



YCAR PART VIII

SUBPART 7

METEOROLOGICAL SERVICES

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FOREWORD

- 1 The Civil Aviation and Meteorology Authority (hereinafter “Authority”) has implemented YCAR Part VIII, Subpart 7 based on ICAO Annex 3 but with additional paragraphs where considered appropriate.
- 2 This issue is dated November 2018. All pages of this issue of Subpart 7 are now current.
3. This issue is based on a review and assessment of currency of terms, and the requirement to update the document.
4. Future amendments of SUBPART 7 shall be harmonized with amendments to ICAO Annexes and Documents in a timely manner.
5. TRANSITION: A MET Service Provider providing a MET service at the date that this Rule Subpart comes into force, may continue to provide the same service for a period of three years, by which time a Certificate as required by this Subpart will be required.

ISSUE HISTORY AND DATE OF APPLICABILITY

Issue No.	Date of issue	Date of applicability
Issue 01	September 2012	September 2012
Issue 02	June 2013	June 2013
Issue 03	November 2018	November 2018

HIGHLIGHTS OF CHANGE

Amendment	Subject(s)
November 2018	<ul style="list-style-type: none">▪ Updates for standardization of terms to reflect Service Certificate Holder▪ Deletion of reference to obsolete WMO documents▪ Addition of requirements to submit documents to CAMA▪ Inclusion of document review interval▪ Update to Appendix 1 including correction to headers▪ Adding Appendix 2 Competence Certificate of AERONAUTICAL METEOROLOGICAL PERSONNE▪ Typos corrected

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SECTION A — GENERAL PROVISIONS

YCAR 7.1 Applicability

- (a) CAMA is required, under article (7/G) of the Decree No.444/2000, to implement international agreements in the field of Meteorology and by article (7/B) of the Decree specified earlier, to promulgate policy for civil aviation and propose laws and regulations relevant thereto.
- (b) Yemen Civil Aviation Regulations Part VIII, Subpart 7 is issued by the Civil Aviation and Meteorology Authority in pursuit of its obligations to ensure enforcement of accepted international regulations and standards within organisations providing Meteorological Services within Yemen FIR as designated by the Authority.
- (c) Subpart 7 provides the Rules governing the certification and operation of organisations providing meteorological services to aviation.
- (d) The objective of meteorological services for international air navigation shall be to contribute towards the safety, regularity and efficiency of international air navigation.
- (e) This objective shall be achieved by supplying all interested aviation organisations with the meteorological information necessary for the performance of their respective functions.
- (f) The organisation responsible for the provision of Meteorological Services shall determine the type and degree of meteorological services to be provided within Sana'a FIR in accordance with the requirements of the ICAO Regional Plan (Doc 9708)
- (g) The organisation responsible for the provision of Meteorological Services may arrange for the services to be provided on its behalf.
- (h) The organisation responsible for the provision of Meteorological Services and the services to be provided shall be included in Yemen AIP.
- (i) No person shall provide an aviation meteorological service except under the authority of, and in accordance with the provisions of, a meteorological certificate issued under this Rule Subpart.

YCAR 7.2 Definitions and Acronyms

Definitions and acronyms are contained in Subpart 1 to YCAR Part VIII.

YCAR 7.3 Application for Certification

- (a) The applicant for a meteorological certificate shall submit an application for a Meteorological Services Certificate to be downloaded from Legislation Section on the CAMA website. All elements of the application shall be completed.
- (b) In the interests of aviation safety, only one certificate for a meteorological service at the same location shall be current at any time.
- (c) The application shall include the locations and airspace at or within which the services will be provided.
- (d) The application shall be submitted to the Authority along with supporting documentation which shall include the exposition required by YCAR 7.20.

YCAR 7.4 Issue of Certificate

- (a) An applicant is entitled to a meteorological certificate if;

1. The applicant meets the requirements of section B of this Subpart;
 2. The applicant and persons holding positions listed in YCAR 7.6(a).1 to 7.6(a).5 inclusive are acceptable to the Authority;
 3. The organisation's exposition as required by YCAR 7.20 is acceptable to the Authority; and;
 4. The Authority is satisfied that the granting of the certificate is not contrary to the interests of aviation safety.
- (b) The validity of a Meteorological Certificate is based on continued operation in accordance with Civil Aviation Regulations, Civil Aviation Advisory Publications and other publications as promulgated by the Authority. The following certificate-relevant provisions shall be considered:
1. A Meteorological certificate remains in force until it expires, is suspended or revoked.
 2. The holder of a meteorological certificate that expires or is revoked shall surrender the certificate to the Authority.
 3. The holder of a meteorological certificate that is suspended shall immediately return the certificate to the Authority for appropriate endorsement.
- (c) The Meteorological Service Certificate shall remain valid subject to periodic surveillance audits conducted at the discretion of the Authority, confirming ongoing compliance with the Civil Aviation Regulations.
- (d) The Authority shall undertake a complete Meteorological Service certification audit at least once in every three-year period following the issue of a Meteorological Service Certificate.

YCAR 7.5 Privileges of Certificate

- (a) A meteorological certificate shall specify which of the following meteorological services and which training and assessment for such services the certificate holder is authorised to provide.
1. Climatology service: a service for the development and supply of climatological information in accordance with the requirements of chapter 8 of Annex 3, for a specific area or airspace;
 2. Forecast service: a service for the supply of forecast meteorological information in accordance with the requirements of chapter 6 of Annex 3, for a specific area or portion of airspace;
 3. Information dissemination service: a service for the collection and dissemination of meteorological information;
 4. Meteorological briefing service: a service for the supply of written and oral meteorological information on existing and expected meteorological conditions in accordance with the requirements of chapter 9 of Annex 3;
 5. Meteorological reporting service: a service for the supply of routine or special meteorological reports in accordance with the requirements of chapter 4 of Annex 3; or;
 6. Meteorological watch service: a service for maintaining a watch over meteorological conditions affecting aircraft operations in a specific area in accordance with the requirements of chapter 7 of Annex 3.

SECTION B — CERTIFICATION REQUIREMENTS

YCAR 7.6 Personnel Requirements

- (a) Each holder of a meteorological service certificate shall engage, employ or contract:
1. A person identified as the Chief Executive who has the authority within the applicant's organisation to ensure that each meteorological service listed in their exposition can be financed and carried out to meet the operational requirements, and in accordance with the requirements prescribed by this Rule subpart;
 2. A person or group of persons who are responsible for ensuring that the applicant's organisation complies with the requirements of this subpart. Such nominated person or persons shall be ultimately responsible to the Chief executive;
 3. An accountable manager responsible for the provision of a safety management system according to the requirements of YCAR Part X; and
 4. Sufficient personnel to plan, operate, supervise, inspect and certify the meteorological offices and facilities and provide the meteorological services listed in the applicant's exposition.
- (b) Each service certificate holder shall establish procedures:
1. To provide training for meteorological personnel in accordance with the WMO requirements contained in as WMO 49, Vol. 1 and 2 and WMO 1083 Vol. 1 and 2, in addition to competence guidelines prescribed in Appendix 2 of this subpart; and
 2. To assess the competence in accordance with WMO requirements of those personnel who are authorised by the applicant to
 - i. Place and maintain facilities listed in the applicant's exposition into operational service;
 - ii. Produce and release meteorological information;
 - iii. Establish a procedure to maintain and develop the competence of those authorised personnel; and;
 - iv. Provide those authorised personnel with written evidence of the scope of their authorisation, i.e. Certificate of Competence.

YCAR 7.7 Facility Requirements

- (a) Each holder of a meteorological service certificate shall determine which meteorological office(s) is intended to be established.

These shall be one or more of the following —

1. A meteorological office either located at, or associated with an aerodrome to carry out some or all of the following tasks as required to meet the requirements of flight operations at the aerodrome:
 - i. prepare and/or obtain forecasts complying with Annex 3 format and validity requirements for:
 - A. departing aircraft; and;
 - B. local meteorological conditions;
 - ii. maintain a continuous watch of meteorological conditions over the aerodrome/s for which it prepares forecasts;
 - iii. provide briefing, consultation and flight documentation to crew members and other flight operations personnel;

- iv. supply other meteorological information, complying with Annex 3 format requirements, to aeronautical users including:
 - A. routine observations and reports;
 - B. special observations and reports;
 - C. aerodrome warnings;
 - D. wind-shear warnings; and;
 - E. other warnings as locally agreed
- v. display available meteorological information;
- vi. exchange meteorological information with other meteorological offices; or
- vii. supply information on pre-eruption volcanic activity, volcanic eruptions or ash cloud to associated ATS units, AIS units and meteorological watch offices as per letters of agreement;

2. A meteorological watch office which shall—

- i. maintain a watch over meteorological conditions affecting flight operations within the watch office's area of responsibility;
- ii. prepare and supply SIGMET and other information related to its area of responsibility to associated air traffic services;
- iii. disseminate SIGMET information by AFTN;
- iv. when required by regional air navigation agreements or letters of agreement—
 - A. prepare AIRMET information related to its area of responsibility;
 - B. supply AIRMET information to associated ATS units; and;
 - C. disseminate AIRMET information;
- v. supply information on pre-eruption volcanic activity, volcanic eruptions or ash cloud, for which a SIGMET has not been issued, to its associated ATS units, AIS units as per letters of agreement, and to its associated VAAC as determined by regional air navigation agreement; and;
- vi. supply information received concerning the accidental release of radioactive materials into the atmosphere in the area for which it has responsibility, or in adjacent areas to its associated ATS units, AIS units as per letters of agreement.

3. An aeronautical meteorological station which shall –

- i. be established at aerodromes and offshore structures as deemed necessary by the organisation responsible for the provision of Meteorological Services to support both international air operations and off shore helicopter operations;
- ii. make routine observations at fixed intervals; and;
- iii. at aerodromes, make special observations whenever specified changes occur in respect of surface wind, visibility, runway visual range, present weather, clouds and /or air temperature.

(b) Each holder of a meteorological service certificate shall establish procedures to ensure that--

- 1. Each of the meteorological offices and facilities listed in their exposition is --
 - i. sited and configured in accordance with security measures designed to prevent unlawful or accidental interference; and;
 - ii. provided with suitable power supplies and means to ensure appropriate continuity of service;
- 2. Equipment and instruments used are in accordance with ICAO Doc 8896;
- 3. When applicable, each remote weather sensing facility listed in their exposition is installed and maintained in a technically appropriate position to ensure that the facility provides an

- accurate representation of the local meteorological conditions; and
4. Information concerning adverse weather conditions is disseminated to the maximum extent to all concerned agencies.

YCAR 7.8 Communication Requirements

- (a) Each holder of a meteorological service certificate shall establish communication systems and procedures to ensure that each of the meteorological offices and facilities listed in their exposition can provide the meteorological information services in a timely reliable manner.
- (b) Communication systems and procedures must be able to handle the volume and nature of the meteorological information being communicated so that no meteorological information is delayed to the extent that the information becomes out of date.

YCAR 7.9 Input Requirements

- (a) Each holder of a meteorological services certificate shall establish procedures to obtain input meteorological information appropriate to the meteorological service being provided.
- (b) The procedures shall ensure that:
 1. Each meteorological office or facility listed in the holder's exposition that provides:
 - i. a forecast service has continuous access to appropriate historical, real-time, and other meteorological information for the applicable forecast areas;
 - ii. a meteorological briefing service in person or by any other interactive visual means, has adequate display and briefing resources available for the briefings;
 - iii. a meteorological reporting service has adequate observing systems to supply adequate, accurate and timely meteorological reports in accordance with the requirements of Annex 3 Chapter 4; and;
 - iv. a meteorological watch service has adequate meteorological information to supply an adequate, accurate and timely meteorological watch service; and
 - v. a climatology service has adequate meteorological information for the preparation of climatological information.
 2. Aircraft reports and observations are processed appropriately according to the service being provided by the meteorological office.

YCAR 7.10 Output Requirements

- (a) Each holder of a meteorological services certificate shall:
 1. Identify the output meteorological information provided by each meteorological service listed in their exposition;
 2. Determine the standards and formats for that output meteorological information, in accordance with the requirements of the relevant chapter and appendix of Annex 3 as well as the requirements of Attachments A, B and C of Annex 3; and
 3. Comply with the standards and formats determined under YCAR 7.10(a) (2).
- (b) Each holder of a meteorological services certificate shall establish procedures to ensure that the meteorological information supplied by each meteorological office and facility listed in their exposition is consistent with ICAO Human Factors principles and shall be in forms which require a minimum of interpretation by users.

(c) Each holder of a meteorological service certificate shall establish letters of agreement or similar service provision agreements with the users of the holder's meteorological service/s, covering the user's requirements including notification requirements.

(d) Each holder of a meteorological services certificate with respect to a meteorological briefing service, wishing to automate an information bulletin shall obtain CAMA approval of the automated system in accordance with *CAAP 25 AIR NAVIGATION FACILITIES* for Operational Approvals.

Where the automated system is to include aeronautical information required by YCAR Part VIII, Subpart 2, Section F, agreement with the provider of the AIS Briefing service will be required.

(e) Each holder of a meteorological services certificate, with respect to a meteorological reporting service, shall establish procedures to ensure that the reports issued comply with the requirements of Annex 3, Chapter 4.

YCAR 7.11 Equipment Requirements

(a) Each holder of a meteorological services certificate shall establish procedures to ensure that all electronic data processing facilities used in the acquisition, compilation, computing, access or dissemination of meteorological information are of a nature, configuration and capability to ensure the adequacy, accuracy and timeliness of that meteorological information and other information relevant thereto..

(b) At aerodromes with runways intended for Category II and III ILS operations, automated equipment for measuring or assessing, as appropriate, and for monitoring and remote indicating of surface wind, visibility, RVR, cloud base height, air and dew-point temperatures and atmospheric pressure shall be installed to support approach, landing and take-off operations.

These devices shall be integrated automatic systems for the acquisition, processing, dissemination and display in real time of the meteorological parameters affecting landing and take-off operations.

Human factor principles should be observed in the design of these devices.

(c) At aerodromes with runways intended for Category I ILS operations, the requirements of YCAR 7.11(b) should be met.

YCAR 7.12 Documentation

(a) Each holder of a meteorological services certificate shall hold copies of meteorological office manuals, facility manuals, technical standards and practices, procedure manuals and any other documentation that is necessary for the provision of the meteorological services listed in their exposition.

These documents shall include, but are not limited to:

1. Annex 3;
2. ICAO Doc 7030;
3. ICAO Doc 7192;
4. ICAO Doc 8896;
5. ICAO Doc 9328;

6. ICAO Doc 9377;
7. ICAO Doc 9708;
8. ICAO Doc 9837;
9. ICAO Doc 9859.
10. WMO Publication 49, volumes 1 and 2; and;
11. WMO Publication 1083, volumes 1 and 2.

(b) Each holder of a meteorological services certificate shall establish a procedure to control the documentation required by YCAR 7.12(a).

The procedure shall ensure that:

1. The documentation is reviewed and authorised by appropriate personnel before issue;
2. Current issues of relevant documentation are available to personnel at all locations where they need access to such documentation for the provision of the meteorological services listed in the applicant's exposition;
3. Obsolete documentation is promptly removed from all points of issue or use;
4. Changes to documentation are reviewed and approved by appropriate personnel; and
5. The current version of each item of documentation can be identified to preclude the use of out of date editions.

(c) ICAO Standards & Recommended Practices (SARPs) and Procedures for Meteorological Service for International Air Navigation (PANS) have the following regulatory status:

1. Standards: Mandatory unless specifically modified in the applicable parts of Supplements to the Annexes or in the YCAR.
2. Recommended Practices: Non-Mandatory but preferable.
3. PANS: Shall be applied, with similar Mandatory status as for the SARPs, except where specifically deleted or modified in the YCAR.
4. Definitions, tables, figures and appendices contained in ICAO Annexes are to be considered as Standards and therefore mandatory, when applicable.
5. Attachments to ICAO Annexes are supplementary to SARPs or included as general guidance material. Where specific or general applications are considered necessary for additional safety levels, these are included in the Civil Aviation Regulations and carry Mandatory status.

(d) The following documents shall be submitted to the Authority for acceptance.

Document Module including Change Requests for any amendments:

1. Exposition (refer to YCAR 7.20)
2. Quality Management System Manual (refer to YCAR 7.18)
3. Operations Manual (refer to YCAR 7.22)
4. Training and Competency Manual (refer to YCAR 7.6 (b))

Note: All documentation should be reviewed at intervals not exceeding twenty four (24) months, or, at any earlier time whenever necessity calls for it. The review shall be recorded and authorised before issue.

YCAR 7.13 Periodic Inspection, Testing and Calibration

- (a) Each holder of a meteorological services certificate shall establish procedures for—
1. The periodic inspection of each aeronautical meteorological office listed in the applicant's exposition; and
 2. The periodic inspection, testing and calibration of each facility listed in the applicant's exposition.
- (b) The procedures shall ensure that—
1. Appropriate inspection equipment and systems are available to personnel for the inspection of each meteorological office;
 2. Appropriate inspection, measuring and test equipment and systems are available to personnel for the inspection, testing and calibration of each facility;
 3. The inspection, measuring and test equipment and systems have the precision and accuracy necessary for the inspections, measurements and tests being carried out; and
 4. All meteorological sensing facilities are calibrated and configured so that the environmental sensors fitted or incorporated yield, as far as possible, reliable, accurate and representative meteorological information.

YCAR 7.14 Release of Meteorological Information

- (a) Each holder of a meteorological services certificate shall establish procedures for—
1. The release of meteorological information from each meteorological office listed in their exposition; and;
 2. The placing and maintenance of facilities listed in their exposition into operational service.
- (b) The procedures shall ensure that persons authorised to supervise the production and release of meteorological information and persons authorised to place meteorological facilities into operational service have been assessed as competent under the procedures required by YCAR 7.6(b).

YCAR 7.15 Notification of Meteorological Office and Facility Status

- (a) Each holder of a meteorological services certificate shall establish procedures to notify the users of the holder's meteorological services of relevant operational information and of any changes in the operational status of each meteorological office or facility listed in the holder's exposition.
- (b) The holder must ensure that the procedures established under YCAR 7.15(a) require—
1. The operational information for each of the meteorological services granted that support Yemen air navigation service/system or air traffic service to be forwarded to the Aeronautical Information Service for publication in Yemen AIP; and;
 2. The users of a meteorological office or facility to be notified without delay of any change in the operational status of the meteorological office or facility if the change may affect the safety of air navigation. For those meteorological offices and facilities published in Yemen AIP, the information concerning any change to their operational status must be forwarded to the AIS for the issue of a NOTAM.

- (c) Notification required from the operators should be in accordance with the requirements of Annex 3, Chapter 2.

YCAR 7.16 Meteorological Information Check after Accident or Incident

- (a) Each holder of a meteorological services certificate shall establish procedures for checking the adequacy, accuracy and timeliness of any of their meteorological information that may have been used by an aircraft or an air traffic service involved in an accident or incident.
- (b) The procedures shall ensure that—
1. The checks are carried out as soon as practicable after notification to the holder's organisation of such an accident or incident;
 2. Meteorological offices shall supply search and Rescue Services Units with meteorological information required, which should be in a form established by mutual agreement; and;
 3. Copies of the meteorological information are kept in a secure place for possible use by any subsequent investigation.

YCAR 7.17 Records

- (a) Each holder of a meteorological services certificate shall establish procedures to identify, collect, index, store, maintain and dispose of the records that are necessary for the supply of the meteorological services listed in their exposition.
- (b) The procedures shall ensure that—
1. There is a record of the input meteorological information obtained under the procedures required by YCAR 7.9;
 2. There is a record of all output meteorological information identified under YCAR 7.10;
 3. The records specified in YCAR 7.17 (b).1 and 7.17 (b).2 are retained for a period of at least 31 days or for such longer period as may be required by the Authority;
 4. There is a record for each meteorological office and facility listed in the holder's exposition, in order to document the performance of each meteorological office and facility and to provide a traceable history of its maintenance, service and product quality, its periodic inspections, and the person responsible for each of these activities;
 5. There is a record of the equipment and systems used for verification, inspection, testing and calibration under the procedures required by YCAR 7.13. The record shall provide a traceable history of the location, maintenance and calibration checks for the equipment and systems;
 6. There is a record of each occurrence of erroneous meteorological information reported and of each malfunction detected under the procedures required by YCAR 7.18 (e). The record shall detail the nature of the erroneous meteorological information or malfunction and the findings of the investigation and the follow-up corrective actions;
 7. There is a record of each internal quality review of the holder's organisation carried out under the procedures required by YCAR 7.18. The records shall detail the part or activity of the organisation that was reviewed, the findings of the review and any necessary follow-up corrective actions;
 8. There is a record for each person who is authorised by the holder to supervise the production and release of meteorological information and for each person who is authorised by the holder to place into, and maintain facilities in, operational service. The record shall include details of their experience, qualifications, training and current authorisations;
 9. All records are legible and of a permanent nature; and;

10. All records other than those required by YCAR 7.17 (b).1 and 7.17 (b).2 are retained for at least one year, or for such longer period as may be required by the Authority, in order to establish a history of the performance of the meteorological services.

YCAR 7.18 Internal Quality Management

- (a) Each holder of a Meteorological Service Certificate shall establish internal quality management procedures to ensure compliance with, and the adequacy of, the procedures required by this Subpart.
- (b) The quality system established in accordance with YCAR 7.18(a) shall conform to ISO 9000 standards and shall be certified by an approved organization.
- (c) The person who has responsibility for internal quality management shall have direct access to the Chief Executive on matters affecting the adequacy, accuracy and timeliness of the meteorological information.
- (d) When the quality management procedures indicate that meteorological information to be supplied does not comply with the output requirements of YCAR 7.10 (a). 3, and automatic error correction procedures are not appropriate, such information shall not be supplied to the users unless it is validated with the originator.
- (e) The quality system shall include procedures and resources for –
 1. The routine verification of meteorological information obtained and provided by the holder; and;
 2. The assessment of the timeliness of transmission of messages or bulletins.
- (f) Each holder of a meteorological services certificate shall establish procedures—
 1. To identify, record, notify, investigate and rectify any report of erroneous meteorological information;
 2. To identify, record, notify, investigate and rectify any detected malfunction in the facilities and meteorological services listed in their exposition that may result in the supply of erroneous meteorological information;
 3. To notify without delay all users who have received the erroneous meteorological information;
 4. To notify the Authority, within 12 hours, of those malfunctions that cannot be remedied within 72 hours; and;
 5. To fulfill the status reporting requirements in the case of continuation of malfunction whenever such reports are required by the Authority.

YCAR 7.19 Safety Management

- (a) Each holder of a Meteorological Service Certificate should, whenever desirable, establish a safety management system that, as a minimum, complies with YCAR Part X.
- (b) A unit providing meteorological services should define appropriate target levels of safety and alert levels for the occurrences listed in Appendix 1, and submit them annually to the CAMA ANA Principal Inspector.

YCAR 7.20 Organizational Exposition

- (a) Each holder of, or applicant for, a Meteorological Services Certificate shall provide the Authority with an exposition which shall contain—
1. A statement signed by the Chief Executive on behalf of the holder or applicant's organisation confirming that the exposition and any included manuals—
 - i. define the organisation and demonstrate its means and methods for ensuring ongoing compliance with this Subpart; and;
 - ii. will be complied with at all times;
 2. The titles and names of the person or persons required by YCAR 7.6 (a).1 to 7.6 (a).5 ;
 3. The duties and responsibilities of the person or persons specified in YCAR 7.6 (a).1 to 7.6.(a) 5;
 4. An organisation chart showing lines of responsibility of the persons specified in YCAR 7.20(a).2;
 5. A summary of the holder or applicant's staffing structure at each meteorological office listed under YCAR 7.20 (a).7.i;
 6. A list of the meteorological services to be covered by the certificate;
 7. A list providing—
 - i. the location of each meteorological office operated by the holder or applicant;
 - ii. the location of each facility operated by the holder or applicant that provides meteorological information directly to the users;
 - iii. the meteorological services provided by each of those meteorological offices and facilities; and;
 - iv. the locations and airspace covered by such meteorological services;
 8. Details of the holder or applicant's output meteorological information identified under YCAR 7.10 (a).1 and the standards and formats for that information determined under YCAR 7.10 (a).2;
 9. Details of the holder or applicant's procedures and systems required by this Subpart; and;
 10. Procedures to control, amend and distribute the exposition.
- (b) The holder or applicant's exposition shall be acceptable to the Authority.

SECTION C — OPERATING REQUIREMENTS

YCAR 7.21 Continued Compliance

(a) Each holder of a meteorological service certificate shall –

1. Hold at least one complete and current copy of their exposition at each meteorological office specified in their exposition;
2. Comply with all procedures and systems detailed in their exposition;
3. Make each applicable part of their exposition available to personnel who require those parts to carry out their duties;
4. Continue to meet the standards and comply with the certification requirements prescribed in Section B and conducted under YCAR Part VIII, Subpart 7; and;
5. Notify the Authority of any change of address, telephone or facsimile number, or e-mail address required by the CAMA within 30 days of the change, via the application form on the Legislation section of the CAMA website

YCAR 7.22 Operations Manual

(a) Each holder of a meteorological services certificate shall provide an operations manual for each meteorological office listed in their exposition. The manual shall set out the procedures for the operation and maintenance of the meteorological office and associated facilities and shall include a list of –

1. The meteorological information and meteorological services provided;
2. The minimum acceptable operating parameters and standards for facilities;
3. The minimum meteorological inputs required;
4. The minimum performance and quality levels for output meteorological information and meteorological services provided;
5. The test equipment and systems required for the measurement of the minimum levels listed under YCAR 7.22 (a).4; and;
6. Any mandatory check procedures for releasing meteorological information.

The holder shall ensure that the operations manual is kept up to date with respect to amendments to Annex 3.

YCAR 7.23 Limitation on Certificate Holder

(a) The holder of a meteorological service certificate shall not—

1. Provide meteorological information where the meteorological input information required to provide that meteorological information is not available;

2. Provide meteorological information where the operational performance of the meteorological office or facility producing that meteorological information does not meet the applicable requirements;
3. Provide meteorological information where any integrity monitoring system associated with that meteorological information is not fully functional; or provide meteorological information where any required verification, inspection, test or calibration relating to that meteorological information has not been completed; or;
4. Provide meteorological information where there is any cause whatsoever to suspect the integrity of that meteorological information.

YCAR 7.24 Changes to a Certificate Holder's Organisation

- (a) Each holder of a meteorological service certificate shall ensure that their exposition is amended so as to remain a current description of the holder's organisation and meteorological services provided.
- (b) The certificate holder shall ensure that any amendments made to the holder's exposition meet the applicable requirements of this Subpart and comply with the amendment procedures contained in the holder's exposition.
- (c) The certificate holder shall provide the Authority with a copy of each amendment to their exposition as soon after its incorporation into the exposition as practicable.
- (d) Where a certificate holder proposes to make a change to any of the following, prior notification to and acceptance by the Authority is required —
 1. The Chief Executive;
 2. The person/s listed in YCAR 7.6 (a).2 to 7.6 (a) 5;
 3. Meteorological services provided by the holder; or;
 4. The locations and airspace covered by each of the meteorological services provided by the holder.
- (e) The notification of changes shall be made by completing the appropriate application form on the CAMA Website.
- (f) The Authority may prescribe conditions under which a certificate holder may operate during or following any changes specified in YCAR 7.24 (d).
- (g) The certificate holder shall comply with any conditions prescribed under YCAR 7.24 (e).
- (h) Where any of the changes referred to in this Rule require an amendment to the certificate, the certificate holder shall forward the certificate to the Authority as soon as practicable.
- (i) The certificate holder shall make any amendments to the holder's exposition as the Authority may consider necessary in the interests of aviation safety.

YCAR 7.25 Safety Inspections and Audits

- (a) The Authority may, in writing, require the holder of a meteorological service certificate to undergo or carry out such inspections and audits of the holder's meteorological offices, facilities, documents and records as the Authority considers necessary in the interests of civil aviation safety and security in accordance with Article 7.10 of the CAMA Law.

(b) The Authority may require the holder of a meteorological service certificate to provide any information as the Authority considers relevant to the inspection or audit.

APPENDIX 1

Measure	National Target Level	Previous year Achieved Level of Safety	Present year Target Level of Safety	Next year Target Level of Safety	Supporting Action Details
Reporting Service					
Errors in METAR/SPECI reports not picked up prior to transmission	Maximum 0.5% error rate				
Timely issuance of flight documentation and reports	90% issued in timely manner				
Forecasting Service	Minimum %				
TAF Accuracy elements:					
• Wind Direction and Speed in accordance with Annex 3 Attachment B	80%				
• Visibility accuracy in accordance with Annex 3 Attachment B	80%				
• Precipitation Occurrence or non-occurrence Accuracy	80%				
• Cloud Amount and Height	70%				

Measure	National Target Level	Previous year Achieved Level of Safety	Present year Target Level of Safety	Next year Target Level of Safety	Supporting Action Details
• Air Temperature within ± 1°C.	70%				
Fog Prediction Accuracy (either forecast but did not appear or appeared but was not forecast.)	80%				
Forecasts for Take-off Elements					
• Wind Direction and Speed in accordance with Annex 3 Attachment B	90%				
• Air Temperature in accordance with Annex 3 Attachment B	90%				
• Pressure Value in accordance with Annex 3 Attachment B	90%				

APPENDIX 2

A2. COMPETENCE CERTIFICATE OF AERONAUTICAL METEOROLOGICAL PERSONNEL (AMP)

A2.1 COMPETENCE CERTIFICATE OF AERONAUTICAL METEOROLOGICAL OBSERVER (AMO)

A2.1.1 General rules concerning Competence Certificate of Aeronautical Meteorological Observer (AMO)

To be eligible for Competence Certificate of Aeronautical Meteorological Observer (AMO), an applicant shall:

- (a) Have successfully completed BIP-MT training course;
- (b) Successfully complete Special courses in aviation knowledge and procedures for meteorological service to international air navigation, according to WMO and ICAO standards ;
- (c) Successfully complete the OJT on aeronautical meteorological Observations;
- (d) Demonstrate basic competence in compiling such observations.

Note (1)

A Competence Certificate of Aeronautical Meteorological Observer (AMO) will be awarded to Weather Observer who:

- a) satisfies the qualification criterion required of a WMO Meteorological Technicians. WMO-No.1083, (Edition of 2015) *Manual on the Implementation of Education and Training Standards in Meteorology and Hydrology, Volume I – Meteorology* defines the WMO requirements for training and qualification as a Meteorological Technicians; and
- b) has successfully completed training and an approved competency assessment of Aerodrome Meteorological Observations;

Note (2)

A Competence Certificate of Aeronautical Meteorological Observer (AMO) that he/she has will permit him/her to provide aerodrome meteorological observations. AMO's are issued certificates on a perpetual basis. However, to exercise the privileges of the certificate an ongoing competency assessment is required.

A2.1.2 General Requirements for Aeronautical Meteorological Observer (AMO)

A2.1.2.1 Duties and tasks in aeronautical meteorological stations

The functions of aeronautical meteorological stations serving international air navigation are set out in section 4 of WMO-No. 49, Vol. II, C.3.1. The primary tasks, extracted from subsection [C.3.1.] 4.1.3 may be summarized as follows:

- (a) Make routine meteorological observations at fixed intervals.
- (b) Make special weather observations whenever specified changes occur in respect of surface wind, visibility, runway visual range, present weather, clouds and/or air temperature.

A2.1.2.2 Knowledge and skills requirements in weather observing

In order to carry out these duties and tasks, observers need to constantly monitor the local meteorological conditions. Their training should be guided by ' WMO-No.1083, (Edition of 2015) *Manual on the Implementation of Education and Training Standards in Meteorology and Hydrology, Volume I – Meteorology* ' from which the following summary has been extracted:

- (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.

A2.1.2.3 Specific knowledge and skills for aeronautical observing

In addition to the general observing skills, an aeronautical observer is required to constantly monitor the meteorological conditions at the aerodrome and its vicinity; and to have skills and knowledge in the use of aviation specific codes and practices as well as an appreciation of the impact of their observations on aviation operations. These, which have been extracted from WMO-No. 49, Vol. II and from WMO-No. 258, Chapter 4, are summarized below.

- (a) Aeronautical observations. Knowledge of the procedures for the making of routine and special observations and reports (As described in WMO-No. 49, Vol. II).
- (b) Hazardous phenomena. Elementary knowledge of the phenomena hazardous to aviation (As listed in the Annex to Chapter 4 of WMO-No. 258).
- (c) Meteorological aspects of flight planning. Knowledge of the technical regulations (As described in WMO-No. 49, Vol. II).
- (d) Reporting, coding, and dissemination of weather information. Knowledge of the technical regulations (As described in WMO-No. 49, Vol. II).
- (e) Definitions. Knowledge of the aeronautical definitions (As listed in the Annex to Chapter 4 of WMO-No. 258).
- (f) Procedures for meteorological services for international aviation (As listed in the Annex to Chapter 4 of WMO-No. 258).
- (g) Air traffic services. Knowledge of the technical regulations (As described in WMO-No. 49, Vol. II).
- (h) Operation of aircraft. Elementary knowledge of the operations (As listed in the Annex to Chapter 4 of WMO-No. 258).
- (i) Aeronautical telecommunications. Elementary knowledge of the general organization of aeronautical telecommunications (As listed in the Annex to Chapter 4 of WMO-No. 258).

- (j) World Meteorological Organization (WMO) and International Civil Aviation Organization (ICAO) documentation. Knowledge of the documents.

A syllabus for the training required to acquire this knowledge and skill is framed in section (A3.1.2.5) below.

A2.1.2.4 Competency requirements in aeronautical observing

Following training, it is usual for observers to undergo a period of on-the-job training at an aviation observing office before being permitted to operate unsupervised. During this period of training, observers develop the job competencies set out in WMO -No. 258 (Annex to Chapter 4) and WMO-No. 49, learn any special procedures relevant to the country or office in which they are working and also how products are generated and issued. When establishing the minimum job competencies that an observer must reach before becoming 'independent', it is essential to understand the area of operations and to interpret which job competencies are of high and which are of lower importance. That balance will change depending on region. Therefore, a critical part of the on-the-job training is to become familiar with the procedures used in the area.

Job competencies will vary from job to job but the following are the generic competencies that should be demonstrated by an aeronautical meteorological observer:

- (a) Make and disseminate aeronautical weather observations in accordance with International Civil Aviation Organization (ICAO) and World Meteorological Organization (WMO) regulations.
- (b) Identify hazardous aviation conditions and their likely impact on aircraft operations.
- (c) Describe the impact of a range of meteorological conditions on aviation operations and procedures.
- (d) Assist the aeronautical aviation forecaster.

A2.1.2.5 Syllabus framework for Aeronautical Meteorological Observers (AMO)

The training of new aeronautical meteorological observers is set out in detail in WMO - No. 258. The following syllabus is intended to be used to both confirm that the training of existing aeronautical observers is adequate and to help identify any gaps or omissions so that they may be corrected and the integrity of air safety maintained.

The following list, taken from WMO-No. 258, Annex to Chapter 4, enumerates the topics that should be covered; however, bearing in mind that this syllabus provides the underpinning skills and knowledge for the competencies in Section 2.4, the order of presentation and the extent to which the topics are addressed may vary from one country to another depending on local conditions.

(a) Observing techniques:

- Surface wind direction and speed; wind variations.
- Visibility; definition of visibility for aeronautical purposes.
- RVR, spatial and temporal variations, methods of assessment;

- Vertical visibility.
- Cloud amount, height and type; spatial and temporal variations;
- Pressure; determining QFE and QNH;
- Meteorological observing equipment calibration standards and maintenance procedures.

(b) Hazardous phenomena:

- Aircraft icing; icing types; formation, accretion rates and association of icing with clouds, freezing precipitation, orographic and frontal lifting.
- Turbulence; turbulence near the ground, high-level turbulence (CAT).
- Reduced surface visibility.
- Low-level clouds.
- Thunderstorms; associated phenomena.
- Tropical cyclones.
- Wind shear.
- Volcanic ash.

(c) Meteorological aspects of flight planning:

- Meteorological requirements for en-route and aerodrome forecasts and reports.
- Interpretation of area, route and terminal forecasts.
- Preparation of material for briefing of flight crews.

(d) Reporting, coding and dissemination of weather information.

- Meteorological codes related to observations and forecasts; METAR, SPECI, SYNOP, PILOT, TEMP, TAF and ROFOR.
- Dissemination of weather information at the aerodrome; special needs of ATC units.
- Plain language forms of meteorological messages. Local routine and special reports.

(e) International Civil Aviation Organization (ICAO) definitions and terms:

- Meteorological report, observation.
- Visibility (for aeronautical purposes), runway visual ranges.
- Altitude, elevation, height, aerodrome elevation, flight-level, transition level.
- Aerodrome meteorological minima, instrument runway, landing area.
- Landing forecast, aerodrome forecast, GAMET area forecast.
- SIGMET and AIRMET information; briefing; routine and special air-report.
- Operator, pilot-in-command.

(f) Meteorological services for international aviation:

- Meteorological offices and meteorological watch offices; their functions.
- Aeronautical meteorological stations; their functions.
- Local routine and special observations and reports, METAR and SPECI.
- Aircraft observations and reports; their ground-to-ground dissemination.
- Responsibilities of International Civil Aviation Organization (ICAO) and World Meteorological Organization (WMO) in aeronautical meteorology.

(g) Air traffic services:

- Meteorological information required by air traffic services units; duplicate displays required in ATS units.

- Category II and III operations; role of runway visual range and height of cloud base information.
- Low Visibility Procedures (LVP).

(h) Operation of aircraft:

- Flight planning.
- Navigation and landing aids.
- Effects of meteorological parameters on aircraft performance and fuel consumption.
- Altimeter setting procedures, standard atmosphere.
- Effects of meteorological phenomena on aerodrome ground services.

(i) Aeronautical telecommunications:

- Organization of aeronautical telecommunications.
- Aeronautical fixed service (particularly AFTN and ATN), and any special broadcasts and/or regional telecommunications networks applicable to the region concerned.
- Message headings, addressing of messages, priorities of messages and any appropriate regional procedures.
- International Civil Aviation Organization (ICAO) abbreviations and codes.

(j) International Civil Aviation Organization (ICAO) and World Meteorological Organization (WMO) documentation – see References list.

Note: Some civil aviation administrations in specific circumstances authorise air traffic services (ATS) personnel to make meteorological observations at an aerodrome. As indicated in ICAO Annex 1—Personnel Licensing, the training syllabi for the ATS personnel concerned should be supplemented by relevant parts of the syllabus of the Aeronautical Meteorological Technician given under items (a) to (d) above.

A2.2 COMPETENCE CERTIFICATE OF AERONAUTICAL METEOROLOGICAL FORECASTER (AMF)

A2.2.1 General rules concerning Competence Certificate of Aeronautical Meteorological Forecaster (AMF)

To be eligible for Competence Certificate of Aeronautical Meteorological Forecaster (AMF), an applicant shall:

- (e) Be not less than 23 years of age.
- (f) have successfully completed WMO-BIP-M training course;
- (g) Successfully complete Special courses in aviation knowledge and procedures for meteorological service to international air navigation, according to WMO and ICAO standards;
- (h) Complete the OJT and pass a test on aeronautical meteorological forecasting and warnings bulletins; and;
- (i) Demonstrate basic competence in compiling such forecasting and warnings.

Note (1)

Competence Certificate of Aeronautical Meteorological Forecaster (AMF) will be awarded to a meteorologist who:

- c) satisfies the qualification criterion required of a WMO meteorologist. WMO-No.1083, (Edition of 2015) *Manual on the Implementation of Education and Training Standards in Meteorology and Hydrology, Volume I – Meteorology* defines the WMO requirements for training and qualification as a Meteorologist;
- d) has successfully completed training and an approved competency assessment of Aeronautical Meteorological Forecasting and Warnings;

Note (2)

A Competence Certificate of Aeronautical Meteorological Forecaster (AMF) that he/she has will permit him/her to provide Aeronautical meteorological forecasting and warnings. An Aeronautical Meteorological Forecaster is issued a certificate on a perpetual basis. However, to exercise the privileges of the certificate an ongoing competency assessment is required.

A2.2.2 General Requirements for Aeronautical Meteorological Forecaster (AMF)

A2.2.2.1 Duties and tasks in aeronautical meteorological offices

The functions of meteorological offices serving international air navigation are set out in WMO-No. 49, Vol. II, C.3.1, sub-sections [C.3.1.] 3.3 and [C.3.1.] 3.4. The primary duties extracted from that Chapter might be summarized as follows:

- (a) Prepare and/or obtain forecasts and other relevant information for aerodromes, flight information regions, routes and flights with which it is concerned.
- (b) Maintain a continuous survey of meteorological conditions over the aerodromes, flight information regions and routes for which it is designated to prepare forecasts.

The extent of the office's responsibilities to prepare forecasts shall be related to the local availability and use of en-route and aerodrome forecast material received from other offices.

A2.2.2.2 Knowledge and skills requirements in weather forecasting

Forecasters working in meteorological offices serving international air navigation must have the knowledge and skills to maintain an appropriate weather watch, to analyse the weather situation and to prepare and communicate weather forecasts. The guidance below is taken from WMO-No. 258, Chapter 2:

- (a) Atmospheric processes and phenomena. Know and be able to explain the main atmospheric processes and phenomena from the planetary to local scales; and know the region-specific weather phenomena, and be able to interpret the major meso-local scale particularities of the atmospheric dynamics over the assigned area.
- (b) Analysing and monitoring the weather. Analyse and interpret synoptic charts, diagrams and graphics; integrate all available data to produce a consolidated diagnosis; perform real-time

weather monitoring, utilising all available remote sensing technologies such as radar surveillance and satellite imagery; constantly monitor the actual weather evolution, particularly the severe weather aspects associated with microclimates in the assigned area

- (c) Weather forecasting. Know and be able to apply weather forecasting principles, methods and techniques; understand the operation of NWP models; and be able to utilize their strengths while being aware of their weaknesses. Verify, interpret and use NWP output; adding value to model or guidance forecasts where appropriate.
- (d) User-specific forecasts and warnings. Elaborate and distribute regional/local and user-specific forecasts; verify the ongoing forecasts; identify errors and amend erroneous forecasts as appropriate; issue warnings; and provide reliable emergency services. Comprehend users' needs and risk-taking limitations.
- (e) Information technology and data processing. Know and be able to use the operational system technology; and understand and be able to apply basic operating system functions, data processing and visualization technology.

A2.2.2.3 Specific knowledge and skills for aeronautical forecasting

In addition to the general weather analysis and forecasting skills, an aeronautical forecaster is required to have skills in diagnosing and forecasting aviation specific phenomena, knowledge and skills in the use of aviation specific codes and practices, as well as an appreciation of the impact of their forecasts on aviation operations. These, which have been extracted from WMO-No. 258, Chapter 2, are summarized below.

- (a) Weather phenomena. Understand the weather phenomena hazardous to aviation, and their analysis and forecasting; understand which meteorological parameters are crucial for the safety and regular operations of aviation user groups
- (b) Aviation specific phenomena. Enable to forecast aircraft icing; turbulence; wind shear; volcanic ash dispersal; other hazardous phenomena.
- (c) Weather monitoring. Perform continuous monitoring of weather phenomena relevant to aviation including the use of reports from aircraft where available; understand the evolution of the weather phenomena observed at the aerodrome; carry out the required observations and measurements.
- (d) Meteorological codes. Know all aeronautical meteorological codes, and criteria applied for warnings and change groups in TAF and TREND forecasts; follow the standard regulations contained in WMO Technical Regulations.
- (e) Satellite and radar interpretation. Know how to interpret satellite and radar imagery, including analysis of the evolution of convective systems, frontal systems and tropical cyclones, location of fog and stratus, gravity waves in cirrus cloud and jet streams; and detection of icing potential in layer cloud, and of volcanic ash and wind-shear.
- (f) Weather forecasting. Know and apply standard methods, techniques, and other numerical tools for forecasting low clouds, winds (including gusts), fog and reduced visibility, thunderstorms, heavy precipitation, hail, tropical cyclones, and volcanic ash cloud displacement; and know and apply customary algorithms and methods to forecast icing, mountain waves and turbulence (including clear-air turbulence).

- (g) Local forecaster's responsibilities. Perform proficiently the 'local' forecaster's responsibilities, including the evaluation and dissemination of aerodrome warnings and short period forecasts; and understand and appreciate competently the local users' operational requirements.
- (h) Special air-reports. Be able to assess special air-reports and, if appropriate, issue the corresponding SIGMET message.
- (i) International Programmes. Understand the functioning, interpretation and use of products from the World Area Forecast System (WAFS); understand the functioning, interpretation and use of products provided by the Volcanic Ash Advisory Centres (VAACs) and the requirements of the International Airways Volcano Watch (IAVW); understand the functioning of the Tropical Cyclone Advisory Centres (TCACs); and cooperate operationally with air traffic services units.
- (j) Aviation operations. Know meteorological aspects of flight planning; definitions; procedures for meteorological services for international air navigation; Air Traffic Services (ATS); aerodromes; operation of aircraft; Aeronautical Information Services (AIS); aeronautical telecommunications.
- (k) World Meteorological Organization (WMO) and International Civil Aviation Organization (ICAO) documentation - Familiarize with the documents contained in the references list.

A syllabus framework for the training required to acquire this knowledge and skill is given in section (A3.2.2.5).

A2.2.2.4 Competency requirements in aeronautical meteorology

In addition to the knowledge requirements set out above, a practising forecaster should have developed appropriate 'job competencies'.

These comprise the characteristics that should be displayed on a day-to-day basis. They demonstrate not only that a forecaster can apply the knowledge identified in sections (A3.2.2.2) and (A3.2.2.3) above, but also that the knowledge has been adapted to the local area. Additional to this, job competencies also demonstrate whether the forecaster has understood the special requirements of the area of operations, and can interpret which elements of the job competencies are of high and which are of lower importance. That balance will change depending on region.

Job competency will vary from job to job but the following are the minimum generic competencies that should be demonstrated by all aeronautical forecasters:

- (a) Perform weather watch and monitoring, including the ability to detect and forecast hazards relevant to the aviation community, in accordance with International Civil Aviation Organization (ICAO) and World Meteorological Organization (WMO) requirements.
- (b) Derive forecast and warning products to the standards required by the user community.
- (c) Communicate effectively, using appropriate language, with aeronautical users, including oral briefings to pilots and dispatchers as necessary.
- (d) Tailor meteorological products and services to aviation operations, in accordance with local aviation procedures and regulatory requirements.

A2.2.2.5 Syllabus framework for Aeronautical Meteorological Forecaster (AMF)

The training of new Aeronautical Meteorological Forecasters (AMF) is set out in detail in the Guidelines (WMO-No. 258). The following syllabus is intended to be used to both confirm that the training of existing aeronautical forecasters is adequate and to help identify any gaps or omissions so that they may be corrected and the integrity of air safety maintained.

The following list, taken from WMO/TD-No. 1101, section 3.3, enumerates the topics that should be covered; however, bearing in mind that this syllabus provides the underpinning skills and knowledge for the competencies in Section 2.4, the order of presentation and the extent to which the topics are addressed may vary from one country to another depending on local conditions.

(a) Aircraft Icing:

- Theory of formation of icing; processes and dependence upon temperature, drop size, liquid-water content, airframe configuration and aircraft speed.
- Types of icing, clear ice, rime ice, hoar frost and mixed ice.
- Ice accretion rates; association with cloud types; thunderstorms; freezing precipitation; orographic and frontal lifting effects.
- International Civil Aviation Organization (ICAO) criteria for reporting icing.
- Methods of diagnosing and forecasting the risk of icing, and means of avoiding icing areas.
- Operational problems associated with icing: formation and effects of in-flight icing on different types of aircraft; formation or deposition on parked aircraft; formation of in-flight icing in engines.

(b) Turbulence:

- Turbulence near the ground; mechanical turbulence; convective turbulence; effects of boundary-layer turbulence on take-offs and landings; turbulence related to clouds, fronts and thunderstorms.
- High-level Clear Air Turbulence (CAT); association with wind shear, jet streams, stability and tropopause inversion.
- Mountain wave turbulence (both boundary layer and high-level).
- Gravity waves.
- Wake vortex.
- International Civil Aviation Organization (ICAO) criteria for reporting turbulence and mountain waves.
- Methods of diagnosis and forecasting the risk of turbulence.
- Operational problems associated with turbulence; means of avoiding turbulence areas.

(c) Other hazardous phenomena:

- Reduced surface visibility; fog types and their formation and dissipation; and other weather phenomena causing reduced surface visibility.
- Low-level clouds; operational problems associated with low-level clouds in the terminal area and en-route.
- Thunderstorms; associated phenomena; types: air-mass and severe thunderstorms.
- Use of weather/Doppler radar for detecting and forecasting hazardous phenomena.
- Wind shear; operational problems associated with wind shear in the approach and landing phases of flight.
- Tropical cyclones; operational problems associated with tropical cyclones.
- Volcanic ash; operational problems associated with volcanic ash.

(d) Meteorological services for international air navigation:

- Air navigation plans; the associated facilities and implementation document (FASID).
- WAFS; and World Area Forecast Centres (WAFCs) and their functions.
- Warnings for volcanic ash; VAACs and their functions; and IAVW.
- Warnings for tropical cyclones; TCACs and their functions.
- Meteorological offices and their functions; trend forecasts and TAF; wind shear and aerodrome warnings.
- Meteorological watch offices; scope of meteorological watch; SIGMET and AIRMET information.
- Aeronautical meteorological stations; their functions; local routine and special reports, METAR and SPECI.
- Information for operators and flight crew members prior to departure, display of meteorological information and flight documentation.
- Information for aircraft in flight, VOLMET broadcasts and D-VOLMET.
- Information for and from air traffic services; types of meteorological information required by ATS; transmission of aircraft meteorological reports by ATS.
- Forms of meteorological messages; local routine and special reports; METAR and SPECI, TAF aid amendments thereto; trend forecasts; route and area forecasts (including GAMET); SIGMET and AIRMET information; tropical cyclone and volcanic ash advisory; units of measurements.
- Information for search and rescue.
- Aeronautical climatological information.

(e) Meteorological aspects of flight planning:

- Meteorological basis for flight planning: great circle track; composite tracks; wind components; minimum time tracks; D-value; drift angle.
- Requirements for en-route and aerodrome forecasts and reports; use of forecasts from the WAFS; direct supply of information to operators for centralised operational control.
- Preparation of area and route forecasts.
- Briefing of flight crews and operational personnel.

(f) Air traffic services:

- Visual and Instrument Flight Rules (VFR/IFR); and Visual and Instrumental Meteorological Conditions (VMC/IMC).
- Flight Information Service, Automatic Terminal Information Service (ATIS).
- Low Visibility Procedures (LVP)
- Air Traffic Control Service; terrain clearance; cruising level system; vertical separation minima; horizontal separation.
- Functions of Area Control Centre, Approach Control Unit, Aerodrome Control Tower and Flight Information Centre; holding and approach procedures.
- Search and Rescue Services.
- CNS/ATM systems.
- Air reporting; position reporting and meteorological reporting procedures, Automatic Dependent Surveillance (ADS).
- Co-ordination between ATS units and the meteorological service; meteorological observations performed by ATC.
- Transition levels, layers and altitudes; the lowest usable flight level en-route.
- Category II and III operations; role of runway visual range and height of cloud base.

(g) Aerodromes:

- Aerodrome lighting; its relation to operations in lower visibility conditions and to runway visual range (RVR) assessment.
- Effects of meteorological parameters on aerodrome ground services; snow (snow clearing), precipitation (the effect of wet runways on braking action).
- Parameters related to meteorology required by aerodrome authorities; aerodrome reference temperature, state of the runway, local climatological conditions (their effects on noise and atmospheric emissions by aircraft operations).
- Aerodrome capacity management and its relation to operations in poor weather conditions.

(h) Operation of aircraft:

- Aerodrome operating minima; minima applicable to the regular and alternate international aerodromes.
- Approach systems: visual and instrumental.
- Categories of operations.
- Altimeter setting procedures; the International Civil Aviation Organization (ICAO) Standard Atmosphere.
- Basic flight navigation, the principal aids to navigation basic aerodynamics; methods of determining wind in flight.
- Effects of meteorological parameters and phenomena on aircraft performance and fuel consumption.
- Special requirements of International General Aviation (IGA) and helicopter operations.

(i) Aeronautical information services:

- Aeronautical Information Publication (AIP); Aeronautical Information Circular (AIC); meteorological elements required.
- NOTAM/ASHTAM/SNOWTAM.
- International Civil Aviation Organization (ICAO) Abbreviations and Codes.
- Information concerning the meteorological service aeronautical charts.

(j) Aeronautical telecommunications:

- Organization of aeronautical telecommunications; procedures applicable to the preparation of meteorological messages.
- Operation of the Aeronautical Fixed Service (AFS); Aeronautical Fixed Telecommunication Network (AFTN); Aeronautical Telecommunications Network (ATN).
- Message headings, addressing of messages, priorities of messages; regional aeronautical MET telecommunication procedures (AMBEX, ROBEX).
- Satellite distribution system for information relating to air navigation (SADIS) and international satellite communications system (ISCS).

(k) International Civil Aviation Organization (ICAO) definitions and terms (as defined in ICAO Annex 3, Chapter 1):

- Air-report, meteorological report, briefing, forecast, observation, GAMET area forecast, SIGMET and AIRMET information.
- Visibility (for aeronautical purposes); prevailing visibility; runway visual range.

- Altitude, elevation, height, density altitude, pressure altitude, flight level, cruising level, transition altitude, transition level, transition layer.
- Operator, operator's local representative, pilot-in-command.
- Flight information region, terminal area, controlled airspace, advisory airspace, control zone, ATS route, airway, advisory route, air traffic control service, air traffic advisory service, flight information service, alerting service; aerodrome control tower, area control centre, approach control unit.
- Aerodrome, instrument runway, landing area, movement area, obstacle free zone, final approach, circling approach, initial visual approach, missed approach; take-off and initial climb-out phase.

"Service"; "provide", "issue", "make available", "supply"; "designated meteorological authority", "meteorological service provider".