots**	**WSW**	**West south west**
LAT	**Latitude**	**WTSPT**	**Waterspout**
LEN	**Length**	**WX**	**Weather**
LINE	**Line**	**Z**	**Coordinated Universal Time**