Standard Operational Procedure for Aviation Meteorology

India Meteorological Department

Ministry of Earth Sciences

Govt. of India

STANDARD
OPERATIONAL PROCEDURE
FOR
AVIATION METEOROLOGY

PREFACE

Aviation Meteorological Services is one of the oldest services provided by the India Meteorological Department (IMD) which plays an important role in safe and efficient flight operations to National & International sectors through civil airports in India. These meteorological services are being provided as per the recommended and standard practices given by International Civil Aviation Organization (ICAO) Annex-3, (Meteorological service for International Air Navigation) & Director General of Civil aviation in India (DGCA).

In India, aviation meteorological services are provided through a network of Meteorological Watch Offices (MWOs), functioning at four international airports namely Kolkata, New Delhi, Chennai, and Mumbai & also through 18 Aerodrome Meteorological Offices (AMOs) & 54 Aeronautical Meteorological Stations (AMSs) situated at various national and international airports of the country. The MWOs are catering the needs to flights in their respective flight information region (FIR). Regional Specialized Meteorological Centre (RSMC), IMD New Delhi also serves as one of the ICAO designated Tropical Cyclone Advisory Centres (TCAC) to provide Tropical cyclone advisory to the MWOs in India and neighbouring countries for safety of aircraft movement in disaster weather. The technical coordination and overseeing of the functions of the aviation meteorological offices in India is done by Central Aviation Meteorological Division (CAMD) functioning at DGM New Delhi.

The web based information dissemination system known as On-line Briefing System (OLBS) of IMD is being maintained by the meteorological offices functioning at MWOs Chennai and New Delhi, through which the registered users can directly download the forecast products as desired. Apart from the primary communication channels of AAI, the department has all advanced communication modes for the dissemination of aviation information.

The aviation industry in India has emerged as one of the fastest growing industries in the country during recent years. New airports are coming up under RCS UDRAN. So Aviation sector has witnessed rapid growth both in terms of density of air traffic and number of airports. This trend is expected to continue in coming years also.

In order to meet demands of growing aviation sectors & to discharge quick quality work , the need for a consolidated Standard Operational Procedure (SOP) on aviation meteorological services for ready use by aviation meteorological offices was felt necessary and hence the first edition of SOP on aviation meteorological services in India has been brought out (March 2021) . The topics of this SOP are restricted to procedural aspects of meteorological service to aviation. It is hoped that the information it contains will be very useful to the officials working in operational field.

(Dr. M. Mohapatra)

Director General of Meteorology

ACKNOWLEDGEMENT

The entire work of the publication has been made by a group of officers and other members associated with aviation services of IMD. I am thankful to the authors for their tireless effort towards formulation of the document—Standard operational procedure of aviation services. I would like to place on record the significant contributions & guidance made by Dr. G.C.Debnath, Sc. F & Head MWO Kolkata as chairman of the committee towards preparation, compilation, edition, of the publication.

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Serial No.	Name of Author	Affiliation	Topic
1	Shri Gajendra Kumar & Shri C.S.Tomar	CAMD New Delhi	Introduction and Overview of Aviation Service
2	Shri S.G.Kamble	MWO Mumbai	Standard observational procedure
3	Shri Soumak Banerjee	MWO Kolkara	Climatology
4	Dr. G.C. Debnath & Shri Soumak Banerjee	MWO Kolkata	Aviation weather forecast
5	Dr. G.C.Debnath	MWO Kolkata	Weather advisory - SIGMET
6	Dr. G.C. Debnath & Shri Soumak Banerjee	MWO Kolkata	Aviation weather warnings
7	Dr. G.C.Debnath	MWO Kolkata	Briefing, De-briefing and Documentation
8	Dr. G.C.Debnath	MWO Kolkata	Action for VIP/VVIP Flight movement
9	Shri Sourav Adhikary & Shri Chiranjit chakraborty	MWO Kolkata	Online Briefing System (OLBS)
10	Dr. G.C. Debnath & Shri Chiranjit chakraborty	MWO Kolkata	Operational Messages
11	Shri. Chiranjit Chakraborty & Dr. G.C.Debnath	MWO Kolkata	World Area Forecast System (WAFS)
12	Shri N. Meenatchi Nathan	MWO Chennai	Action for Search and Rescue Operation
13	Shri Gajendra Kumar Shri. C.S.Tomar	CAMD , New Delhi	Action for Aircraft Accident and Investigation
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Chapter - 1

INTRODUCTION AND OVERVIEW OF AVIATION SERVICE

1.1 INTRODUCTION

Weather affects aviation activities at various stages of operation. In order to ensure safe operations in all-weather situations, National Meteorological Services throughout the world are obliged by law to make meteorological observations & forecasts, to establish and maintain monitoring and warning systems in their countries. The objective of Aeronautical Meteorology is to contribute towards the safety, economy, regularity and efficiency of air navigation. National Meteorological Services throughout the world make meteorological observations and forecasts through establishment of sustained monitoring and warning systems in their respective countries, as per the standards and guidelines provided by World Meteorological Organisation (WMO) and International Civil Aviation Organisation (ICAO).

World Meteorological Organisation (WMO) sets standards and guidelines for meteorological service for aviation through its Standing Committee on Services for Aviation (SC-AVI) earlier known as Commission for Aeronautical Meteorology. International Civil Aviation Organisation (ICAO) which is responsible for civil aviation regulations co-operates closely with WMO in all matters related to meteorology and common regulations are agreed to by both organisations.

India Meteorological Department (IMD) is the national agency in India, which is responsible in all the matters pertaining to meteorology in civil aviation. Aviation services are provided for National and International flights for safe and efficient operations in terms of take-off, landing and en-route forecasts. These services are provided through a network of Meteorological Watch Offices (MWOs) at four international airports at Chennai, Kolkata, Mumbai and New Delhi and other aviation meteorological offices. The aviation meteorological offices provide the airports specific current weather reports, forecasts and warnings for safety, economy and efficiency of aircraft operations.

1.2 WORLD METEOROLOGICAL ORGANISATION (WMO)

WMO is an intergovernmental organisation and acts as a specialised agency of the United Nations (UN) for meteorology (weather and climate), operational hydrology and related sciences. It is the UN system's authoritative voice on the state and behaviour of the Earth's atmosphere, its interaction with the oceans, the climate it produces and the resulting distribution of water resources that regulates all activities related to meteorology and climate.

1.3 INTERNATIONAL CIVIL AVIATION ORGANISATION (ICAO)

The ICAO officially came into being on 4th April 1947. It has its Head Quarters at Montreal, Canada. In October 1947, ICAO became the specialized agency of the United Nations (UN). Non-governmental organizations which also participate in ICAO's work include the International Air Transport Association (IATA), the Airports Council International, the International Federation of Air Line Pilot's Associations, and the International Council of Aircraft Owner and Pilot Associations.

1.4 OBJECTIVE

The main purpose of ICAO is to develop the principles and techniques for international air navigation and to foster the planning and development of international air transport so as to:

- Ensure the safe and orderly growth of international civil aviation throughout the world;
- Encourage the arts of aircraft design and operation for peaceful purposes;
- Encourage the development of airways, airports and air navigation facilities for international civil aviation;
- Meet the needs of the peoples of the world for safe, regular, efficient and economical air transport;
- Prevent economic waste caused by unreasonable competition;
- Ensure that the rights of contracting states are fully respected and that every contracting state has a fair opportunity to operate international airlines;
- Avoid discrimination between contracting states;
- Promote safety of flight in international air navigation;
- Promote generally the development of all aspects of international civil aeronautics.

1.5 ICAO ORGANIZATION

ICAO is made up of an Assembly, a Council of limited membership with various subordinate bodies and a Secretariat. The chief officers are the President of Council and the Secretary General.

The General Assembly:

The sovereign body of ICAO is the Assembly and is composed of representation from all contracting states. The Assembly meets once in every 3 years, reviewing in detail the work of the Organization in technical, economic, legal and technical assistance fields and setting policy for the coming years. It also votes a triennial budget.

The Council:

The governing body of ICAO is the Council. It is composed of 33 contracting states elected by the assembly for a 3 years term. The assembly chooses the council member states. The Council together with its sub-ordinate bodies, the Air Navigation Commission, Air Transport Committee, The Committee on joint support for Air Navigation Services and Finance Committee provide the continuing direction of work of the Organization. One of the major duties of the Council is to adopt "International Standard and Recommended Practices" and to incorporate these Annexes to the Convention on International Civil Aviation. Both ICAO Assembly and the Council function from ICAO's Head Quarters at Montreal, Canada.

The Secretariat:

The Secretariat is headed by a Secretary General. It is divided into five main divisions, the Air Navigation Bureau, the Air Transport Bureau, the Technical Assistance

Bureau, the legal Bureau and Bureau of Administration and Services. Corresponding to each ICAO committee and Division, is a Section of the ICAO Secretariat, made up of staff members selected for technical competence in their respective fields, which supplies technical and administrative aid to the governmental representatives who make up the ICAO Council Committees and Divisions.

In order that the work of the Secretariat shall reflect a truly international approach, professional personnel are recruited on a broad geographical basis. In addition to the regular staff, the services of experts are obtained from member states.

1.6 AIR NAVIGATION COMMISSION AND METEOROLOGICAL DIVISION

The requirements of meteorological facilities for civil aviation during different phases of operation of aircraft are discussed along with other related problems concerning Aviation by periodical Air Navigation Conference held by ICAO. Matters of purely meteorological interests are discussed in Meteorological Division meetings. To coordinate action between ICAO and WMO in respect of provision of meteorological services to civil aviation, the meetings are held conjointly with the SC-AVI (formerly CAeM) of WMO whenever meteorological aspects are to be discussed.

1.7 THE REGIONAL ASSOCIATIONS

The aim of a Regional Association (RA) is to provide co-operation among National Meteorological and Hydrological Services (NMHS) in a given geographical region in dealing with special problems of a regional nature. There are six RAs, which are given below.

- RA I: Africa
- RA II: Asia
- RA III: South America
- RA IV: North and Central America
- RA V: South west Pacific
- RA VI: Europe

India comes under RA II – Asia. The functions of RA are:

- To promote the execution of the resolutions of Congress and the Executive Council in its Region;
- To consider matters brought to its attention by the Executive Council;
- To discuss matters of general interest and to coordinate meteorological and related activities in its Region;
- To make recommendations to congress and the Executive Council on matters within the purposes of the Organization; and
- To perform such other functions as may be conferred on it by Congress.

The Regional Offices:

In dealing with international civil aviation on a world wide scale, there are many

subjects which ICAO has had to consider on a regional basis. The Organization has set up eight geographical regions, both to facilitate detailed planning and to cater to different types of flying operations. The eight regions are:

- The North American Region (NAM)
- The South American Region (SAM)
- The North Atlantic Region (NAT)
- The South Atlantic Region (SAT)
- The European Mediterranean Region (EUM)
- The Middle East Region (MID)
- The South East Asia Region (SEA)
- The Pacific Region (PAC)

India is located in MID and SEA Regions and takes part in the Regional Air Navigation Meetings (RAN) of these regions which is held as a combined meeting. Similar combined RAN meetings are also held by NAM & NAT and SAM & SAT.

The ICAO Regional Offices to cater to the specific aviation needs of the regions are at Bangkok, Dakar, Cairo, Paris, Lima, Mexico City. The Regional Office at Bangkok is concerned with the MID/SEA region and is known as the Far East Asia and Pacific (FEAP) Office.

1.8 ICAO ADVISORY CENTRES

Volcanic Ash Advisory Centres (VAAC):

The role of a VAAC is to provide expert advice to Area Control Centres (ACCs)/ Meteorological Watch Offices (MWOs) in its area of responsibility regarding the extent and forecast movement of a volcanic ash cloud. This information is required by the MWOs in order to issue SIGMETs for volcanic ash. ICAO has designated the following VAACs to provide advice to MWOs on the extent and forecast movement of volcanic ash within an agreed area of responsibility: Anchorage (United States), Buenos Aires (Argentina), Darwin (Australia), London (United Kingdom), Montreal (Canada), Tokyo (Japan), Toulouse (France), Washington (United States), and Wellington (New Zealand). In order to provide guidance to States, a set of International Airways Volcanic Watch (IAVW) procedures has been developed by ICAO and circulated to States in addition to the provisions in the relevant Annexes.

Tropical Cyclone Advisory Centre: It is a meteorological centre designated to provide advisory information to meteorological watch office regarding the position, forecast direction and speed of movement, central pressure and maximum surface wind of tropical cyclones. The following are the Designated TCACs: Miami (USA), Tokyo (Japan), New Delhi (India), La Reunion (France), and Nadi (Fiji).

1.9 INDIA METEOROLOGICAL DEPARTMENT– CENTRAL AVIATION METEOROLOGICAL DIVISION (CAMD)

India Meteorological Department is the national agency which is responsible in all matters related to provision of Meteorological support to aviation in India. The

principal requirements in the aviation point of view are:

1. Supply of Current Weather Observations to all aeronautical users,
2. Issue of forecast and warnings on meteorological hazards to aviation, and
3. Adherence to procedures and formats for dissemination of products to aviators. Service to International Civil Aviation is in accordance with the Standards and Recommended Practices (SARPs) of ICAO (Annex 3).

Domestic Aviation (Civil, Defense, Chartered flights, Explorative missions, relief & rescue operations, VVIP/ VIP flights, flying clubs etc.) is governed by the aviation legislation, Civil Aviation Requirements (CAR) of Director General of Civil Aviation (DGCA), India. It is essentially an extension of SARPs of ICAO with some National Practices of IMD as accepted and required by the users.

1.10 CENTRAL AVIATION METEOROLOGICAL DIVISION (CAMD)

CAMD is the nodal office for the aviation services in the country. Central Aviation Meteorological Division (CAMD) at DGM, New Delhi is the nodal office for the aviation services in the country. It also maintains the liaison with ICAO, WMO, Airlines, DGCA, and AAI on technical aspects of aviation. The installation and maintenance of Airport Meteorological Instruments are done by IMD (SI) division, Pune. The telecommunications requirements for aviation are managed by the IMD (Telecommunication Division) functioning at New Delhi and by the telecommunication unit of Airport Authority of India.

These services are provided through 18 Aerodrome Meteorological Offices (AMO) and 72 Aeronautical Meteorological Stations (AMS) (including 18 AMOs) located at various national and international airports of the country.

Aerodrome Meteorological Offices functioning at Mumbai , Kolkata , Delhi and Chennai airports also serve as Meteorological Watch Offices (MWOs) catering to flights in respective Flight Information Regions (FIR). One ICAO designated Tropical Cyclone Advisory Centre (TCAC) is functioning at IMD HQ, New Delhi. It is this center's responsibility to monitor the development of tropical cyclones in its area of responsibility.

The guidelines for meteorological service to aviation in India are given in “Manual on Procedures for Meteorological Services for Aviation in India” published by CAMD, India Meteorological Department. It is essentially the Annex 3, incorporating national practices also. The Aviation Weather Code Book, also published by CAMD, IMD closely resembles “Manual on Codes- WMO 306”. These two publications are updated and revised from time to time in order to incorporate all the amendments and changes by WMO and ICAO.

1.11 FLIGHT INFORMATION REGION (FIR)

An airspace of defined dimensions within which flight information service and alerting service are provided. Indian airspace is divided into five FIRs, namely, Chennai, Delhi, Kolkata, Guwahati and Mumbai. The associated meteorological office providing services to an FIR should be a MWO. However, the responsibility of meteorological watch over Guwahati FIR is being handled by MWO Kolkata.

1.12 METEOROLOGICAL INFORMATION IN SUPPORT OF AVIATION

The meteorological information for the use of aviation activities are:

1. Current weather observations (METAR/ SPECI, MET REPORT/ SPECIAL).
2. Forecasts (Terminal Aerodrome Forecast (TAF), Area/ Local Forecast, Route Forecast, Take-off and Landing (TREND) Forecast)
3. Warnings (Aerodrome warnings, Warning for Light Aircrafts, Wind shear warnings, SIGMET)
4. Climatology (Climatology of Aerodromes, Climatological Summary, Climatology of upper wind and temperature).

1.13 RESPONSIBILITIES OF MWO

Following are the responsibilities of Meteorological Watch Office (MWO):

1. Maintain continuous watch of meteorological conditions affecting flight operations within its Flight Information Region (FIR).
2. Prepare SIGMET and other information relating to its FIR.
3. 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, Cambodia, China (Beijing), Guam (US), Indonesia, Peoples Democratic Republic of Lao, Malaysia, Maldives, Myanmar, Nepal, Philippines, Russian Federation, Singapore, Sri Lanka, Thailand, Uzbekistan, Vietnam.
4. Supply SIGMET information and other meteorological information to associated air traffic services units, including SIGMET messages of other MWOs.
5. Disseminate their SIGMET information to other forecasting offices in India.
6. 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 Centres (ACC) and to its associated VAAC.

1.14 RESPONSIBILITIES OF AMO

Following are the major responsibilities of Aerodrome MET Office (AMO):

1. 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.
2. Preparation and/or obtaining forecasts of local meteorological conditions.
3. 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.
4. Provision of briefing, consultation and flight documentation to flight crewmembers and/or other flight operations personnel.
5. Supply of other meteorological information to aeronautical users like-

- Hourly/ half hourly current weather observations and special reports.
- RVR observations.
- Landing/Take-off reports on request for the required elements.
- Meteorological information for VOLMET broadcasts, ATIS broadcasts, VOR broadcasts, etc.
- Pressure data.
- Radar and Satellite Observations.
- SIGMETs of FIR of which the Aerodrome Meteorological Office is a part and SIGMETs of other FIRs.
- AIREPs available.
- METARs /SPECIs of other stations as appropriate.
- Low level wind shear and temperature inversions.

6. Display of available meteorological information.
7. Exchange of meteorological information with other meteorological offices.
8. Issue of landing and take-off forecasts.
9. Supply of flight planning information.
10. Supply of aerodrome forecasts of relevant aerodromes.
11. Supply of forecasts to their associated Aeronautical Meteorological Stations for flights operating from their aerodromes.
12. To issue aerodrome warnings for local aerodrome as well as for their associated Aeronautical Meteorological Stations.
13. 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.

1.15 RESPONSIBILITIES OF AMS

Following are the major responsibilities of Aeronautical Meteorological Station (AMS):

1. Supply to aeronautical users, of current weather observations of their own station and those of other stations as required, by obtaining them from the stations concerned.
2. Providing documentation for flights originating from their stations after obtaining the forecasts from their associated Aerodrome Meteorological Office(s).
3. Supply of TAF and aerodrome warnings to aeronautical users of their aerodrome after being received from their associated Aerodrome Meteorological Office.
4. Supply of information received on pre-eruptive volcanic activity, volcanic eruption or volcanic ash cloud to aeronautical users.

5. Supply of SIGMET as and when received.

1.16 DUTIES AND TASKS OF METEOROLOGICAL OFFICER AT AIRPORT

Meteorological Watch Officer: The primary duties of a Meteorological Watch Officer are as follows:

1. To provide Aeronautical Met Service within their area & airspace of responsibility in accordance with the standard procedures and practices prescribed in relevant documents.
2. Ensure that her/his unit operates efficiently and administered in accordance with relevant provisions.
3. Keep continuous watch over the airspace bounded by the FIR boundaries and also the adjoining FIR for weather phenomenon detrimental for Air Navigation and take follow- up action in terms of issuance of SIGMET and amendments to existing warning.
4. Monitoring the SIGMET of adjoining regions for transient weather phenomenon and take timely action for their own airspace of responsibility.
5. Continuously monitor for advisories issued by Tropical Cyclone Advisory Centre, Volcanic Ash Advisory Centre, and Space Weather Advisory Centre.
6. Continuously monitor the OPMET generated by the AMO, AMS under their area of responsibility and intervene as per the requirements.
7. Maintain close liaison and coordination with Air Traffic Services units, ATFM, operators and attached AMO, AMS.

Duty Officer-Meteorology: The primary duties of a Duty Officer-Meteorology are as follows:

1. To provide Aeronautical Met Service within their area & airspace of responsibility in accordance with the standard procedures and practices prescribed in relevant documents which includes briefing, consultation to operators and flight crew members.
2. Ensure that her/his unit operates efficiently and administered in accordance with relevant provisions.
3. Maintain close liaison with Air Traffic Services units, operators, and adjoining AMO, AMS.
4. Keeps continuous watch over the area of responsibility for weather phenomenon detrimental for Air Navigation and takes follow-up action in terms of issuance of forecasts, warning and amendments to existing forecast.
5. Analysis and prognosis of synoptic weather charts.
6. Issuance of routine and non-routine forecasts and warning, AD warning for attached AMS including take-off, local forecast.
7. Preparation of Flight folder, Route forecast as per the requirements and requisition.
8. Briefing the Pilots, ATCO, and Operators about the meteorological conditions.

9. Responding to telephonic queries.
10. Carrying out other station specific activities for the office.

Tower MET Officer (TMO): The primary duties of a Tower MET Officer are as follows:

1. Observation and Recording of Aeronautical Meteorological Phenomena and parameters in accordance with relevant provisions.
2. Ensure that her/his unit operates efficiently.
3. Keep continuous watch over the Aerodrome and vicinity for weather phenomenon detrimental for Air Navigation.
4. Prepare routine, non-routine report and disseminates it to recipients as per the schedule.
5. Keeps continuous watch over the performance of sensors and instruments.
6. Check and confirm the quality of meteorological observations before issuance including relevance of content, time of validity and location of phenomena.
7. Issues TREND Forecasts. Briefs the ATCO, Duty Officer and Operators about the prevailing meteorological Conditions and imminent changes.

1.17 AVIATION METEOROLOGICAL NETWORK IN INDIA

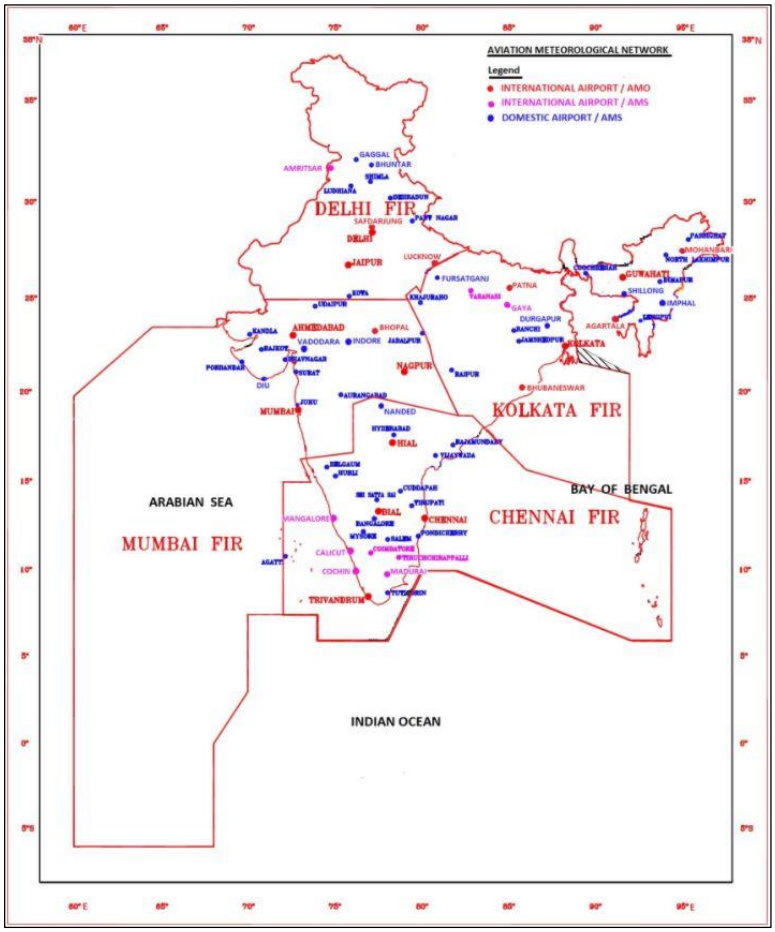
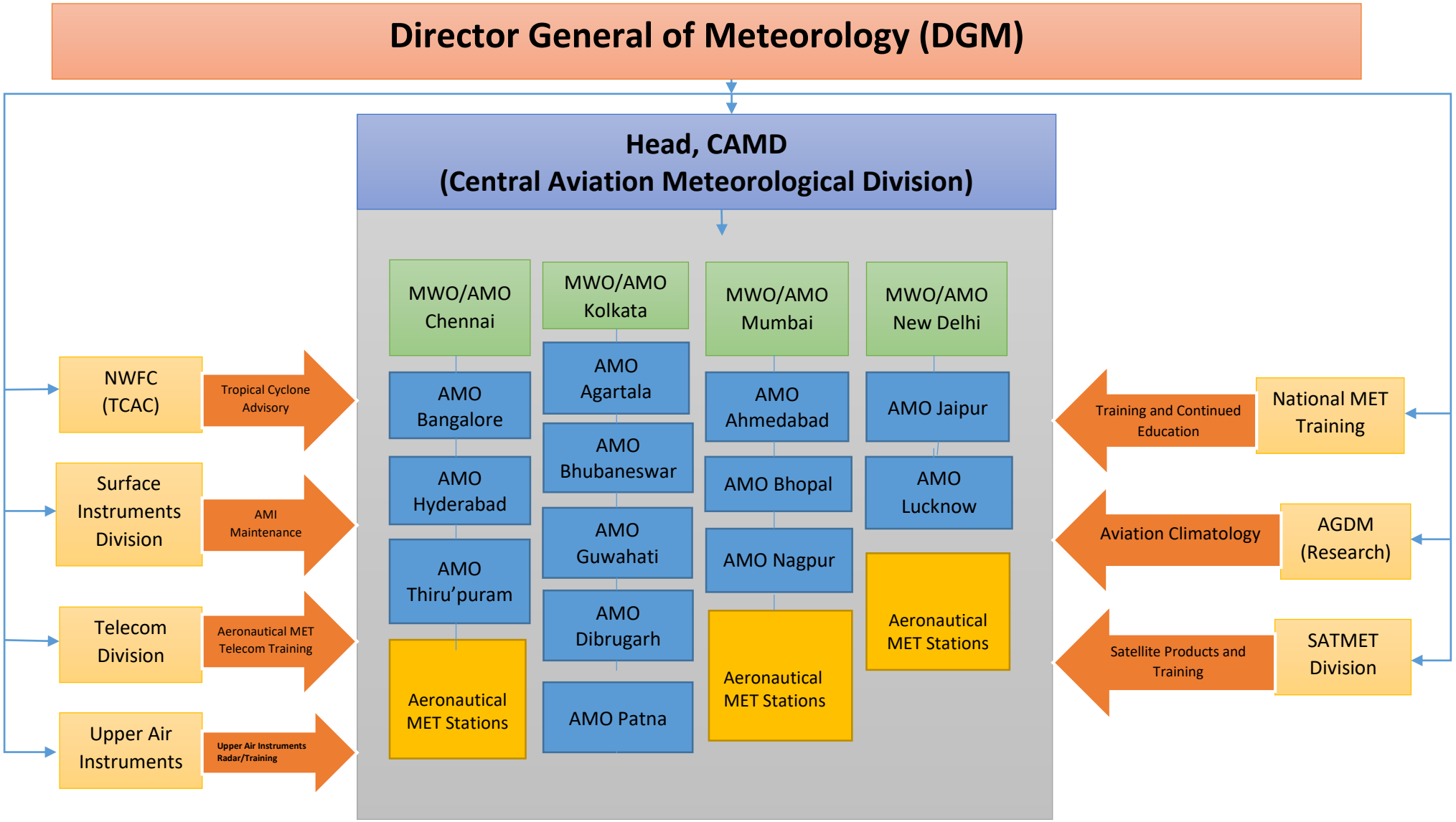


Figure 1: Aviation Meteorological Network

1.18 IMD AVIATION ORGANISATION CHART

Central Aviation Meteorological Department



1.19 LIST OF INSTALLED INSTRUMENTS AT AIRPORTS

Serial No.	Airport (ICAO Code)	Name	Type of the Instrument					RVR	
			Vaisala	Telvent	DCWIS	DIWE	CWIS	Drishti	Telvent
1	VIAR	AMRITSAR						3	2
2	VEBN	VARANASI				1		1	
3	VOCL	KOZHIKODE				1	1		
4	VIGG	GAGGAL				1			
5	VOHS	HYDERABAD			2			2	2
6	VEAT	AGARTALA				1			
7	VOCP	CUDDAPAH				1			
8	VOHY	BEGUMPET			1				
9	VAJB	JABALPUR				1			
10	VILD	LUDHIANA				1			
11	VOMD	MADURAI				1			
12	VOML	MANGALORE			1			1	
13	VEMN	DIBRUGARH				1			
14	VIPT	PANTNAGAR				1			
15	VORY	RAJAHMUNDRY				1			
16	VOSM	SALAM				1			
17	VOTP	TIRUPATI				1			
18	VOBZ	VIJAYAWADA				1			
19	VELP	LENGPUI				3			
20	VEPT	PATNA				1	1	1	
21	VEGY	GAYA				1	1		
22	VECC	KOLKATA	3		1			3	
23	VOBL	BANGALURU					1	1	1
24	VAKE	KANDLA				1			
25	VOND	NANDED				1			
26	VAUD	UDAIPUR				1			
27	VEDG	DURGAPUR					1		
28	VISM	SHIMLA				1			
29	VERB	FURSATGANJ					1		
30	VIJP	JAIPUR					1	3	1
31	VANP	NAGPUR			1	1			
32	VABB	MUMBAI			2			2	2
					1			1	1
33	VAAH	AHMEDABAD			1				
34	VAPR	PORBANDER				1			
35	VADU	DIU			1				
36	VASU	SURAT				1			
37	VABO	VADODARA				3			
38	VEBI	SHILLONG				1			
39	VAJL	JALGAON©							

40	VASD	SHIRDI			1				
41	VASL	SOLAPUR							
42	VAJJ	JUHU			1				
43	VABV	BHAVNAGAR				1			
44	VEKS	KESOD							
45	VOAT	AGATTI				1			
46	VOTV	TRIVANDRUM					1	1	
47	VELR	LILABARI				1			
48	VERC	RANCHI				1			
49	VEIM	IMPHAL							
50	VOCB	COIMBATORE				1			
51	VIBR	BHUNTAR				1			
52	VIDN	DEHRADUN				1		1	
53	VOBM	SAMBRA				1			
54	VOTR	TIRUCHIRAPPALLI				1			
55	VOMM	CHENNAI			2			2	1
					1			0	0
56	VARK	RAJKOT				1			
57	VIDP	DELHI		1				2	2
					2			6	
				2				5	3
58	VEPY	PAKYONG							
59	VEBS	BHUBNESWAR						1	
60	VABP	BHOPAL				1			
61	VIKO	KOTA							
62	VEJR	JAGDALPUR							
63	VEJH	JHARSUGUDA							
64	VOPC	PUDDUCHEREY				1			
65	VIHR	HISAR				1			
66	VIPT	PITHORAGARH				1			
67	VIDD	SAFDARJUNG				1			
68	VOHB	HUBLI				1			
69	VOTK	TUTICORIN				1			
70	VIKG	KISHANGARH					1		
71	VOKN	KANNUR						1	
72	VOMY	MYSORE				1			
73	VEJS	JAMSHADPUR				1			
74	VAAU	AURANGABAD				1			
75	VAKP	KOHLAPUR							
76	VIRP	ROHINI					1		
77	VILK	LUCKNOW			1			3	
78		SINDHDURG							
79	VOCI	KOCHI			1	1			
80	VERP	RAIPUR				1			
81	VEGT	GUWAHATI	(IA AMS)					1	1

82	VAGD	GONDIA				1	1		
83	VAID	INDORE				3			
84	VEKO	KHAJURAHO				1			
85	VECO	COOCH-BEHAR				1			
86	VEMR	DIMAPUR				1			
87	VOPN	PUTTAPARTHI							
88*	VOBG	BANGALORE(HAL)			1				

*88-Puttaparthi (VOPN): Annual number of flight operations is about 20-25. Feb 2019 had only total of 2 flights. Met instruments available: Max, Min, DB, WB, ORG, Aneroid Barometer, CCA, and Wind wane, IMD ARG. NO DIWE or CWIS. Presently they employ retired IMD or IAF met officer's per visit basis whenever flights are scheduled.

1.20 ROUTINE REPORTS

The following routine reports are to be forwarded to CAMD:

Serial No.	Description of Reports /Returns	Originating Office	Periodicity of Report	Schedule of Report to Reach CAMD
1	Statement verification of Aviation Forecast	All AMOs	Monthly	By 10th of following month
2	Statement of verification of Aerodrome Warning	All AMOs	Monthly	By 10th of following month
3	Statement of Verification of Trend Forecast	All AMOs	Monthly	By 10th of following month
4	Statistics of Aviation Forecast	All AMOs	Monthly	By 10th of following month
5	Delay in reception of Aviation Met. Messages	All AMOs	Quarterly	By 10th of following month
6	Implementation of Aviation Circulars	All AMOs/ AMSs	Monthly	By 10th of following month
7	Amendment to AIP India	All RMCs	Quarterly	After 15 days of Quarter ending
8	Half yearly TAF Statement	All AMOs	Half Yearly	After 15 days of half Year ending
9	Installations and working status of AMI	All AMOs and AMSs	Monthly	By 5th of following month
10	List of in-charges of Aviation Met. Offices	All RMC's	Half Yearly	By 10th of Jan and July Every year
11	Changes in Handbook Pages	All AMOs and AMSs	As and When Required	
12	Random Scrutiny of Forecasts	DDGM (RMC)	Monthly	15th of the following month
13	List of Officers for undertaking Familiarization Flight	RMC	Annual	By end of January every year

1.21 TIMING OF THE AIRPORT MET SERVICES AVAILABLE AT ACT AND STATUS CURRENT WEATHER INSTRUMENTS

Major airports (MWO/AMOs):

Serial No.	Name of the MWO/ Operation hours/ ICAO Index	Instruments Available/Installed
1	Chennai H24/VOMM	RWY07→ IAAMS RWY25→ DCWIS + TXM RWY12/30 →DCWIS+TXMD
2	Delhi H24/VIDP	RWY28→ DCWIS + TXMD, ~~Flamingo~~ RWY10 & RWY09→ DCWIS + TXM RWY27 IAAMS, TXMD RWY 29 IAAMS, TXMD&29MID TXM, TXMD, RWY29 beg TXMD RWY11→IAAMS TXMD RWY11beg→ TXMD
3	Kolkata H24/VECC	RWY01R→ DCWIS +TXM Vaisala RWY19L mid→ TXM Vaisala RWY19L→ DCWIS+ TXM Vaisala RWY19R→ TXMD
4	Mumbai H24/VABB	RWY27 IAAMS, TXM RWY09 IAAMS, TXM RWY14→ IAAMS, TXM

Other major AMOs:

Serial No.	Name of the AMO / Operation hours / ICAO index	Instruments Available/Installed
1	Bangalore H24 / VOBL	RWY27→IAAMS RWY09→DCWIS + TXM
2	Shamshabad H24 / VOHS	RWY27→ IAAMS RWY09→ DCWIS +TXM
3	Thiruvananthapuram H24 / VOTV	RWY32→DCWIS
4	Delhi Safdarjung H24 / VIDD	DIWE
5	Jaipur H24 / VIJP	RWY27→IAAMS RWY 09& MID → TXM
6	Lucknow H24 / VILK	RWY27→ DCWIS+ TXM RWY 09&MID→ TXMD

7	Agartala H24 / VEAT	DIWE
8	Bhubaneshwar H24/ VEBS	DIWE +TXM
9	Patna H24 / VEPT	DIWE+TXM
10	Mohanbari H24/ VEMN	RWY →DIWE
11	Guwahati H24 / VEGT	RWY02→ IAAMS +TXM
12	Nagpur AMO H24 / VANP	RWY32→DCWIS
13	Bhopal AMO H24 / VABP	DIWE
14	Ahmedabad H24 / VAAH	RWY23→ DCWIS+TXM RWY05→ DIWE

Other major AMSs:

Serial No.	**Name of the AMS/ Operation Hours/ ICAO index**	**Instruments Available/Installed**
1	Agatti H07 / VOAT	RWY04□ DIWE
2	Bengaluru HAL H24 / VOBG	RWY27□DCWIS RWY09□ DIWE
3	Belgaum H24 / VOBM	RWY08□ DIWE
4	Coimbatore H24 / VOCB	DIWE
5	Hubli H07 /VOHB	DIWE
6	Hyderabad H24 / VOHY	RWY27□ DCWIS
7	Kochi CIAL H24 / VOCI	RWY27□ DCWIS RW09□ DIWE
8	Kozhikode / Calicut H24 /VOCL	RWY28□DCWIS RWY10□DIWE
9	Madurai H24 / VOMD	DIWE
10	Mangalore H24 /VOML	DCWIS DIWE at 2 ATC towers + TXM

11	Mysore H07 / VOMY	DIWE
12	Pondicherry H07 / VOPC	CGA Wind
13	Rajahmundry H14 / VORY	DIWE
14	Salem H07 / VOSM	DIWE
15	Tiruchirapalli H24 / VOTR	DIWE
16	Tirupati H14/ VOTP	DIWE
17	Tuticorin H07 / VOTK	DIWE
18	Vijayawada H07/ VOBZ	RWY08 DIWE
19	Puttaparthi (HO/NB) / VOPN	PAB/Portable Kit/Conventional Instrument Owned by Airport Operator
20	Cudappah H07/VOCP	Portable kit
21	Amritsar H24 / VIAR	RWY34 IAAMS RWY16&MID TXM
22	Bhuntar (Kulu) H07 / VIBR	DIWE
23	Dehradun H07 / VIDN	DIWE + TXM
24	Fursatganj(Raebareli) H14 / VIRB	Surface Instrument
25	Gaggal (DharmasalaKangra) H07 / VIGG	DIWE
26	Kota H14/ VIKO	Surface Instrument
27	Ludhiana H07 / VILD	Surface Instrument
28	Pantnagar H07 / VIPT	Surface Instrument
29	Udaipur H14 / VIUD	DIWE
30	Varanasi H24 / VIBN	DIWE +TXM

31	Shimla NB / VISM	DIWE
32	Aizwal (Lengpui) H14 / VEAZ	DIWE
33	Cooch-behar H14 / VECO	DIWE
34	Dimapur H14 / VEMR	~~DIWE~~ -
35	Gaya H14 / VEGY	DIWE
36	Imphal H14 / VEIM	DIWE
37	Jamshedpur H14 / VEJS	DIWE
38	North Lakhimpur H07 / VELR	DIWE
39	Passighat H14 / VEPG	Surface Instrument
40	Ranchi H14 / VERC	DIWE
41	Shillong (Barapani) H14 / VEBI	DIWE
42	Durgapur H07/VEDG	IAAMS
43	Aurangabad H24 / VAAU	DIWE
44	Bhavnagar H14 / VABV	DIWE
45	Diu (HO/NB) / VADU	DCWIS
46	Gondia (HO/NB) / VAGD	DCWIS, DIWE
47	Indore H24 / VAID	DIWE
48	Jabalpur (HO/NB) / VAJB	?Surface
49	Juhu Mumbai H14 / VAJJ	HAWOS
50	Kandla H14 / VAKE	DIWE
51	Khajuraho (HO/NB) / VAKJ	DIWE

52	Nanded (HO/NB) / VOND	DCWIS
53	Porbandar H07 / VAPR	DIWE
54	Raipur H14 / VARP	DIWE
55	Rajkot H07 / VARK	DIWE
56	Surat H07 / VASU	DIWE
57	Vadodara H07 / VABO	DIWE

1.22 VARIOUS FORECASTS/WARNING SERVICES AVAILABLE AT DIFFERENT AIRPORTS

Serial No.	AIRPORT	NAME	FORECASTs
1	VIAR	AMRITSAR	TREND
2	VEBN	VARANASI	TREND
3	VOCL	KOZHIKODE	TREND,AD
4	VIGG	GAGGAL	NIL
5	VOHS	HYDERABAD	TREND,LOCAL,AREA,AD
6	VEAT	AGARTALA	LOCAL,AREA,TAKEOFF,AD,TAF
7	VOCP	CUDDAPAH	NIL
8	VOHY	BEGUMPET	LOCAL,AREA,AD
9	VAJB	JABALPUR	NIL
10	VILD	LUDHIANA	NIL
11	VOMD	MADURAI	TREND,LOCAL,AD
12	VOML	MANGALORE	TREND
13	VEMN	DIBRUGARH	TREND,TAKEOFF,LOCAL,AD,TAF
14	VIPT	PANTNAGAR	NIL
15	VORY	RAJAHMUNDRY	TREND
16	VOSM	SALAM	TREND
17	VOTP	TIRUPATI	LOCAL,AREA,AD
18	VOBZ	VIJAYAWADA	TREND,TAF
19	VELP	LENGPUI	TREND,AD
20	VEPT	PATNA	TREND,LOCAL,AREA,AD,TAF
21	VEGY	GAYA	TREND
22	VECC	KOLKATA	TREND,LOCAL,AD,TAF,SIGMET
23	VOBL	BANGALURU	TREND,AREA,LOCAL,AD,TAF
24	VAKE	KANDLA	NIL
25	VOND	NANDED	TREND,AREA,LOCAL

26	VAUD	UDAIPUR	TREND
27	VEDG	DURGAPUR	TREND,AD
28	VISM	SHIMLA	NIL
29	VERB	FURSATGANJ	NIL
30	VIJP	JAIPUR	TREND,AREA,LOCAL,TAKEOFF,AD,TAF
31	VANP	NAGPUR	TREND,AREA,TAKEOFF,AD
32	VABB	MUMBAI	TREND,LOCAL,AD,TAF,SIGMET
33	VAAH	AHMEDABAD	LOCAL,TAKEOFF,AD,TAF
34	VAPR	PORBANDER	NIL
35	VADU	DIU	NIL
36	VASU	SURAT	NIL
37	VABO	VADODARA	TREND
38	VEBI	SHILLONG	NIL
39	VAJL	JALGAON	NIL
40	VASD	SHIRDI	NIL
41	VASL	SOLAPUR	NIL
42	VAJJ	JUHU	TREND,LOCAL,AD
43	VABV	BHAVNAGAR	NIL
44	VEKS	KESOD	NIL
45	VOAT	AGATTI	TREND,AD
46	VOTV	TRIVANDRUM	TREND,LOCAL,AREA,AD,TAF
47	VELR	LILABARI	NIL
48	VERC	RANCHI	TREND
49	VEIM	IMPHAL	TREND,AD
50	VOCB	COIMBATORE	TREND,LOCAL,AD
51	VIBR	BHUNTAR	NIL
52	VIDN	DEHRADUN	NIL
53	VOBM	SAMBRA	NIL
54	VOTR	TIRUCHIRAPPALLI	TREND,AD
55	VOMM	CHENNAI	TREND,LOCAL,AREA,TAKEOFF, AD,TAF,SIGMET
56	VARK	RAJKOT	NIL
57	VIDP	DELHI	TREND,LOCAL,AREA,TAKEOFF, AD,TAF,SIGMET
58	VEPY	PAKYONG	NIL
59	VEBS	BHUBANESHWAR	TREND,LOCAL,AD,TAF
60	VABP	BHOPAL	NIL
61	VIKO	KOTA	TREND
62	VEJR	JAGDALPUR	NIL
63	VEJH	JHARSUGUDA	NIL
64	VOPC	PUDDUCHEREY	TREND,AD,TAF
65	VIHR	HISAR	NIL
66	VIPT	PITHORAGARH	NIL

67	VIDD	SAFDARJUNG	TREND,AREA,LOCAL,AD
68	VOHB	HUBLI	TREND,LOCAL,AD
69	VOTK	TUTICORIN	TREND,AD
70	VIKG	KISHANGARH	NIL
71	VOKN	KANNUR	TREND,AREA,AD
72	VOMY	MYSORE	NIL
73	VEJS	JAMSHADPUR	NIL
74	VAAU	AURANGABAD	NIL
75	VAKP	KOHLAPUR	NIL
76	VIRP	ROHINI	NIL
77	VILK	LUCKNOW	TREND,LOCAL,AREA, TAKE OFF,AD,TAF
78		SINDHDURG	NIL
79	VOCI	KOCHI	TREND
80	VERP	RAIPUR	TREND
81	VEGT	GUWAHATI	TREND,TAF,AD,LOCAL,TAKE OFF
82	VAGD	GONDIA	NIL
83	VAID	INDORE	TREND
84	VEKO	KHAJURAHO	NIL
85	VECO	COOCH-BEHAR	NIL
86	VOBG	BANGALORE(HAL)	NIL
87	VEMR	DIMAPUR	NIL
88*	VOPN	PUTTAPARTHI	NIL

Chapter - 2

STANDARD OBSERVATIONAL PROCEDURE

2.1 INTRODUCTION

A set of step-by-step instructions to help Aviation Meteorological Observers to carry out routine monitoring, observing and reporting of weather elements. SOPs aim is to achieve efficiency, quality output and uniformity of performance in compliance with the regulations laid-in.

As per ICAO the duty of AMO is performed by a Meteorological Technician.

"He is a person who has successfully completed the Basic Instruction Package for Meteorological Technicians (BIP-MT)."

In IMD's context the duty of AMO (Aeronautical Meteorological Observers) is performed by Scientific Assistant or Meteorologist – A / B

They have been re-designated as Tower Met Officer.

Aeronautical Meteorological Observers duties and responsibilities:

Monitor continuously the weather situation;

Observe and record aeronautical meteorological phenomena and parameters;

Ensure the quality of the performance of systems and of meteorological information;

Communicate meteorological information to internal and external users.

In addition to taking and disseminating accurate, scheduled observations, the observer must report significant changes in weather conditions that could have an adverse effect on safe and efficient aviation operations. Observations should be taken and disseminated as rapidly and accurately as feasible to report these changes when they are observed. The observer shall disseminate corrected reports immediately upon discovering an error as per guidelines.

Service to Aviation is one of the most important activities of India Meteorological Department. Meteorological support contributes towards the safety, economy, regularity and efficiency of aviation operations. Towards achieving these objectives, an aeronautical observer is required to constantly monitor the meteorological conditions at the aerodrome and its vicinity and make routine meteorological observations at fixed intervals and to make special observations whenever specified changes occur. They should have skills and knowledge in the use of aviation specific codes and practices also. As specified by WMO in its Document No. 258 Supplement No.1, AMO should have the following knowledge and skills in order to carry out their duties and tasks:

(a) Surface observations: Make surface meteorological observations; observe and record the parameters that make up a meteorological message; encode the observations in the standard format; transmit coded information.

(b) Weather watch: Analyse observations in the local area and be in a position to identify probable significant changes in weather at the station; know and understand

the region-specific weather phenomena; be aware of likely weather sequences that are expected to affect the station.

(c) Weather alert: Understand a basic weather briefing or forecast, so as to be able to identify changes from the expected evolution at the station; alert the duty forecaster and external users to observed changes in the weather within the local area.

(d) Product distribution: Distribute data and information; disseminate messages to users; issue routine and non-routine reports in accordance with normal working practice; answer questions from users.

(e) Equipment maintenance: Carry out routine maintenance of observing/ office equipment; operate and maintain automated weather stations, as appropriate.

All the airports have been provided with automated / manual equipment 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.

2.2 OBSERVATION & REPORTING OF WEATHER FOR AVIATION SERVICES

METAR and SPECI:

METAR and SPECI are weather reports encoded from the airport weather observations. METAR is the name of the code for an aviation routine weather report. A METAR is issued at half- hourly intervals in India. SPECI is the name of the code for an aviation special weather report. A SPECI can be issued at any time when certain criteria are met. Both METAR and SPECI have the same code form and both may have a TREND forecast appended. METAR and SPECI are disseminated beyond the aerodrome of origin.

Reports of routine observations are also issued as Local Routine Reports, only for dissemination at the aerodrome of origin. These are issued to local ATC units on white paper in abbreviated plain language and identified by the prefix “MET REPORT”. Similarly reports of special observations (conditions are given in a separate section) are also issued for local use as local special reports on red colour paper in abbreviated plain language. They are identified by the prefix “SPECIAL”.

Contents of Reports:

Content and order:

METAR or SPECI and MET REPORT and SPECIAL, ADDITIONAL contain the following information in the given order.

1. Identification of the type of report

2. Location indicator

3. Time of Observation

4. Identification of an automated or missing report, when applicable

5. Surface Wind (Direction and Speed)

6. Visibility

7. Runway Visual Range (if available)

8. Present Weather

9. Cloud amount, cloud type (only for cumulonimbus and towering cumulus clouds) and height of cloud base or where measured, Vertical Visibility

10. Air Temperature and Dew Point Temperature

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

12. Supplementary Information (included in accordance with regional air navigation agreement)

13. RMK group

CAVOK: The code word CAVOK is used to replace the visibility, present weather and cloud groups when the following conditions occur simultaneously at the time of observation:

(a) The visibility is 10 km or more;

(b) There is no cloud of operational significance; (cloud of operational significance: A cloud with the height of cloud base below 1500m (5000ft) or below the highest minimum sector altitude, whichever is greater, or a Cumulonimbus cloud or a towering cumulus cloud at any height);

(c) There is no significant weather phenomenon.

RMK group: At the end of a METAR or SPECI a section starting with the code word RMK may be appended. This section contains information required by the national authority of each country and is not disseminated internationally.

As per ICAO, issuance of SPECI is not necessary if METAR are issued at half-hour intervals. India had stopped issuing SPECI w.e.f. 15th Nov. 2015 (00Z) (ORDER enclosed SPECI and Additional Reports for reference)

Additional Reports:

Aviation Circular 2/2015/CA-080300/2015

India Meteorological Department

Central Aviation Meteorological Division (CAMD)

Office of the Director General of Meteorology, New Delhi

Sub: Revised criteria for additional Reports.

The following changes are to be made in para 4.8 Additional Reports of the 4th Edition (2012) of 'Manual on Meteorological Services for Aviation in India'. The criteria for Additional reports is changed to include visibility changes to or passes 550m, 1200 m and 2500m. Accordingly para 4.8 will be changed as given below:

This message is identified with the prefix "ADDITIONAL" and supplied on red color 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.

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
Cloud Base	Whenever the height of base of cloud covering more than half the sky changes to or passes 90 or 120 m (300 or 400 ft)	All stations equipped with ceilometers/ ceilographs.
Visibility	Whenever visibility changes to or passes 550, 1200, 2000, 2500 and 4000 meters.	By all Aerodrome Meteorological Offices/ aeronautical meteorological stations recording routine observations.

2.3 METAR/SPECI CODE FORM

2.3.1 IDENTIFICATION GROUPS

METAR or COR CCCC vyggggz NIL (AUTO)

This has three parts:

1. The Report code Name (METAR or SPECI and MET REPORT/SPECIAL/ADDITIONAL)
2. The ICAO location indicator of the reporting station, e.g. VOMM (Chennai Airport)
3. The day of the month and the time of the observation in hours and minutes UTC, followed by the letter Z. Example: 211030Z (CW observation of 21st day of the month and time of observation 1030 UTC).

The code words COR and NIL are to be inserted after the code name and the time group, for indicating a corrected message or as an indication of a NIL message. Usually NIL is not being used in India.

The indicator AUTO is inserted when the report contains a fully automated observation, that is, without human intervention. But in India it is not being practiced.

2.3.2 Surface Wind (KMH or KT or MPS)

Code Format: dndndnVdxdxdx

Reporting steps: Knots (KT) is the primary unit used in India for reporting wind speeds in aviation messages. The mean true direction in degrees rounded off to the nearest 10 degrees from which the wind is blowing and the mean speed of the wind over the 10-minute period immediately preceding the observation shall be reported for

dddff followed, without a space, by the abbreviation KT. Values of wind direction less than 100o shall be preceded by 0 and a wind from true north shall be reported as 360. Values of wind speed less than 10 units shall be preceded by 0.

Reporting: Normally there will be a five-figure group to indicate the ten-minute mean wind followed by an abbreviation to indicate the wind speed units used. The first three figures indicate the wind direction and the last two the wind speed.

Example: 31015KT, 09008KT

Averaging periods for wind observations:

1. The wind reported in METAR and SPECI should be the mean over the ten minutes preceding the observation. If during this period there has been a marked discontinuity lasting at least two minutes, the mean values should be assessed over the period after the discontinuity. A marked discontinuity occurs when there is a wind direction change of 30 degrees or more with a wind speed of 10kt or more, before or after the change or a wind speed change of 10 kt or more.

2. The averaging period for measuring variations from the mean wind speed (gusts) should be three seconds.

3. For inclusion in MET REPORT and SPECIAL and for displays in air traffic service units, two minutes averaged wind is used.

Wind Reporting- Special Cases:

1. In the case of variable wind direction, ddd shall be encoded as VRB when the mean wind speed is less than 3 knots. A variable wind at higher speeds, shall be reported only when the variation of wind direction is 180° or more or when it is impossible to determine a single wind direction, for example when a thunderstorm passes over the aerodrome.

   Example: VRB02KT (variable wind with mean wind speed of 2 knots)

   VRB20KT (mean wind speed is 20 knots the wind direction is varying by 180° or more)

   In MET REPORT as “WIND VRB2KT” and as “WIND VRB28KT”

2. If, during the 10-minute period preceding the observation, the total variation in wind direction is 60° or more but less than 180° and the mean wind speed is 3 knots or more, the observed two extreme directions between which the wind has varied shall be given for dndndnVdxdxdx in clockwise order. The wind shall be reported in METAR/ SPECI as 31015KT 280V020. (Clockwise variation of wind from 280° to 20°) In local reports, it shall be reported as “WIND 310/15KT VRB BTN 280/ AND 020/”

3. Variation from the mean wind speed (gusts) during the past ten minutes shall be reported when the maximum wind speed exceeds the mean speed by 10 knots or more. The wind shall be reported in METAR/ SPECI as 31015KTG30KT. In METREPORT it shall be reported as WIND 310/15KT MAX 30 MIN 5.

4. When a wind speed of less than 1 knot is reported, it shall be indicated as calm. "Calm" shall be coded as 00000 followed immediately, without a space, by the

abbreviation KT, in the form 00000KT. In MET REPORT it shall be indicated as WIND CALM.

5. In MET REPORT and SPECIAL, 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

Estimating Wind Speed Alternative method:

If the wind direction indicator is inoperable, estimate the direction by observing the wind cone/ wind sock.

Use the Beaufort scale, to estimate wind speeds if instruments are out of service. Gusts and squalls are not to be estimated.

Use Portable Airport Met Instruments Kit Provided

2.3.3 Visibility:

Code Format: VVVVDv VxVxVxVxDv

When there is NO marked directional variation in visibility, the minimum visibility will be reported in metres using four figures. The visibility is assessed manually with the help of visibility polar diagrams.

Example: 4000 (Four thousand metres)

Reporting:

Visibility shall be reported as follows:

1. In steps of 50M when the visibility is less than 800M,
2. In steps of 100M, when it is 800M or more but less than 5 km;
3. In kilometers steps when the visibility is 5km or more but less than 10km;
4. 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.

Directional variations:

Directional variations are NOT considered MARKED unless the minimum visibility is less than 5000M and the variations are at least 50 percent of the minimum visibility.

When there is a marked directional variation in the visibility, the reported minimum visibility will be followed by one of the eight points of the compass to indicate the direction of this visibility.

Example: 4000NE (Four thousand meters to the North East)

If the lowest visibility is observed in more than one direction, then the most operationally significant direction shall be reported.

Exception: When the minimum visibility is less than 1500 m and the visibility in another direction is more than 5000 m, the maximum visibility and its direction should also be reported.

Example: 1400SW 6000N (One thousand four hundred metres to the Southwest and 6 km to the North)

If the maximum visibility is observed in more than one direction, then the most operationally significant direction is reported.

Manual Visibility estimating aid: Visibility landmarks and Polar diagram for both day and night visibility prepared using standard procedures and made available at the station.

Dark or nearly dark objects viewed against the horizon sky during the day, or unfocused lights of moderate intensity (about 1000 candela) during the night.

At all stations, for METAR and SPECI, the visibility shall be the lowest observed around the point of observation.

2.3.4 Runway Visual Range:

Code Format: rdrdr/vrvrvri or rdrdr/vrvrvrvrvvrvrvrvri

The group starts with the letter R followed by the Runway designator DRDR and a "/" followed by the RVR in metres. Up to a maximum of four groups may be reported in METAR.

Example: R24/1100 (Runway visual range on Runway 24, greater than one thousand one hundred metres)

Directional variation of RVR as indicated in rdrdr/vrvrvrvrvvrvrvrvri is not reported in India.

Special Case:

1. When the RVR is assessed to be more than 2000 m it should be reported as P2000. Example: R24/P2000 (Runway visual range on Runway 24, greater than 2000 metres). In MET REPORT, it will be reported as "RVR RWY 24 ABV 2000M".
2. When the RVR is below the minimum value that can be assessed the RVR should be reported as M followed by the appropriate minimum value that can be assessed.

   Example: R24/M0050 (Runway visual range on Runway 24, less than one hundred and fifty metres). In MET REPORT it is reported as RVR RWY 24 BLW 50M.

Reporting and reporting scales:

In METAR and SPECI, 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.

In local reports, the available runway visual range values shall be reported indicating the locations, in the order touchdown zone, mid and end.

Reporting scales of RVR are as follows:

1. Increments of 25 m, if RVR below 400 m

2. Increments of 50 m, if RVR between 400 and 800 m

3. Increments of 100 m, if RVR above 800 m

Any observed value, which does not fit the report scale in use, shall be rounded down to the nearest step in the scale.

National practice:

Runway visual range observations should 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 should be included in the METAR/SPECI and in local routine and special reports as supplementary information under "RMK" group.

This supplementary information is not to 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.

Manual RVR:

Whenever the visibility become 1500m or less, all aviation forecasting offices should 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 should be asked to provide transport with communication facility. An observer should 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) should be ascertained from ATC well in advance and the observer should be sent to the corresponding observing point of runway in use to take RVR observations. Where runway visual range is determined by human observers, runway visual range should be reported to the appropriate local air traffic services units, whenever there is a change in the value to be reported in accordance with the reporting scale. The transmission of such reports shall normally be completed within 15 seconds after the termination of observation.

Reporting Of Manual RVR:

Visual observations using lights:

In the visual observations method using lights, the RVR should ideally be assessed at a height of 5 m above the centre line of the runway and the observer should count runway lights from the runway threshold or from the touchdown zone. If it were possible to assess RVR this way, the observing position would correspond best to what the pilot sees. However, during flight operations, the observer, with the observation vehicle, must be removed from the runway and its immediate area. Because it is also necessary for continuous RVR information to be available to the pilot during flight operations, it is clear that human RVR assessments cannot be made from the runway itself. Instead, an observing position is chosen so that continuous RVR assessment can be carried out from a safe location. Moreover, RVR observing structures are made as frangible as possible consistent with their purpose. In all applications of human

observer RVR systems, the observers should meet a specified vision standard and be subject to periodic vision checks. If no suitable platform is available as observing point, a jeep can be taken to the observing location and standing over the bonnet of the jeep, the observer counts the number of runway edge lights. As the distance between two lights is known, it is possible to assess the RVR.

Normally, the runway edge lights on the side of the runway opposite the observing position are counted; centre line lights, being flush fittings, are not sufficiently visible therefrom. (Furthermore, runways with centre line lights tend to be equipped with instrumented RVR systems) Using the far side lights provides a better assessment of conditions along the runway than would be achieved by using the same side lights. In a basic human observer system, the straight line distance from the observing position to each light is measured and this becomes the reported RVR, but this method has considerable inaccuracy. The edge lights are usually 60 m apart, except at taxiway intersections, where the distance is different (e.g. 120 m). The RVR assessed visually is the distance in the runway direction between the observer and the furthest visible edge light. A simple conversion table is often compiled relating the number of observed lights to RVR to be reported.

Counting runway edge lights that are visible on either the near or far side of the runway is a difficult task because the edge lights may become confused with other white lights on the aerodrome; also, the observer's perception of the spacing between lights becomes progressively less as range increases making it difficult to accurately count the number of lights. Therefore, some States use separate lights — identical to the runway lights in use and varied in intensity in the same way — for assessing RVR. Because the observer and the light rows used are beyond the obstacle limits, RVR assessments can be made during flight operations provided that these lights do not give false indication of the runway position to pilots (see Annex 14, 5.3.1.2). Some systems include the possibility of switching separate lights on and off to assist the observer. The use of separate light rows requires special calibration procedures (see 10.3), which may be difficult to perform. These kind of lights also need periodic cleaning like the runway lights.

Calibration of Visual Observations:

Because the RVR assessment point is different from that located at a height of 5 m above the centre line of the runway, a calibration of the system must be carried out. The direct method of calibrating the RVR observations is to make simultaneous observations from the Runway Observing Point (ROP) and from the corresponding touchdown point on the central line of the runway during poor visibility conditions when there is no air traffic. If no suitable platform of 5 meter height is available, the bonnet of another jeep can be used for locating the observer at central line. Now the two observers are count the number of edge lights- the observer at the central line

counts the number lights along the runway on his left hand side visible to him and the observer at ROP facing the runway counts the number of runway edge lights visible to him on the other side of the runway, same row of lights as the other observer. This experiment is to be done during poor visibility conditions when there is no air traffic and the same has to be repeated in a variety of visibility conditions covering the required reporting range and under different background conditions, like, day, twilight and night and for various runway edge light intensities. Thus a conversion table for

various above conditions for actual RVR is originated from the number of runway edge lights observed as shown in the sample table.

As the distance between two consecutive lighted lamps is normally 60 meter, the columns 3 and 4 of the table are accordingly indicated. Similar tables are to be prepared for all the various intensities of the runway edge lights normally in operation under different visibility conditions. With these repeated experiments and calibration, it will be possible to report RVR whenever required from the conversion tables by just

Station	**Airport**	**No. of the Runway**	
Intensity of Runway Edge Lights:		**Background Condition: Day / Twilight / Night**	
Serial No. (1)	**No. of Lights Visible from ROP (2)**	**Number of Lights Visible From Central Line at Touchdown Point (3)**	**Runway Visual Range to be Reported (in Meters) (4)**
1	1	2	120
2	2	3	180
3	3	4	240
4	4	5	300
5	5	6	360
6	6	7	420

counting the number of visible runway edge lights from ROP during poor visibility conditions.

Method of Observation:

An observer having normal vision should go to the site either with a walkie-talkie set or a telephone and establish communication with the current weather observer at the ATC. At site, he should stand on the platform available and count the edge lights on the other side of the runway. He should record the observations in a log book, check again and confirm the observations taken and transmit the information to the control tower. The following procedure may be followed:

(a) The observer to stand on the elevated platform

(b) Designate the nearest illuminated edge light opposite to him, on the other side of the runway as No.1 of the count.

(c) Count the number of illuminated edge lights on the other side of the runway that is just distinguishable.

(d) Note the number of lights counted in the log book.

(e) Check again and confirm the number of lights counted.

(f) Pass on the number of lights counted to the C.W. assistant at the tower by telephone or walkie-talkie.

(g) The tower Assistant will read off from the RVR table, reportable RVR value corresponding to the number of lights counted.

(h) The ATC Assistant will report the value so obtained according to the reporting steps to be used.

(i) Observations may be taken and reported at desired interval and also whenever there is a change in the reportable value and/or as often as the weather situation warrants.

Since many a time, these observations have to be made in the night or early morning, it is advisable to depute two persons to the "touchdown" site for taking manual RVR observations. They will help each other in counting edge lights confirming the counts, recording the observations and passing on the data to ATC. Also, this will provide moral support so necessary in carrying out the difficult job satisfactorily.

Errors with Human Observer Systems:

Ideally, the RVR reported should correspond to the conditions on the runway experienced by the pilot when landing or taking off. However, errors in the visual observations occur due to a number of factors:

(a) Differences in the exposure to lights. Significant differences may occur in the background luminance and extraneous lights to which an observer and a pilot are exposed. This can be important where observations are not made at the runway centre line (e.g. using a separate row of lights in a direction different from that of the runway in use)

(b) Variations in vision among observers. Pilots must check their eyesight periodically and have generally high demands on their vision, but this does not necessarily apply to personnel making RVR assessments. A group of observers may have a different distant visual acuity, significant variations in the visual threshold of illumination in different background luminance conditions or other degraded vision characteristics.

(c) Exposure of an observer to high levels of illumination. If this happens just before making visual observations using lights, as would be the case when an observer leaves a lighted area to make night observations, it would degrade the observer's ability to see the lights, and the RVR values would be underestimated, which could result in the unnecessary deviations of aircraft to alternative aerodromes. This difficulty can be overcome by allowing several minutes for adjustment to illumination conditions outside the station.

***(d) Beaming of the runway edge lights*.** The runway edge lights are so directed that the beam intensities have a high value at the runway centre line while the intensity falls off rapidly towards the edges. Because runway lights are not observed at the centre line, the intensities directed towards the observer are lower. If the calibration of visual observations as is not undertaken carefully, errors in reported RVR values will occur.

Averaging of RVR:

Where instrumented systems are used for the assessment of RVR, the averaging period of RVR should 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. 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.

RVR Tendency:

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:

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.

2.3.5 Present Weather

Qualifier		**Weather Phenomenon**		
Intensity or Proximity	**Descriptor**	**Precipitation**	**Obscuration**	**Other**
Light **Moderate** **+ Heavy**	**MI** Shallow **BC** Patches **PR** Partial (Covering Part of the Aerodrome) **DR** Low Drifting **BL** Blowing **SH** Showers **TS** Thunderstorm **FZ** Freezing (Super Cooled)	**DZ** Drizzle **RA** Rain **SN** Snow **SG** Snow Grain **IC** Ice Crystals (Diamond dust) **PL** Ice Pellets **GR** Hail **GS** Small Hail and/or Snow Pellets	**BR** Mist **FG** Fog **FU** Smoke **VA** Volcanic Ash **DU** Wide-Spread dust **SA** Sand **HZ** Haze	**PO** Dust/Sand Whirls (dust devils) **SQ** Squalls **FC** Funnel Clouds (Tornado or Water Spout) **SS** Sand Storm **DS** Dust Storm

Example:

Having decided there is a weather phenomenon to be reported, the present weather is encoded by considering each column in the table above.

For example:

There is rain - RA

It is heavy - +

It is a shower - SH

The encode becomes +SHRA

Explanations:

One or more groups w´w´, but not more than three, should be used to report all present weather phenomena observed at or near the aerodrome and of significance to aeronautical operations in accordance with the above Code table.

Appropriate intensity indicators and letter abbreviations should be combined in groups of two to nine characters to indicate present weather phenomena.

The w´w´ groups shall be reported in the following order:

1. First, if appropriate, the qualifier for intensity *or* for proximity, followed without a space by;
2. If appropriate, the abbreviation for the descriptor followed without a space by;
3. The abbreviation for the observed weather phenomenon or combinations thereof.

Intensity description:

- Intensity should be indicated only with precipitation, precipitation associated with showers and/or thunderstorms, dust storm or sandstorm.
- If the intensity of the phenomena reported in the group is either light or heavy, this shall be indicated by the appropriate sign.
- No indicator shall be included in the group when the intensity of the reported phenomenon is moderate.

The following may be referred to:

	Local Routine	**METAR and SPECI**
	Local Special Reports	
Light	FBL	-
Moderate	MOD	(no indication)
Heavy	HVY	+

The intensity of present weather phenomena reported in the group w´w´ shall be determined by the intensity at the time of observation.

Qualifiers:

- If more than one significant weather phenomenon is observed, separate w´w´ groups should be included in the report in accordance with the Code table.
- If more than one form of precipitation is observed, the appropriate letter abbreviations should be combined in a single group with the dominant type of precipitation being reported first.
- In such a single group, the intensity should refer to the total precipitation and be reported with one or no indicator as appropriate.

The qualifier SH:

- Should be used to indicate precipitation of the shower type.
- When associated with the indicator VC, the type and intensity of precipitation should not be specified.

The qualifier TS:

- Should be used whenever thunder is heard or lightning is detected at the aerodrome within the 10-minute period preceding the time of observation.
- When appropriate, TS should be followed immediately, without a space, by relevant letter abbreviations to indicate any precipitation observed.
- The letter abbreviation TS on its own should be used when thunder is heard or lightning detected at the aerodrome but no precipitation observed.
- A thunderstorm should be regarded as being at the aerodrome from the time thunder is first heard, whether or not lightning is seen or precipitation is observed at the aerodrome.
- A thunderstorm should be regarded as having ceased or being no longer at the aerodrome at the time thunder is last heard, and the cessation is confirmed if thunder is not heard for 10 minutes after this time.

The qualifier FZ:

- Should be used only to indicate supercooled water droplets or supercooled precipitation and is used only with FG, DZ and RA.
- Any fog consisting predominantly of water droplets at temperatures below 0°C should be reported as freezing fog (FZFG) whether it is depositing rime ice or not.
- Whether or not the supercooled precipitation is of the shower type need not be specified.

The qualifier VC:

- Should be used to indicate the significant weather phenomena TS, DS, SS, FG, FC, SH, PO, BLDU, BLSA, BLSN and VA observed in the vicinity of the aerodrome.
- Vicinity means “Not at the aerodrome but not further away than approximately 8 km from the aerodrome perimeter and used only in METAR and SPECI.

Phenomena:

- GR is used to report hail only when the diameter of the largest hailstones observed is 5 mm or more.
- GS should be used to report small hail (diameter of the hailstones less than 5 mm) and/or snow pellets.
- IC should be used to indicate the phenomenon ice crystals (diamond dust). For w´w´ = IC to be reported, the visibility should be reduced by this phenomenon to 5000 metres or less.
- The abbreviations FU, HZ, DU and SA (except DRSA) should be used only when the obstruction to vision consists predominantly of litho-meteors and the visibility is reduced by the reported phenomenon to 5000 metres or less.
- The abbreviation BR should be used when the obstruction to vision consists of water droplets or ice crystals. For w´w´= BR to be reported, the visibility reported in the group VVVV should be at least 1000 metres but not more than 5000 metres.
- The letter abbreviation FG should be used when the obstruction to vision consists of water droplets or ice crystals (fog or ice fog). For w´w´= FG to be reported without the qualifiers MI, BC or VC, the visibility reported in the group VVVV should be less than 1000 metres.
- For w´w´= MIFG to be reported, the visibility at two metres above ground level should be 1 000 metres or more and the apparent visibility in the fog layer shall be less than 1000 metres.
- The abbreviation VCFG can be used to report any type of fog observed in the vicinity of the aerodrome.
- The abbreviation BCFG is used to report fog patches. BCFG should be used only when the visibility in parts of the aerodrome is 1000 metres or more although, when the fog is close to the observing point, the minimum visibility reported will be less than 1000 metres.
- The abbreviation PRFG is used to report fog covering part of the aerodrome. The apparent visibility in the fog patch or bank should be less than 1000 metres, and the fog should be extending to at least two metres above ground level.
- BL (blowing) is used to report DU, SA or SN raised by the wind to a height of 2m or more above the ground.
- DR (Low drifting) is used with DU, SA, or SN raised by the wind to less than 2m above ground level.
- SQ is used to report squalls when a sudden increase of at least 16 knots in wind speed is observed, the speed rising to 22 knots or more and lasting for at least one minute.

2.3.6 Cloud or Vertical Visibility

Code form: NsNsNshshshs or VVhshshs or SKC or NSC

Reporting:

Cloud groups consist of six characters under normal circumstances. The first three indicate cloud amount with:

1/8 to 2/8 reported as FEW (Few)

3/8 to 4/8 reported as SCT (Scattered)

5/8 to 7/8 reported as BKN (Broken) and

8/8 reported as OVC (Overcast)

The last three characters indicate the height of the base of the cloud in units of 30 m or 100 ft upto 3000 m (10000 ft).

Example: 3/8 of Stratocumulus with a base of 1850 will be encoded: SCT018.

Cloud Type:

- Types of cloud other than significant convective clouds are not identified.
- Significant convective clouds are; Cumulonimbus indicated by CB and Cumulus congestus of great vertical extent indicated by TCU.
- The contraction TCU, taken from "Towering Cumulus", is an ICAO abbreviation used to describe this type of cloud.

Repeated Cloud Groups:

The cloud group can be repeated to report different layers or masses of cloud but the number of groups should not normally exceed three.

The following criteria should be followed for reporting cloud layers:

- The lowest individual layer (mass) of any amount as FEW, SCT, BKN or OVC.
- The next individual layer of more than 2/8 as SCT, BKN, or OVC as appropriate.
- The next higher layer of more than 4/8 as BKN or OVC; and
- Cumulonimbus (CB) and/or towering cumulus clouds (TCU), whenever observed and not already reported.

Example:

There are 1/8 at 500 ft

2/8 Cumulonimbus at 1000 ft

3/8 Cumulus at 1800 ft

5/8 Stratocumulus at 2500 ft

At mountain stations, when cloud base is below station level, the cloud group should read NsNsNs///.

Example: SCT///, FEW///CB

The reported cloud would be:

FEW005 FEW010CB SCT018 BKN025

Explanations:

1. The cloud groups are reported in ascending order of height.
2. When there are no clouds of operational significance and no restriction on vertical visibility and the abbreviation CAVOK is not appropriate, the abbreviation NSC (Nil Significant Cloud) should be used. (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).
3. When Cumulonimbus (CB) and Towering Cumulus (TCU) have a common cloud base, the type of cloud is reported as CB and the amount of clouds is encoded as the sum of CB and TCU amounts at that cloud base.

Vertical Visibility:

When the sky is obscured and cloud details cannot be assessed but information on vertical visibility is available, the cloud group should be replaced by a five character group, the first two characters being VV followed by the vertical visibility in units of 30 m or 100 ft as for cloud base. When the sky is obscured but the vertical visibility cannot be assessed the group will read VV///.

Example: VV003 (Vertical visibility three hundred feet/ 90 meters)

2.3.7 Air and Dew Point Temperature

Code format: T´T´/ TdTd

The observed air temperature and dew point temperature, each as two figures rounded to the nearest whole degree Celsius, should be reported next.

Temperatures below 0 degrees Celsius will be preceded by M to indicate minus.

Example: Minus 9.5 degrees Celsius is reported as M09.

Explanations: Air temperature and dew point values of 0.5 degrees will be rounded up to the higher whole degree.

Example: Air temperature of 9.5 degree Celsius and Dew point temperature of 3.3 degree Celsius will be reported as 10/03

Alternative to recording temperature when automated instrument is out of order: Psychrometer / Sling Psychrometer:

An instrument used for measuring the water-vapor content of the air. It consists of two ordinary glass thermometers. The bulb of one thermometer (wet-bulb) is covered with a clean muslin wick, which is saturated with water prior to an observation. When the bulbs are properly ventilated, they indicate the wet- and dry-bulb temperatures of the atmosphere.

Use Hygrometric Tables to find out Dew Point temperature from Dry and Wet Bulb Temperatures

2.3.8 Pressure – QNH

Code Format: QPHPHPHPH

The last group of the main part of the report should indicate the QNH rounded down to the nearest whole HectoPascal.

The group starts with the letter Q followed by four figures.

In local reports, QFE also is to be reported.

Example: A QNH of 995.6 hPa is reported as Q0995

Alternative method to record QNH and QFE when automated instruments are out of order:

- Use either of available Digital Barometer/Aneroid barometer installed at the station.
- Take values from the Surface observatory of the station/nearby station and apply correction, if any, known.
- Use Portable Airport Met Instruments Kit provided.

2.3.9 Supplementary Information

Code Format: WS RWYDRDR Or RE wiwi WS ALL RWY (WTsTs/SSi) (RRRRERCReReRBRBR)

For international dissemination this section is used for reporting:

- Recent weather phenomena of operational significance;
- Information on wind shear in the lower layers; and,
- Other information in accordance with regional air navigation agreement including:

(a) Sea surface temperature and the state of the sea, and

(b) State of the runway

The other information group is not being used in India.

Observations made at aerodromes should **include the available supplementary information concerning significant meteorological conditions, particularly those in the approach and climb-out areas, and specifically the location of cumulonimbus or thunderstorm**, moderate or severe turbulence, wind shear, hail, severe line squall, moderate or severe icing, freezing precipitation, marked mountain waves, sandstorm, dust-storm, blowing snow or funnel cloud (tornado or waterspout). Where practicable, the information should identify the vertical extent and direction and rate of movement of the phenomenon. As turbulence, wind shear and icing cannot, for the time being, be satisfactorily observed from the ground, evidence of their existence should be derived from aircraft observations during the climb out or approach phases of flight to be made in accordance with separate regulations.

In local routine and special reports and in METAR and SPECI, the following recent weather phenomena, i.e. weather phenomena observed at the aerodrome during the period since last hour, whichever is the shorter, but not at the time of observation, should be reported, up to a maximum	**REFZDZ, REFZRA**

three groups, in the supplementary information: freezing precipitation	
Moderate or heavy precipitation (including showers thereof)	**REDZ, RERA, RESN, RESG, REPL, RESHRA, RESHSN, RESHGR, RESHGS**
Blowing snow	**REBLSN**
Dust-storm or Sandstorm	**RESS, REDS**
Thunderstorm	**RETS**
Funnel Cloud (tornado or water spout)	**REFC**
Volcanic Ash	**REVA**

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

Cumulonimbus cloud	**CB**
Thunderstorm	**TS**
Moderate or severe turbulence	**MOD TURB, SEV TURB**
Wind Shear	**WS**
Hail	**GR**
Severe line squall	**SEV SQL**
Moderate or severe icing	**MOD ICE, SEV ICE**
Freezing precipitation	**FZDZ, FZRA**
Severe mountain wave	**SEV MTW**
Duststorm, Sandstorm	**SS, DS**
Blowing snow	**BLSN**
Funnel cloud (tornado or water spout)	**FC**

Information on recent weather of operational significance observed at the aerodrome within the period since the last issued routine report or last hour, whichever is the shorter, but not at the time of observation should be reported.

- Where local circumstances warrant, information on wind shear should be added in reports disseminated beyond the aerodrome.
- Information on wind shear should be added in the form “WS RWY 12” or “WS ALL RWY”.
- Information on recent significant weather should be added in the form “REFZRA”.
- Significant directional variations in visibility particularly, those affecting the approach area, should be observed and reported.
- Directional variations in visibility should be reported with an indication of the direction of observation, for example, “VIS 2000M TO S”.

- RVR values above 1500 m and up to 2000 m are to be reported in METAR/SPECI and in special MET REPORTS as supplementary information which should not be disseminated internationally.
- If the horizontal visibility is 1500 m or less but RVR is more than 2000 m the same should be reported as "RVR ABV 2000 M" as supplementary information.

2.4 CRITERIA FOR ISSUANCE OF LOCAL SPECIAL REPORTS AND SPECI

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

2.4.1 Surface Wind

1. When the mean surface wind direction has changed by 600m or more from that given in the latest report, the mean wind speed before and/or after the change being 10 knots or more;
2. When the mean surface wind speed has changed by 10 knots or more from that given in the latest report;
3. 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.

2.4.2 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.

2.4.3 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.

2.4.4 Present Weather

1. When the onset, cessation or change in intensity of any of the following weather phenomena occurs:
   a. Freezing precipitation
   b. Moderate or heavy precipitation (including showers thereof)
   c. Thunderstorm (with precipitation)
   d. Duststorm
   e. Sandstorm
   f. Funnel cloud (tornado or waterspout)
2. When the onset or cessation of any of the following weather phenomena occurs:

a. Ice crystals

b. Freezing fog

c. Low drifting dust, sand or snow

d. Blowing dust, sand or snow

e. Thunderstorm (without precipitation)

f. Squall

2.4.5 Cloud

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.)

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

1. From SCT or less to BKN or OVC; or
2. From BKN or OVC to SCT or less.

2.4.6 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 300 m (100, 200, 300, 1000 ft)

2.4.7 Air temperature

When air temperature has increased by 20 C or more from that given in the latest report.

2.5 DISSEMINATION OF SPECI AND SPECIAL REPORTS

1. When a deterioration of one weather element is accompanied by an improvement in another element, a single SPECI / local special report should be issued. It should be treated as a deterioration report.
2. SPECI representing a deterioration in conditions shall be disseminated immediately after the observation.
3. A SPECI representing a deterioration of one weather element and an improvement in another element shall be disseminated immediately after the observation.
4. A SPECI representing an improvement in conditions 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.

5. 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.

6. Local Special Reports shall also be made available to the operators and to other users at the aerodrome.

 # Refer Aviation Circular 2/2015 regarding SPECI dissemination

2.6 ADDITIONAL REPORTS

This message is identified with the prefix "ADDITIONAL" and supplied on red colored 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.

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
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.
Visibility	Whenever visibility changes to or passes 2000 or 4000 metres.	By all aerodrome meteorological offices/ aeronautical meteorological stations recording routine observations.

2.7 TREND FORECAST

2.7.1 General:

1. Landing forecasts issued in India as a routine are called trend forecast.

2. These forecasts are intended to meet the requirements of local users and of aircraft within about one hour's flying time from the aerodrome.

3. All Aerodrome Meteorological Offices (with forecasting facility) issue TREND forecasts during the forecast watch hours.

4. The AMSs at Kochi and Kozhikode also issue TREND forecasts.

5. They are appended to a local routine or local special report, or a METAR or SPECI.

6. 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.

2.7.2 Inclusion of meteorological elements in trend forecasts:

1. The trend forecast indicates significant changes in respect of one or more of the elements: surface wind, visibility, weather and clouds.

2. Only those elements are included for which a significant change is expected.

3. 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.

4. In the case of a significant change in visibility, the phenomenon causing the reduction of visibility should also be indicated.

5. When no change is expected to occur, this shall be indicated by the term "NOSIG".

2.7.3 Use of change indicators:

When a change is expected to occur, the trend forecast message should begin with one of the change indicators "BECMG" or "TEMPO".

BECMG

- The change indicator "BECMG" is 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 is indicated, using the abbreviations "FM", "TL", or "AT", as appropriate.
- They should be 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).

TEMPO

- The change indicator "TEMPO" is 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
- They should be followed by a time group in hours and minutes.

Example, for a trend forecast period from 1000 to 1200 UTC in the form "TEMPO FM1030 TL1130" (in both METAR and local routine report).

Surface wind

The trend forecast for surface wind is issued for the following conditions:

1. A change in the mean wind direction of 600 or more, the mean speed before and/or after the change being 10 kts or more;

2. A change in mean wind speed of 10 kts or more.

Example:

An expected temporary fluctuation of surface wind from 250° at 35 kt with maximum speed (gusts) to 50 kt throughout the period of the trend forecast is indicated in the form:

"TEMPO 25035G50KT" in METAR and

"TEMPO 250/35KT MAX50" in METREPORT

Visibility

1. Trend forecast for visibility is issued when it is expected to change to or pass through any one of the values 150, 350, 600, 800, 1500, 3000 or 5000 m.
2. Whenever reduction of visibility is indicated in trend forecasts in locally disseminated reports, the reasons for such reduction in visibility is also specified in the trend part of the message.

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" in METAR or

"TEMPO VIS 700M" MET REPORT.

Weather phenomena

1. The trend forecast should indicate the expected onset, cessation or change in intensity of one or more of the following weather phenomena or combinations thereof:
   a. Freezing precipitation
   b. Moderate or heavy precipitation (including showers thereof)
   c. Thunderstorm (with precipitation)
   d. Duststorm
   e. Sandstorm
   f. Other weather phenomena if they are expected to cause a significant change in visibility.
2. The trend forecast should indicate the expected onset or cessation of one or more of the following weather phenomena or combinations thereof:
   a. Ice crystals
   b. Freezing fog
   c. Low drifting dust, sand or snow
   d. Blowing dust, sand or snow
   e. Thunderstorm (without precipitation)
   f. Squall
   g. Funnel cloud (tornado or waterspout)

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

4. The expected end of the weather phenomena shall be indicated by the abbreviation "NSW".

Example:

"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, is indicated in the form "BECMG AT1630 NSW" (in both METAR and local routine report).

Clouds

1. Trend forecast should be issued when the height of the base of a cloud layer of BKN or OVC extent is expected to change to or pass through one or more of the following values: 30, 60, 150, 300 and 450 m (100, 200, 500, 1000 and 1500 ft).

2. 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 should 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.

3. When no clouds of operational significance are forecast and "CAVOK" is not appropriate, the abbreviation "NSC" should be used.

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 change to or pass through one or more of the following values: 30, 60, 150, or 300m (100, 200, 500, or1000 ft), the trend forecast should indicate the change.

Chapter - 3

CLIMATOLOGY

3.1 GENERAL PROVISIONS

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.

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.

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.

3.2 AERODROME CLIMATOLOGICAL TABLES

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

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

3.3 AERODROME CLIMATOLOGICAL SUMMARIES

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.

3.4 COPIES OF METEOROLOGICAL OBSERVATIONAL DATA

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.

3.5 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.

3.6 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.

3.7 CONTENT OF AERONAUTICAL CLIMATOLOGICAL INFORMATION

3.7.1 Aerodrome Climatological Table

An aerodrome climatological table shall give:

- Mean values and variations there from, including maximum and minimum values, of meteorological elements (for example, of air temperature); and /or
- The frequency of occurrence of present weather phenomenon affecting flight operations at the aerodrome (for example, of sandstorms); and/or
- 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).
- Aerodrome climatological tables shall include the information required for the preparation of aerodrome climatological summaries.

3.7.2 Aerodrome climatological summaries

Aerodrome climatological summaries shall cover:

- 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;
- Frequencies of visibility below specified values at specified times;
- Frequencies of height of base of the lowest cloud layer of BKN or OVC extent below specified values at specified times;
- Frequencies of occurrence of concurrent wind direction and speed within specified ranges;
- Frequencies of surface temperature in specified ranges of 5^{o}C at specified times; and
- 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 - 4

AVIATION WEATHER FORECAST

4.1 INTRODUCTION

Definition: A weather forecast is a statement of expected meteorological conditions for a specified time or period, and for a specified area or portion of airspace (ICAO Annex 3 - Meteorology).

Meteorological Watch Office (MWO)/Airport Meteorological Office (AMO) delivers consistent & timely weather forecast & related information for the aviation activities of the country through a team of highly skilled people to enhance safe and efficient flight operations.

Applicability: The forecasting procedures outlined in this SOP are applicable to all aviation weather forecasting offices of the country. However each forecasting office will develop the forecast based on details - regarding available data sources, evaluation of the weather data, & specific feature of the aerodrome (local topography), experience of the forecaster etc.

Wording: The terms are used in this SOP to specify the degree of obligation with reference to stated procedures.

1. Weather forecast/ forecast describes: Aviation weather forecast.
2. Shall - The procedure is mandatory
3. Should - The procedures is recommended
4. May - The procedure is optional
5. Will - Means futurity, and never indicates any degree of requirement for application of a procedure.

Basis of Weather Forecasting: The data gathered from various observational sources, synoptic charts & model out puts form the basis of all weather forecasts, advisories, warnings and briefings.

<u>Observations:</u>

- Surface Aviation Weather Observations (Current Weather)
- Upper Air Observations (RS/RW& PB)
- Remote sensing (Radar, Satellite etc.)
- Lightning Data
- Aircraft Meteorological Data Relay (AMDAR)

Synoptic Charts:

- Surface Level Analysis
- Upper Level Analysis.

NWP model: Particularly Mesoscale models (including local models) for analyses and prognoses.

Types of aviation weather forecast: There are different types of aviation forecasts designed to meet requirements for the various stages of flight planning. They differ in respect of area or airspace covered and period of validity. Forecast may be categorized as

1. Terminal aerodrome forecast (TAF)
2. Route forecast
3. Local / Area forecast
4. Trend forecast

4.2 TERMINAL AERODROME FORECAST (TAF)

4.2.1 Basis of TAF

Definition: Terminal Aerodrome Forecast (TAF) is a concise statement of the expected meteorological conditions within 8 km radius from the centre of an airport's runway during a specified period (usually 24 hours).

Observational requirements of TAF:

TAF are issued for aerodromes for which regular half hourly and special weather reports meeting standards for observations are available.

Note: If an aerodrome is closed for greater than 24 hours, no TAF needs to be generated.

The next TAF shall be generated based on at least two consecutive hourly observations with all required elements (wind, visibility, weather and, sky condition, temperature, dew point, and altimeter) immediately prior to the issue time of the TAF & reopening of the station.

However, requirement of TAF by ATC authority shall be given **highest priority** in **closed condition also**.

4.2.2 Updation of TAF

Time References & Time of updation/transmission:

All times in the TAF shall be are stated in Coordinated Universal Time (UTC) or Zulu time with whole hour time increments.

To facilitate flight planning, aerodrome forecasts **shall** be transmitted on OLBS not later than 20 minutes prior to the beginning of their period of validity.

4.2.3 Issuing authority & dissemination of TAF

In India, TAF is being issued by all AMO/MWO for their own aerodromes and also for their associated AMS as per requirement.

Note: If any AMO is having restricted watch/operational hour the AMO/MWO of respective states/region will assume the responsibility of issue of TAF for the close period of the said (parent) AMO.

TAF and amended TAF shall be issued only in accordance with the template.

TAF are provided through web based automated information dissemination system known as **On-line Briefing System** (OLBS) of IMD and can be found on two websites after log in namely https://olbs.amsschennai.gov.in/ and https://olbs.amssdelhi.gov.in

4.2.3 Types & validity of TAF

TAF may be categorized as short & long.

Short TAF are issued with 9 hours validity period for the requirement of domestic flight, VOLMET and DVOLMET broadcast. Short TAF are transmitted locally & nationally only.

Long TAF are issued with 30 hours validity for the use of international flight & transmitted through international mode.

Note: When issuing TAF, meteorological offices shall ensure that only one TAF of a particular type (Short/Long) is valid at an aerodrome at any given time & when a new TAF is issued, it automatically cancels the previous one.

4.2.4 Work sheet for preparation of TAF

Producing an accurate TAF is challenging for numerous reasons. Therefore it is suggested to prepare & complete some type of worksheet prior to development & dissemination of a TAF.

Worksheets are nothing more than a list of charts, bulletins, and different products that provide a standardized and systematic approach to TAF preparation and the forecaster indicates he has studied by placing a check mark next to each item.

A good TAF worksheet should follow the "funnel" forecast thought process of looking at hemispheric features down to local features considering atmospheric scales as 10 percent hemispheric, 30 percent synoptic, 60 percent mesoscale and local scale and lead the forecaster to some definite conclusion about what weather conditions to forecast.

A simple guide line worksheet is described below for this purpose.

Terminal Aerodrome Forecast (TAF) Tools/Worksheet

Analysis:

HEMISPHERIC Feature:

- Mark long wave features affecting your station i.e. Ridge/Trough, Axis location: West/ East/ Overhead.
- Analyse long wave ridge/trough amplitude changes and axis shift during 24/30 hour forecast period.

SYNOPTIC Feature:

- Examine/ Consult Synoptic forecast bulletins issued by NWFC/SWFC
- Examine & analyse following **input data (charts) & interpolation** as necessary to describe upper air and surface features **that will influence your forecast period** at 6 hours interval (00 HR, 06 HR, 12 HR, and 18 HR).
- Examine 200 mb to delineate - Jet Maxima (Y/N) & Cold/Warm region/area.
- 300 mb to identify - Confluence/Difluence region/area
- 500 mb to examine - Trough / Ridge position, CAA/WAA, vorticity advection, character of airmass (moist/dry), Contour height rise/fall
- 700 mb to examine - Trough/Ridge position, CAA/WAA, airmass (Moist/dry)
- Lower level (850 & 925 mb) to examine - Dryline, Trough/Ridge position, CAA/WAA, airmass character (Moist/dry), Low-Level Jet (Y/N)
- Surface level to delineate - High/low pressure zone, temperature & moisture gradient, CAA/WAA & moisture advection etc.

Vertical profile:

- Tephigram analysis (00Z/12Z) applicable to today's forecast problem.
- Examine the stability index value i.e. LI, TT, SWEAT, KI, CAPE, CIN etc.
- Examine CCL/LCL & FZL value, convective temperature etc.

Note: Explain which values are pertinent today & why

Models (Output & Guidance):

1. Examine various model outputs & diagnostic products available at IMD & other related website.
2. Make **value addition** to model output for framing the final forecast based on –
    - Station specific current weather observation.
    - Station specific prevailing wind flow pattern.
    - Consistency of model output compared to previous run.
    - Latest Radar signature - animations for reflectivity and velocity.
    - Satellite imagery to include special enhancements for fog, ground temperature, severe weather, movement of features, etc.
    - Lightning data.

Climatology:

Examine whether final forecast of the station make sense based on monthly/daily aerodrome climate summary data? (Extreme temperatures, 24-hour precipitation extremes - (Y/N)?

Station Consideration:

- Microscale (point) forecasting like TAF, requires the forecaster to consider and give more attention to station factors than synoptic condition.
- The topography of an area can significantly modify any synoptic feature.
- Aviation Forecasters should have a thorough knowledge on local-area topography/geography and all associated local effects of any forecasted station.
- Above all the forecaster's experience plays a vital role for accurate TAF.

Note: Obviously, it is impossible to design a universal TAF worksheet that can be used by every weather forecasting office. But, there are many elements common to a sound worksheet. However TAF specific to each airfield will be issued based on available & evaluation/analysis of the weather data, local features besides forecaster's experience.

4.2.5 TAF Formulation

When formatting a TAF every effort shall be made to present a representative outlook of the forecast elements for the valid period as possible.

On the other hand, the forecaster should avoid redundancy, ambiguity and the inclusion of additional groups that illustrate changes but **have no operational impact on flight operations.**

Aerodrome forecast and amendments thereto should be issued only in accordance with the template and shall be disseminated in the TAF code form.

4.2.6 Encoding the Elements in TAF

The initial line for the TAF shall contain all the required elements describing the prevailing conditions forecasted to occur at the beginning of the forecast period.

This conditions prevail until the end of the forecast period or until modified by a change group/line like –

BECMG, FM, TEMPO, and PROB.

4.2.7 TAF Template

Kindly Refer to Appendix-IV.

4.2.8 Description of TAF Template

Template consists of broad 5 parts (group) & are issued **in the following order** as indicated:

[Type of forecast] [ICAO Station Identifier] [Date and Time of Origin] [Valid Period Date and Time] [Forecast Meteorological Conditions]

Type of forecast:

(Inclusion criteria M = inclusion mandatory, part of every message)

- There are two types of TAF issuances (Forecast) **a routine forecast (TAF)** and **an amended forecast (TAF AMD)**
- An amended TAF is issued when the current TAF no longer adequately describes the on-going weather or the forecaster feels the TAF is not representative of the current or expected weather.
- Amended TAFs are valid from the current hour to the ending hour of the original TAF.
- Corrected (COR) TAF included when the TAF is a correction of a previously issued TAF; Example: TAF (TAF COR)/TAF AMD

ICAO Station location Identifier:

(Inclusion criteria, M= inclusion mandatory, part of every message)

The TAF code uses the ICAO four letter location identifier.

Example:

TAF VECC 110500Z 1106/1212 19008KT 3500 HZ SCT018 BKN100
TEMPO 1108/1112 2000 TSRA SCT015 FEW025CB OVC090
BECMG 1122/1124 2800 -RA HZ
BECMG 1203/1205 3500 -RA HZ
TEMPO 1205/1209 2000 TSRA SCT015 FEW025CB OVC090 =

VECC is the NSCBI (Dumdum, Kolkata) Airport's ICAO four letter code.

Date & Time of origin:

(Inclusion criteria, M = inclusion mandatory, part of every message)

In the TAF, there are two items of date-time information. The first group indicates the date and time at which the TAF issued.

Two-digit date with a four-digit time group (dd/hh/mm) appended with Z to denote the time (UTC)

Example:

TAF VECC 110500Z

110500Z the digits 11 identify the day of the month. Other 4-digit and Z indicates hours and minutes in UTC. The above TAF, originates on 11th day of the month, at 05:00, UTC.

Valid Period Date and Time:

(Inclusion criteria, M = inclusion mandatory, part of every message)

The second time group with UTC valid period of the forecast consists of two four-digit sets, separated by a "/". The first four-digit set is a two-digit date followed by the two-digit beginning hour, and the second four-digit set is a two-digit date followed by the two-digit ending hour.

In the case of an amended forecast, or a forecast which is corrected or delayed, the valid period may be for less than 09/30 hours

Example:

TAF VECC 110500Z 1106/1212

The day of month is repeated, 11, and is followed by the start of the forecast time in hours, 06, and then, separated by a slash the end of the forecast time, with the validation day of the month, 12 and end of the validity period in hours, 12.

Forecast Meteorological Conditions:

Forecast Meteorological condition are included in the TAF as per **following order** as indicated:

- Surface Wind
- Visibility
- Weather
- Cloud (sky condition) and
- If a significant change to one or more of these elements is expected during the period of validity a new time period with the following **change group** is included : From as FM; Becoming as BECMG; TEMPO; Probability as PROB 30/40

The following describes how the meteorological elements to be indicated in the above Template:

Surface wind (Direction & Speed with unit): (Inclusion criteria, M = inclusion mandatory, part of every message)

Surface Wind & Wind Gust: (Inclusion criteria, C = inclusion conditional, dependent on meteorological conditions)

Wind group writing/inclusion - GENERAL procedure:

- Normally there will be a five-figure group (dddff) to indicate the ten-minute mean wind followed by an abbreviation Knot (KT) without space to indicate the wind speed units used.
- The first three figures indicate the wind direction and the last two the wind speed. Example: TAF VECC 110500Z 1106/1212 19008KT

  Wind comes from 190° with speed 08 KT.
- When it is not possible to forecast a prevailing particular direction, the forecast wind direction is indicated as "variable" using "VRB" followed by an abbreviation Knot (KT) without space (for example, during light wind conditions (less than 3kt) or thunderstorms) Example :- VRB02KT

- Values of wind direction less than 100^{o} shall be preceded by 0 and a wind from true north shall be reported as 360. Values of wind speed less than 10 units shall be preceded by 0.
- When the wind is forecast to be less than 1 knot (calm), it will be indicated as 00000KT.
- Wind gusts are noted by the letter "G" appended to the wind speed followed by the highest expected gust and coded form is dddffGffKT. Example: 35012G20KT (Wind three five zero at one two gust two zero)
- When the wind speed of 100KTs or more is forecast it shall be indicated to be more than 99KT in the form P99KT. Example: 120P99KT

Surface wind writing/inclusion - SPECIAL procedure:

The change for surface wind is issued for the following conditions:

- A change in the mean wind direction of 60° or more, the mean speed before and/or after the change being 10 KT or more.
- A change in mean wind speed of 10 KT or more.

  Example: An expected fluctuation of surface wind from 250^{o} at 05KT with speed to 15KT throughout the period after the fluctuation is indicated in the form: BECMG 25015 KT

  Note: Squalls are not forecasted in the wind group; if expected, they shall be included in the significant weather group (TEMPO) with direction and speed.

Surface Visibility: (Inclusion criteria, M = inclusion mandatory, part of every message)

- Visibility Group: VVVV
- **Encode the forecasted prevailing visibility for the initial forecast period and in any subsequent FM group or BECMG group that includes an expected change.**
- Visibility is indicated in meters rounded down to the nearest reportable value.
- When the visibility is forecast to be
  - less than 800 m it is expressed in steps of 50 m;
  - between 800 m and 5 km, in steps of 100 m;
  - between 5 km and 10 km in steps of km and
  - More than 10 km, it is expressed as 10 km, except CAVOK condition.
- Include a weather group immediately following the visibility group whenever forecasting a visibility of 5000 meters or less.

  Example: TAF VECC 110500Z 1106/1212 19008KT 3500 HZ.

  Visibility is 3500 metre due to haze.

Significant change in Visibility:

- In the case of a significant change in visibility, the phenomenon causing the reduction of visibility should also be indicated and only one value of the following significant level will be included.
- 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: 150, 350, 600 800, 1500, 3000 or 5000 meters,
- Only one value of the significant level will be included in visibility group.

Note: For deteriorating condition use only one value between 1500 & 800. From 1500 next value will be less than 800 but in improving condition both value can be included in sequence.

If the visibility will alternate between significant values, describe the situation in a change group. Do not use variable visibility remarks.

Weather: (Inclusion criteria, C = inclusion conditional, dependent on meteorological conditions)

Weather Group: w´w´

General consideration: Encode the forecasted weather and obstructions to vision, if any, for the initial forecast period and any subsequent FM or BECMG lines.

- If no significant weather is expected in the initial time period or additional FM lines, omit the line.
- One or more groups (w´w´) up to a **maximum of three** of the following weather phenomena or combinations thereof, together with their characteristics and, where appropriate, their intensity:
  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 if they are expected to cause a significant change in visibility.
- The expected end of occurrence of the weather phenomena shall be indicated by the abbreviation "NSW".
- **Format is** [Intensity Or Proximity] [Descriptor] [Weather Phenomena]

Selection Criteria of weather elements: Normally, first consider the need for intensity, followed by a descriptor and then weather phenomena (precipitation and/or obscuration). No space is placed among the groups.

- Only one intensity and one descriptor shall be used for each weather group or combination. Example: +SHRA
- **Order of weather element: TS > RA > DZ**

Intensity description:

- Intensity should be indicated only with precipitation, precipitation associated with showers and/or thunderstorms, duststorm or sandstorm.
- Indicate Light intensity as (-), Heavy as (+) & no symbol for moderate intensity.

For Freezing Precipitation: A forecast of freezing precipitation **is an exception** to the above rule.

- When one or more types of precipitation are forecasted and one is freezing (e.g. FZRA), that type shall be encoded first regardless of the intensity.
- Intensity shall not be encoded with a second or third precipitation. For instance if heavy snow and light freezing rain are forecast, the proper encoded is –FZRASN.

Special consideration for Thunderstorm: Thunderstorm (TS) is the only descriptor that may be encoded without any associated precipitation.

- Whenever a thunderstorm is included in the weather group, even if in the vicinity, the cloud group shall include a **forecast** cloud type of **cumulonimbus.**
- Intensity indicators refer only to the intensity of the precipitation associated with a thunderstorm, not the intensity of the thunderstorm.
- There is no way to explicitly forecast a severe thunderstorm; however, a severe thunderstorm can be indicated on the basis of the forecast winds, i.e. wind gusts of 50 knots or greater or forecast hail size of ¾ inch or greater.

Special Criteria for Obscuration (**Visibility) Forecast:**

- Encode **BR (Mist)** if the prevailing visibility is expected to be at least 1000 m but not more than 5000 m and RH more than 75% & phenomena due to hydrometeors.
- Encode **FG (Fog)** when the prevailing visibility is expected to be less than 1000 meters.
- Encode **MIFG (Shallow Fog)** when the fog depth is less than six (6) feet and not expected to obscure any part of the sky.
- Encode **PRFG (Partial Fog)** to describe fog "covering substantial part of the aerodrome."
- Encode **BCFG (Patchy Fog)** to describe fog patches randomly covering the aerodrome.
- Encode **HZ (Haze)** when visibility is 5000 m or less and RH less than 75% & phenomena due to litho-meteors.
- Encode **FU (Smoke)** when visibility is 5000 m or less and obscuration is due to litho-meteors.
- Encode **DS (Duststorm)** when visibility is 5000 m or less and obscuration is due to litho-meteors.
- Encode **SS (Sandstorm)** when visibility is 5000 m or less and obscuration is due to litho-meteors.

Special criteria for Weather CAVOK:

Example: TAF VECC 110500Z 1106/1212 04009KT CAVOK=

- The code CAVOK is frequently used in the TAF code, being the abbreviation for 'Ceiling (or cloud) and visibility are OK'
- If CAVOK is used, it will replace the Visibility, RVR, weather and cloud groups.
- There are four following criteria which must be met in order for CAVOK to appear in the TAF.
    1. The visibility must be 10 kilometres or more.
    2. The height of the lowest cloud must be no less than 5000 feet, or the level of highest minimum sector altitude, whichever is the greater.
    3. There must be no cumulonimbus present.
    4. There must be no significant weather

Cloud:

Cloud amount & height of base: (Inclusion criteria, M = inclusion mandatory, part of every message)

Cloud type: (Inclusion criteria, C = inclusion conditional, dependent on meteorological conditions)

General consideration:

- The group shall be in the initial time period line, all subsequent change lines as necessary.
- The cloud group can be repeated to indicate different layers or masses of cloud but the number of groups should not normally **exceed three** with the following considerations:

Cloud amount (Sky cover):

- The lowest individual layer (mass) of with amount as FEW, SCT, BKN or OVC as appropriate.
- The next individual layer of more than 2/8 as SCT, BKN, or OVC as appropriate.
- The next higher layer of more than 4/8 as BKN or OVC; and Cumulonimbus (CB) and/or towering cumulus clouds (TCU), whenever observed and not already reported.
- When no cloud of operational significance is forecast, and "CAVOK" is not appropriate, the abbreviation "NSC" shall be used.
- Vertical visibility is to be forecast in the form "VV" followed by the forecast value of the vertical visibility when the sky is expected to remain or become obscured and clouds cannot be forecast and information on vertical visibility is available.

Height of cloud base:

- Encode the height of the base of each cloud layer in hundreds of feet AGL. This entry follows the amount without a space.
- Express the height to the nearest 100 feet from the surface to 5,000 feet, to the nearest 500 feet from 5,000 feet to 10,000 feet; and to the nearest 1,000 feet above 10,000 feet.
- Layers from the surface to 50 feet are considered to be surface based and encoded as 000.

Cloud Type:

The only cloud type included in the TAF is cumulonimbus (CB).following the height in a cloud group without a space, (i.e. BKN020CB). CB may be forecasted without the forecast of a thunderstorm.

Change groups (Forecast Change Indicators):

Inclusion of Change group: Change groups are included as per following criteria:

- When the mean surface wind direction is forecasted to change by 60º or more, the mean speed before and/or after the change being 10 kts or more;
- When the mean surface wind speed is forecasted to change by 10 kts or more;
- When the variation from the mean surface wind speed (gusts) is forecasted to increase by 10 knots or more, the mean speed before and/or after the change being 15 knot or more;
- Diurnal changes of surface wind (onset of sea breeze etc.), even if the changes do not meet the above criteria.
- When the visibility is forecast to change to or pass through one or more of the following values: 150, 350, 600, 800, 1500, 3000 or 5000 m;
- When any of the following weather phenomena or combinations thereof are forecasted to begin or end or change in intensity -
    - Freezing precipitation
    - Moderate or heavy precipitation (including showers thereof)
    - Thunderstorm (with precipitation)
    - Duststorm
    - Sandstorm
- When any of the following weather phenomena or combinations thereof are forecasted 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)

- When the height of base of the lowest layer or mass of cloud of BKN or OVC extent is forecasted pass through one or more of the following values:

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

- When the amount of a layer or mass of cloud below 450 m (1500 ft) is forecasted to change:
  - From NSC, FEW or SCT to BKN or OVC; or
  - From BKN or OVC to NSC, FEW or SCT;
- When the vertical visibility is forecast to pass through one or more of the following values:

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

- There are distinctive TAF codes which indicate that a change is expected in some or all of the forecast meteorological conditions.
- The nature of the change can vary; it may, for instance, be a rapid, gradual or temporary change.

Types of change group:

These codes are FM (meaning FROM), BECMG (meaning BECOMING), TEMPO (meaning TEMPORARILY), and PROB (meaning PROBABILITY).

1. FROM (FM) Group:

- The FM indicator introduces what is effectively a **new (permanent) forecast** and Change is from a point of time.
- The change indicator FM is followed by a four-digit time group in hours, and minutes, to indicate the time at which the change is expected to begin.

  Example: TAF VECC 130600Z 1307/1316 31015KT 8000 –SHRA SCT010 BKN018 FM 1220 27015KT 4000 BKN010 =

  Explanation: From the above example, we read that, **from 1220Z until the end of the TAF period**, the wind will change to be 270° at 15 knots, with a prevailing visibility of 4000 metres, and broken cloud at 1000 feet.

2. Becoming (BECMG) Group:

- The code BECMG, marks a **permanent change** in the forecast weather, but which will establish itself **more gradually** than weather conditions introduced by the code FM.
- BECMG is 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.
- The **BECMG** indicator is followed by two four-digit sets, separated by a **"/".**
- The first four-digit set is a two-digit date followed by the two-digit beginning hour, and the second four-digit set is a two-digit date followed by the two-digit ending hour between which the change conditions is **expected to occur.**

  Example:

  TAF VECC 130600Z 1307/1316 31015KT 8000 –SHRA SCT010 BKN018 BECMG 1309/1311 5000 –RA =

  Explanation: TAF indicates that at some time between the 0900 and 1100 UTC, but definitely by 1100 UTC the prevailing conditions will give 5000 metres visibility, in light rain. There is no new wind information after BECMG, so the implication is that the wind will be as previously forecast value of 310° 15KT.

3. Temporary (TEMPO) Group:

- TEMPO is used for 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 **generally 4 hours.**
- The **TEMPO** indicator is followed by two four-digit sets, separated by a **"/".**
- The first four-digit set is a two-digit date followed by the two-digit beginning hour, and the second four-digit set is a two-digit date followed by the two-digit ending hour between which the temporary change conditions is expected to **begin and end**.

  Example:

  TAF VECC 130600Z 1307/1316 31015KT 8000 KT –SHRA SCT010 BKN018 TEMPO 1312/1314 4000 TSRA BKN010CB =

  Explanation: TAF tells us that sometime between 1200 UTC and 1400 UTC, the visibility will fall 4000 metres, with the weather being thunderstorms and moderate rain. There will be 5 to 7 oktas of cumulonimbus cloud at 1000 feet.

4. The Probability (PROB) Indicator:

- The code PROB in a TAF indicates the probability of the occurrence of specified weather phenomena. There are two type of PROB:

  i. PROB30: indicates a low probability of a change occurring.

  ii. PROB40: indicates a high probability of a change occurring.

- The code PROB can be followed by a time group of its own, and/or by an indicator, such as BECMG or TEMPO.

  Example:

  TAF VECC 130600Z 1307/1316 31015KT 8000 –SHRA SCT010 BKN018 PROB40 TEMPO 1310/1314 +TSRAGR SCT005CB =

  Explanation: The above example of TAF tells us that there is a high probability that, between 1000 UTC and 1400 UTC, there will be thunderstorms with heavy rain and hail, and from 3 to 4 oktas of cumulonimbus clouds at 500 feet.

End of Message:

An equals sign (=) appears at the end of the TAF reports to denote that the message is complete.

Example:

TAF VECC 110500Z 1106/1212 19008KT 3500 HZ SCT018 BKN100
TEMPO 1108/1112 2000 TSRA SCT015 FEW025CB OVC090
BECMG 1122/1124 2800 -RA HZ
BECMG 1203/1205 3500 -RA HZ
TEMPO 1205/1209 2000 TSRA SCT015 FEW025CB OVC090 =

Issue time & updation of TAF:

Long TAF (30 hour validity period) are scheduled four times daily (0000Z, 06000Z, 1200Z, 1800Z)

Short TAF (9 hour validity period) are scheduled eight times daily (0000Z, 0300Z 06000Z, 0900Z, 1200Z, 1500Z, 1800Z & 2100Z)

Issue time, schedule of updation & validity of short & long TAF are as follows:

Issue Time (UTC)	Validity Period (UTC)	
	9 hours	30 hours
0200	03 -12	
0500	06 -15	06-12
0800	09 -18	
1100	12 -21	12- 18
1400	15 -24	
1700	18 – 03 (next day)	18 - 00
2000	21 – 06	
2300	00 - 09	00-06

Note: The 9 hourly TAF and 30 hourly are filed for departmental exchange 3 hours before the start of the validity period. The 30 hourly TAF to international destination are filed one hour before the beginning of validity period.

4.3 ROUTE FORECAST (ROFOR)

4.3.1 General

Definition:

ROFOR is an abbreviation for "Route Forecast". As the name suggests it is the *route weather forecasts* any aircraft between the point of departure and destination.

Form of ROFOR:

Route forecast are issued in:

1. Code form
2. Chart form and
3. Pictorial form

ROFOR is issued in coded form by AMOs and transmitted to AMSs for preparation of route forecast between two specified aerodromes.

ROFOR is then decoded and MET-T4/ MET-T3 are prepared for handing over to pilot.

MET-T4 is used for flights beyond 500 nautical miles and MET-T3 is used for flight below 500 nautical miles.

4.3.2 Content of ROFOR

ROFOR contain upper winds, upper-air temperatures, and significant en-route weather phenomena and associated clouds. Other elements namely-freezing (Icing) levels, turbulence and vertical wind shear may be added as required. This information covers the flight operations for which they are intended in respect of time, altitude and geographical extent.

4.3.3 Steps for preparation of ROFOR

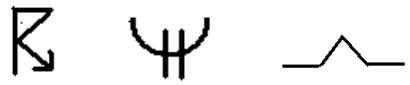
The preparation of Manual ROFOR involves following main steps:

- Aviation Forecast Order Form is filled by the duty Aviation officer at the briefing office with the information provided by the Captain of the flight or the agency.
- Aviation Forecast Order Form is then forwarded /faxed to the Duty Forecaster.
- Duty Forecaster at briefing used this information to prepare a ROFOR.
- ROFOR prepared /filed at briefing to be collected by the ATS/pilot.

3.3.4 General Rules for Preparing Route Forecast (MET-T4)

1. Route forecast on MET-T4 is prepared in pictorial form **for flight beyond 500 nautical miles**.
2. 0°C isotherm is to be drawn as a dashed line in blue or black and labelled 0°C on either end.

3. 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.
4. 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.
5. The following symbols are to be depicted in blue or black:



6. General information about flight should be entered in first page of MET-T4 form. It contain Serial No. of flight, date of flight, flight number, ICAO name of AMO issuing route forecast, route for which forecast is valid, date and time of issuing route forecast, date and time of validity and Name of forecaster. And any other special information.
7. TAFORS of originating and destination along with their alternates and inference may be given on first page under special information

4.3.5 Route Forecast (ROFOR) (For Decoding Into Met-T4 Form)

General Information

Serial No.: PQR-01

Flight number: IC-720

Date of flight: 15-12-2016

ROFOR 150100Z 150310KT VOMM VABB 03 VOHY 6000 SCT020 7060160 405026 27010 407020 27015 410013 36010 414002 09010 TEMPO 1509/1515 4000 TSRA SCT015 7050/// FEWCB025 7340/// 651509 580256 OVC080 03 VAAU 6000 SCT020 7060160 405028 33015 407021 36015 410013 36010 414002 09010 TEMPO 1509/1515 3000 TSRA SCT015 7050/// 03 VABB 4000 HZ SCT025 7060160 405027 33015 407020 36015 410013 36010 414002 09010=

4.3.6 Preparation for plotting MET-T4

ROFOR	**Message indicator**
150100Z	Date and Time of issue in UTC Issued on 15th day of the month at 0100 UTC
150310KT	Period of validity On 15th Day of the month & valid from 0300 to 1000 UTC
VOMM-VABB	ROFOR is from Chennai to Mumbai
VOHY	This division of route on Station basis i.e. Route forecast is up to Hyderabad
6000	Visibility group: Visibility is 6000 m
SCT020	Cloud group: SCT is amount & type of cloud, 020 base of cloud

7060160	This group is top (height) of cloud & height of freezing level. 070 is top of cloud whose base is 020 & freezing level is 160
405026	Indicator of flight level (height) and corresponding temperature, 050 is flight level (height) and 26 (plus 26°C) is temperature at flight level (height) 050
27010	This is wind direction and wind speed,270° is wind direction & 10 kts is wind speed at flight level (height) 050
407020	Indicator of flight level (height) and corresponding temperature, 070 is flight level (height) and 20 (plus 20°C) is temperature at flight level (height) 070
27015	This is wind direction and wind speed, 270° is wind direction & 15 kts is wind speed at flight level (height) 070
410013	Indicator of flight level (height) and corresponding temperature, 100 is flight level (height) and 13 (plus 13°C) is temperature at flight level (height) 100
36010	This is wind direction and wind speed, 360° is wind direction & 10 kts is wind speed at flight level (height) 100
414002	Indicator of flight level (height) and corresponding temperature, 140 is flight level (height) and 02 (plus 02°C) is temperature at flight level (height) 140
09010	This is wind direction and wind speed, 090° is wind direction & 10 kts is wind speed at flight level (height) 140
TEMPO	This is the change indicator, temporary fluctuation in meteorological parameter
1509/1515	Date and validity temporary fluctuation, 15 is date, change is expected from 0900 to 1500 UTC
4000	Reduction in visibility to 4000 M
TSRA	Weather group as the supplementary phenomena is Thunderstorm
FEWCB025	FEW amount & type of cloud is CB, 025 base of CB cloud
7340///	340 is Top of CB, /// - no freezing level forecast as it has already given (160)
651509	This is icing group, 5 is type of icing at base height (flight level) 150 and thickness is 9. The base of icing is at 150 and top is (150*30 + 9*300)/30 = 240
580256	This is turbulence group, 8 is type of turbulence at base height 025 flight level and thickness 6. The base of turbulence 025 & top is (025*30 + 6*300)/30 = 085
OVC080	Cloud group BKN is amount & type of cloud, 080 is the base of cloud
03 VAAU	This division of route on Station basis i.e. Route forecast is up to Aurangabad
6000	Visibility
SCT020	Cloud group: SCT is amount & type of cloud, 020 base of cloud
7060160	This group is top (height) of cloud & height of freezing level. 070 is top of cloud whose base is 020 & freezing level is 160
405028	Indicator of flight level (height) and corresponding temperature, 050 is flight level (height) and 28 (plus 28°C) is temperature at flight level (height) 050
33015	This is wind direction and wind speed, 330° is wind direction

	& 15 kts is wind speed at flight level (height) 050
407021	Indicator of flight level (height) and corresponding temperature, 070 is flight level (height) and 21 (plus 21°C) is temperature at flight level (height) 070
36015	This is wind direction and wind speed, 360° is wind direction & 15 kts is wind speed at flight level (height) 070
410013	Indicator of flight level (height) and corresponding temperature, 100 is flight level (height) and 13 (plus 13°C) is temperature at flight level (height) 100
36010	This is wind direction and wind speed, 360° is wind direction & 10 kts is wind speed at flight level (height) 100
414002	Indicator of flight level (height) and corresponding temperature, 140 is flight level (height) and 02 (plus 02°C) is temperature at flight level (height) 140
09010	This is wind direction and wind speed, 090° is wind direction & 10 kts is wind speed at flight level (height) 140
TEMPO	This is the change indicator, temporary fluctuation in meteorological parameter
1509/1515	Date and validity temporary fluctuation, 15 is date, change is expected from 0900 to 1500 UTC
3000	Reduction in visibility to 3000 M
TSRA	Weather group as the supplementary phenomena is Thunderstorm
03 VABB	This division of route on Station basis i.e. Route forecast is up to Mumbai
4000	Visibility
HZ	Weather Group is Haze
SCT025	Cloud group: SCT is amount & type of cloud, 025 base of cloud
760160	This group is top (height) of cloud & height of freezing level. 070 is top of cloud whose base is 020 & freezing level is 160
405027	Indicator of flight level (height) and corresponding temperature, 050 is flight level (height) and 27 (plus 27°C) is temperature at flight level (height) 050
33015	This is wind direction and wind speed, 330° is wind direction & 15 kts is wind speed at flight level (height) 050
407020	Indicator of flight level (height) and corresponding temperature, 070 is flight level (height) and 20 (plus 20°C) is temperature at flight level (height) 070
36015	This is wind direction and wind speed, 360° is wind direction & 15 kts is wind speed at flight level (height) 070
410013	Indicator of flight level (height) and corresponding temperature, 100 is flight level (height) and 13 (plus 13°C) is temperature at flight level (height) 100
36010	This is wind direction and wind speed, 360° is wind direction & 10 kts is wind speed at flight level (height) 100
414002	Indicator of flight level (height) and corresponding temperature, 140 is flight level (height) and 02 (plus 02°C) is temperature at flight level (height) 140
09010	This is wind direction and wind speed, 090° is wind direction & 10 kts is wind speed at flight level (height) 140

Kindly refer to Appendix-IV for Met-T4 Format

4.3.7 General Rules for Preparing Route Forecast (Met-T3)

1. MET T3 is the route forecast in tabular form.
2. General information about flight should be entered in first page of MET-T3 form. It contain Serial No. of flight, date and time of flight forecast issued, flight number, ICAO name of AMO issuing route forecast, route for which forecast is valid, and Name of forecaster and any other special information which is significant for the flight also may be provided.
3. Date and time of issuing route forecast, date and time of validity.
4. TAFORs of originating and destination along with their alternates and inference may be given on first page under special information.
5. 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. Cloud types are written in capital letters.

4.3.8 Route Forecast (ROFOR) (For Decoding Into Met-T3 Form)

General Information

Serial No.: PQR-02

Flight number: VUBNH

Date of flight: 13-05-2020

ROFOR 130030Z 200610KT VECC-VANP 2800 HZFEW020 7024140 SCT090 405022 24010 407015 22015 410010 21010 414001 19005 BECMG 1303/1305 4000 HZ=

ROFOR	**Message Identifier**
130030Z	Date and Time of issue in UTC e.g. On 13th Date & issued at 0030UTC
200610KT	Date & Time of validity e.g. On 13th Date & valid from 0300 to 1000UTC
VECC-VANP	ROFOR is from Kolkata to Nagpur
2800	Visibility
HZ	Weather along the route here weather is Haze
FEW020	Cloud group: FEW amount & type of cloud, 020 base of cloud
7024140	This group is top (height) of cloud & height of freezing level. 024 is top of cloud whose base is 020 & freezing level is 140
SCT090	Cloud group: SCT amount & type of cloud, 090 base of cloud
405022	Indicator of flight level (height) and corresponding temperature, 050 is flight level (height) and 22 (Plus 22^{0}C) is temperature at flight level (height) 050

24010	This is wind direction and wind speed group, 240^0 is wind direction & 10KT is wind speed
407015	Indicator of flight level (height) and corresponding temperature, 070 is flight level (height) and 15 (Plus 15^0C) is temperature at flight level (height) 070
22015	This is wind direction and wind speed group, 220^0 is wind direction & 15KT
410010	Indicator of flight level (height) and corresponding temperature, 100 is flight level (height) and 10 (Plus 10^0C) is temperature at flight level (height) 100
21010	This is wind direction and wind speed, 250^0 is wind direction & 15Kt is wind speed at flight level (height) 070
414001	Indicator of flight level (height) and corresponding temperature, 140 is flight level (height) and 01 (Plus 01^0C) is temperature at flight level (height) 140
19005	This is wind direction and wind speed 190^0 is wind direction & 05KT is wind speed at flight level (height) 140
BECMG	Change group indicator
1303/1305	Date and validity period of the temporary fluctuation, 13 is date, The fluctuation in conditions are expected from 0300 to 0500 UTC.
4000	Improvement in visibility to 4000 M in HZ

Kindly refer to Appendix-IV for Met-T4 Format

4.4 LOCAL/AREA FORECAST

4.4.1 Purpose

These are issued for the use of low-level flights including helicopters.

4.4.2 Issuing authority

MWOs/ AMOs in India shall issue Local forecasts for their own aerodromes & Area forecasts for the AMSs under their control as per requirement.

4.4.3 Coverage area

Both are valid over the aerodrome and 100 NM around.

4.4.7 Frequency of issue & Validity

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.

4.4.8 Schedule of issue with validity period

Issued at (UTC)	Valid for (UTC)
2130	2200-0600
0530	0600-1400

1330	1400-2200

Note: At aerodromes, where the ATC maintains only restricted watch, Local and Area forecasts are to be issued to cover the ATC watch hour period.

4.4.9 Template for Local/Area Forecast

Both Local and Area Forecasts are issued in the same template (Met-T2) given below.

4.5 TREND FORECAST/LANDING FORECAST:

4.5.1 Purpose & coverage area

Landing forecasts issued in India as a routine are called trend forecast also.

These forecasts are intended to meet the requirements of local users and of aircraft within about one hour's flying time from the aerodrome.

4.5.2 Issuing authority

All Aerodrome Meteorological Offices (with forecasting facility) issue TREND forecasts during the forecast watch hours.

4.5.3 Frequency of issue & Validity

- They are appended to a local routine or local special report, or a METAR or SPECI as and when situation arises i.e. when significant changes in respect of one or more of the elements: surface wind, visibility, weather and clouds is/are expected.
- 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.

4.5.4 Change indicators

1. When a change is expected to occur, the trend forecast message should begin with one of the change indicators "BECMG" or "TEMPO".
2. The trend forecast indicates significant changes in respect of one or more of the elements: surface wind, visibility, weather and clouds.
3. Only those elements are included for which a significant change is expected.
4. 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.
5. In the case of a significant change in visibility, the phenomenon causing the reduction of visibility should also be indicated.
6. When no change is expected to occur, this shall be indicated by the term "**NOSIG"**.

Surface Wind:

The trend forecast for surface wind is issued for the following conditions:

1. Change in the mean wind direction of 600 or more, the mean speed before and/or after the change being 10 kts or more;

2. Change in mean wind speed of 10 kts or more.

   Example: An expected temporary fluctuation of surface wind from 250° at 35 kts with maximum speed (gusts) to 50 kts throughout the period of the trend forecast is indicated in the form:

   "TEMPO 25035G50KT" in METAR and

   "TEMPO 250/35KT MAX50" in METREPORT.

Visibility:

- Trend forecast for visibility is issued when it is expected to change to or pass through any one of the values 150, 350, 600, 800, 1500, 3000 or 5000 m.
- Whenever reduction of visibility is indicated in trend forecasts in locally disseminated reports, the reasons for such reduction in visibility is also specified in the trend part of the message.

  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" in METAR and

  "TEMPO VIS 700M" in MET REPORT.

Weather phenomena:

- The trend forecast should 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 if they are expected to cause a significant change in visibility.
- The trend forecast should 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)

- The total number of phenomena reported in (a) and (b) should not exceed three.
- The expected end of the weather phenomena shall be indicated by the abbreviation "NSW".

  Example:

  1. "TEMPO FM0300 TL0430 TSRA" (METAR) and "TEMPO FM0300 TL0430 MOD TSRA" (local routine report).
  2. An expected cessation at 1630 UTC, of significant weather, such as a thunderstorm, is indicated in the form "BECMG AT1630 NSW" (in both METAR and local routine report).

Cloud:

- Trend forecast should be issued when the height of the base of a cloud layer of BKN or OVC extent is expected to change to or pass through one or more of the following values: 30, 60, 150, 300 and 450 m (100, 200, 500, 1000 and 1500 ft).
- 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 should 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" should be used.

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 change to or pass through one or more of the following values: 30, 60, 150, or 300m (100, 200, 500, or1000 ft), the trend forecast should indicate the change.

4.5.6 Use of change group

BECMG:

- The change indicator "BECMG" is 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 is indicated, using the abbreviations FROM "FM", TILL "TL", or "AT", as appropriate.
- They should be followed by a time group in hours (2 digit) and minutes (2 digit).

- 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 1400 to 1600 UTC in the form, “BECMG FM1430 TL1600” (in both METAR and local routine report).

TEMPO:

- The change indicator “TEMPO” is 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.
- They should be followed by a time group in hours and minutes.

  Example: For a TREND forecast period from 1000 to 1200 UTC in the form “TEMPO FM1030 TL1130” (in both METAR and local routine report).

Chapter - 5

WEATHER ADVISORY

SIGMET

5.1 INTRODUCTION

Definition:

SIGMET is shorthand for **"Significant Meteorological Information.** SIGMET is an in-flight weather **advisory** concerning the occurrence or expected occurrence of specified en-route weather phenomena (Significant Meteorological hazards) which may affect the safety of aircraft operations.

5.2 ISSUING AUTHORITY

In India, SIGMET messages are issued by the MWOs at Mumbai, Kolkata, New Delhi and Chennai for the respective Flight Information Regions. A SIGMET gives a concise description of the phenomena in **abbreviated plain language.**

5.3 ISSUING TIME

The information may be about a hazardous weather phenomenon already occurring or it may be for the expected occurrence of a phenomenon.

5.4 FORECASTING TOOL FOR SIGMET

Examine the following:

1. Surface pressure tendency: Rise/Fall

2. Low level moisture availability

3. Convection /convergence

4. Wind flow pattern & vertical wind shear.

5. Dry intrusion of air at or near mid tropospheric level

6. Size and distribution of CAPE & environmental lapse rates

7. Stability indices

8. Vorticity advection.

9. Upper level Jet.

10. NWP Model (Nowcast/Mesoscale)

11. Radar products (MAX Z, VVP-2)

12. Satellite imageries (Prevailing cloud pattern, movement & intensification)

5.5 TYPES OF SIGMET

There are three types of SIGMETs:

1. SIGMET for volcanic ash, denoted as VA SIGMET or WV SIGMET
2. SIGMET for Tropical Cyclones, denoted as TC SIGMET or WC SIGMET
3. SIGMET for en-route weather phenomena other than VA and TC, (includes TS, CB, TURB, ICE, MTW, DS, SS and RDOACT CLD) denoted as WS SIGMET.

5.6 DATA TYPE DESIGNATORS

The WMO data type designators used for dissemination of the SIGMETs are:

WC - SIGMET for Tropical Cyclones

WV - SIGMET for Volcanic Ash

WS - SIGMET other than volcanic ash cloud or tropical cyclone.

5.7 PERIOD OF VALIDITY

- The validity of a SIGMET message should not be more than 4 hours.
- In case of VA SIGMET and TC SIGMET, the period of validity can be extended up to 6 hours.

5.8 TIME OF ISSUE AND UPDATING FREQUENCY

- SIGMET messages should be issued not more than 4 hours before the commencement of the period of validity.
- In case of VA SIGMET and TC SIGMET, these messages can 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 should be updated at least every 6 hours.

5.9 SIGMET GUIDANCE CENTRES FOR TC & VA

- SIGMET messages concerning volcanic ash cloud and tropical cyclones shall be based on advisory information provided by the designated VAACs and TCACs, respectively.
- For India RSMC, New Delhi provide guidance for Tropical Cyclone & VAAC – Darwin & VAAC Toulouse (France) provide advisories for Volcanic Ash cloud.

5.10 CANCELLATION OF SIGMET

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

5.11 SPECIFICATION RELATED TO ISSUANCE OF SIGMET INFORMATION

- SIGMET messages should be prepared in abbreviated plain language, using ICAO approved abbreviations.
- Should be prepared in the template given.
- Messages containing SIGMET information shall be identified as "SIGMET".
- The sequence number referred to in the template shall correspond with the number of SIGMET messages issued for the FIR since 0001 UTC on the day concerned, e.g., "3" will be related to the Third SIGMET message issued by MWO since 0001 UTC on the day concerned.

5.12 PHENOMENA TO BE INCLUDED IN A SIGMET MESSAGE

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

Phenomena	Abbreviation	Description
TS	OBSC TS	Obscured thunderstorm(s)
	EMBD TS	Embedded thunderstorm(s)
	FRQ TS	Frequent thunderstorm(s)
	SQL TS	squall line thunderstorm(s)
	OBSC TSGR	obscured thunderstorm(s) with hail
	EMBD TSGR	Embedded thunderstorm(s) with hail
	FRQ TSGR	frequent thunderstorm(s) with hail
	SQL TSGR	squall line thunderstorm(s) with hail
TC	TC (+ Name of the Tropical Cyclone, if known)	Tropical cyclone (with 10 - minute mean surface wind speed of 34 kts or more)
TURB	SEV TURB	severe turbulence
ICE	SEV ICE	severe icing
	SEV ICE (FZRA)	severe icing due to freezing rain
MTW	SEV MTW	severe mountain wave
DS	HVY DS	heavy duststorm
	HVY SS	heavy sandstorm
VA	VA (+ Name of the Volcano, if known)	volcanic ash

5.13 CRITERIA RELATED TO PHENOMENA INCLUDED IN SIGMET MESSAGE

An area of Thunderstorms and cumulonimbus clouds shall be considered:

1. Obscured (OBSC) - If it is obscured by haze or smoke or cannot be readily seen due to darkness.
2. Embedded (EMBD) - If it is embedded within cloud layers and cannot be readily recognized.

3. 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).

4. 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).

5. Frequent (FRQ) - 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 forecasted to be affected, by the phenomenon (at a fixed time or during the period of validity).

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

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

8. 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. Note: Turbulence shall be considered:

9. Severe whenever the peak value of the cube root of eddy dissipation rate (EDR) exceeds 0.7; and

10. 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.

11. 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.

5.14 SPECIAL CONSIDERATION/NOTE

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.

Also the occurrence of heavy hail with thunderstorm shall be indicated.

5.15 TEMPLATE FOR SIGMET

Kindly refer to Appendix – IV.

Chapter - 6

AVIATION WEATHER WARNINGS

6.1 INTRODUCTION

Aviation weather warnings are given as:

1. Aerodrome warning (AW)
2. Light aircraft warning
3. Wind shear warning

6.2 AERODROME WARNING (AW)

6.2.1 Purpose

AWW gives concise information of meteorological conditions, which could adversely affect aircraft on the ground, including parked aircraft and the aerodrome facilities and services.

Information contained in this product is useful to airport managers, airport based operators, airline ground personnel, and others responsible for the safety of ground operations.

6.2.2 When to Issue & for Whom

They can be issued for an observed phenomenon or for the expected occurrence of a phenomenon that could adversely affect aircraft on the ground, including parked aircraft and the aerodrome facilities and services.

Aerodrome warnings are issued only for the **local aerodrome** as they are meant for protection of the aircraft parked and aerodrome facilities.

6.2.3 Issuing Authority

Issued by all MWOs/AMOs during period of forecast watch hour as & when required.

For aerodromes with AMS, these warnings are issued by the associated Aerodrome Meteorological Office.

Outside the forecast watch period of any station, the responsibility is transferred to the concerned AMO or to the MWO.

6.2.4 Format for Issue

The AWW warnings are to be issued in the template given below.

6.2.5 Template for Aerodrome Warning

Kindly refer to Appendix – IV.

6.2.6 Time of Updation & Validity Period

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.

6.2.7 Cancellation of Aerodrome Warning

Aerodrome warnings shall be cancelled when the phenomena are no longer occurring or are no longer expected to occur at the aerodrome.

Cancellation message also should be issued as per the template.

6.2.8 Elements of Aerodrome warning

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 34 kts 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 kts or more even in gusts.
    b. Direction change rapidly by >= 45°, wind speed before and after expected to be >= 20 kts.
11. Squall: Whenever expected, the expected direction and speed shall be indicated.
12. Frost
13. Volcanic ash
14. Tsunami

Note: Reduction in visibility and lowering of cloud base associated with the warning elements should not be mentioned in warnings separately.

6.2.9 Transmission

The warnings are to be passed on to local ATS units, Airport managers for further dissemination over a particular aerodrome and to the operators, etc. These are not to be disseminated beyond the aerodrome of origin. The warning should also be updated in OLBS system.

6.2.10 Verification of Aerodrome warnings

General rule for verification of Aerodrome warnings:

- All the aerodrome warnings issued by the station are to be verified.
- 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.
- For each element, a minimum of 80% of cases percentage within range shall be considered desirable/ satisfactory.

  Example: Out of 100 forecasts of an element, at least on 80 occasions, the forecast shall be correct.

Criteria for verification of Aerodrome warnings:

Weather phenomena: Occurrence or non-occurrence.

- If in the aerodrome warning, a weather phenomenon 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

Surface wind: (For "Strong surface wind and gusts", and for "Squall")

Speed: ± 5 knots; i.e., 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".

Proforma for verification of Aerodrome forecast:

For Proforma for verification of Aerodrome Warning, please refer to Appendix.

6.3 WARNING FOR LIGHT AIRCRAFTS

6.3.1 Purpose

Apart from the aerodrome warnings issued, warnings for gliders, light aircraft and helicopters are to be issued separately when wind speed is expected to reach 17KT or more.

They should also be appended to local forecast.

6.3.2 Issuing Authority

All AMOs/MWOs issues light aircraft warning during operational watch hour.

They are to be issued with the prefix “Warnings for Light Aircraft” in abbreviated plain language.

6.3.3 Format

Format of light aircraft warning is similar to the format of aerodrome warning except it is issue with the prefix “Warnings for Light Aircraft”.

6.3.4 Cancellation of Warning

The warning is cancelled when wind speed no longer exists/expected to exit 17KT or more.

6.3.5 Transmission

The warnings are to be passed on to local ATS units, Airport managers for further dissemination over a particular aerodrome and to the operators, etc.

These are not to be disseminated beyond the aerodrome of origin. Also updated in OLBS system.

6.4 WIND SHEAR WARNING

6.4.1 Phenomena Associated with Wind Shear Warning

Wind shear conditions are normally associated with the following phenomena:

1. Thunderstorms, Microbursts, Funnel cloud (tornado or waterspout), and Gust fronts
2. Frontal surfaces
3. Strong surface winds coupled with local topography
4. Sea breeze fronts
5. Mountain waves (including low-level rotors in the terminal area)
6. Low-level temperature inversions

6.4.2 Content & Purpose

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.

6.4.3 Detection of Wind Shear

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

1. Ground-based wind shear remote-sensing equipment, for example, Doppler Radar;
2. 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;
3. Aircraft observations during the climb-out or approach phases of flight to be made in accordance with the provisions of
4. Aircraft Observations and Reports;

6.4.4 Issuing Authority & When to Issue

Wind shear warnings shall be prepared by AMOs/MWOs when detected.

6.4.5 Criteria for Issue

1. The warnings shall be prepared and disseminated for aerodromes where wind shear is considered a factor for aircraft safety.
2. 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.

6.4.6 Procedure of Issue & Transmission

Wind shear warnings shall be issued in accordance with the template 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.

6.4.7 Format and Dissemination of Wind Shear Warning

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.

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, in the form, “WS WRNG B747 REPORTED MOD WS IN APCH RWY 34 AT 1510”.

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”.

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

6.4.8 Template for Wind Shear Warning

Kindly refer to Appendix – IV.

6.4.9 Intensity Report by Pilot:

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

6.4.10 Cancellation of Wind Shear:

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**.**

Chapter - 7

BRIEFING, DE-BRIEFING AND DOCUMENTATION

7.1 BRIEFING

7.1.1 Role of AMOs /MWOs

Aviation Meteorological Offices should supply the meteorological information to operators and flight crewmembers for:

1. Pre-flight planning by operators;
2. In-flight re-planning by operators using centralised operational control of flight operations;
3. Use by flight crew members before departure; and
4. Aircraft in flight.

7.1.2 Purpose of Briefing

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.

7.1.3 Briefing requirement of National flight (Information to be provided)

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

1. Forecasts of
   a. Upper wind and upper air temperature;
   b. Flight level and temperature of tropopause;
   c. Direction, speed and flight level of maximum wind; and
   d. SIGWX phenomena.
2. METAR and SPECI (including trend forecasts) for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;
3. TAF or amended TAF for the aerodromes of departure and intended landing, and for take-off, en-route and destination alternate aerodromes;
4. Forecasts for take-off;
5. SIGMET information, and appropriate special air-reports relevant to the whole route, those not already used in the preparation of SIGMET;
6. Volcanic ash and tropical cyclone advisory information relevant to the whole route;

7. Area forecast/local forecast;
8. Aerodrome warnings for local aerodrome;
9. Meteorological satellite images; and
10. Ground- based weather radar information

7.1.4 Briefing requirement for International flight

Forecasts listed 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.

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

7.1.5 Mode of supply

Meteorological information can be supplied by one or more of the following methods (order shown below not implying priorities):

1. Written or printed material, including specified charts and forms;
2. Data in digital form;
3. Briefing;
4. Consultation; or
5. Display.
6. Online briefing system (OLBS) through following URL:
   a. http://olbs.amsschennai.gov.in/nsweb/FlightBriefing/#showLogin
   b. http://olbs.amssdelhi.gov.in/nsweb/FlightBriefing/#showLogin

7.1.6 Supply of information & role of Forecasting office

The required briefing, consultation, display and/or flight documentation shall normally be provided by the AMOs at the aerodrome of departure.

If the meteorological office at the aerodrome of departure happens to be an AMS that office will provide necessary flight documentation after obtaining the same from the associated AMO.The required information shall be supplied at the location of the meteorological office.

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. The service shall normally be confined to flights originating within the country.

7.1.7 Time schedule of supply of information

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.

7.1.8 Specific requirement for briefing of low-level flights (Helicopter)

Briefing and/or consultation for low-level flights including those in accordance with the visual flight rules, should 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 should 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.

7.1.9 Provision for amendment of briefing document

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.

7.1.10 Requirement of display system

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 for ready access to the users.

7.1.11 Procedures to be followed when briefing & documentation facility is not available to a particular station

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:

1. If the meteorological office at such stop happens to be an AMO, 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.
2. If the meteorological office at such halt happens to be an AMS, 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.

7.2 DE-BRIEFING

The popular meaning of debriefing is telling about what type of flight weather encountered during en-route. The experience is shared by flight crew member to the Met duty officer at the termination of a flight journey.

7.3 FLIGHT DOCUMENTATION

7.3.1 Documentation of National Flight

1. Content of documentation of National flight

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

a. Forecasts of Upper wind and upper air temperature; and 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;

2. Procedure for documentation of National Flight:

a. The flight documentation for national flights shall be presented in the form of charts, tabular forms or abbreviated plain language texts.

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

c. TAF shall be presented in code form or abbreviated plain language texts.

d. The forms and the legend of charts in flight documentation should be printed in English.

e. The units employed for each element shall be indicated.

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

g. The documentation is to be handed over only to DGCA certified Flight Dispatcher/ Pilots.

7.3.2 Procedure for documentation of International Flight

For flight documentation of international flights, meteorological offices shall provide information received within the framework of WAFS using WAFC SIGWX Chart.

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 Appendix -

Examples of route forecast in Met-T4 and Met-T3 forms. National SIGWX charts are also given as Appendix -

7.3.3 Amendment of flight documentation

- 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.

7.3.4 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.

7.3.5 Set of charts to be provided

The actual charts provided for pre-flight and in-flight planning and for flight documentation shall be based on the user's requirement. 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.

7.3.6 Procedures for supply of documentation by AMO/AMS

- 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.
- For all National flights documentation shall be supplied as follows:

1. For all national flights, national SIGWX charts along with WAFC upper wind and temperature charts shall be provided wherever FAX/internet facility is available.

2. 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.

- 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. AMOs at intermediate halts need not provide fresh documentation for such flights.

- AMOs 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.

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

- For flights starting from an aerodrome with an AMO and returning from another aerodrome with an AMO, briefing and documentation for return flight also shall be provided by the starting AMO. 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.

7.3.7 Supply of documentation by AMS

Documentation shall be provided as follows in respect of flights terminating at AMS and returning from there as new flights:

1. AMO at the starting stations shall provide through documentation for the return flight also if the flights are operating within the same region.

2. 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.

3. 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 AMO in the region.

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

7.3.8 Procedure for supply of documentation in short notice

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".

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

7.3.9 Inputs for preparation of Flight Documentation

Upper wind and upper air temperature:

a. 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.

b. 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.

c. This information shall be given for route segments.

d. 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 at least the following altitudes:

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

7.3.10 Preparation of National significant weather (SIGWX) charts

As per latest decision (23.06.2020) NWP division of HQ will produce National significant weather charts using NWP technique for the medium level (between FL 100 and FL 250) and for high level (between FL 250 and FL 630).

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

7.3.11 Frequency, issue time & validity of National SIGWX charts

- 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.

- 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)	Validity (UTC)
00	09	00 next day
06	15	06 next day
12	21	12 next day
18	03	18 next day

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

7.3.12 Contents of the National SIGWX charts

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

1. Tropical cyclone, provided that the maximum of the 10-minute mean surface wind speed is expected to reach or exceed 63 km/h (34kt);
2. Severe squall lines;
3. Moderate or severe turbulence (in cloud or clear air);
4. Moderate or severe icing;
5. Widespread sandstorm/duststorm;
6. Cumulonimbus clouds associated with thunderstorms and with 1 to 5;
7. Flight level of tropopause;
8. Jet-streams;
9. Information on the location of volcanic eruptions that are producing ash clouds of significance to aircraft operations;
10. Information on the location of an accidental release of radioactive materials into the atmosphere, of significance to aircraft operations.

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.

7.3.13 Criteria for preparation of Flight Documentation Folder

Met.T-3 Format

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

1. Significant features of synoptic situation;
2. Significant weather;
3. Cloud (amounts, types and heights of bases and tops);
4. Surface visibility;
5. Surface pressure data, if required;
6. Height of 0° C isotherm;
7. Upper winds and upper air temperature information;
8. General outlook.

Met T-4 Format

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

1. Significant features of synoptic situation;
2. Significant en-route weather phenomena;
3. Clouds (amount and type of cloud);
4. Upper winds and upper air temperature information;
5. Surface pressure data, if required;
6. Height of 0° C isotherm;
7. Tropopause;
8. Surface visibility (only for flights below FL100).

7.3.14 List of Significant weather for inclusion in flight documentation folder

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.

7.3.15 Flight documentation: Aerodrome forecasts

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

Chapter - 8

ACTION FOR VIP/VVIP FLIGHT MOVEMENT

8.1 CONSIDERATION OF VIP/VVIP FLIGHTS

A non-scheduled flight by chartered or IAF aircraft arranged by the Government for any important person and details of which are notified to the IMD by the DG of Civil Aviation, Air HQ, the Protocol Division of the External Affairs Ministry, the Ministry of Civil Aviation etc., may be considered as a VIP flight.

The term VVIP is used for **President, Vice-President, Prime Minister and Deputy Prime Minister of India** as well as the **Heads of States and Prime Ministers of foreign countries.**

Messages dealing with the programmes of such dignitaries should be prefixed with the term "VVIP", but the actual identity of the party should not be indicated in the messages. Similarly the identity of the party should not be indicated in VIP messages also.

8.2 RESPONSIBILITY OF THE METEOROLOGICAL DEPARTMENT/OFFICE

- Necessary Meteorological services will be rendered by the MWO/AMO/AMS located at the respective aerodrome.
- At aerodromes where no meteorological unit is available, special facilities by way of current weather observations, briefing and documentation is to be provided, if the Civil Aviation Department makes corresponding arrangements for ATC and Communication (COM) facilities.
- The Regional Meteorological Centers concerned should liaise closely with the Regional Controller of Aerodromes and Regional Controller of Communication to find out if arrangements for providing ATC/COM facilities are being made and then arrange for provision of meteorological facilities accordingly.
- If no arrangements are made by Airport Authority of India (AAI), IMD also need not make any special arrangements.
- For reaching remote airfields, the AAI sometimes organize a service party consisting of ATC and communication officers. The DDGM (RMC) concerned may attach the IMD personnel to the service party for the sake of convenience.
- In case of inadequate notice, if it is not possible to make any arrangement for providing meteorological facilities to VIP/VVIP flights, no arrangements may be made for the same. In such cases the Collectors concerned may be informed about the weather conditions on telephone/fax or e-mail. Acknowledgement of them having received the message shall be obtained.
- If the VIP flight starts or terminates at an IAF air field, it is the responsibility of the Air H. Q. to provide all facilities including the meteorological services. IMD need to

provide necessary service only on request from Air H. Q. (Directorate of Meteorology) depending upon the communication facilities provided either by Air H.Q., or AAI.

Request to India Meteorological Department for rendering meteorological services in connection with VIP/VVIP flights at IAF aerodromes (with or without meteorological units) should come from Air H.Q. New Delhi. In special cases, request from local IAF authorities for provision of Meteorological facilities may be entertained; provided IAF agrees to place necessary facilities like transport, etc, at the disposal of the visiting IMD officials.

Helicopter flights, at stations where no meteorological offices exist, need not be covered unless AAI makes special arrangements for providing ATC/ COM facilities.

8.3 ACTION ON VIP/VVIP FLIGHT PROGRAMMES

8.3.1 Intimations

1. Intimations regarding VVIP/VIP flights are generally received from Air Headquarters, Director General of Civil Aviation, Ministry of External Affairs etc., by the meteorological office at Delhi (Palam) airport.

2. On receipt of intimation of a projected VIP/VVIP flight, AMO Delhi (Palam) should sent a copy of the same to the concerned MWO /DDGM (RMC) and CAMD by available fastest mode of communication.

3. Messages relating to VIP/VVIP movements in boarder areas should be exchanged by AMSS, or Landline. As a routine, an acknowledgement of the message shall be send by the in- charge of the receiving office to the originating office in all communications made with respect to VIP/ VVIP flights.

4. Clarifications, if any, required by receiving office may be addressed direct to AMO Delhi (Palam), who should consult with the authorities concerned and promptly issue the clarifications required.

5. Intimations regarding VIP/VVIP flights received at a Met. Office other than at New Delhi should be transmitted by that office to the concerned MWO/DDGM (RMCs) for necessary instructions. CAMD, AMO Delhi (Palam) and DGM may be kept informed.

8.3.2 Briefing of VVIP flights

1. At all aerodromes where a forecasting office is functioning, briefing for VVIP flights should be provided by the Meteorologist-in-charge or, in his absence on leave, tour etc., by the Senior-most officer at the station.

2. Forecasts for VVIP flights whether originating at the station where an Aerodrome Meteorological Office is located or elsewhere in the area of its jurisdiction should, invariably, be issued in consultation with the in-charge of the Aerodrome Meteorological Offices. The forecasts should be kept under constant review and amendments should be issued promptly as and when necessary.

3. Full details of what is told to the pilots of VVIP flights by the briefing officers at the time of briefing should be entered in the column 'Briefing Notes' of the briefing register

8.3.3 Arrangements to be made by the RMC

As soon as the intimation is received regarding the programme of VIP/VVIP flight, the RMCs should make the following arrangements:

1. The concerned MWO/AMO/AMS Met office should be alerted.

2. If there are no suitable meteorological staff available at the aerodrome of departure for a flight, a Group A officer or an experienced Assistant Meteorologist if a Group A officer cannot be spared, should be deputed for providing briefing and documentation, provided AAI makes the corresponding arrangements as envisaged in para 7.2. This officer should reach the station a day before the flight, if possible, for covering the same.

3. If there is an AMS at the aerodrome of departure, manned by Assistant Meteorologist possessing the requisite experience, briefing and documentation may be done by him. Every effort should be made to send a gazetted officer on tour, if time permits, to provide briefing and documentation for VIP flights, at an AMS manned by a Scientific Assistant.

4. Special efforts are to be made to obtain the latest METAR and TAF of the destination aerodrome and the designated alternate. If VVIP/VIP flight goes to a place where there is no meteorological office, a gazetted officer or an experienced Assistant Meteorologist may be sent on tour with portable instruments to provide the necessary Current Weather observations (Local Routine and Local special) required. The documentation and briefing may be provided, if, suitable communication facilities are available to receive the same from the associated AMO. The above arrangement may be done only if AAI authorities are making special arrangements for communication at the station concerned.

5. In the case of VVIP flights to unmanned aerodromes, ATC and communication facilities are normally provided. A gazetted officer /an experienced Assistant Meteorologist should be deputed to cover VVIP flights to such aerodromes.

6. At Intermediate halts, where Aerodrome Meteorological Offices exist, generally fresh briefing and documentation need be provided only if the halt at such places exceeds 45 minutes. For flights with the halts of shorter duration, through forecast from the departure aerodrome to the final aerodrome of landing should be provided with an outlook of weather from the destination aerodrome to a designated alternate.

7. At Intermediate halts without Aerodrome Meteorological Offices, fresh briefing and documentation need be provided only if the halt exceeds 3 hours at the station. In such cases, the required forecast should be sent to the concerned station sufficiently in time to enable it been decoded and documentation to be provided before the departure of the flight from the station.

8. Fresh briefing and documentation are to be provided at intermediate halts where there is no AMO even if the halt is less than three hours in the case of (I) VVIP flight, (II) in case where a number of aircraft are involved (e.g.: visits by Heads of Foreign Governments).

9. In all cases whether fresh briefing and documentation are provided or not, arrangements for current weather watch should be made to cover the arrival and departure of the flights and for the reception of Current Weather observations of the en-route stations, next halt and destination and alternates. These should be passed to the Captain of the aircraft.

10. Current Weather reports of IAF stations connected by AFTN or meteorological T/P channel may be obtained by these channels. TAFs of IAF stations having a forecasting office may be obtained on AFTN or T/P channel if available at the station. Otherwise, the TAFs may be originated by the Aerodrome Meteorological Office in whose area the IAF station is located.

8.3.4 Provision of facilities for VVIP Flight

All meteorological facilities provided for a scheduled flight should be provided for VIP/VVIP flights. The facilities provided are as follows:

1. An official going on tour to an aerodrome to provide meteorological facilities for VIP/VVIP flights should carry with him an altimeter, a portable wind vane and a portable anemometer and psychrometer, if no meteorological unit is available at the aerodrome.

2. On arrival at the aerodrome, the officer must familiarise himself with the topography in the vicinity of the aerodrome as quickly as possible. In case there is already a met unit at the place, he should arrange with the local met staff for the current weather observations required in connection with the flight. If there is no met unit, he should himself plan the method of taking non-instrumental observations, like, visibility, cloud height etc. He should contact AAI and if necessary, other local authorities, such as, Collector, Revenue or Police Officials etc., and make suitable arrangements for expeditious reception and dispatch of met messages and for necessary facilities.

3. The Met. Unit (already existing or the one temporarily set up for the purpose of the VIP/VVIP flight in question) serving the aerodrome of arrival should supply hourly/ half hourly METAR /SPECI messages, if any, to the aerodrome of departure commencing at least two hours before ETD, by all available departmental communication channels.

4. After take-off of the flight from the previous station, hourly or half hourly current weather messages should be supplied as necessary, to the local ATC till the plane arrives at the station. Just before landing, all operational meteorological information required for landing should be supplied.

5. All or part of these messages should be sent to the AMO who will issue the forecast for the flight.

6. All these messages should also be sent to the MWO concerned, when required.

7. After arrival of the plane, the pilot should be de-briefed if feasible. The de-briefing report may be immediately transmitted to the associated AMO as per prior instructions. Otherwise, the same may be submitted to the associated A.M.O along with other documents concerning the flight. If, however, the de-briefing report contains such vital information which in the opinion of the de-briefing officer is necessary to be immediately communicated to the associated AMO he should do so, even in the absence of such instructions.

8. Pre-flight planning information as is available at the station or obtaining the same expeditiously from the associated AMO concerned, should be supplied whenever required.

9. If there is an AMS at the aerodrome of departure, it is the responsibility of the AMS to decode the ROFOR and TAFs and other information received from the associated AMO and provide the necessary briefing and documentation. The efforts made to get the above reports should be entered in briefing register. The forms used for documentation should be the same as for scheduled flights.

10. Briefing should be done with the help of current weather reports and any analyses, inferences etc., received from the associated AMO.

11. Current weather reports along with other relevant information available, of destination and alternates will be passed on to ATC till the aircraft lands.

12. Soon after the conclusion of VVIP/VIP flight, the officer deputed should submit a report regarding the action taken by him and also indicate the shortcomings experienced by him. He should also indicate the type of discussions he had with the crew of VIP/VVIP flight or other authorities

8.3.5 Responsibility of Associated AMO

The associated AMO will send whenever necessary ROFORs/ TAFs and SIGMET to the office providing briefing and documentation by all communication channels available at its disposal so as to reach well in advance for rendering adequate met service. If such information is to be received from other offices the associated A.M.O. should arrange for the receipt for the required information by sending suitable requisitions. Arrangements for expeditious reception of C.W. observations of relevant stations should be made. The associated A.M.O should intimate in advance the concerned station of the arrangement.

8.3.6 Responsibility of MWO

Area meteorological watch will be maintained as usual in the FIR of jurisdiction. The M.W.O should ensure that SIGMET information of interest to the flight is passed to the aircraft through the appropriate A.T.C. channels.

8.3.7 Responsibility of RCs after the flight

On receipt of the report as envisaged in para above the DDGM (RMC) should satisfy himself that the officer concerned had rendered the meteorological facilities satisfactorily.

Any important points mentioned in the report such as, difficulties experienced by the officer, may be communicated to CAMD, who if necessary may bring to the notice of DGM with suitable remarks.

8.3.8 Retention of documents

1. Copies of documents supplied to VVIP/VIP flights should be collected at RMC/MWO and preserved for a period of 180 days as in the case of other documents.

2. These instructions do not apply to flights of VIPs by scheduled services. No special arrangement need be made for such flights.

3. If VIP/VVIP flight crew do not turn up either for collection of forecast or for briefing, entries may be made to that effect in the briefing register. Such instances may also be brought to the notice of CAMD New Delhi.

Chapter - 9

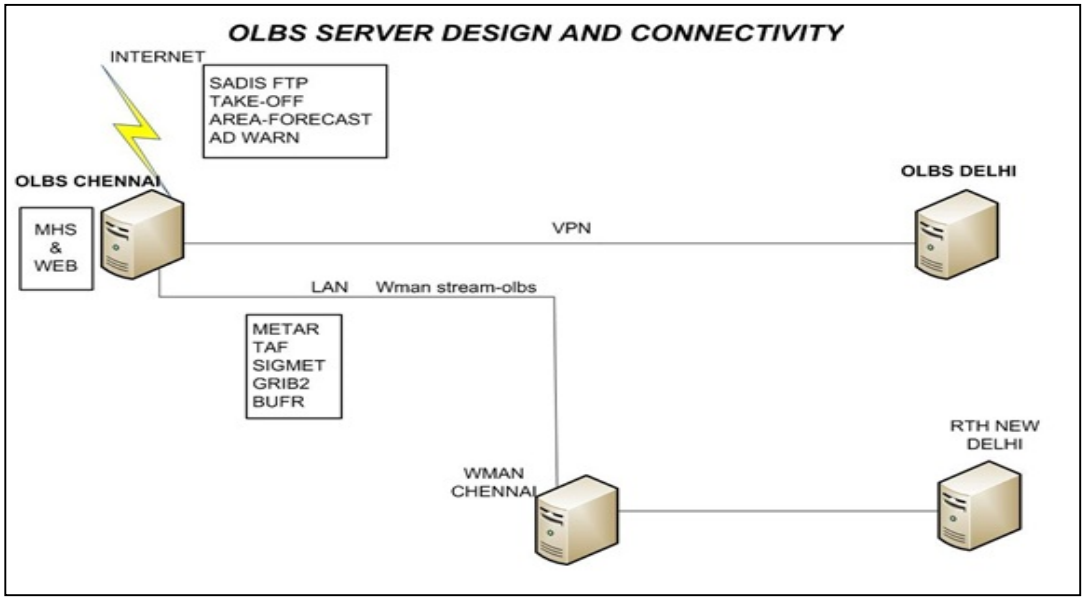
ONLINE BRIEFING SYSTEM (OLBS)

9.1 OLBS updating procedure and time schedule for update

Online Met Briefing System (OLBS) provides weather information to pilots, dispatchers and air traffic controllers to support flight safety and efficiency. It provides a crucial service to the national and international civil aviation sector in fulfilment of the requirements prescribed by the International Civil Aviation Organisation (ICAO) and the Director General of Civil Aviation of India (DGCA). Officers and staff make their best efforts to provide authentic and usable products by updating contents in the OLBS.

9.2 OLBS Server Design:

OLBS Server is a combination of a Message Handler and a Web Server. It is connected to the WMAN communication server through a GTS socket stream and handles messages. Hence it receives global aviation data and products through WMAN. The web-server provides web pages for online Met Briefing as well as data input pages to input METAR/TAF etc., by other Met Offices. All products are either automatically uploaded on receipt from WMAN or product generator upload using web-pages.



The products uploaded in OLBS can be classified as 1. Scheduled products, which are to be uploaded and made available always and 2. Non-scheduled products are uploaded as and when the products are generated by the issuing offices. All timings are in UTC.

1. **Scheduled Products:** These products are uploaded at fixed timings as per the observation schedule or issue schedule.

i. METAR,

ii. Take-off Data,

iii. TAF,

iv. Area Forecast,

v. WAFC Wind/Temp,

vi. IMD Wind Temp Charts,

vii. WAFC SigWx Charts,

viii. IMD SigWx Charts,

ix. Radar Pictures,

x. SAT images,

xi. IWB,

xii. Regional Inferences and

xiii. IONASAC Bulletins are the Scheduled Products. Availability of these products are to be monitored at regular intervals.

i. METAR:

Originator: AMS and AMOs

Time of Issue: HH00, HH30

Mode of collection and upload: At HH03, HH33 by WMAN and OLBS MHS

Tools to Check National METARs: OLBS → Observations→METAR

Action for missing product:

a) Collect from the Originator

b) Retrieve from VABBYZYX

International METARs: Retrieve from

REGIONAL OPMET DATA BANKS RJTDYZYX, VTBBYZYX, YBBBYZYX, NFFNYZYX, WSSSYZYX

ii. Take-off Data:

Originator: AMO

Time of Issue: 0030, 0330, 0630, 0930, 1230, 1530, 1830

Mode of collection and upload: OLBS MHS

Tools to Check: OLBS → Observations→Forecasts→Take-off

Action for missing product: Collect from the Originator

iii. TAF:

Originator: AMO

Time of Issue: a. Short TAF – 0200, 0500,0800,1100,1400,1700,2000,2300

b. Log TAF – 0500, 1100, 1700, 2300

Mode of collection and upload: WMAN, OLBS MHS and OLBS Web Form

Tools to Check National TAFs: OLBS → forecasts→Long TAF/Short TAF:

Action for missing product:

a) Collect from the Originator

b) Retrieve from VABBYZYX

International TAFs: Retrieve from

REGIONAL OPMET DATA BANKS RJTDYZYX, VTBBYZYX, YBBBYZYX, NFFNYZYX, WSSSYZYX

iv. Area Forecast:

Originator: AMO

Time of Issue: 0530, 1330 and 2130

Mode of collection and upload: OLBS Web Form

Tools to Check: OLBS → forecasts→Area Forecast

Action for missing product: Inform the Originator

v. WAFC Wind Temp Charts:

Originator: EGRR WAFC London

Time of Download of GRIB2: Based on 00 → 0401, 06 → 1001, 12 → 1601, 18→2201

Mode of collection: SADIS FTP

Tools to Check: MHS DATA MONITORING

Action for missing product:

a) Check WAFC Notices

b) Run the FTP script manually

c) In case WAFC London EGRR GRIB2 non-availability, fetch GRIB2 from WAFC KWBC

Time of Chart Generation: 0430,1030,1630,2230

Mode of Preparation: OLBS Chart Generation Software

Tools to Check: MHS DATA MONITORING

Action for missing product:

a) Check WAFC Notices

b) Run the chart generation script manually

vi. IMD Wind Temp Charts:

Originator: NWP, New Delhi

Time of Download: Based on 00 → 0712, 06 → 1312, 12 → 1912, 18→0112

Mode of collection and upload: FTP

Tools to Check: MHS DATA MONITORING

Action for missing product: Run the FTP script manually

vii. WAFC SIGWX Charts:

Originator: EGRR WAFC London

Time of Download of BUFR: Based on 00 → 0901, 06 → 1501, 12 → 2101, 18→0301

Mode of collection: SADIS FTP

Tools to Check: MHS DATA MONITORING

Action for missing product:

a) Check WAFC Notices

b) Run the FTP script manually

c) In case WAFC London EGRR BUFR non-availability, fetch from WAFC KWBC

Time of Chart Generation: 0910,1510,2110,0310

Mode of Preparation: OLBS Chart Generation Software

Tools to Check: MHS DATA MONITORING

Action for missing product:

a) Check WAFC Notices

b) Run the chart generation script manually

viii. IMD SIGWX Charts:

Originator: MWO Chennai

Time of Issue: Based on 00 → 0901, 06 → 1501, 12 → 2101, 18→0301

Mode of collection and upload: FTP from DO PC to OLBS

Tools to Check: MHS DATA MONITORING

Action for missing product: Run the FTP script manually

ix. Radar Pictures:

Originator: DWR Stations

Time Of Issue: Every 10 minutes

Mode of collection and upload: FTP

Tools to Check: MHS DATA MONITORING

Action for missing product: Contact concerned DWR

x. SAT Images:

Originator: SAT Met, New Delhi

Time of Issue: Every 30 Mts

Mode of collection and upload: FTP

Tools to Check: MHS DATA MONITORING

Action for missing product: SAT Met, New Delhi

xi. IWB:

Originator: IMD, Pune

Time of Issue: Based on 0300UTC and 1200UTC

Mode of collection and upload: WMCC (AMSS) through RTH New Delhi

Tools to Check: Online

Action for missing product: RTH New Delhi

xii. Regional Inferences:

Originator: RMC

Time of Issue: Based on 0300Utc and 1200UTC

Mode of collection and upload: WMCC (AMSS)

Tools to Check: Online

Action for missing product: Contact respective RMCs

xiii. IONOSAC Bulletins:

Originator: IONOSAC Section, IMD, Pune

Time of Issue Based on 0000UTC and 1200UTC

Mode of collection and upload: WMCC (AMSS)

Tools to Check: Online

Action for missing product: contact IONOSAC Section, IMD, Pune

2. Non-Scheduled Products: These products are generated by Offices whenever certain weather phenomena occur in the area concerned. They are i. Aerodrome Warning, ii. SIGMET iii. Tropical Cyclone Advisories.

i. Aerodrome Warning:

Originator: AMO

Mode of collection and upload: OLBS WEB form

Tools to Check: OLBS → forecasts→Aerodrome Warning

Action for missing product: Contact the concerned AMO

ii. SIGMET:

Originator: MWO

Mode of collection and upload: WMAN

Tools to Check: OLBS → forecasts→SIGMET

Action for missing product: Resubmit at WMAN

iii. Tropical Cyclone Advisories:

Originator: TCAC, New Delhi

Mode of collection and upload: Received through Email and uploaded using Graphical Tropical Cyclone Advisory

Tools to Check: OLBS → Forecasts→ Graphical Tropical Cyclone Advisory

Action for missing product: Repeat Upload procedure.

Action on Messages from Users Requesting products:

Users are provided with a facility to send messages through OLBS whenever a required real time product is not available in the web-site. OLBS staff shall monitor such messages and update the requested product.

OLBS Product Schedules:

Short TAF Schedule:

Validity	Issue Time/Upload Time
00-09	2300
03-12	0200
06-15	0500
09-18	0800
12-21	1100
15-24	1400
18-03	1700
21-06	2000

Long TAF Schedule:

Validity	Issue Time/Upload Time
00-06	2300
06-12	0500
12-18	1100
18-24	1700

Take-Off Data Schedule:

Validity	Issue Time/Upload Time
0100-0600	0030
0400-0900	0330
0700-1200	0630
1000-1500	0930

1300-1800	1230
1600-2100	1530
1900-2400	1830

Area forecast Schedule:

Validity	Issue Time/Upload Time
0600-1400	0530
1400-2200	1330
2200-0600	2130

WAFC GRIB2 download Schedule:

Data time	Download beginning Time
0000	0401 *
0600	1001*
1200	1601*
1800	2201*

(*Download begins 0401 hrs from the time of observation) WAFC W/T Charts

Generation Schedule:

Data time	Generation Time/Upload Time
0000	0430
0600	1030
1200	1630
1800	2230

WAFC BUFR Download Schedule

Data time	Download Time
0000	0901*
0600	1501 *
1200	2101 *
1800	0301 *

(* Download begins 0901 hrs from the time of observation)

WAFC SIGWX CHART Generation Schedule:

Data time	Chart Generation Time/Upload Time
0000	0910
0600	1510
1200	2110
1800	0310

IMD W/T Carts Schedule:

Validity	Upload Time
Data time 0000	0712
Data time 0600	1312
Data time 1200	1912
Data time 1800	0112

IMD SIGWX Charts Schedule:

Based on	Issue Time/Upload Time
0000	0900
0600	1500
1200	2100
1800	0300

9.3 REGISTRATION PROCEDURE TO OLBS FOR STAKEHOLDERS

Online Met Briefing System (OLBS) is a web-based pre-flight information briefing system provided by India Meteorological Department for flights originating from airports in India. The system is operational since 1st December 2012 with servers in Chennai and Delhi. As per DGCA Regulations, only authorized Pilots/Flight Dispatchers can avail Met. Briefing. Users are required to register themselves online in OLBS for availing the services. There are around 1400 registered users. The users can be classified as i. IMD Offices ii. DGCA and iii. Flight Operators.

Registration of IMD Offices and DGCA:

IMD Offices require access to OLBS to provide Met briefing for Non-scheduled flights and VIP/VVIP flights. DGCA requires access to OLBS as a regulatory body in the field of Civil Aviation. OLBS system administrator shall submit the details of the IMD Offices and DGCA and the system generates. The username and password shall be informed to the corresponding offices by email.

Procedure for registration of Flight Operators is given below:

Information about OLBS: The airlines get the information about OLBS through Met Offices in the airports or through IMD Website. URL for Registration: https://olbs.amsschennai.gov.in for Chennai site and https://olbs.amssdelhi.gov.in for Delhi site.

Formation of Club: (Club administrator):

Airlines with many Pilots and Flight Despatchers are registered as a ‘Club’. For each registered club an administrator is designated in consultation with the Head of the Airlines. The OLBS admin collects the required information and creates Clubs. It is the responsibility of the Club administrator to check the genuineness of the users under the club.

Registration shall be initiated by the applicants by clicking the link ‘Click here to register’ or the button ‘Register’ found in the web page. The applicant is navigated to a page containing FAQ and terms and conditions. On clicking the button ‘continue’ found at the bottom of this page, the online registration form appears.

The following details are to be furnished by the applicant in the registration form:

Email address

Requested username

Full name(s)

Telephone number

Physical address

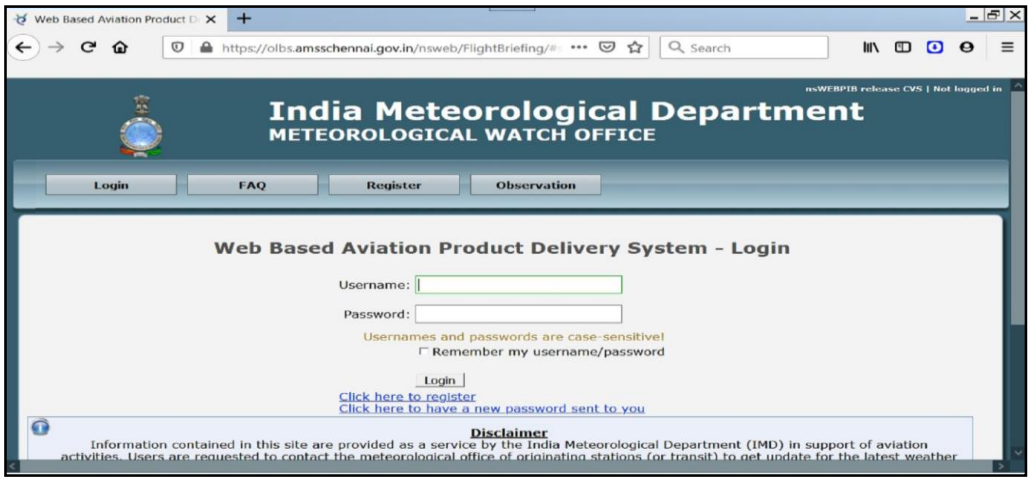
Company/Organization

Motivation and Pilot License No. / DGCA Flight Dispatcher No

FD/CPL/ATPL Number

FD/CPL/ATPL Expiry Date

Airline Operator (Drop down menu to select the name of the club or none)



The applicant belonging to a registered club shall select the name of the appropriate club under item No.10. Airline Operator else select 'None'. The applicant shall submit the details by clicking the button 'Register' found at the bottom of the form page.

OLBS Automated Response:

1. The system validates the details and originates verification emails to the applicant to his email ID and to the club administrator, if the applicant belongs to a registered club.
2. The system displays the details of the application in the User Management Page under Pending Activation.

Expected Response from the applicant and club administrator:

1. The applicant shall click the activation link received from the OLBS system.
2. The club administrator shall either approve or disapprove the applicant through the email sent by OLBS.

Authorization Procedure:

The OLBS admin shall regularly check the User Management Page for requests pending for approval and process the requests.

Applicants belonging to a Club:

'Approve' if the approval from the club admin approval is 'YES' and the applicant verification is "YES".

The System sends an email to the applicant informing the username/password. The password can be changed by the user at any time after registration.

'Reject' the application if the club administrator approval is 'NO'.

Keep pending and generate email reminders to the parties until a response is received.

Applicants not belonging to a Club:

1. The OLBS admin shall check the details provided by the applicant and the entry under club is N/A.
2. Shall check whether the applicant has verified the system sent email. If 'No' generate an email reminder to verify the system sent email.
3. If the applicant's verification is 'YES', request further details to be furnished through the official email ID of the OLBS station.
4. Instruct the applicant to send to the OLBS station official email ID
5. Scanned copy of the valid license

Flight levels of operation

Frequency of operation

Authorization letter from the Company CEO.

Shall 'Approve' if the flight level of operation is Medium/High altitude and the other documents are found valid and genuine.

The System sends an email to the applicant informing the username/password. The password can be changed by the user at any time after registration.

Shall 'Reject' if the flight level of operation is Low altitude and originate an email informing rejection with the reason.

Shall 'Reject' if the applicant's license is not valid and the request is not genuine and originate an email informing rejection with the reason.

The system removes the entries of applicant from the User Management Page on 'Approval' or 'Rejection'. The system also posts a message to OLBS administrator.

Replication of Registration: Once an user is approved and registered in one of the OLBS viz Chennai or Delhi relevant entries are made in the other OLBS enabling the user access both the systems with the same username/password.

Blocking A Registered User: In the event of a registered user misuse/exploit the access to the OLBS the login shall be blocked and the user shall be informed. The registration shall be cancelled on receipt of information regarding termination/resignation of a registered operator from the company.

Chapter - 10

OPERATIONAL MESSAGES

10.1 INTRODUCTION

India Meteorological Department caters to the needs of Aviation Services through a network of 4 Meteorological Watch Offices (MWOs – Kolkata, Delhi, Chennai and Mumbai), 18 Aerodrome Meteorological Offices (including 4 MWOs) and 54 Aeronautical meteorological stations (AMS). The operational messages managed by all the offices and stations are given below:

Type of offices	Operational Messages Disseminated	WMO Heading TTAAiiCCCC for National Transmission
MWOs	METAR SPECI Long TAF Short TAF WS SIGMET VA SIGMET TC SIGMET	SAIN90 CCCC SPIN90 CCCC FTIN90 CCCC FCIN90 CCCC WSIN31 CCCC WVIN31 CCCC WCIN31 CCCC
AMOs	METAR SPECI Long TAF Short TAF	SAIN90 CCCC SPIN90 CCCC FTIN90 CCCC FCIN90 CCCC
AMSs	METAR SPECI	SAIN90 CCCC SPIN90 CCCC

Except the above mentioned operational messages there are also some other operational messages managed by different Met offices which is discussed below.

10.2 EXAMPLES OF OPERATIONAL MESSAGES

METAR

METAR VECC 032100Z 28003KT 4000 HZ SCT020 BKN100 25/23 Q1008 TEMPO 3000 HZ

MET REPORT VECC 032110Z WIND 280/3KT VIS 4000M HZ CLD SCT 2000FT (600M) BKN 10000FT (3000M) T25 DP23 QNH 1008HPA TREND TEMPO VIS 3000MHZ

Meaning:

Local routine weather report for Kolkata airport issued on 3rd of the month at 2100 UTC, surface wind direction 280 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 (3000 metres), air temperature 25℃ , dew point temperature 23℃, QNH 1008 hPa, Trend during next 2 hours is temporary reduction of visibility to 3000 metres in Haze.

SPECI (For reduction invisibility)

SPECI VECC 032216Z 00000KT 3000 HZ SCT020 BKN100 24/23 Q1007 TEMPO 2000 BR

SPECIAL VECC 032216Z WIND CALM VIS 3000M HZ CLD SCT 2000FT (600M) BKN 10000FT (3000M) T24 DP23 QNH 1007HPA TREND TEMPO VIS 2000M BR

Meaning:

Local special weather report for Kolkata airport issued on 3rd of the month at 2216 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 24℃, dew point temperature 23℃, QNH 1007 hPa, Trend during next 2 hours is visibility reducing to 2000 metres for a period of less than one hour in Mist.

ADDITIONAL (For reduction of visibility to 2000m)

Coded form not given as ADDITIONAL is meant for local use only.

ADDITIONAL VECC 032314Z WIND CALM VIS 2000M BR CLD SCT 2000FT (600M) BKN 10000FT (3000M) T23 DP23 QNH 1008HPA TREND NOSIG

Meaning:

Local additional weather report for Kolkata airport issued on 3rd of the month at 2314 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℃, dew point temperature 23℃, QNH 1008 hPa, Trend during next 2 hours is no significant change.

TAF (LONG TAF)

TAF VECC 041100Z 0412/0518 15006KT 3000 HZ SCT018 BKN 100 BECMG 0418/0420 00000KT 2200 –RA BR BECMG 0500/0502 1000 BR FEW020 SCT100 BECMG 0503/00505 11005KT 2200 HZ BECMG 0506/0508 17007KT 3200 HZ SCT018 SCT100 TEMPO 0512/0514 2000 TSRA SCT015 FEW025CB OVC090

Meaning:

Terminal Aerodrome Forecast issued by Kolkata airport on 4th day of the month at 1100 UTC with validity period of 30 hours ranging from 1200 UTC of that day to 1800 UTC of the next day. The general forecasting consist of surface wind direction 150 degree and surface wind speed 06 knots, visibility 3000 metres in present weather Haze, scattered clouds at 1800 feet (540 metres) and broken clouds at 10000 feet (3000 metres).

It is expected that the surface wind will gradually become calm within the period 1800 UTC and 2000 UTC; similarly visibility will likely to reduce to 2200 metres either in light rain or in Mist within that period.

It is expected that the visibility will likely to reduce to 1000 metres in Mist within the period 0000 UTC and 0200 UTC of the next day; few clouds at 2000 feet (600 metres) and scattered clouds at 10000 feet (3000 metres).

It is expected that the surface wind direction will 110 degree and surface wind speed will 05 knots within the period 0300 UTC and 0500 UTC of the next day; visibility will likely to increase to 2200 metres in Haze within that period.

It is expected that the surface wind direction will 170 degree and surface wind speed will 07 knots within the period 0600 UTC and 0800 UTC of the next day; visibility will likely to increase to 3200 metres in Haze within that period; scattered clouds at 1800 feet (540 metres) and scattered clouds at 10000 feet (3000 metres).

It is expected that the visibility will temporarily reduce to 2000 metres in present weather thunderstorm within the period 1200 UTC and 1400 UTC; scattered clouds at 1500 feet (450 metres), few cumulonimbus clouds at 2500 feet (750 metres), overcast clouds at 9000 feet (2700 metres).

TAF (SHORT TAF)

TAF VECC 041100Z 0412/0421 15006KT 3000 HZ SCT018 BKN 100 BECMG 0418/0420 00000KT 2200 –RA BR

Meaning:

Terminal Aerodrome Forecast issued by Kolkata airport on 4th day of the month at 1100 UTC with validity period of 9 hours ranging from 1200 UTC to 2100 UTC. The general forecasting consist of surface wind direction 150 degree and surface wind speed 06 knots, visibility 3000 metres in present weather Haze, scattered clouds at 1800 feet (540 metres) and broken clouds at 10000 feet (3000 metres).

It is expected that the surface wind will gradually become calm within the period 1800 UTC and 2000 UTC; similarly visibility will likely to reduce to 2200 metres either in Light Rain or in Mist within that period.

AERODROME WARNING

VECC 201200Z AD WRNG 3 VALID 201320/201520 SFC WSPD 40KT MAX 60KT FROM 050 DEG TSRA FCST NC=

Meaning:

Aerodrome warning number 3issued by Kolkata airport at 1200 UTC on 20th day of the month with validity period of 2 hours from 1320 UTC to 1520 UTC. It is forecasted that the surface wind speed will reach 40 knots gusting to 60 knots from 50 degree in Thunderstorm. No change of intensity is expected.

LIGHT AIRCRAFT WARNING

VECC 250600Z LIGHT AIRCRAFT WRNG 2 VALID 250630/250930 SFC WDSPD 17KT MAX 27 KT FROM 190 DEG FCST NC=

Meaning:

Light Aircraft warning number 2issued by Kolkata airport at 0600 UTC on 25th day of the month with validity period of 3 hours from 0630 UTC to 0930 UTC. It is forecasted that the surface wind speed will reach 17 knots gusting to 27 knots from 190 degree. No change of intensity is expected.

OUTLOOK (LOW VISIBILITY PROCEDURE)

OUTLOOK FOR LOW VISIBILITY PROCEDURE
India Meteorological Department

Reference Paragraph 11b of Page 24 of AIP India Supplement 32/2007

To be issued only when,
(1) RVR of Operating Runway is less than 1200 m and visibility/RVR is forecasted to deteriorate to 800 m or less and/or cloud ceiling is 400 ft and is forecasted to fall to 200 ft or less;
(2) Both Transmissometer (TDZ and MID) of Operating Runway are serviceable.

Date: *05/12/2019* Time of Origin: *0115* UTC

Visibility: *1000* m

RVR Runway *01R*: TDZ: *1100* m
MID: *1000* m
RVR Runway *19L*: TDZ: *1100* m
MID: *1000* m

Cloud Ceiling:

Trend: *BECMG 0800 MIFG*

Any other pertinent information:-

To (1) WSO:
(2) D.O. Tower:

Signature of D.O.Met (with date and time)

Meaning:

Outlook for low visibility is issued by Kolkata airport at 0115 UTC on 05th December, 2019 as visibility reduces to 1000 metres. RVR of runway 01R touchdown zone is 1100 metres; RVR of runway 01R mid is 1000 metres. RVR of runway 19L touchdown zone is 1100 metres; RVR of runway 19L mid is 1000 metres. It is expected that the visibility will likely reduce to 800 metres in Mist Fog.

ADVISORY (LOW VISIBILITY PROCEDURE)

ADVISORY MESSAGE
India Meteorological Department

Reference Paragraph 11b of Page 24 of AIP India Supplement 32/2007

To be issued only when,
(1) RVR of operating runway is likely to fall below 800 m and/or cloud ceiling is likely to fall to 200 ft or less within next two hours;
(2) Both Transmissometer (TDZ and MID) of operating runway are serviceable.

Date: *05/12/2019* Time of Origin: *0118* UTC

Visibility: *0900* m

RVR Runway *01R*: TDZ: *1000* m
MID: *1000* m
RVR Runway *19L*: TDZ: *1000* m
MID: *1000* m
Cloud Ceiling:

Trend: *BECMG 0700 MIFG*

Any other pertinent information:-

To (1) WSO:
(2) D.O. Tower:

Signature of D.O.Met (with date and time)

Meaning:

Advisory for low visibility is issued by Kolkata airport at 0118 UTC on 05th December, 2019 as RVR is expected to fall below 800 metres. RVR of runway 01R touchdown zone is 1000 metres; RVR of runway 01R mid is 1000 metres. RVR of runway 19L touchdown zone is 1000 metres; RVR of runway 19L mid is 1000 metres. It is expected that the visibility will likely reduce to 700 metres in Mist Fog.

TC ADVISORY

TC ADVISORY
TCAC: NEW DELHI
DTG: 20200518/1200Z
TC: AMPHAN
NR: 11
PSN: N1400 E08618
MOV: N12KT
C: 930HPA
MAX WIND: 120KT
FCST PSN+06HR: 18/1800Z N1512 E08630
FCST MAX WIND +6HRS: 125 KT
FCST PSN+12HR: 19/0000Z N1554 E08642
FCST MAX WIND +12HRS: 125 KT
FCST PSN+18HR: 19/0600Z N1706 E08700
FCST MAX WIND +18HRS: 125 KT
FCST PSN+24HR: 19/1200Z N1742 E08712
FCST MAX WIND +24HRS: 120 KT
RMK: NIL
NXT MSG: 20200518/2100Z
TOO: 182030HRS IST

Meaning:

Tropical cyclone advisory number 11 for tropical cyclone AMPHAN issued at 1200 UTC on 18 th May, 2020 by TCAC New Delhi. Position of the centre of the tropical cyclone is 14°00´´ north, 86°18´´ east. Direction and speed of movement are Northwards and 12 knots respectively. Central pressure is 930 hPa. Max surface wind near the centre is 120 knots. Forecasted position of the centre of tropical cyclone after 6 hours (1800 UTC) is 15°12´´ North, 86°30´´ East with max surface wind speed 125 knots. Forecasted position of the centre of tropical cyclone after 12 hours (0000 UTC of 19 th May, 2020) is 15°54´´ North, 86°42´´ East with max surface wind speed 125 knots. Forecasted position of the centre of tropical cyclone after 18 hours (0600 UTC of 19 th May, 2020) is 17°06´´ North, 87°00´´ East with max surface wind speed 125 knots. Forecasted position of the centre of tropical cyclone after 24 hours (1200 UTC of 19 th May, 2020) is 17°42´´ North, 87°12´´ East with max surface wind speed 120 knots. Next advisory message will be issued on 2100 UTC of 18 th May, 2020.

TC SIGMET

VECF SIGMET 1 VALID 190600/191200 VECC – VECF KOLKATA FIR TC AMPHAN OBS AT 0000Z N1536 E08642 CB TOP FL 520 WI 200 NM OF CENTRE MOV NNE 12KT NC FCST 1200Z TC CENTRE N1724 E08706

Meaning:

SIGMET 1 valid from 190600 UTC to 191200 UTC issued by MWO Kolkata for Kolkata FIR for Tropical Cyclone AMPHAN observed at 15º36´´ North and 86 º42´´East, CB top at flight level 52000 feet within 200 nautical mile of centre movement NNE, expected no change of intensity, forecasted at 1200Z TC centre will be at 17º24´´ North and 87º06´´ East.

Chapter-11

WORLD AREA FORECAST SYSTEM

11.1 INTRODUCTION

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.

11.2 WORLD AREA FORECAST CENTRES (WAFC)

Responsibilities of WAFC:

a. To prepare gridded global forecast 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 Centre (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.

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, as but not later than 6 hours after standard time of observation.

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

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

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

3) Note3: The products from e to h are issued on a trial basis and are available through FTP service.

i) 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).

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 forecasts are prepared in a regular grid with a horizontal resolution of 1.25° of latitude and longitude.

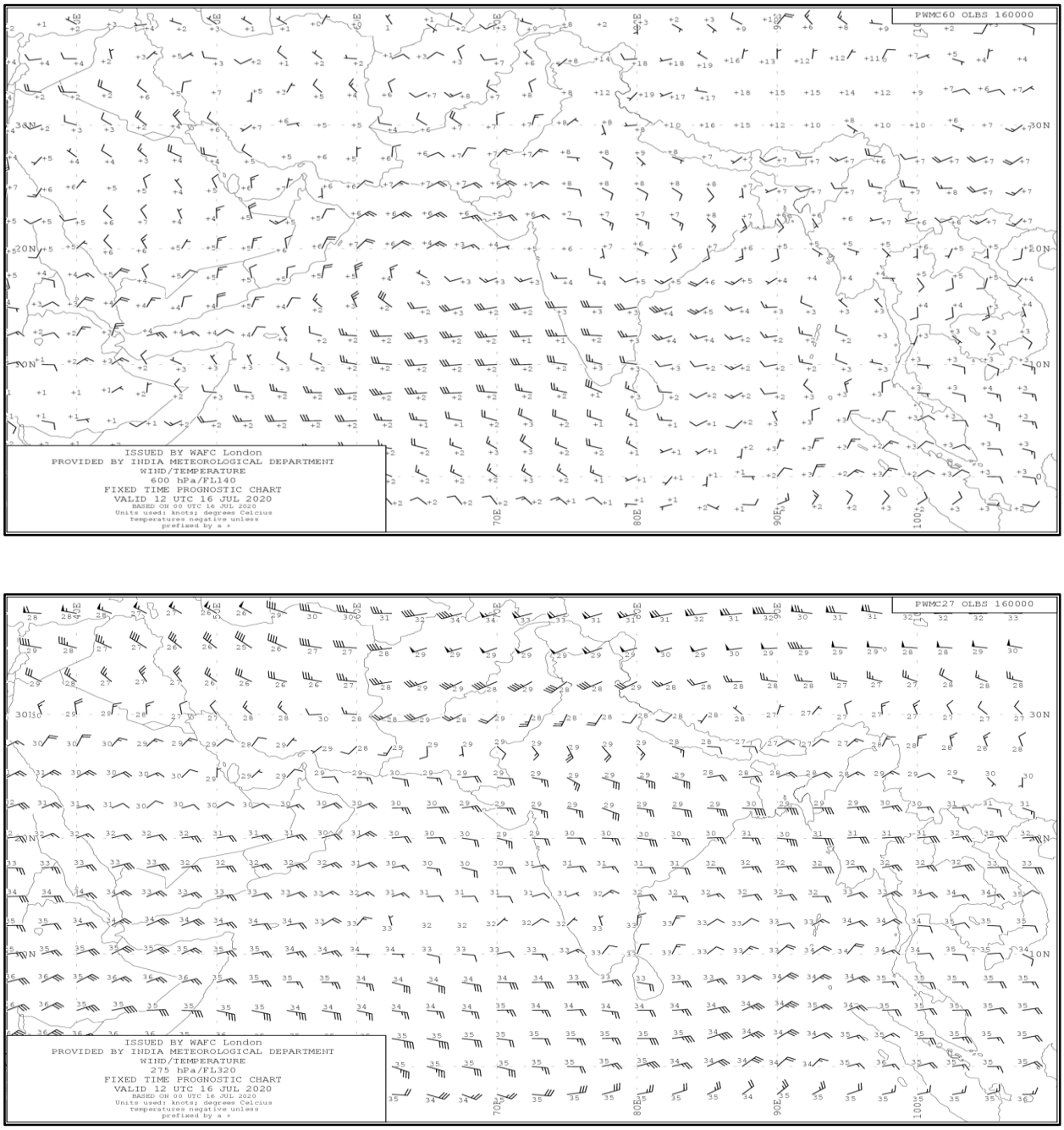


Fig: WAFC Wind/ Temp Charts at FL 140 and FL320

11.3 SIGNIFICANT WEATHER (SIGWX) FORECASTS

General provisions

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, as but not later than 9 hours after standard time of observation.

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

Types of SIGWX forecasts

SIGWX forecasts are being issued as:

i) High- level forecasts for flight levels between 250 and 630; and

ii) Medium-level forecasts for flight levels between 100 and 250.

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; severe squall lines;

b. Moderate or severe turbulence (in cloud or clear air);

c. Moderate or severe icing;

d. Widespread sand storm / duststorm;

e. 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

f. Flight level of tropopause;

g. Jet streams;

h. 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

i. 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.

Criteria for including items in WAFC SIGWX forecasts:

The following criteria are applied for SIGWX forecasts:

a. 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% 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.

b. 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;

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

d. 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], the highest priority is given to volcanic eruptions, followed by release of radioactive materials and by tropical cyclones. The item with the highest priority is placed at the location of the event, and an arrow is used to link the location of the other item(s) to its associated symbol or textbox.

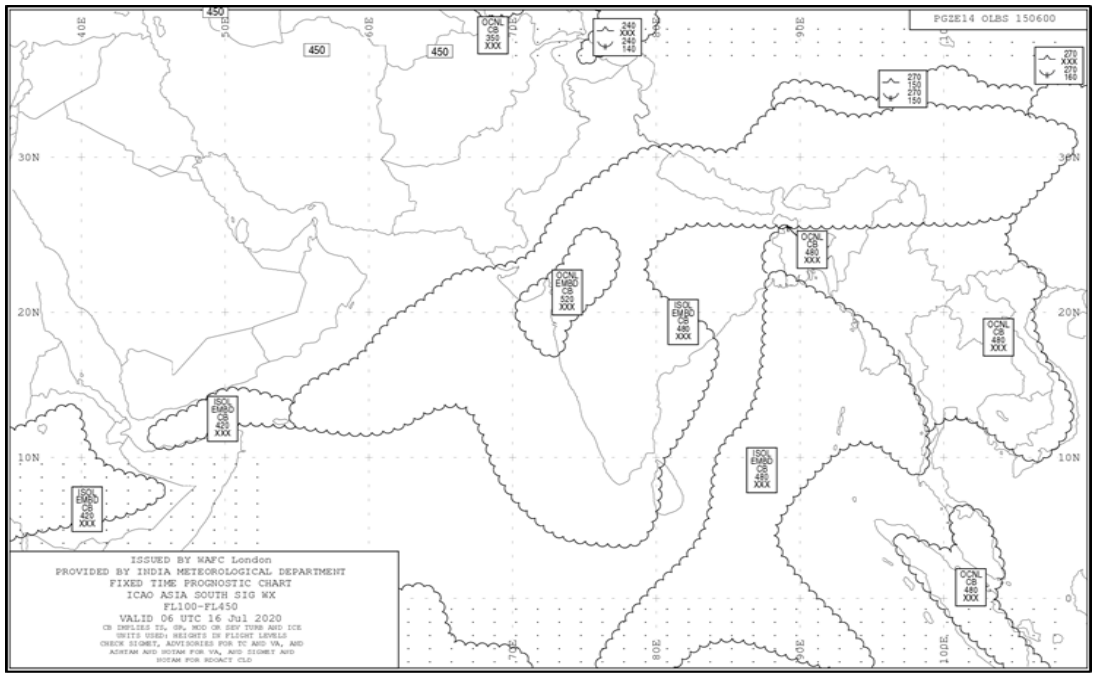


Fig: SIG WX Chart (FL 100 – FL 450)

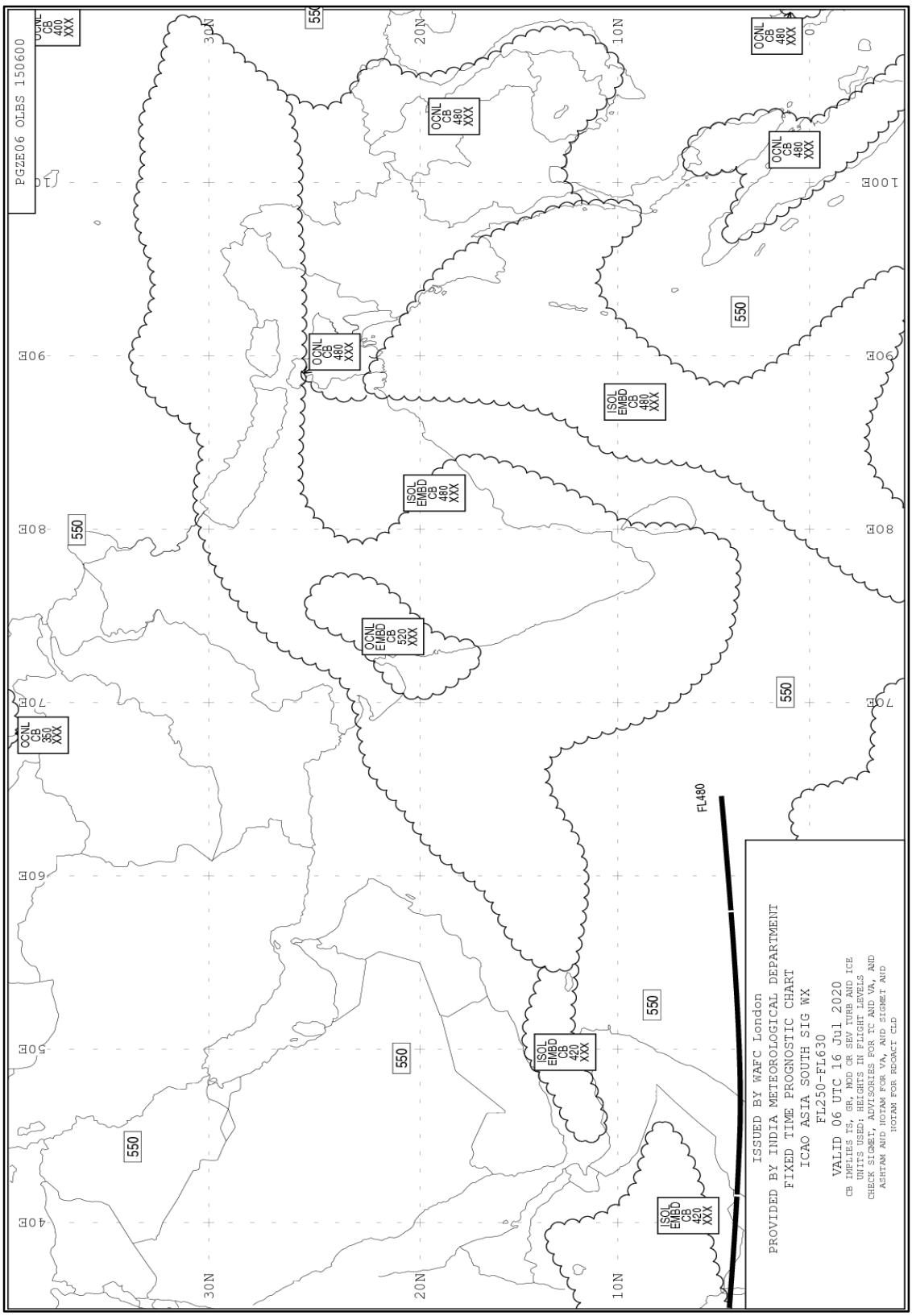


Fig: SIGWX Chart (FL 250 – FL 630)

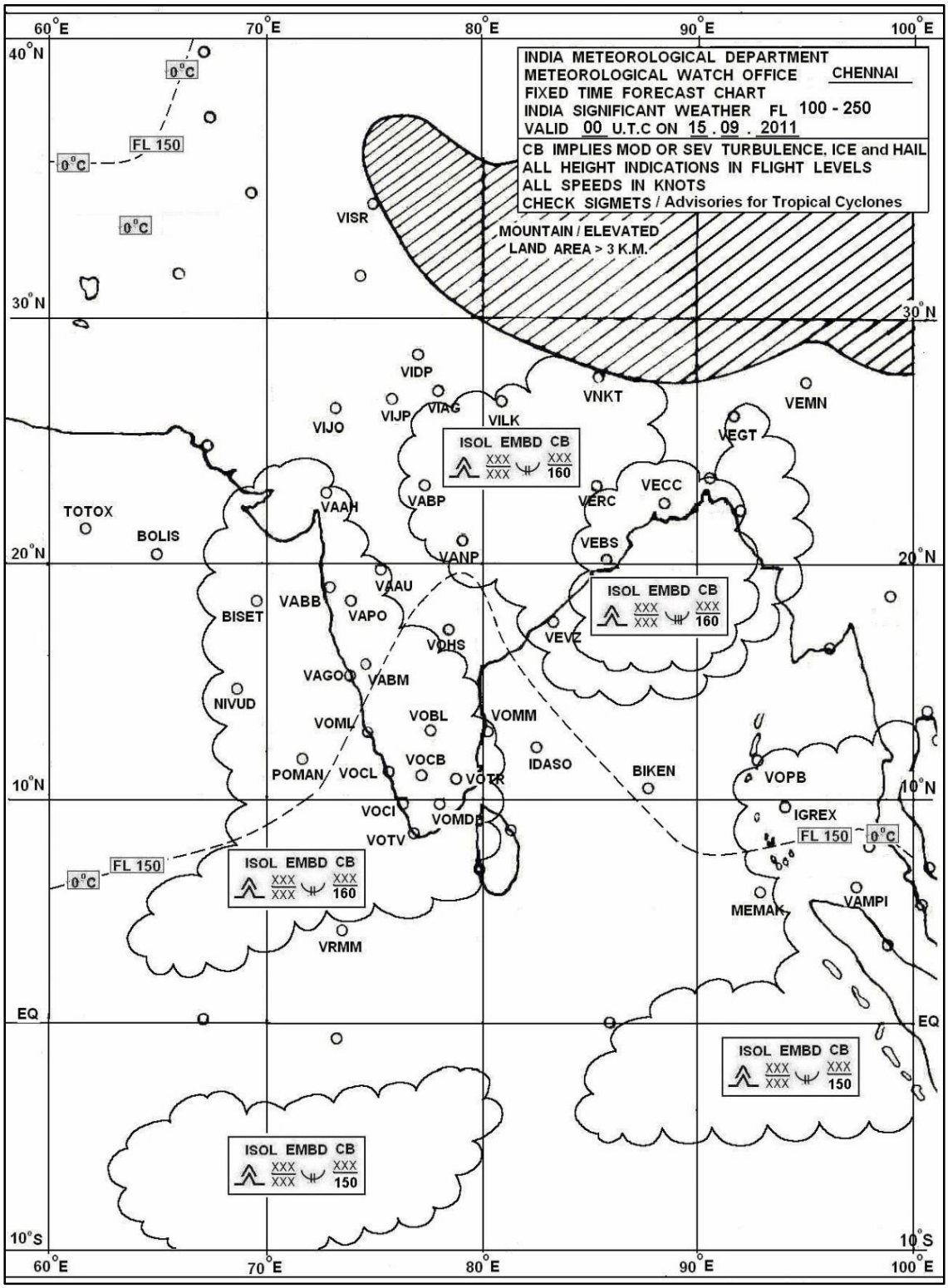


Fig: NATIONAL SIGWX Chart- MIDDLE LEVEL

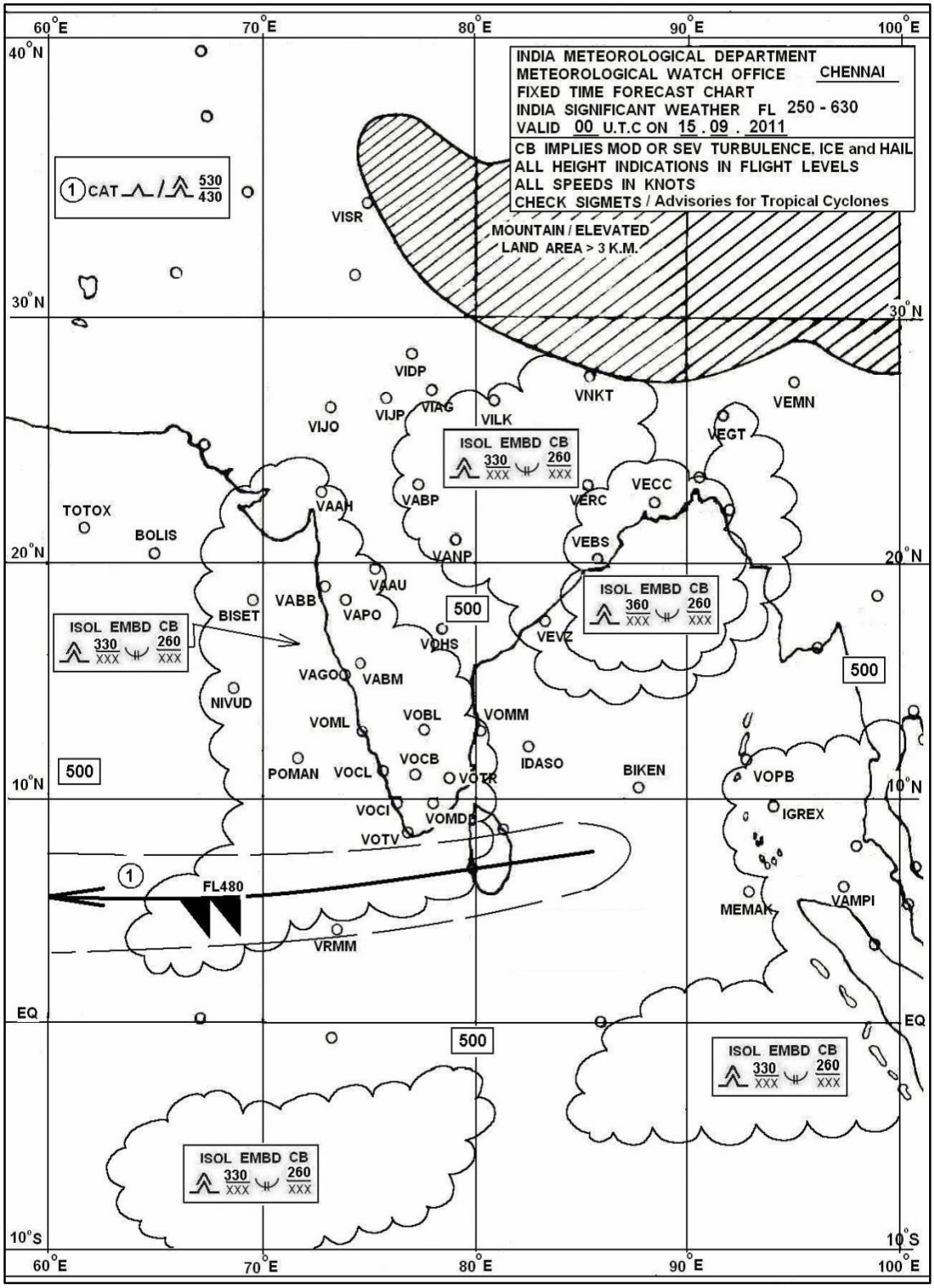
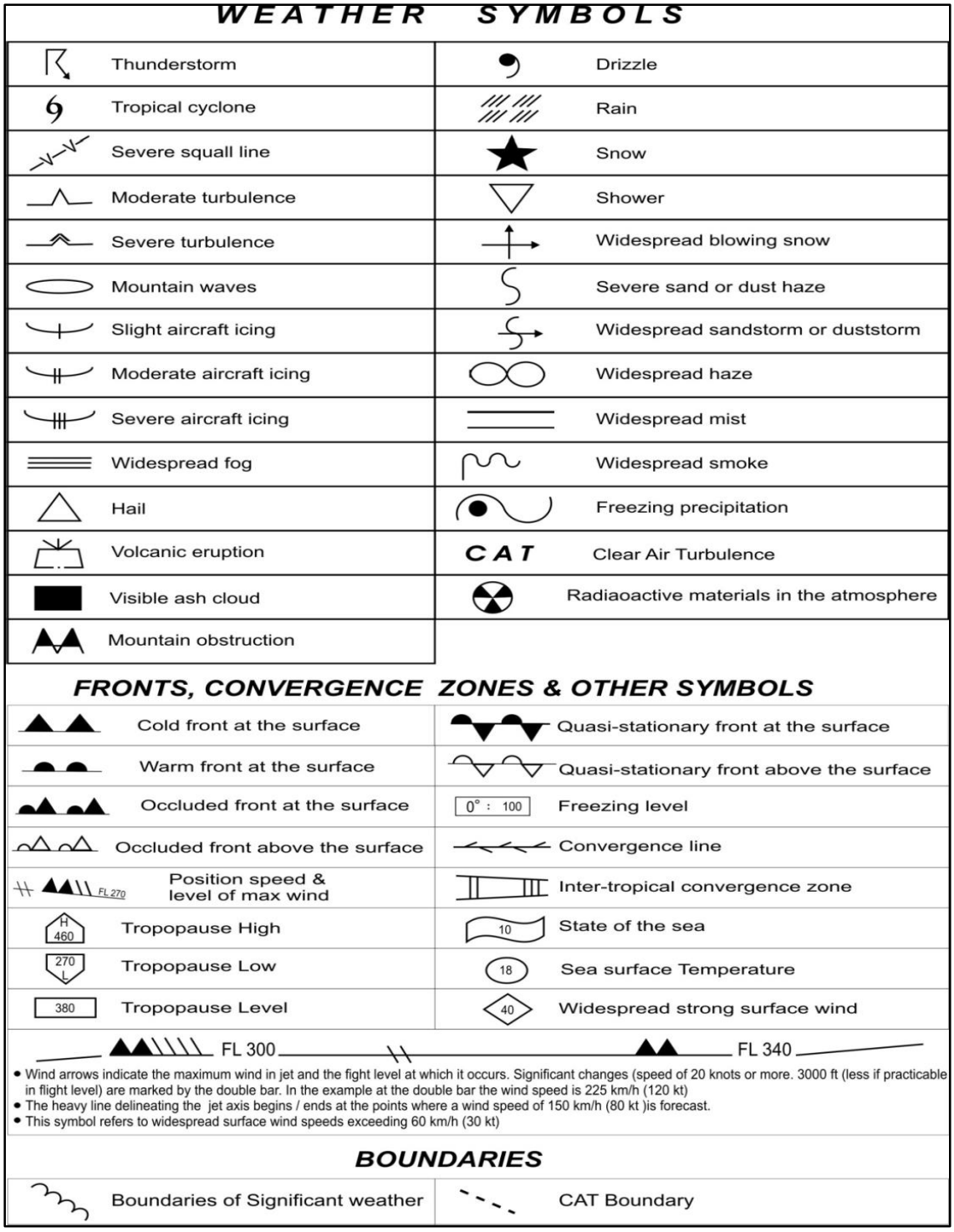


Fig: NATIONAL SIGWX Chart- HIGH LEVEL

Weather Symbol:



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.

Abbreviations used to describe clouds:

Type

CI=Cirrus AS =Altostratus ST = Stratus

CC = Cirrocumulus NS = Nimbostratus CU = Cumulus

CS=Cirrostratus SC = Stratocumulus

CB= Cumulonimbus

AC =Altocumulus

Amount

Clouds except CB

SKC = sky clear (0/8) FEW =few (1/8 to2/8)

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)

Height

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:

Heights are indicated as altitudes above mean sea level;

The abbreviation SFC is used to indicate ground level.

Depicting of lines and systems on specific charts

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.FL270accompaniedby+ 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 hig 340 s of the tropopause topography are indicated by the letters L or H, respectively inside a pentagon with the height in flight level.

11.4 RECEPTION OF WORLD AREA FORECAST CENTRE (WAFC) PRODUCTS

Wind and temperature charts for different flight level are given in GRIB (Gridded Data in Binary) format and Significant Weather charts are in BUFR (Binary Universal Forecast Representation) format.

These data and information is distributed either through Secured FTP or through satellite-based broadcast system. The data disseminated by UK Met Office is through SADIS (SAtellite DIstribution System) and it mainly covers Europe, Asia, Indian Ocean and Africa. The data disseminated by U.S. NOAA broadcast system is through ISCS (International Satellite Communications System) and mainly covers America and the Pacific Ocean. Both these centres work in dual redundancy mode and in event of failure of one centre, the other centre automatically takes over the responsibility.

Data formats on the secure SADIS FTP service:

OPMET, AIRMETs, GAMETs – Alphanumeric format

SIGWX Charts – PNG2format

BUFR3 encoded high level SIGWX information – BUFR; FM 94 BUFR (Binary Universal Form for the Representation of meteorological data

GRIB1 (GRIB4 edition 1) encoded wind, temperature and humidity information

GRIB2 (GRIB edition 2) encoded wind, temperature and humidity information GRIB2format

Volcanic ash advisory graphics and tropical cyclone advisory graphics – PNG format in the PNG_FORMAT subfolders.

Volcanic ash and tropical cyclone advisory statements - Alphanumeric format

General login information for the service:

Host name sadisftp/metoffice.gov.uk

Domain name metoffice.gov.uk

IP Address 151.170.240.15

Access via web browser ftp://[username]:[password]@sadisftp.metoffice.gov.uk

11.5 GUIDANCE ON REPORTING SIGNIFICANT DISCREPANCIES IN WAFC SIGWX CHARTS

Purpose of the report

To permit the meteorological offices to inform the WAFCs about significant discrepancies on significant weather (SIGWX) forecasts issued by WAFCs.

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.

Usefulness of the report for the WAFCs

WAFC benefits from the notification by:

1. being informed of possible discrepancies;
2. analysing the proposal coming from a meteorological office;
3. re-initiating the forecasts model, if appropriate, taking into account the proposal; or

Sending an amendment for the SIGWX forecast concerned.

Steps to be followed by a meteorological office

WAFS SIGWX forecast is received by a meteorological office;

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'; no other differences shall be reported;

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

5. The notification is to be written in English.

Steps to be followed by a WAFC

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

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.

Chapter - 12

ACTION FOR SEARCH & RESCUE OPERATION

SEARCH & RESCUE OPERATION (AIR TRAFFIC SERVICE AND SEARCH & RESCUE UNIT)

Responsible authority

The Search & Rescue service in India is organized in accordance with the Standards and Recommended Practices of ICAO Annex 12 by the Airports Authority of India in collaboration with the Ministry of Defence, which has the responsibility for making the necessary facilities available.

Area of responsibility

The Search & Rescue service is responsible for entire India territory including territorial waters as well as airspace over high-seas encompassed by Chennai, Kolkata and Mumbai FIRs and Delhi FIR.

Types of Service

1. Details of the Rescue Coordination Centres and related Rescue Units are given in page GEN 3.6-2 to GEN 3.6-7. In addition, various other departments of the Central and State Governments such as Railways, Post & Telegraph, All India Radio, Police and District Collectors/Magistrates, Municipal and Local bodies, Airline operators, Flying clubs, Professional pilots, Mercantile marine, Port Trust and Armed Forces are available for search and rescue missions when required.

2. Satellite aided Search and Rescue

a. India has evolved a Satellite-aided Search and Rescue programme participation in the COSPAS/SARSAT systems. It operates on 406MHz. Location accuracy is normally within 5Km. The system will detect transmissions on this frequency throughout the Indian Search and Rescue Region (SRR) and also SRR of Bangladesh, Myanmar, Bhutan, Indonesia, Kenya, Malaysia, Maldives, Mauritius, Nepal, Seychelles, Singapore, Somalia, Sri Lanka, Thailand and Tanzania.

b. Under this programme Local User Terminals (LUT) have been established at Bangalore and Lucknow. Indian Mission Control Centre (INMCC) at Bangalore is responsible for coordinating with Rescue Coordination Centres and other International mission Control Centres.

c. INMCC at Bangalore is connected with RCCs at Chennai, Delhi, and Kolkata & Mumbai through AFS network and any distress alert received for the areas covered is automatically transmitted to the concerned RCC.

Rescue coordination centre (RCC)

There are four rescue coordination centres available in India as follows

RCC-Chennai

Name	Rescue Coordination Centre - Chennai
Postal Address	Airports Authority of India, Chennai Airport, Chennai 600027
Telephone	91-44-22560700(RCC), 91-44-22561803(FIC), 91-44-22560893 (WSO)
Fax	91-44-22560700(RCC), 91-44-22560894(WSO)
AFS	VOMMYCYX
Telegraphic	Aerodrome, Chennai
SAR Area	Chennai FIR
Responsible agency or department	Flight Information Centre, Chennai
Name & location of Rescue Sub-Centre	Nil

RCC-Delhi

Name	Rescue Coordination Centre - Delhi
Postal Address	Airports Authority of India, I.G.I Airport, New Delhi 110017
Telephone	91-11-25654061(RCC), 91-11-25653457(FIC), 91-11-25653283(WSO)
Fax	91-11-25654061(RCC), 91-11-25653284(WSO)
AFS	VIDPYCYX
Telegraphic	
SAR Area	Delhi FIR
Responsible agency or department	Flight Information Centre, Delhi
Name & location of Rescue Sub-Centre	Nil

RCC-Kolkata

Name	Rescue Coordination Centre - Kolkata
Postal Address	Airports Authority of India, N.S.C.B. I. Airport, Kolkata
Telephone	91-33-25130218(RCC), 91-33-25119520(WSO)
Fax	91-33-25130218(RCC), 91-33-25130134(WSO)
AFS	VECCYCYX
Telegraphic	

SAR Area	Kolkata FIR
Responsible agency or department	Flight Information Centre, Kolkata
Name & location of Rescue Sub-Centre	Guwahati RSC

RCC-Mumbai

Name	Rescue Coordination Centre - Mumbai
Postal Address	Airports Authority of India, C.S.I. Airport, Mumbai 400099
Telephone	91-22-26819421(RCC),EPBAX 91-22-26828100 Extn 3421, 91-2226828002/8022(OCC/FIC), 91-2226828088(WSO)
Fax	91-22-26828121(RCC), 91-2226819341(OCC/FIC), 91-2226828066(WSO)
AFS	VABBYCYX
Telegraphic	Air Com
SAR Area	Mumbai FIR
Responsible agency or department	Flight Information Centre, Mumbai
Name & location of Rescue Sub-Centre	Nil

Agreement between RCC and MWO, IMD

Each FIR/ SAR area has a MWO for aviation weather watch in India and hence the RCC has made an agreement with MWO level to take part in search and rescue operation.

The General Manager (ATM) of the respective region is the responsible to maintain and operate Rescue Coordination Centre (RCC) made an agreement with the respective MWO Director (Met Office) who is responsible to maintain and operate MWO to provide aviation weather services to contribute to safety improvement regularity, of air navigation and efficiency.

Objective of the Agreement

The Meteorological Watch Office (MWO) aims to provide aviation weather services to contribute to safety improvement regularity, of air navigation and efficiency. It conducts aviation weather services according to the provisions of the International Civil Aviation Organization (ICAO), Annex 3 and the World Meteorological Organization (WMO), as well as standards and recommended practices of regional agreements and convections in air navigation.

The RCC (e.g. RCC Chennai) has the responsibility to organize and coordinate Aeronautical Search and Rescue in the respective region (e.g. CHENNAI Search and Rescue Region (SRR)). And the respective MWO (e.g. MWO Chennai) will arrange for the supply of up to-date meteorological information to relevant ATS units and search and rescue services units, as necessary, for the conduct of Search and Rescue Operations.

Scope of this Agreement

Any meteorological information requested by RCC (e.g. RCC Chennai) unit in connection with an aircraft emergency shall be supplied as rapidly as possible. The Meteorological Watch Office (MWO) (e.g. MWO CHENNAI) in coordination with the RCC (e.g. RCC CHENNAI,) shall arrange for the supply of up to-date meteorological information to relevant ATS units and search and rescue services units, as necessary, for the conduct of Search and Rescue Operations.

Extent of Assistance

The RCC and Meteorological Watch Office (MWO) agree to co-operate in the following areas:

1. RCC (eg. RCC CHENNAI) will notify MWO (eg. MWO Chennai) ,the time, location, extent of possibility area, ATS Units within the possibility area, ATS Routes/Route segment within/passing through the possibility area and other relevant details regarding the Aircraft requiring Search and Rescue Services in the **Form-A**
2. MWO (eg. MWO CHENNAI) shall supply RCC (RCC CHENNAI) or as agreed in coordination with RCC to relevant ATS units and search and rescue services units, as, with the meteorological information they require in the **Form-B**.
3. Respective MWO shall maintain liaison with the respective RCC throughout a search and rescue operation.
4. MWO shall ensure that all pertinent meteorological observation and forecast data are retained for at least 30 days.

Terms of Agreement

1. Keep information or other resources readily available which may be needed for implementing this agreement.
2. RCC shall keep MWO fully and promptly informed of all SAR operations which may involve use of Meteorological facilities.
3. RCC and MWO shall promptly respond to each other request for assistance.

Deviations

Temporary deviation from the procedures specified in this agreement shall only be permitted in exceptional circumstances and not without prior co-ordination on a case-by-case basis.

Annexure

Form –A

Serial No.	Information		Remarks
1	The time of incident		
2	Last Known Position		
3	ATC unit of Last contact		
4	Location or,		
5	Possibility area		
6	ATS Units within the possibility area		
7	ATS Routes/ Segment within/ passing through possibility area		
8	Other relevant information		
	Call Sign		
	Type		
	Departure		
	Destination		
	Departure Time		
	Person on Board(POB)		

Form B

Serial No	Information		Remarks
1	Met reports including winds at different levels in probability area/ on route		
2	En-route Forecast for next 24 hrs from the time (notified Form-A)		
3	Supplementary information obtained from aircraft		
4	Meteorological information obtained from aircraft		
5	Meteorological information obtained from ground weather radar		
6	Special reports, SIGMET and AIRMET information, warning etc		
7	Any Other provision from doc 9377		

Chapter - 13

ACTION FOR AIRCRAFT ACCIDENT INVESTIGATION

13.1 INTRODUCTION

Mishap may occur to an aircraft during any phase of its operation. Mishap to an aircraft may be divided into two categories – Accidents and Incidents.

Damage may also be caused to parked or moored aircraft by weather phenomena.

13.2 Definitions

Accident: An occurrence associated with the operation of an aircraft which takes place between the times any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which:

1. A person is fatally or seriously injured as a result of being in or upon the aircraft or by direct contact with the aircraft or anything attached thereto; or
2. The aircraft incurs damage or structural failure which adversely affects the structure, strength, performance or flight characteristics of the aircraft and which would normally require major repair or replacement of the affected component; or
3. The aircraft is missing or is completely inaccessible.

Incident: An occurrence, other than an accident associated with the operation of an aircraft which affects or could affect the safety of operation.

13.3 Accidents

13.3.1 Intimation to Headquarters' Offices

Whenever an Aerodrome Meteorological Office (AMO) comes to know from any source of an accident, the duty officer/officer-in-charge of the AMO should immediately obtain the official time of occurrence of the accident from the local aerodrome authorities. If it is an AMS, the message containing available information should be send to the Director/ Meteorologist-in-charge of the controlling Aerodrome Meteorological Office by name. All available details should be immediately communicated through any available communication channel like AMSS network, IMD VPN, Phone, or Telefax, by name to the Deputy Director General of Meteorology (DDGM) of the parent Regional Meteorological Centre (RMC). The DDGM (RMC) will in turn communicate the information using the above modes of communication by name to Scientist F, Central Aviation Meteorological Division (CAMD) and DDGM (RMC) of the region from which the flight has originated. The first intimation shall contain the following:

1. Name of the Airline
2. Type and Call sign of the aircraft
3. Route followed or local flying
4. Details of Meteorological Briefing and documentation provided
5. Description of the accident/incident

6. Time of occurrence
7. Place of the accident/incident
8. Number of persons on-board
9. Casualty details, if any
10. Extent of damage to the aircraft
11. Reason of accident, if known
12. From whom the Message was received
13. Time of receipt of information
14. Whether entries have been made in the accident register and aviation log book and signed by the officer in charge
15. Action taken on receipt of the information (Whether documents sealed and kept under safe custody)
16. Whether Special Current weather observation was recorded as per para 3.2.5 of IMD Aviation Manual or not.
17. Description of weather prevailed around the time of accident at the place/ site of accident
18. Any other relevant details

In case of serious accidents involving loss of life or substantial damage to the aircraft, the messages should commence with the identifier "AIRCRASH" and should be sent without any delay. In addition, the information should be conveyed to the DDGM (RMC) by telephone. The DDGM (RMC) in turn should convey the information, by Telefax and telephone to Scientist F, CAMD/ DGM and DDGM (RMC) of the region from which the flight had originated.

13.3.2 Responsibility of AMO & AMS

- Soon on getting information of an accident all relevant original documents connected with the service rendered to the flight in question should be taken possession of by the Officer-in-charge.
- Following are the list of documents to be kept in safe custody:

1. Office copy of documentation provided to the aircraft.
2. Office copies of relevant forecasts, aerodrome forecasts, and landing forecasts
3. Relevant SIGMET warnings
4. Routine, special and additional reports
5. Current Weather Diary
6. Radarscope Polar Diagrams/ Office copy of the DWR products, if used in briefing
7. Office copies of satellite images, if used in documentation/ briefing.

8. Briefing register/ relevant log page of OLBS

9. Log Books, if relevant

10. SIGMET information register

11. Office copies of relevant Aerodrome Warnings.

12. Office copies of WAFC WINTEMP charts, WAFC SIGWX charts, if used in documentation.

13. Office copies of National SIGWX charts

14. All relevant information furnished to ATC, with proof, if possible, of receipt by the recipient.

15. Autographic charts

16. Any other document that may be significant

- Where the meteorological briefing is being provided through web based briefing system, the hard copies of the briefing materials should be taken possession of in the same manner as in the case of manual briefing. Soft copies of the relevant documents should also be preserved.
- No correction/alteration/modification shall be made in the original documents. Immediately 5 copies of the original documents are to be readied.
- The documents in original together with two sets of copies should then be sealed by the Officer-in-charge, in the presence of another officer/ member of staff and kept under his safe custody.
- The officers sealing the documents should append their signatures together with the time of sealing on the outer cover.
- In case the Officer-in-charge is not promptly available for sealing the documents it shall be done by another officer/member of staff on duty.
- Three sets of copies duly attested by the Officer-in-charge should be forwarded immediately under sealed cover to the Regional Meteorological Centre concerned by Registered Post.
- Original sealed documents should be handed over to the Director of Air Safety/ Inspector of Accidents/ Investigator-in-charge or to an officer deputed by him for the purpose, after obtaining a written request from him.
- The DDGM (RMC) should be kept informed of the action taken. The documents sealed may be replaced in the Office records as soon as they are received back from the Director of Air Safety/Inspector of Accidents/Investigator-in-charge or from the officer deputed by him.
- In case no officials of DGCA call to collect the sealed documents, the documents may be replaced in office records as soon as the final recommendations and report of the investigating authority are received.
- In case no request is received for sealed documents, and no official communication is received about the final recommendations and reports, the

officer-in-charge of the concerned AMO/ AMS could open the sealed covers and the documents may be replaced in office records after the completion of one year from the date of occurrence of accident/ incident.

- Proper entry in this regard may be made in the accident register under intimation to DDGM (RMC).
- An 'Aircraft Accident Register' shall be maintained by all AMOs and AMSs and entries shall be made regarding details of action taken in respect of each accident.
- List of original documents sealed for safe custody and subsequently handed over to the Inspector of Accidents or other authorised representative of the Civil Aviation Department, details of copies taken and furnished to the Regional Meteorological Centre, details of current weather information supplied to Airline Operators, current meteorological registers withdrawn from use etc., shall be entered in the register.
- The 'Aircraft Accident Register' should be put up for perusal to DDGM (RMC)/ Scientist F, CAMD/ DGM/ IMD Safety Oversight Auditors during their inspection visits to the office concerned.
- If during a particular quarter no aircraft accident occurs, a NIL entry may be made for that quarter.
- Immediately after a meteorological office becomes aware of an aircraft accident occurred at or in the vicinity of the local aerodrome, a special current weather observation shall be recorded in case more than 5 minutes have elapsed since the recording of the previous routine/ special/ additional report at the station.
- The duty officer/ officer-in-charge should initial this Special Current Weather observation. However, in cases when the aircraft accident has occurred more than half an hour earlier, no special observation need be taken.

13.3.3 Court Of Enquiry

- In order to avoid any controversy and embarrassment, all IMD officials should desist from making any public statement expressing technical opinion or personal views on meteorological factors/ services concerning the accident to the press or other media or any agency or individual not authorised by government to investigate the accident. It is not necessary or obligatory to obtain prior permission of the DDGM (RMC) concerned either for attending a Court of Enquiry or for producing meteorological documents to the Inspector of Accidents or the Committee of Enquiry or the Court of Enquiry. A written request may be obtained from the Inspector of Accidents or the Committee of Enquiry for releasing the documents required by them. The officer-in-charge of the meteorological office shall inform the DDGM (RMC) about attendance at Court of Enquiry or the supply of meteorological documents.
- The DDGM (RMC) will in turn keep Scientist F, CAMD /DGM informed of such attendance at Courts of Enquiry or supply of documents. DDGM, Regional Meteorological Centres may nominate officers, preferably the Directors/ Meteorologists-in-charge of aviation forecasting offices or Meteorological Centres to attend the investigation board as "observers" without prior approval of Scientist F, CAMD or DGM.

- The officer concerned should send a report to Scientist F, CAMD and DGM through his DDGM (RMC) on his attendance at the investigation board.

- In giving evidence, only factual information about the weather at the time of accident based on available recorded data, charts, and details of forecasts or warning issued for the flight should be given. No attempt should be made to express a view as to whether or not the accident has been caused by weather conditions. Answers to all questions should be strictly factual, to the point and precise. When specifically questioned by the Court of Enquiry, the Officer may give information of a general nature on meteorological phenomena. It is desirable that the officer tendering evidence before Courts of Enquiry goes prepared to answer the probable questions (and supplementary) that might be asked and gives precise answers.

- Under the existing provisions of the Indian Aircraft Act, the Inspector of Accidents/ Court of Enquiry has the legal authority to question any member of the meteorological staff on aspects, which may, or may not, be concerned with the weather. There is no objection to the concerned persons answering questions on aspects which may not be concerned with weather, but they should restrict their answers to facts of which they have direct personal knowledge.

- Care should be taken not to offer opinions or remarks on the role of individual officials, especially in fields in which the meteorological office has no concern.

- In the event of the meteorological staff expressing an opinion on non-meteorological subjects, the responsibility of substantiating their statements before a Committee of Enquiry (or other relevant investigating authority) rests entirely on the persons concerned.

- Details of evidence given before Courts of Enquiry together with original summons for giving evidence, should be sent to RMC concerned within a week of tendering the evidence. RMC concerned should supply a copy of the same to Scientist F, CAMD/ DGM along with their comments, if any.

- During the course of enquiry into aircraft accidents the Inspector of Accidents may call for signed statements from concerned meteorological officials. Whenever such requests are made, they should give the required signed statements. The instructions contained in paragraphs 3.2.8 and 3.2.9 should be strictly followed while giving such signed statements.

- The procedures are same in respect of investigation by IAF. Courts of Enquiry also.

- Whenever any interested party other than Director General of Civil Aviation(DGCA)/Court of Enquiry makes a request in writing for supply of factual weather information covering the period of the accident, Meteorological offices may supply the available observational data with the prior permission of DDGM (RMC) concerned. Director/Met-in-charge of Meteorological Centres may supply only factual information to parties and DDGM (RMC) concerned should be kept informed. This authority should not be delegated by him to any lower cadre. Scientist F,

- CAMD/ DGM should be informed by concerned DDGM (RMCs) of such

requests received and replies issued.

13.3.4 Responsibilities of Regional Meteorological Centres

- Preliminary inquiry into all cases of aircraft accidents whether due to weather or not, should be initiated by the DDGM concerned and the findings reported to Scientist F, CAMD /DGM.
- In cases of accidents occurring in bad weather detailed investigation is necessary. While forwarding the report of any aircraft accident to Scientist F, CAMD/ DGM, the weather situation associated with the accident should be specifically commented upon by the DDGM (RMCs).
- Detailed report may not be sent in case of accidents which are clearly not due to weather conditions.
- However, this point may be brought out in the preliminary report and approval of Scientist F, CAMD obtained for not submitting a detailed report. The same procedure will apply for cases of incidents also.
- In the case of accidents, where more than one region is involved, the DDGM (RMC) controlling the AMO or the AMS or the meteorological unit which provided briefing and documentation or any other service for the flight in question will send a report to Scientist F, CAMD/ DGM. The DDGM (RMC) in whose region the accident occurred will also initiate a factual inquiry regarding the weather conditions at the time and place of occurrence and supply of meteorological data, if any, from meteorological offices in his region to the Airport/ Air Traffic Control/ other Aviation Meteorological Offices and send his report to Scientist F, CAMD / DGM.
- In the case of a major accident, the DDGM (RMC) may visit the site of accident whenever necessary, for making an on-the-spot investigation. This authority should not normally be delegated by him to any lower cadre.

13.3.5 Reports on Aircraft Accidents

The nature of all the correspondences pertaining to an aircraft accident/ incident investigation shall be confidential and shall only be signed by DDGM (RMCs). Detailed reports of investigation of accidents should be prepared by DDGM (RMCs) and sent to Scientist F, CAMD /DGM as soon as possible after the occurrence of the accident, preferably not later than a week after the accident.

Following are the contents of the Report:

I.	**General Description:**	
This part shall contain a general description of the accident with all relevant details such as:		
	(a)	Name of the airline
	(b)	Type and call sign of the aircraft
	(c)	Route followed or local flying
	(d)	Details of Meteorological Briefing and documentation provided
	(e)	Description of accident/ incident
	(f)	Time of occurrence
	(g)	Place of accident/ incident
	(h)	No. of persons on board

	(i)	Casualty details, if any		
	(j)	Extent of the damage to the aircraft		
	(k)	Reason of accident, if known		
	(l)	From whom the Message was received by the met office		
	(m)	Time of receipt of information		
	(n)	Whether entries have been made in the accident register and aviation log book and signed by the officer-in-charge		
	(o)	Action taken on receipt of the information (Whether documents sealed and kept under safe custody)		
	(p)	Whether Special Current weather observation was recorded or not		
	(q)	Description of weather prevailed around the time of accident at the place/ site of accident		
	(r)	Any other relevant details		
II.	**Brief on Meteorological services rendered:**			
	A brief account of the meteorological services rendered to the aircraft in question with copies of relevant documents as detailed below:			
	(a)	Documentation provided		
		i)	Reports	
			1.	Routine, Special and Additional weather reports
		ii)	Forecasts	
			1.	Route forecast (Chart form as well as Tabular form), Terminal Aerodrome Forecast (TAF), SIGMET messages and advisories, if any, utilized in the preparation of documentation
			2.	Local/ Area forecast, aerodrome warnings for Parked and Moored Aircraft and Take-off/ Landing Forecast (TREND).
	(b)	Extracts from briefing registers, current weather registers, aviation log book, telephonic discussions with ATC, operators etc.		
	(c)	Autographic charts; where relevant		
	(d)	Radar imageries/ Satellite imageries; where relevant		
	(e)	Any other items having a bearing on the accident.		
III.	**Description of the weather situation:**			
The weather situation at the time of the accident with a short description of the development leading to it with copies of inferences, Bulletins etc., issued/received.				
IV.	**Brief on media reports:**			
Reference to press reports together with relevant cuttings				
V.	**Comments on adequacy of meteorological services provided:**			
Findings regarding adequacy or otherwise of meteorological services rendered; remarks on the availability of basic data, state of completion of charts at the time of issue of forecasts, quality of relevant analysis/prognosis, standards of forecasting etc. may be included as necessary				
VI.	**Comments on procedural deficiencies**			
Remarks regarding adherence to current departmental instructions regarding writing of forecasts, preparation of aerodrome reports etc.				
VII.	**Local action taken on deficiencies noticed**			
VIII.	**Additional remarks, if any**			

All documents relating to the meteorological services provided to the ill-fated aircraft are required to be checked

All the meteorological elements for which forecast was issued in TAF, TREND Forecast, Local/Area Forecast, Route Forecast, Aerodrome Warning, etc., covering the event are to be verified individually and a report along with comments are to be sent to Scientist F, CAMD/ DGM.

DDGM (RMC) may also send his remarks on duration of current weather watch, frequency and period of validity of all types of forecasts issued by the concerned office and serviceability of aviation meteorological instruments in the airport to CAMD/DGM.

Reports of investigations received from DDGM (RMCs) shall be examined in CAMD. A consolidated report would be submitted by Scientist F, CAMD to DGM giving his findings and recommendations.

13.4 Incidents

In cases of occurrence of incidents, the relevant documents need not be taken possession of and sealed. The same procedures as in cases of aircraft accidents should be followed for supply of any information or for tendering any evidence or for giving signed statements required by the investigating officer of the Director General of Civil Aviation (DGCA).

The procedure followed in cases of accidents by the aviation meteorological offices in informing the Regional Meteorological Centre and by the latter to Scientist F, CAMD/ DGM and the Regional Meteorological Centre from which the flight had originated should also be followed in cases of incidents. However, the intimation about the incident may be sent by post. The DDGM (RMCs) and Scientist F, CAMD should investigate the cases of incidents in the same way as in cases of accidents.

For supply of information to any party other than the investigation officer of the Civil Aviation Department, instructions given for accidents may be followed.

13.5 Damage to Parked and Moored Aircraft

Certain cases of damage to aircraft while parked and/or moored on ground are also investigated by the Director General of Civil Aviation (DGCA) or by the airlines themselves. When such investigations are done and information about weather conditions are asked for by the investigating officer, a full report on the same as in cases of accidents should be sent by the aviation meteorological office concerned to the Regional Meteorological Centre. The DDGM (RMC) in turn shall send a report to the Scientist F, CAMD/ DGM in the same manner as in cases of accidents.

Chapter - 14

PROCEDURE OF FORECAST VERIFICATION

14.1 TERMINAL AERODROME FORECAST (TAF)

Wind direction:

The forecast of wind direction is considered correct if the actual value is within ±20º of the forecasted value.

Example:

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.

Wind speed:

The forecast of wind speed is considered correct if the actual value is within ±5kts of the forecasted value.

Example:

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.

Visibility:

The forecast of visibility is considered correct if the actual value is within ±200m up to 800m.

Example:

If the forecast visibility is 600m and the actual value is in between 400m and 800m then the forecast may be considered as correct.

The forecast of visibility is considered correct if the actual value is within ±30% of the forecasted value in the visibility range of 800m to 10km.

Example:

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.

Precipitation:

The forecast of precipitation is considered correct when occurrence or non-occurrence of precipitation is observed.

Example:

If a heavy precipitation is forecasted and heavy precipitation is observed then the forecast may be considered as correct. Similarly, if moderate precipitation is forecasted and moderate precipitation is observed then also the forecast can be considered correct. Conversely, if precipitation is forecasted and no precipitation is 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.

Cloud amount:

The forecast of cloud amount is considered correct when the actual value is within one category when the cloud base height is below 450m.

Example:

When the cloud amount is forecasted to be SCT for cloud with base height below 450m, the forecast may be considered as correct, if the observed value is any of the category among FEW, SCT or BKN.

The forecast of cloud amount is considered correct for clouds between 450m and 3000m if occurrence or non-occurrence of BKN or OVC is observed.

Example:

If the forecast of 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 forecasted 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.

Cloud height:

The forecast of cloud height is considered correct when the actual value is within ±30m for cloud base heights up to 300m.

Example:

If the forecast of cloud height is 200m and if actual value is in between 170m and 230m then the forecast may be considered as correct.

The forecast of cloud height is considered correct if the actual value is ±30% of the forecast value for cloud heights between 300m and 3000m.

Example:

If the forecasted 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.

14.2 TREND FORECAST

Wind Direction:

The verification criterion and example is the same as that given in 13.1. However, the

minimum percentage of cases within range is 90% of cases.

Wind speed:

The verification criterion and example is the same as that given in 13.1. However, the minimum percentage of cases within range is 90% of cases.

Visibility:

The verification criterion and example is the same as that given in 13.1. However, the minimum percentage of cases within range is 90% of cases.

Precipitation:

The verification criterion and example is the same as that given in 13.1. However, the minimum percentage of cases within range is 90% of cases.

Cloud amount:

The verification criterion and example is the same as that given in 13.1. However, the minimum percentage of cases within range is 90% of cases.

Cloud height:

The verification criterion and example is the same as that given in 13.1. However, the minimum percentage of cases within range is 90% of cases.

14.3 FORECAST FOR TAKE-OFF

Wind Direction:

The verification criterion and example is the same as that given in 13.1. However, the minimum percentage of cases within range is 90% of cases.

Wind speed:

A forecast of wind speed is considered correct if the actual value is within ±5kts. The forecast needs to be verified only for wind values up to 25kts.

Example:

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.

Air Temperature:

An air temperature forecast is considered correct when the actual value is within ±1ºC of the forecasted temperature.

Example:

If the forecast air temperature is 20ºC and actual value is in between 19ºC and 21ºC, then the forecast may be considered as correct.

Minimum percentage of cases within range is 90% of cases.

Pressure value (QNH):

A forecasted pressure value is considered correct when the actual pressure value is

within ±1hPa of the forecasted value.

Example:

If the forecasted 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.

14.4 AREA/ LOCAL FORECAST

Upper air temperature:

A forecast of 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.

Example:

If the forecast of 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.

Upper wind:

A forecast of upper wind is considered correct if the actual value is within ±10kts of the forecast value.

Example:

If the forecast of 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.

Significant Weather Phenomena and Cloud:

Significant weather phenomena and cloud are considered correct with regards to the occurrence or non- occurrence of weather phenomena within 100NM area.

Example:

If a significant weather phenomena was forecasted and if it occurs then the forecast may be considered as correct. Conversely, if no significant weather was forecasted 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.

The forecast of vertical extent of cloud is considered correct if the actual value is within ±300m (1000ft) of the forecast value.

Example:

If the vertical extent of cloud was forecasted to be 4000m and if the actual value is observed to be between 3700 and 4300m, and the forecast may be considered as correct.

Minimum percentage of cases within range is 70% of cases.

14.5 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:

- When the wind direction is out by more than 90^{o} the forecast is considered as 'wrong' except when both the forecast and actual wind speeds are less than 10kts.
- When the actual wind speed is more than 60kts, the above mentioned range for speed shall be taken as 15 knots.
- The observation that fall within 50 kilometers on either side of the route may also be considered for verifying a route forecast.
- Observations during the entire validity period are to be taken into account.
- If the route contains different sections, then verification is to be done for each section.

14.6 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.

14.7 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	

14.8 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
TERMINAL AERODROME FORECAST		
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
TAKE-OFF FORECAST		
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 FORECAST		
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 FORECAST		
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

Chapter - 15

QUALITY MANAGEMENT SYSTEM (QMS)

15.1 HIGHLIGHTS

In the Year 2001- QMS was introduced for Aeronautical Met Services.

In the year 2010- Amendments in QMS provisions were introduced.

15.2 ICAO DEFINITIONS

- **Quality assurance:** Part of quality management focused on providing confidence that quality requirements will be fulfilled.
- **Quality control:** Part of quality management focused on fulfilling quality requirements.
- **Quality management:** Coordinated activities to direct and control an organization with regard to quality.

15.3 ICAO ANNEX 3 PROVISIONS

Para – 2.2

Each Contracting State shall ensure that the designated meteorological authority establishes and implements a **properly organized quality management system** comprising **procedures, processes and resources** necessary to provide for the quality management of the meteorological information to be supplied to the users.

In regard to the exchange of meteorological information **for operational purposes, the quality system should include verification and validation procedures and resources for monitoring adherence to the prescribed transmission schedules** for individual messages and/or bulletins required to be exchanged, and the times of their filing for transmission

The quality system should be **capable of detecting excessive transit times** of messages and bulletins received.

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

- **Quality:** Any *feature* or *characteristic* of a product or service that is needed to satisfy user needs or achieve fitness for use.
- **Quality for goods or products:** Accessibility, Availability, Operability and Durability
- **Quality for services:** Waiting time, Delivery time, Accuracy and Accessibility.

In context of aviation weather services and products, the word quality communicates a high level of consistent performance, reliability and overall credibility in meeting and satisfying the aviation industry's identified needs.

These characteristics are measurable and consequently can be used to monitor the quality of the product or service

15.4 ADVANTAGES OF QMS

1. Enable the department to develop standard operating procedures (SOPs) for its functions and activities. These SOPs are codified in a Quality Manual and Procedures.
2. Compare and benchmark these (SOP) with other similar organizations in state or international organizations.
3. Identify areas for improving functioning of the organization.
4. Codify institutional and personal memories and experiences for future generations. Hence, when a person leaves, he or she will be able to leave behind SOPs for others to follow and improve.
5. Bring in transparency and accountability in the operations.
6. Allow the organization to audit itself against the ISO standards.
7. The potential for losing the ISO certification during the audit every third year allows the system to sustain itself over time

15.5 WHAT IS REQUIRED TO BE DONE?

1. Standardization and implementation of documented procedures for the development of the end activities.
2. These specific standards are already in notified by WMO, ICAO and respective governments.
3. Standards of generic nature is notified under ISO standards.
4. **http://www.iso.org/iso/iso_catalogue**
5. Structuring of the processes/services oriented to customer satisfaction and continuous improvement.
6. Continuous monitoring of activities

15.6 PROCEDURE FOR QUALITY CONTROL AND CORRECTIVE ACTION THEREON

1. The forecasts issued by AMOs shall be scrutinized by the AMOs-in-Charge on a routine basis in order to find out the procedural lapses.
2. 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.
3. A register for noting the discrepancies and the remedial actions taken shall be maintained.
4. A monthly statement of the same shall be submitted to DDGM (RMC) who will forward it to CAMD with his comments.

5. Verification of forecasts on systematic and routine basis as per the procedure laid down to check, evaluate and improve the accuracy of forecasts issued. A monthly statement of verification of Forecasts is sent to CAMD, NewDelhi.
6. Conducting of Refresher Training course periodically for improvement in forecasts.
7. Preventive maintenance and servicing of Airport Met Instruments strictly following maintenance and calibration schedule to aid and facilitate accurate observations and reporting thereon of Aviation Meteorological Parameters.

15.7 SCOPE

1. To provide reliable meteorological information to the stakeholders and society contributing positively in the decision – making process associated with any related development.
2. To be a major contributor to the development of the knowledge and use of meteorology and climatology at both National and International levels through innovation.
3. Search for recognition, trust and high level of satisfaction of users through the efficient monitoring of meteorological conditions, use of modern weather forecasting tools and timely delivery of the products and services required.
4. Obtain National recognition through the ISO Certification
5. Search excellence through continuous improvement of activities, processes, products, services and customer satisfaction.
6. Use and expand the knowledge of meteorology and in particular aviation meteorology.
7. Involve staff in all processes, from data collection to realization of products;
8. Have an integrated view of the organization.

15.8 INSPECTION POLICY

A routine inspection of all airport Met Instruments are conducted by concerned Regional Meteorological Centre along with Surface Observatory annually.

15.9 MAINTENANCE AND CALIBRATION SCHEDULE FOR AIRPORT METEOROLOGICAL INSTRUMENT:

First Level Fortnightly Preventive Maintenance: Inspection of field site must be carried out on fortnightly periodicity and Instrument inspection register is to be maintained for recording deficiency, if any, and corrective action taken thereof. This register should contain Fortnightly preventive maintenance and Quarterly controlled corrective maintenance as well by dividing that register in to two parts by reversing the register. Some of the check-list on commonly experienced deficiency / problems (although not exhaustive and may vary from station to station and vary with type of instruments) are given below for ready reference.

Check List:

1. Physical observation for rusting, damage on all equipment, fixtures, installation bolts, screws & nuts.

2. General cleanliness at field site

3. Internal checking for all the cables connections, modules, units.

4. Checking connections of all sensor, if any loose connection

5. Checking of the commercial power supply provided at the field site including Earth-Neutral voltage, condition of earthing

6. Checking of UPS supply and batteries provided at the field sites

7. Checking of cable modems / Radio modems and connections provided for data communication

8. Checking of signal condition status at the site

9. Checking of Data Logger and their interfaces provided for data display

10. Checking of various display systems provided.

11. Cleaning of Enclosure at site.

12. Similar checking at MBR / ATC including signal cable connectivity, identification of wires with proper marking / tag, cleanliness etc.

The following format may be maintained in the Instruments register:

Date & time	Description of Preventive Maintenance / Nature of Problem	Reasons for fault/ Deficiency.	Service Details/ Corrective action taken	Signature of the maintenance personnel with Date and time	Signature of the Duty officer / in-charge with Date and time
IMD Duty official/In charge Remark					

Second Level Controlled Corrective Quarterly Maintenance Schedule

Quarterly maintenance of all airport meteorological instruments must be carried out in controlled corrective manner. Some of the check-list, though not exhaustive, are given below for ready reference.

Check List:

CWIS & DIWE:

1. Physical observation for rusting, damage on all equipment, fixtures, installation bolts, screws & nuts.
2. Checking of the commercial power supply provided at the field site including Earth-Neutral voltage, condition of earthing.
3. Checking of free movement of wind vane.
4. Checking wind-vane north setting with true NORTH.
5. Checking free movement of optical wind anemometer.
6. Cleaning of Ultrasonic wind sensor (if installed).
7. Checking and cleaning of Temperature/ Humidity sensor.
8. Checking and recording of pressure values (QFE/QNH).
9. Checking of data communication facilities (both wireless and with cable.
10. Checking of Data Logger and their interfaces provided for data display.
11. Cleaning of enclosure at site.
12. General cleanliness at site and in MBR/ATC.
13. The following format may be maintained in the Instruments register

The following format may be maintained in the Instruments register:

Date & time	Description of Preventive Maintenance/ Nature of Problem	Reasons for fault/ Deficiency.	Service Details / Corrective action taken	Signature of the maintenance personnel with Date and time	Signature of the Duty officer / in-charge with Date and time
IMD Duty official/In charge Remark					

Calibration /Field Test Schedule:

Calibration/field testing of installed sensors with travelling standards should be done as per schedule given below:

1. Wind Instrument: Once in six months
2. Temperature/Dew point/humidity: Once in 12 months
3. Pressure: Once in 12 months.

4. Transmissometer (RVR): Once in six months and prior to commencement of fog season.

Procedure of Field Testing:

Field testing report/calibration should be done by concerned MC/RMC/MWO.

For Wind /temperature/Pressure sensors:

1. Installed sensors readings should be compared with travelling standards.
2. Minimum four (4) set observations at interval of three hours should be recorded (may be in parallel with synoptic observations).
3. Duly signed Calibration/Field test report should be sent in the format enclosed below and a copy maintained for office record at station for showing inspecting authorities including DGCA.

Field Test Report on Calibration and Inter Comparison with Travelling Standard Kit:

1. Name of instrument/sensor:

2. Serial Number:

3. Make and Model:

4. Field test observations:

Date and time	Actual Value	Value in travelling standard kit	Difference
Mean difference			
Accuracy required as per ICAO			

Operationally Desirable Accuracy of Measurement:

Reference:

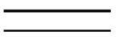
ICAO Annexure 3, 19th edition, July 2016, ATTACHMENT A. OPERATIONALLY DESIRABLE ACCURACY OF MEASUREMENT OR OBSERVATION.

APPENDICES

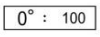
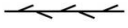
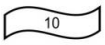
Appendix - I

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 FL100. This symbol refers to "squall line".

Radioactive materials in the atmosphere symbol:

The following information shall be included at the side of the chart:

1. Radioactive material symbol;
2. Latitude/Longitude of the accident site;
3. Date and time of accident;
4. Check NOTAM for further information.

Volcanic eruption symbol:

The following information shall be included at the side of the chart:

1. Volcanic eruption symbol;
2. Name an international number of volcano (if known);
3. Latitude/Longitude;
4. Date and time of the first eruption (if known);
5. 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.

Abbreviations used to describe clouds:

Type

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

Amount

Clouds except CB

SKC = Sky clear (0/8)	FEW = Few (1/8 to2/8)
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)

Height

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:

1. Heights are indicated as altitudes above mean sea level;
2. The abbreviation SFC is used to indicate ground level.

Depicting of lines and systems on specific charts

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 kts 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 kts of movements of frontal systems
Flight levels inside small rectangle	Height in flight levels of tropopause at spot locations e.g. 340 Low and high points of the tropopause topography are indicated by the letters L or H, respectively inside a Pentagon with the height in flight level.

Appendix - II

AVIATION TERMINOLOGY

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 ground-based navigation aid; or 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:

1. A decision height lower than 30 m (100 ft) or no decision height; and
2. A runway visual range not less than 175 m.

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

1. A decision height lower than 15 m (50 ft) or no decision height; and
2. 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 HectoPascal (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:

1. When set to a QNH altimeter setting, will indicate altitude;
2. When set to a QFE altimeter setting, will indicate height above the QFE reference datum; and
3. 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 centered 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 analyzing 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 measure of:

1. 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;

2. 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 varies with the background illumination. The former 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:

1. 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;
2. "Provide" is used solely in connection with the provision of service;
3. "Issue" is used solely in connection with the cases where the obligation specifically extends to sending out the information to a user;
4. "Make available" is used solely in connection with cases where the obligation ends with making the information accessible to a user; and
5. "Supply" is used solely in connection with cases where either 3 or 4 applies.

Appendix - III

LIST OF REGISTERS TO BE MAINTAINED BY DIFFERENT TYPES OF AVIATION MET OFFICES

Serial No.	Registers/ log books	MWO	AMO	AMS
1	Accident register	✓	✓	✓
2	Registers for noting lapses, deficiencies, procedural mistakes etc.	✓	✓	
3	Current Weather Register	✓	✓	✓
4	Briefing Register	✓	✓	✓
5	De-briefing Register	✓	✓	
6	Aviation Action Diary (Routine)	✓	✓	
7	Aviation Action Diary (Non- Routine)	✓	✓	
8	In-flight and Post-flight report register	✓	✓	
9	Aviation Log book	✓	✓	✓
10	FIR Warning/ SIGMET Register	✓	✓	
11	Aerodrome Warning Register	✓	✓	
12	Register for coded ROFORs, TAFs etc.	✓	✓	
13	Verification of Aviation Forecasts	✓	✓	
14	Register regarding Implementation of instructions and circulars	✓	✓	✓
15	NOTAM Register	✓	✓	✓
16	Radar Scope Observation Register	✓	✓	
17	METAR Plotting Register (Format not provided)	✓	✓	At AMS where TREND Forecast is issued

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/ 9hr TAF/ 30hr 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.

(3) 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.

Serial 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 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	Realized 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.

Serial 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)	Characteristics	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 Echoes	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 Layer				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°C)	Wet Bulb (0.1°C)	Dew Point (0.1°C)
GGgg	ddd	ff	fmfm fnfn	VVVV	$V_RV_RV_RV_RD_RD_R$	W`W`					T`T`		T_d`$T_d$`
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_H P_HP_H	**N**	**WW**	**W**		**ddd**	**ff**	**f_mf_m / f_nf_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: ……..

Serial 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

Briefing Register

……Airport

From (Year/Month/ Date) To (Year/Month/ Date) Page No.

Date: ……..

Serial 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.

Serial 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

MONTHLY AVIATION STATISTICS FORMAT

मासिक वैमानिक सांख्यिकी का प्रारूप

Format for Monthly Aviation Statistics

माह/ Month: _____

क्र.सं. S/No.	**पूर्वानुमानों/ चेतावनियों के प्रकार Type of forecasts/ warnings**	**पूर्वानुमानों/ चेतावनियों की संख्या Number of forecasts / warnings**
	वि .मौ .का .का नाम / Name of AMO / AMS	
1	निर्धारित उड़ान पूर्वानुमान Scheduled flight F/C	
	मेट .टी/ 3टी 4MET T3 / T4	
	चार्ट प्रारूप Chart form	
	ऑन-लाइन ब्रीफिंग On-line Briefing	
2	अनिर्धारित उड़ान पूर्वानुमान Non-scheduled flight F/C	
	मौखिक Oral	
	मेट .टी / 3टी 4MET. T3 / T4	
	चार्ट प्रारूप Chart form	
3	मार्ग पूर्वानुमान Route forecast	
4	विमानक्षेत्र पूर्वानुमान Terminal Aerodrome forecast	
5	प्रवृति)ट्रेंड (पूर्वानुमान Trend forecast	
6	विमानक्षेत्र चेतावनी Aerodrome Warning	
7	स्थानीय पूर्वानुमान Local forecast	
8	क्षेत्रीय पूर्वानुमान Area forecast	
9	सिग्मेट – चेतावनी SIGMET- Warnings	
10	उत्प्रस्थान पूर्वानुमान Take-off Forecast	
11	कुलयोग TOTAL	
12	डी – ब्रीफिंग De-Briefing	

Forwarded to: Officer-in-charge

SCHEDULED OF OBSERVATONAL HOURS IN DIFFERENT AVIATION OFFICES

Serial No.	Name of station / Location indicator	Type and frequency of observations	Type of met reports and supplementary information included	Hours of operation/ Type of station
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 + Hsalf 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/	Half hourly	METAR/SPECITREND	H24

	VEMN			
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:

Hourly observations are recorded at: Ahmedabad, Mumbai, Hyderabad, Chennai, Nagpur, Tiruchirapalli and Thirivananthapuram at HH + 40 min. and HH + 10 min.

Kolkata and Patna at HH + 50 min. and HH + 20 min.

Delhi, Lucknow, Amritsar, Varanasi and Jaipur at HH + 30 min and HH + 00

At all other stations:HH + 00 min. HH = Full Hour UTC

Half-hourly observations are recorded half-an-hour after the hourly observations, mentioned in Note 1 above.

SPECI's and ADDITIONAL REPORTS are prepared whenever warranted, throughout the hours of watch.

Abbreviation and Legends:

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 7 hrs watch
B:	AMS upto 14 hrs watch
C:	AMS round the clock watch.

Appendix - IV

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 RWY 10L BLW 50M RVR RWY 14 ABV 2000M RVR RWY 10 BLW 150M RVR RWY 12 ABV 1200M*
	RVR (M)	[ABV or BLW] nn[n][n]M				
	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 (C)	[ABV or BLW] nn[n][n]M				*RVR RWY 26 500M RWY 20 800M*
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				*CLD NSC* *CLD SCT 300M OVC 600M (CLD SCT 1000FT OVC 2000FT)* *CLD OBSC VER VIS 150M (CLD OBSC VER VIS 500FT)* *CLD BKN TCU 270M (CLD BKN TCU 900FT)* *CLD RWY 08R BKN 60M RWY 26 BKN 90M (CLD RWY 08R BKN 200FT RWY 26 BKN 300FT)*
	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		
	Cloud type (C)	CB or TCU	-			
	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)]			

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 (M)	nnnnHPA					*QNH 1009HPA*
	Name of the element (O)	QFE					*QNH 1022HPA QFE 1001HPA*
	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 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*
	Location of the phenomenon(C)	IN APCH[nnnM-WIND nnn/nnKT] or IN CLIMBOUT[nnnM-WIND nnn/nnKT] or RWY nn[n]					*WS RWY 12*
	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					*TREND NOSIG*
	Change indicator (M)	NOSIG	BECMG or TEMPO				*TREND BECMG FEW 600M*
	Period of change (C)		FMnnnn *and/or* TLnnnn Or ATnnnn				*TREND TEMPO 250/35KT MAX 50*
	Wind (C)		nnn/ [ABV] n[n]KT [MAX[ABV]nn]				*TREND BECMG AT1800 VIS 10KM NSW*
	Visibility (C)		VIS nn[n][n]M or VIS n[n]KM			C A V O K	*TREND BECMG TL1700 VIS 800M FG*
	Weather phenomenon: intensity (C)		FBL or MOD or HVY	-	NSW		*TREND BECMG FM1030 TL1130 CAVOK* *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*
	Cloud type (C)		CB or TCU	-			*TREND TEMPO TL1530 HVY SHRA CLD BKN CB360M*
	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.

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*
	Units of measurement(M)	KT				*24016G27KT*
	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 *SCT008 BKN025CB*
	Cloud type (C)	CB or TCU	-				
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*
	QNH (M)	Nnnn					*Q1009* *Q1022*
							Q0987
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			CAVOK	
							BECMG FM1030 TL1130 CAVOK
							BECMG TL1700 0800 FG
							BECMG AT1800 9000 NSW
							BECMG FM1900 0500 +SNRA
	Weather phenomenon:		- or +	-	NSW		*BECMG FM1100 SN TEMPO FM1130 BLSN*
	Intensity (C)						*TEMPO FM0330 TL0430 FZRA*
	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			
	Cloud amount and height of cloud base *or* vertical visibility (C)		FEWnnn or SCTnnn or BKNnnn or OVCnnn	VVnnn or VV///	NSC		*TEMPO TL 1200 0600 BECMG AT1200 8000 NSW NSC* *BECMG AT1130 OVC010*
	Cloud type (C)		CB or TCU	-			
							TEMPO TL1530 +SHRA BKN012CB

TEMPLATE FOR TERMINAL AERODROME FORECAST (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*

Cloud (M)	Cloud amount and height of base or vertical visibility (M)	FEWnnn or SCTnnn or BKNnnn or OVCnnn	VVnnn or VV///	NSC		*FEW010 VV005 OVC020 VV///* *SCT005 BKN012* *SCT008 BKN025CB NSC*
	Cloud type (C)	CB or TCU	--			
Expected significant changes to one or more of the above elements during the period of validity (C)	Change or probability indicator (M)	PROB30 (TEMPO) or PROB40 (TEMPO) or BECMG or TEMPO or FM				
	Period of occurrence or change (M)	nnnn/nnnn				
	Wind (C)	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)*				*TEMPO 0815/0818 25035G50KT* *TEMPO 2212/2214 17012G25KT 1000 TSRA SCT010CB BKN 020*
	Minimum visibility (C)	Nnnn			C A V O K	*BECMG 3010/3011 00000KT 2400 OVC010* *PROB30 1412/1414 0800 FG*
	Weather phenomena: intensity (C)	- or +		NSW		
	Weather phenomena: 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			*BECMG 1412/1414 RA TEMPO 2503/2504 FZRA TEMPO 0612/0615 BLSN* *PROB40 TEMPO 2923/3001 0500 FG*
	Cloud amount and height of base or vertical visibility (C)	FEWnnn or SCTnnn or BKNnnn or OVCnnn	VVnnn Or VV///	NSC		*FM051230 15008KT 9999 BKN020* *BECMG 1618/1620 8000 NSW NSC* *BECMG 2306/2308 SCT015CB BKN020*
	Cloud type (C)	CB or TCU	--			

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.)

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 APCHRWY26* *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	*SFC WIND: 320/10KT* *200FT-WIND: 360/25KT* *30KT ASPEEDL 2NM FNA RWY13*
		or nnKT ASPEEDG nnNM FNA RWYnn	
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).

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 nnnnnnnnn 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) nnnnnnnnnnnn 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	*FL 180* *FL050/080* *TOP FL390* *SFC/FL070* *TOP ABV FL100* *FL310/450*
		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)	*CB TOP FL500 WI 270KM OFCENTRE* *(CB TOP FL500 WI 150NM OF CENTRE)* *FL310/350 APRX 220KM BY 35KM*
		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))	*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.

Notes:

Severe icing and severe turbulence (SEV ICE, SEV TURB) associated with thunderstorms, cumulonimbus clouds or tropical cyclones should not be included.

TEMPLATE FOR MET-T4

मेट टी०-4
MET T.-4

उड़ान पूर्वानुमान/FLIGHT FORECAST

क्रम संख्या Serial No. PQR-01

उड़ान संख्या Flight No. IC-720

मौसम कार्यालय द्वारा Issued by CLASS-I Meteorological Office 15-12-2016 / 0100 UTC
(दिनांक, समय ग्री० मा० स०) (Date, Time G. M. T.)

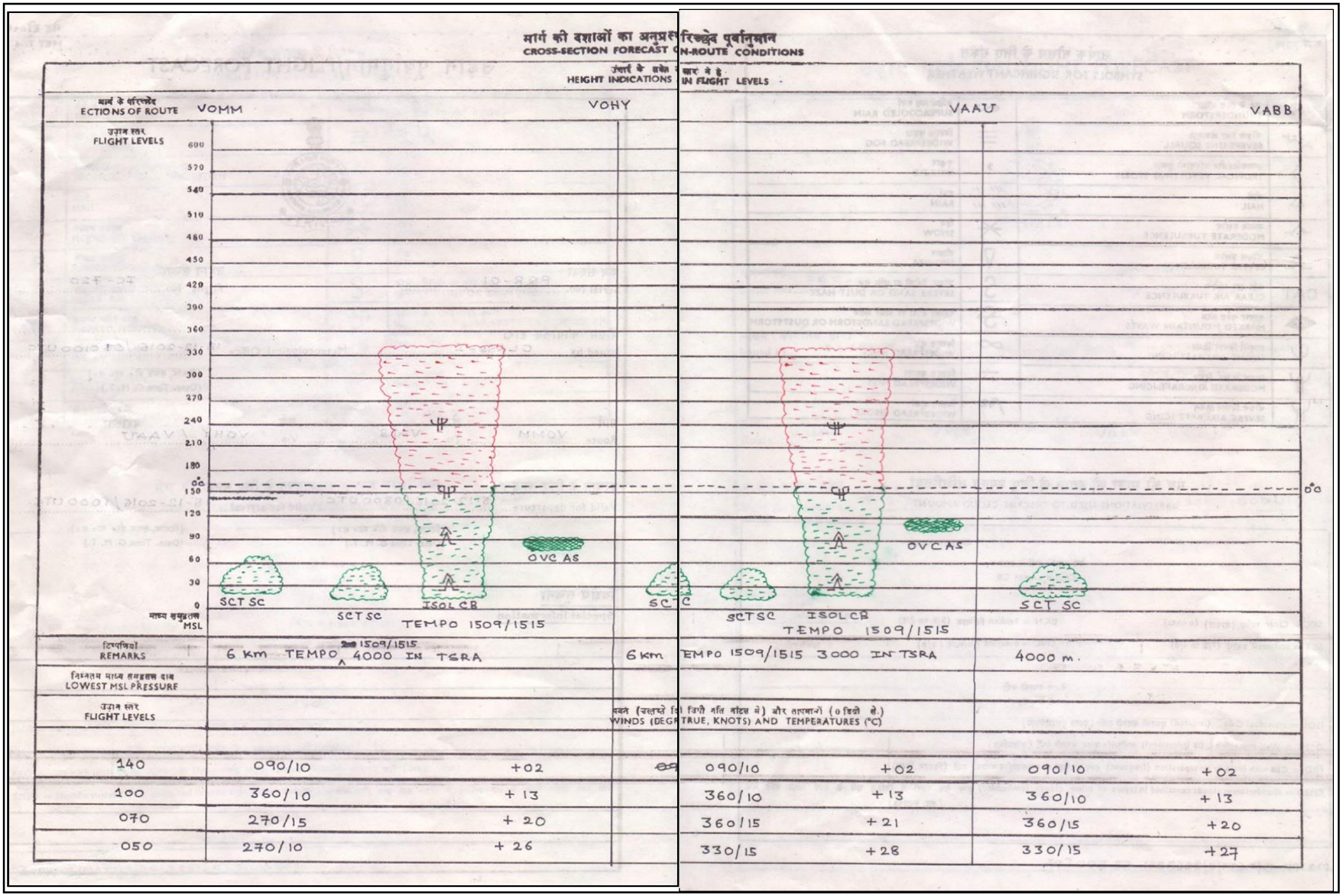
मार्ग Route VOMM से To VABB तक Via VOHY / VAAU बरास्ता

प्रस्थान के लिए मान्य Valid for departure 15-12-2016 / 0300 UTC
(दिनांक, समय ग्री० मा० स०) (Date, Time G. M. T.)

आगमन के लिए मान्य Valid for arrival 15-12-2016 / 1000 UTC.
(दिनांक, समय ग्री० मा० स०) (Date, Time G. M. T.)

विशेष सूचना
Special Information

मार्ग की दशाओं का अनुप्रस्थ परिच्छेद पूर्वानुमान
CROSS-SECTION FORECAST ON-ROUTE CONDITIONS



टिप्पणियाँ REMARKS	6 Km TEMPO 1509/1515 4000 IN TSRA		6 Km	TEMPO 1509/1515 3000 IN TSRA		4000 m.	
निम्नतम माध्य समुद्रतल दाब LOWEST MSL PRESSURE							
उड़ान स्तर FLIGHT LEVELS	पवन (दिशा डिग्री में चुंबकीय और गति नॉट्स में) और तापमान (० डिग्री से.) WINDS (DEGR TRUE, KNOTS) AND TEMPERATURES (°C)						
140	090/10	+02		090/10	+02	090/10	+02
100	360/10	+13		360/10	+13	360/10	+13
070	270/15	+20		360/15	+21	360/15	+20
050	270/10	+26		330/15	+28	330/15	+27

सार्थक मौसम के लिए संकेत
SYMBOLS FOR SIGNIFICANT WEATHER

	गर्ज के साथ आँधी THUNDERSTORM		अतिशीतित वर्षा SUPERCOOLED RAIN
	भीषण रेखा झंझावात SEVERE LINE SQUALL		विस्तृत कुहरा WIDESPREAD FOG
	उष्णकटिबंधीय परिक्रामी तूफान TROPICAL REVOLVING STORM		फुहार DRIZZLE
	ओले HAIL		वर्षा RAIN
	मध्यम प्रक्षोभ MODERATE TURBULENCE		हिम SNOW
	भीषण प्रक्षोभ SEVERE TURBULENCE		बौछार SHOWER
CAT	स्वच्छ वायु प्रक्षोभ CLEAR AIR TURBULENCE		भीषण रेतीली या धूलि धुंध SEVERE SAND OR DUST HAZE
	सुस्पष्ट पर्वत तरंग MARKED MOUNTAIN WAVES		रेतीली आंधी या आंधी तूफान WIDESPREAD SANDSTORM OR DUSTSTORM
	सामली विमान हिमन SLIGHT AIRCRAFT ICING		विस्तृत धुंध WIDESPREAD HAZE
	मध्यम विमान हिमन MODERATE AIRCRAFT ICING		विस्तृत कुहासा WIDESPREAD MIST
	भीषण विमान हिमन SEVERE AIRCRAFT ICING		विस्तृत धूआं WIDESPREAD SMOKE

मेघ की मात्रा को बताने के लिए प्रयुक्त संक्षिप्तियां
ABBREVIATIONS USED TO DESCRIBE CLOUD AMOUNT

मेघ-कपापी वर्षी के अलावा
Clouds except CB

SKC = Clear स्वच्छ (आकाश) (0 okta)

SCT = scattered प्रकीर्ण (1/8 to 4/8)

BKN = broken विच्छिन्न (5/8 to 7/8)

OVC = overcast मेघाच्छन्न (8/8)

केवल कपापी वर्षी
C B only

ISOL = individual C Bs (isolated) एकाकी कपापी वर्षी (इक्का दुक्का/नित्य)

OCNL = Well-separated C Bs (occasional) भलीभांति पृथक कपापी वर्षी (अनियमित)

FRQ = CBs with little or no separation (frequent) अल्प पृथकता या पृथकताहीन कपापी वर्षी (निरंतर/नित्य)

EMBD = thunderstorm clouds contained in layers of other clouds (embedded) अन्य मेघ स्तरों में निहित गर्ज के साथ आँधी वाले मेघ (अंत: स्थापित)

M&IPK-3/METT/9/96(328)- 53,500 Cps.

TEMPLATE FOR MET-T3

क्रम सं.
Serial No PQR-02

मेट टी - ३
Met.T-3

भारत

मौसम विज्ञान विभाग

उड़ान और हवाई अड्डा पूर्वानुमान
FLIGHT AND AERODROME FORECASTS

उड़ान सं
Flight No. VUBNH

मार्ग
Route VECC - VANP

..... के द्वारा जारी किया गया ..... मौसम विज्ञान कार्यालय का स्थान
issued by CLASS-I Meteorological Office at NSCBI AIRPORT

दर 0030 यु. टी. सी. 13-05-2020
At ..... UTC 19

द्वारा
By 20200513/0030UTC

उड़ान पूर्वानुमान / FLIGHT FORECAST

मार्ग Route VECC में To VANP बरास्ता Via DIRECT वायु की अनुमानित वास्तविक गति Assumed True Air speed ____ नाट Kts.

छूटने के लिए मान्य Valid for departure 0600 (समय यु. टी. सी. और तारीख) (Time U.T.C. and Date) 20200513 पहुँचने के लिए मान्य Valid for arrival 1000 (समय यु. टी. सी. और दिनांक) (Time U.T.C and Date) 20200513

मौसम स्थिति के विशेष लक्षण / Special Features of Meteorological Situation.

ऊपरी वायु / Upper wind (वास्तविक डिग्री व नाट) और तापमान (सें) (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) VECC	VANP
उड़ान स्तर FLIGHT LEVELS	140	190/05 KT	+01
	100	210/10 KT	+10
	070	220/15 KT	+15
	050	240/10KT	+22
निम्नतम परत / LOWEST LAYER मात्रा और किस्म / AMOUNT AND TYPE उड़ान स्तर FLIGHT LEVELS आधार पर / of Base		2 OCTA SC 0600M	
शिखर पर / of top		0800M	
बादल / CLOUD उच्चतर परत / HIGHER LAYER मात्रा और किस्म / Amount and Type उड़ान स्तर FLIGHT LEVELS आधार पर / of Base		4 OCTA AC 2700M	
शिखर पर / of top		3000M	
सतह दृश्यता / SURFACE VISIBILITY		2800M IN HZ BECMG 1303/1305 4000M IN HZ	
सार्थक मौसम / SIGNIFICANT WEATHER		NOSIG WX	
0° से. की समतापीय उड़ान स्तर FLIGHT LEVELS OF 0 °C ISOTHERM		140	
न्यूनतम माध्य समुद्रतल का दाब LOWEST MSL PRESSURE			
टिप्पणियाँ / REMARKS			

TEMPLATE FOR AREA / LOCAL FORECAST

India Meteorological Department

METERROROLOGICAL OFFICE: *VXXX 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* *450* / *600* *M* *BKN AC* *2400* / *2700* *M* *TEMPO 09 / 14*

BKN ST *240* *M* *SCT SC* *360* / *540* *M* *ISOL CB* *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 Office

TEMPLATE FOR OUTLOOK FOR LOW VISIBILITY PROCEDURE
India Meteorological Department

Reference Paragraph 11b of Page 24 of AIP India Supplement 32/2007

To be issued only when,

(1) RVR of Operating Runway is less than 1200 m and visibility/RVR is forecasted to deteriorate to 800 m or less and/or cloud ceiling is 400 ft and is forecasted to fall to 200 ft or less;

(2) Both Transmissometer (TDZ and MID) of Operating Runway are serviceable.

Date: *05/12/2019* Time of Origin: *0115* UTC

Visibility: *1000* m

RVR Runway *01R*: TDZ: *1100* m
MID: *1000* m
RVR Runway *19L*: TDZ: *1100* m
MID: *1000* m

Cloud Ceiling:

Trend: *BECMG 0800 MIFG*

Any other pertinent information:-

To (1) WSO:
(2) D.O. Tower:

Signature of D.O.Met (with date and time)

TEMPLATE FOR ADVISORY MESSAGE
India Meteorological Department

Reference Paragraph 11b of Page 24 of AIP India Supplement 32/2007

To be issued only when,

(1) RVR of operating runway is likely to fall below 800 m and/or cloud ceiling is likely to fall to 200 ft or less within next two hours;

(2) Both Transmissometer (TDZ and MID) of operating runway are serviceable.

Date: *05/12/2019* Time of Origin: *0115* UTC

Visibility: *0900* m

RVR Runway *01R*: TDZ: *1000* m
MID: *1000* m
RVR Runway *19L*: TDZ: *1000* m
MID: *1000* m

Cloud Ceiling:

Trend: *BECMG 0700 MIFG*

Any other pertinent information:-

To (1) WSO:
(2) D.O. Tower:

Signature of D.O.Met (with date and time)

Appendix - V

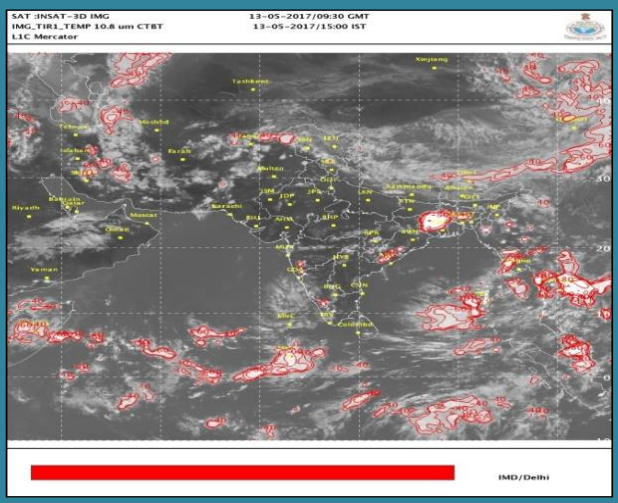
ICAO ABBREVIATIONS

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	Volcanic Eruption	**SN**	Snow
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 (without Precipitation)

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	Kilometres	**WRNG**	Warning
KMH	Kilometre 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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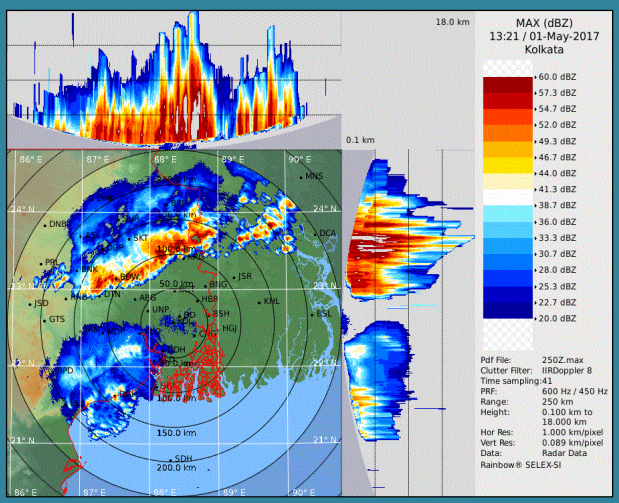
13-05-2017/15:00 IST
IMD/Delhi


MAX (dBZ)
13:21 / 01-May-2017
Kolkata
18.0 km
0.1 km
60.0 dBZ
57.3 dBZ
54.7 dBZ
52.0 dBZ
49.3 dBZ
46.7 dBZ
44.0 dBZ
41.3 dBZ
38.7 dBZ
36.0 dBZ
33.3 dBZ
30.7 dBZ
28.0 dBZ
25.3 dBZ
22.7 dBZ
20.0 dBZ
Pdf File: 250Z.max
Clutter Filter: IIRDoppler 8
Time sampling:41
PRF: 600 Hz / 450 Hz
Range: 250 km
Height: 0.100 km to 18.000 km
Hor Res: 1.000 km/pixel
Vert Res: 0.089 km/pixel
Data: Radar Data
Rainbow® SELEX-SI