COVER SHEET TO AMENDMENT 74

INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

METEOROLOGICAL SERVICE FOR INTERNATIONAL AIR NAVIGATION

PART I — CORE SARPS
PART II — APPENDICES AND ATTACHMENTS

ANNEX 3
TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

SIXTEENTH EDITION — JULY 2007

INTERNATIONAL CIVIL AVIATION ORGANIZATION

Checklist of Amendments to Annex 3

	Effective date	*Date of applicability*
Sixteenth Edition (incorporates Amendments 1–74)	16 July 2007	7 November 2007
Amendment 74 (adopted by the Council on 21 February 2007) Replacement pages 6-1 and 6-2, 9-1 and 9-2, APP 1-2, APP 2-3, APP 3-3, APP 3-6 to APP 3-29, APP 5-2 to APP 5-8, APP 5-10 to APP 5-13, APP 5-18, and APP 8-4.	16 July 2007	5 November 2008

Transmittal note

Amendment 74

to the

International Standards and
Recommended Practices

METEOROLOGICAL SERVICE FOR INTERNATIONAL AIR NAVIGATION

(Annex 3 to the Convention on International Civil Aviation)

1. Insert the following replacement pages in Annex 3 (Sixteenth Edition) to incorporate Amendment 74 which becomes applicable on 5 November 2008:

a)	Pages 6-1 and 6-2	—	Chapter 6
b)	Pages 9-1 and 9-2	—	Chapter 9
c)	Page APP 1-2	—	Appendix 1
d)	Pages APP 2-3	—	Appendix 2
e)	Pages APP 3-3, APP 3-6 to APP 3-29	—	Appendix 3
f)	Pages APP 5-2 to APP 5-8, APP 5-10 to APP 5-13, and APP 5-18	—	Appendix 5
g)	Pages APP 8-4	—	Appendix 8

2. Record the entry of this amendment on page (ii).

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CHAPTER 6. FORECASTS

Note.— Technical specifications and detailed criteria related to this chapter are given in Appendix 5.

6.1 Interpretation and use of forecasts

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

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

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

6.2 Aerodrome forecasts

6.2.1 An aerodrome forecast shall be prepared by the meteorological office designated by the meteorological authority concerned.

6.2.2 An aerodrome forecast shall be issued at a specified time and consist of a concise statement of the expected meteorological conditions at an aerodrome for a specified period.

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

a) identification of the type of forecast;

b) location indicator;

c) time of issue of forecast;

d) identification of a missing forecast, when applicable;

e) date and period of validity of forecast;

f) identification of a cancelled forecast, when applicable;

g) surface wind;

h) visibility;

i) weather;

j) cloud; and

k) expected significant changes to one or more of these elements during the period of validity.

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

Note.— The visibility included in TAF refers to the forecast prevailing visibility.

6.2.4 Meteorological offices preparing TAF shall keep the forecasts under continuous review and, when necessary, shall issue amendments promptly. The length of the forecast messages and the number of changes indicated in the forecast shall be kept to a minimum.

Note.— Guidance on methods to keep TAF under continuous review is given in Chapter 3 of the Manual of Aeronautical Meteorological Practice *(Doc 8896).*

6.2.5 TAF that cannot be kept under continuous review shall be cancelled.

6.2.6 **Recommendation.**— *The period of validity of a routine TAF should be not less than 6 hours nor more than 30 hours; the period of validity should be determined by regional air navigation agreement. Routine TAF valid for less than 12 hours should be issued every 3 hours and those valid for 12 to 30 hours should be issued every 6 hours.*

6.2.7 When issuing TAF, meteorological offices shall ensure that not more than one TAF is valid at an aerodrome at any given time.

6.3 Landing forecasts

6.3.1 A landing forecast shall be prepared by the meteorological office designated by the meteorological authority concerned as determined by regional air navigation agreement; such forecasts are intended to meet the requirements of local users and of aircraft within about one hour's flying time from the aerodrome.

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

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

6.4 Forecasts for take-off

6.4.1 A forecast for take-off shall be prepared by the meteorological office designated by the meteorological authority concerned.

6.4.2 **Recommendation.—** *A forecast for take-off should refer to a specified period of time and should contain information on expected conditions over the runway complex in regard to surface wind direction and speed and any variations thereof, temperature, pressure (QNH), and any other elements as agreed locally.*

6.4.3 **Recommendation.—** *A forecast for take-off should be supplied to operators and flight crew members on request within the 3 hours before the expected time of departure.*

6.4.4 **Recommendation.—** *Meteorological offices preparing forecasts for take-off should keep the forecasts under continuous review and, when necessary, should issue amendments promptly.*

CHAPTER 9. SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

Note.— Technical specifications and detailed criteria related to this chapter are given in Appendix 8.

9.1 General provisions

9.1.1 Meteorological information shall be supplied to operators and flight crew members for:

a) pre-flight planning by operators;

b) in-flight re-planning by operators using centralized operational control of flight operations;

c) use by flight crew members before departure; and

d) aircraft in flight.

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

9.1.3 Meteorological information supplied to operators and flight crew members shall be up to date and include the following information, as established by meteorological authority in consultation with operators concerned:

a) forecasts of

   1) upper wind and upper-air temperature;

   2) upper-air humidity;

   3) geopotential altitude of flight levels;

   4) flight level and temperature of tropopause;

   5) direction, speed and flight level of maximum wind; and

   6) SIGWX phenomena;

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

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

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

d) forecasts for take-off;

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

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

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

g) aerodrome warnings for the local aerodrome;

h) meteorological satellite images; and

i) ground-based weather radar information.

9.1.4 Forecasts listed under 9.1.3 a) shall be generated from the digital forecasts provided by the WAFCs whenever these forecasts cover the intended flight path in respect of time, altitude and geographical extent, unless otherwise agreed between the meteorological authority and the operator concerned.

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

9.1.6 Charts generated from the digital forecasts provided by the WAFCs shall be made available, as required by operators, for fixed areas of coverage as shown in Appendix 8, Figures A8-1, A8-2 and A8-3.

9.1.7 When forecasts of upper wind and upper-air temperature listed under 9.1.3 a) 1) are supplied in chart form, they shall be fixed time prognostic charts for flight levels as specified in Appendix 2, 1.2.2 a). When forecasts of SIGWX phenomena listed under 9.1.3 a) 6) are supplied in chart form, they shall be fixed time prognostic charts for an atmospheric layer limited by flight levels as specified in Appendix 2, 1.3.2 and Appendix 5, 4.3.2.

9.1.8 The forecasts of upper wind and upper-air temperature and of SIGWX phenomena above flight level 100 requested for pre-flight planning and in-flight re-planning by the operator shall be supplied as soon as they become available, but not later than 3 hours before departure. Other meteorological information requested for pre-flight planning and in-flight re-planning by the operator shall be supplied as soon as is practicable.

9.1.9 When necessary, the meteorological authority of the State providing service for operators and flight crew members shall initiate coordinating action with the meteorological authorities of other States with a view to obtaining from them the reports and/or forecasts required.

9.1.10 Meteorological information shall be supplied to operators and flight crew members at the location to be determined by the meteorological authority, after consultation with the operators and at the time to be agreed upon between the meteorological office and the operator concerned. The service for pre-flight planning shall be confined to flights originating within the territory of the State concerned. At an aerodrome without a meteorological office, arrangements for the supply of meteorological information shall be as agreed upon between the meteorological authority and the operator concerned.

9.2 Briefing, consultation and display

Note.— The requirements for the use of automated pre-flight information systems in providing briefing, consultation and display are given in 9.4.

APPENDIX 1

FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS

(See Chapter 9 of this Annex.)

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

OPMET information MODEL A

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

INTENSITY

" – " (light); no indicator (moderate); " + " (heavy, or well-developed in the case of dust/sand whirls (dust devils) and funnel clouds) are used to indicate the forecast intensity of certain phenomena

DESCRIPTORS

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

FORECAST WEATHER ABBREVIATIONS

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

EXAMPLES

+SHRA – heavy shower of rain
FZDZ – moderate freezing drizzle
+TSSNGR – thunderstorm with heavy snow and hail
TSSN – thunderstorm with moderate snow
SNRA – moderate snow and rain

SELECTED ICAO LOCATION INDICATORS

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

METAR CYUL 240700Z 27018G30KT 9999 SN FEW020 BKN045 M02/M07 Q0995=

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

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

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

TAF AMD NZAA 240855Z 2409/2506 24010KT 9999 FEW030 BECMG 2411/2413 VRB02KT 2000 HZ FM 242224010KT CAVOK=

TAF ZBAA 240440Z 2406/2506 13015KMH 6000 NSC BECMG 2415/2416 2000 SN OVC040 TEMPO 2418/24211000 SN BECMG 2500/2501 32015KMH 3500 BR NSC BECMG 2503/2504 32030G60KMH CAVOK=

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

HECC SIGMET 2 VALID 240900/1200 HECA-
HECC CAIRO FIR SEV TURB OBS N OF N27 FL 390/440 MOV E25KMH NC.

j) information on the location of an accidental release of radioactive materials into the atmosphere, of significance to aircraft operations, comprising: the radioactivity symbol at the site of the accident and, at the side of the chart, the radioactivity 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.

Note.— Items to be included in low-level SIGWX forecasts (i.e. flight levels below 100) are included in Appendix 5.

1.3.4 Criteria for including items in SIGWX forecasts

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

a) items a) to f) in 1.3.3 shall only be included if expected to occur between the lower and upper level of the SIGWX forecast;

b) the abbreviation "CB" shall only be included when it refers to the occurrence or expected occurrence of cumulonimbus clouds:

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

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

3) embedded in cloud layers or concealed by haze.

c) the inclusion of "CB" shall be understood to include all weather phenomena normally associated with cumulonimbus clouds, i.e. thunderstorm, moderate or severe icing, moderate or severe turbulence and hail;

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

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

2. METEOROLOGICAL OFFICES

2.1 Use of WAFS products

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

2.1.2 In order to ensure uniformity and standardization of flight documentation, the WAFS GRIB and BUFR data received shall be decoded into standard WAFS charts in accordance with relevant provisions in this Annex, and the meteorological content and identification of the originator of the WAFS forecasts shall not be amended.

2.2 Notification of WAFC concerning significant discrepancies

Meteorological offices using WAFS BUFR data shall notify the WAFC concerned immediately if significant discrepancies in accordance with the following criteria are detected or reported in respect of WAFS SIGWX forecasts:

a) icing, turbulence, thunderstorms that are obscured, frequent, embedded or occurring at a squall line, and sandstorms/duststorms:

— newly expected occurrence or non-occurrence; or

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

— inclusion or removal of volcanic activity symbol or radiation symbol.

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

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

3. VOLCANIC ASH ADVISORY CENTRES (VAAC)

3.1 Volcanic ash advisory information

3.1.1 **Recommendation.—** *The advisory information on volcanic ash issued in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature, should be in accordance with the template shown in Table A2-1. When no approved ICAO abbreviations are available, English plain language text, to be kept to a minimum, should be used.*

3.1.2 **Recommendation.—** *The volcanic ash advisory information listed in Table A2-1, when issued in graphical format, should be as specified in Appendix 1. When issued in binary format, the BUFR code form should be used.*

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

4. STATE VOLCANO OBSERVATORIES

4.1 Information from State volcano observatories

Recommendation.— *The information required to be sent by State volcano observatories to their associated ACCs, MWO and VAAC should comprise:*

a) for significant pre-eruption volcanic activity: the date/time (UTC) of report; name and, if known, number of the volcano; location (latitude/longitude); and description of volcanic activity; and

b) for volcanic eruption: the date/time (UTC) of report and time of eruption (UTC) if different from time of report; name and, if known, number of the volcano; location (latitude/longitude); and description of the eruption including

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

1) 800, 1 500 or 3 000 m; and

2) 5 000 m, in cases where significant numbers of flights are operated in accordance with the visual flight rules;

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

f) 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 m;

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

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

h) when the onset or cessation of any of the following weather phenomena or combinations thereof occurs:

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

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

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

2) 450 m (1 500 ft), in cases where significant numbers of flights are operated in accordance with the visual flight rules;

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

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

2) from BKN or OVC to SCT or less;

k) when the sky is obscured and the vertical visibility is improving and changes to or passes through one or more of the following values, or when the vertical visibility is deteriorating and passes through one or more of the following values: 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); and

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

Note.— Other criteria based on local aerodrome operating minima are to be considered in parallel with similar criteria for the inclusion of change groups and for the amendment of TAF developed in response to Appendix 5, 1.3.1 k).

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

3. DISSEMINATION OF METEOROLOGICAL REPORTS

3.1 METAR and SPECI

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

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

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

3.2 Local routine and special reports

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

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

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

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

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

4. OBSERVING AND REPORTING OF METEOROLOGICAL ELEMENTS

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

4.1 Surface wind

4.1.1 Siting

4.1.1.1 **Recommendation.—** *Surface wind should be observed at a height of approximately 10 m (30 ft) above the runway(s).*

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

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

4.1.2 Displays

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

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

4.1.3 Averaging

4.1.3.1 The averaging period for surface wind observations shall be:

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

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

Note.— A marked discontinuity occurs when there is an abrupt and sustained change in wind direction of 30° or more, with a wind speed of 20 km/h (10 kt) before or after the change, or a change in wind speed of 20 km/h (10 kt) or more, lasting at least 2 minutes.

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

4.1.4 Accuracy of measurement

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

4.1.5 Reporting

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

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

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

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

1) when the total variation is 60° or more and less than 180° and the wind speed is 6 km/h (3 kt) or more, such directional variations shall be reported as the two extreme directions between which the surface wind has varied;

2) when the total variation is 60° or more and less than 180° and the wind speed is less than 6 km/h (3 kt), the wind direction shall be reported as variable with no mean wind direction; or

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

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

1) 10 km/h (5 kt) or more in local routine and special reports when noise abatement procedures are applied in accordance with paragraph 7.2.3 of the PANS-ATM (Doc 4444); or

2) 20 km/h (10 kt) or more otherwise;

d) when a wind speed of less than 2 km/h (1 kt) is reported, it shall be indicated as calm;

e) when a wind speed of 200 km/h (100 kt) or more is reported, it shall be indicated to be more than 199 km/h (99 kt); and

f) when the 10-minute period includes a marked discontinuity in the wind direction and/or speed, only variations from the mean wind direction and mean wind speed occurring since the discontinuity shall be reported.

Note.— See note under 4.1.3.1.

4.1.5.3 In local routine and special reports:

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

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

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

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

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

4.2 Visibility

4.2.1 Siting

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

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

4.2.2 Displays

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

4.2.3 Averaging

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

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

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

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

4.2.4 Reporting

4.2.4.1 In local routine and special reports and in METAR and SPECI, the visibility shall be reported in steps of 50 m when the visibility is less than 800 m; in steps of 100 m, when it is 800 m or more but less than 5 km; in kilometre steps, when

the visibility is 5 km or more but less than 10 km; and it shall be given as 10 km when the visibility is 10 km or more, except when the conditions for the use of CAVOK apply. Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.

Note.— Specifications concerning the use of CAVOK are given in 2.2.

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

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

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

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

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

a) when the lowest visibility is different from the prevailing visibility, and 1) less than 1 500 m or 2) less than 50 per cent of the prevailing visibility and less than 5 000 m; the lowest visibility observed should also be reported and its general direction in relation to the aerodrome indicated by reference to one of the eight points of the compass. If the lowest visibility is observed in more than one direction, then the most operationally significant direction should be reported; and

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

4.2.4.5 **Recommendation.—** *In automated METAR and SPECI, when visibility sensors are sited in such a manner that no directional variations can be given, the visibility value reported should be followed by the abbreviation "NDV".*

4.3 Runway visual range

4.3.1 Siting

4.3.1.1 **Recommendation.—** *Runway visual range should be assessed at a height of approximately 2.5 m (7.5 ft) above the runway.*

4.3.1.2 **Recommendation.—** *Runway visual range should be assessed at a lateral distance from the runway centre line of not more than 120 m. The site for observations to be representative of the touchdown zone should be located about 300 m along the runway from the threshold. The sites for observations to be representative of the mid-point and stop-end of the runway should be located at a distance of 1 000 to 1 500 m along the runway from the threshold and at a distance of about 300 m from the other end of the runway. The exact position of these sites and, if necessary, additional sites should be decided after considering aeronautical, meteorological and climatological factors such as long runways, swamps and other fog-prone areas.*

4.3.2 Instrumented systems

Note.— Since accuracy can vary from one instrument design to another, performance characteristics are to be checked before selecting an instrument for assessing RVR. The calibration of a forward-scatter meter has to be traceable and verifiable to a transmissometer standard, the accuracy of which has been verified over the intended operational range. Guidance on the use of transmissometers and forward-scatter meters in instrumented RVR systems is given in the Manual of Runway Visual Range Observing and Reporting Practices *(Doc 9328).*

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

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

4.3.3 Display

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

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

4.3.4 Averaging

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

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

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

Note.— A marked discontinuity occurs when there is an abrupt and sustained change in runway visual range, lasting at least 2 minutes, which reaches or passes through criteria for the issuance of SPECI reports given in 2.3.2 f).

4.3.5 Runway light intensity

Recommendation.— *When instrumented systems are used for the assessment of runway visual range, computations should be made separately for each available runway. RVR should not be computed for a light intensity of 3 per cent or less of the maximum light intensity available on a runway. For local routine and special reports, the light intensity to be used for the computation should be:*

a) for a runway with the lights switched on, the light intensity actually in use on that runway; and

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

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

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

4.3.6 Reporting

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

4.3.6.2 **Recommendation.—** *Fifty metres should be considered the lower limit and 2 000 metres the upper limit for runway visual range. Outside of these limits, local routine and special reports and METAR and SPECI should merely indicate that the runway visual range is less than 50 m or more than 2 000 m.*

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

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

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

4.3.6.4 In local routine and special reports:

a) the units of measurement used shall be included;

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

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

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

4.3.6.5 **Recommendation.—** *In METAR and SPECI:*

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

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

4.3.6.6 **Recommendation.—** *In METAR and SPECI when instrumented systems are used for the assessment of runway visual range, the variations in runway visual range during the 10-minute period immediately preceding the observation should be included as follows:*

a) if the runway visual range values during the 10-minute period have shown a distinct tendency, such that the mean during the first 5 minutes varies by 100 m or more from the mean during the second 5 minutes of the period, this should be indicated. When the variation of the runway visual range values shows an upward or downward tendency, this should be indicated by the abbreviation "U" or "D", respectively. In circumstances when actual fluctuations during the 10-minute period show no distinct tendency, this should be indicated using the abbreviation "N". When indications of tendency are not available, no abbreviations should be included; and

b) if the 1-minute runway visual range values during the 10-minute period vary from the mean value by more than 50 m or more than 20 per cent of the mean value, whichever is greater, the 1-minute mean minimum and the 1-minute mean maximum values should be reported instead of the 10-minute mean value. If the 10-minute period immediately preceding the observation includes a marked discontinuity in runway visual range values, only those values occurring after the discontinuity should be used to obtain variations.

Note.— A marked discontinuity occurs when there is an abrupt and sustained change in runway visual range, lasting at least 2 minutes, which reaches or passes through criteria for the issuance of SPECI given in 2.3.2 f).

4.4 Present weather

4.4.1 Siting

Recommendation.— *When instrumented systems are used for observing present weather phenomena listed under 4.4.2.3 and 4.4.2.5, representative information should be obtained by the use of sensors appropriately sited.*

4.4.2 Reporting

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

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

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

a) Precipitation

Drizzle	*DZ*
Rain	*RA*
Snow	*SN*
Snow grains	*SG*
Ice pellets	*PL*
Ice crystals (very small ice crystals in suspension, also known as diamond dust) — *Reported only when associated visibility is 5 000 m or less.*	*IC*

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

Small hail and/or snow pellets *GS*
— *Reported when diameter of largest hailstones is less than 5 mm;*

b) Obscurations (hydrometeors)

Fog *FG*
— *Reported when visibility is less than 1 000 m, except when qualified by "MI", "BC", "PR" or "VC" (see 4.4.2.5 and 4.4.2.6).*

Mist *BR*
— *Reported when visibility is at least 1 000 m but not more than 5 000 m;*

c) Obscurations (lithometeors)
— *The following should be used only when the obscuration consists predominantly of lithometeors and the visibility is 5 000 m or less except "SA" when qualified by "DR" (see 4.4.2.5) and volcanic ash.*

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

d) Other phenomena

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

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

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

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

Shower *SH*
— *Used to report showers in accordance with the templates shown in Tables A3-1 and A3-2. Showers observed in the vicinity of the aerodrome (see 4.4.2.6) should be reported as "VCSH" without qualification regarding type or intensity of precipitation.*

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

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

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

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

Patches *BC*
— *Fog patches randomly covering the aerodrome.*

Partial *PR*
— *A substantial part of the aerodrome covered by fog while the remainder is clear.*

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

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

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

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

4.4.2.7 **Recommendation.—** *In local routine and special reports and in METAR and SPECI:*

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

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

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

4.5 Clouds

4.5.1 Siting

Recommendation.— *When instrumented systems are used for the measurement of the cloud amount and the height of cloud base, representative observations should be obtained by the use of sensors appropriately sited. For local routine and special reports, in the case of aerodromes with precision approach runways, sensors for cloud amount and height of cloud base should be sited to give the best practicable indications of the height of cloud base and cloud amount at the middle marker site of the instrument landing system or, at aerodromes where a middle marker beacon is not used, at a distance of 900 to 1 200 m (3 000 to 4 000 ft) from the landing threshold at the approach end of the runway.*

Note.— Specifications concerning the middle marker site of an instrument landing system are given in Annex 10, Volume I, Chapter 3 and at Attachment C, Table C-5.

4.5.2 Display

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

4.5.3 Reference level

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

4.5.4 Reporting

4.5.4.1 In local routine and special reports and in METAR and SPECI, the height of cloud base shall be reported in steps of 30 m (100 ft) up to 3 000 m (10 000 ft). Any observed value which does not fit the reporting scale in use shall be rounded down to the nearest lower step in the scale.

4.5.4.2 **Recommendation.—** *In local routine and special reports and in METAR and SPECI:*

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

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

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

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

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

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

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

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

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

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

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

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

4.5.4.3 In local routine and special reports:

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

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

4.5.4.4 **Recommendation.—** *In automated METAR and SPECI:*

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

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

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

4.6 Air temperature and dew-point temperature

4.6.1 Display

Recommendation.— *When automated equipment is used for the measurement of air temperature and dew-point temperature, air temperature and dew-point temperature displays should be located in the meteorological station with*

corresponding displays in the appropriate air traffic services units. The displays in the meteorological station and in the air traffic services units should relate to the same sensors.

4.6.2 Reporting

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

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

4.7 Atmospheric pressure

4.7.1 Display

When automated equipment is used for the measurement of pressure, QNH and, if required in accordance with 4.7.3.2 b), QFE displays relating to the barometer shall be located in the meteorological station with corresponding displays in the appropriate air traffic services units. When QFE values are displayed for more than one runway, as specified in 4.7.3.2 d), the displays shall be clearly marked to identify the runway to which the QFE value displayed refers.

4.7.2 Reference level

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

4.7.3 Reporting

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

4.7.3.2 In local routine and special reports:

a) QNH shall be included;

b) QFE shall be included if required by users or, if so agreed locally between the meteorological and air traffic services authorities and operators concerned, on a regular basis;

c) the units of measurement used for QNH and QFE values shall be included; and

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

4.7.3.3 In METAR and SPECI, only QNH values shall be included.

4.8 Supplementary information

4.8.1 Reporting

4.8.1.1 **Recommendation.—** *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 the last issued routine report or last hour, whichever is the shorter, but not at the time of observation, should be reported, up to a maximum of three groups, in accordance with the templates shown in Tables A3-1 and A3-2, in the supplementary information:*

- *freezing precipitation*
- *moderate or heavy precipitation (including showers thereof)*
- *blowing snow*
- *duststorm, sandstorm*
- *thunderstorm*
- *funnel cloud (tornado or water spout)*
- *volcanic ash*

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Element as specified in Chapter 4	*Detailed content*	*Template(s)*			*Examples*
Identification of the type of report (M)	Type of report	MET REPORT *or* SPECIAL			MET REPORT SPECIAL
Location indicator (M)	ICAO location indicator (M)	nnnn			YUDO[1]
Time of the observation (M)	Day and actual time of the observation in UTC	nnnnnnZ			221630Z
Surface wind (M)	Name of the element (M)	WIND			WIND 240/15KMH (WIND 240/8KT)
	Runway (O)[2]	RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			WIND RWY 18 TDZ 190/22KMH (WIND RWY 18 TDZ 190/11KT)
	Runway section (O)[3]	TDZ			
	Wind direction (M)	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	C A L M	WIND VRB4KMH WIND CALM (WIND VRB2KT) WIND VRB BTN 350/ AND 050/4KMH (WIND VRB BTN 350/ AND 050/2KT)
	Wind speed (M)	[ABV] n[n][n]KMH (*or* [ABV] n[n]KT)			WIND 270/ABV 199KMH (WIND 270/ABV 99KT)
	Significant speed variations (C)[4]	MAX [ABV] nn [n] MNM n [n]			WIND 120/12KMH MAX35 MNM8 (WIND 120/6KT MAX18 MNM4)
	Significant directional variations (C)[5]	VRB BTN nnn/ AND nnn/	—		WIND 020/20KMH VRB BTN 350/ AND 070/ (WIND 020/10KT VRB BTN 350/ AND 070/)
	Runway section (O)[3]	MID			WIND RWY 14R MID 140/22KMH (WIND RWY 14R MID 140/11KT)
	Wind direction (O)[3]	nnn/	VRB BTN nnn/ AND nnn/ *or* VRB	C A L M	
	Wind speed (O)[3]	[ABV] n[n][n]KMH (*or* [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 240/32KMH MAX54 MNM20 END 250/28KMH (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][n]KMH (*or* [ABV] n[n]KT)			
	Significant speed variations (C)[4]	MAX [ABV] nn [n] MNM n [n]			

Element as specified in Chapter 4	*Detailed content*	*Template(s)*			*Examples*	
	Significant directional variations (C)[5]	VRB BTN nnn/ AND nnn/	—			
Visibility (M)	Name of the element (M)	VIS		C A V O K	VIS 350M VIS 7KM VIS 10KM	CAVOK
	Runway (O)[2]	RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			VIS RWY 09 TDZ 800M END 1200M	
	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)[6]	Name of the element (M)	RVR			RVR RWY 32 400M RVR RWY 20 1600M	
	Runway (C)[7]	RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]				
	Runway section (C)[8]	TDZ				
	RVR (M)	[ABV *or* BLW] nn[n][n]M			RVR RWY 10L BLW 50M RVR RWY 14 ABV 2000M RVR RWY 10 BLW 150M RVR RWY 12 ABV 1200M	
	Runway section (C)[8]	MID			RVR RWY 12 TDZ 1100M MID ABV 1400M	
	RVR (C)[8]	[ABV *or* BLW] nn[n][n]M				
	Runway section (C)[8]	END			RVR RWY 16 TDZ 600M MID 500M END 400M	
	RVR (C)[8]	[ABV *or* BLW] nn[n][n]M			RVR RWY 26 500M RWY 20 800M	
Present weather (C)[9, 10]	Intensity of present weather (C)[9]	FBL *or* MOD *or* HVY	—			
	Characteristics and type of present weather (C)[9,11]	DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* 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 HVY TSRA HVY DZ FBL SN HVY TSRASN FBL SNRA FBL DZ FG HVY SHSN BLSN	HZ FG VA MIFG
Cloud (M)[12]	Name of the element (M)	CLD				
	Runway (O)[2]	RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]			CLD NSC	

Element as specified in Chapter 4	*Detailed content*	*Template(s)*				*Examples*
	Cloud amount (M) *or* vertical visibility (O)[9]	FEW *or* SCT *or* BKN *or* OVC	OBSC	NSC		CLD SCT 300M OVC 600M (CLD SCT 1000FT OVC 2000FT) CLD OBSC VER VIS 150M (CLD OBSC VER VIS 500FT)
	Cloud type (C)[9]	CB *or* TCU	—			CLD BKN TCU 270M (CLD BKN TCU 900FT)
	Height of cloud base *or* the value of vertical visibility (C)[9]	nn[n][n]M (*or* nnn[n]FT)	[VER VIS nn[n]M (*or* VER VIS nnn[n]FT)]			CLD RWY 08R BKN 60M RWY 26 BKN 90M (CLD RWY 08R BKN 200FT RWY 26 BKN 300FT)
Air temperature (M)	Name of the element (M)	T				T17 TMS08
	Air temperature (M)	[MS]nn				
Dew-point temperature (M)	Name of the element (M)	DP				DP15 DPMS18
	Dew-point temperature (M)	[MS]nn				
Pressure values (M)	Name of the element (M)	QNH				QNH 0995HPA QNH 1009HPA
	QNH (M)	nnnnHPA				
	Name of the element (O)	QFE				QNH 1022HPA QFE 1001HPA QNH 0987HPA QFE RWY 18 0956HPA RWY 24 0955HPA
	QFE (O)	[RWY nn[L] *or* RWY nn[C] *or* RWY nn[R]] nnnnHPA [RWY nn[L] *or* RWY nn[C] *or* RWY nn[R] nnnnHPA]				
Supplementary information (C)[9]	Significant meteorological phenomena (C)[9]	CB *or* TS *or* MOD TURB *or* SEV TURB *or* WS *or* GR *or* SEV SQL *or* MOD ICE *or* SEV ICE *or* FZDZ *or* FZRA *or* SEV MTW *or* SS *or* DS *or* BLSN *or* FC[13]				FC IN APCH WS IN APCH 60M-WIND: 360/50KMH WS RWY 12
	Location of the phenomenon (C)[9]	IN APCH [nnnM-WIND nnn/nnKMH] *or* IN CLIMB-OUT [nnnM-WIND nnn/nnKMH] (IN APCH [nnnFT-WIND nnn/nnKT] *or* IN CLIMBOUT [nnnFT-WIND nnn/nnKT]) *or* RWY nn[n]				
	Recent weather (C)[9, 10]	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)[14]	Name of the element (M)	TREND				
	Change indicator (M)[15]	NOSIG	BECMG *or* TEMPO			TREND NOSIG TREND BECMG FEW 600M (TREND BECMG FEW 2000FT)
	Period of change (C)[9]		FMnnnn *and/or* TLnnnn *or* ATnnnn			
	Wind (C)[9]		nnn/ [ABV] n[n][n]KMH [MAX[ABV]nn[n]] (*or* nnn/ [ABV] n[n]KT [MAX[ABV]nn])			TREND TEMPO 250/70KMH MAX 100 (TREND TEMPO 250/35KT MAX 50)
	Visibility (C)[9]		VIS nn[n][n]M *or* VIS n[n]KM		C A V O K	TREND BECMG AT1800 VIS 10KM NSW TREND BECMG TL1700 VIS 800M FG TREND BECMG FM1030 TL1130 CAVOK
	Weather phenomenon: intensity (C)[9]		FBL *or* MOD *or* HVY	—	NSW	TREND TEMPO TL1200 VIS 600M BECMG AT1230 VIS 8KM NSW NSC

Element as specified in Chapter 4	*Detailed content*	*Template(s)*					*Examples*
	Weather phenomenon: characteristics and type (C)[9, 10, 12]		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)[9]		CLD				
	Cloud amount and vertical visibility (C)[9]		FEW *or* SCT *or* BKN *or* OVC	OBSC	NSC		TREND BECMG AT1130 CLD OVC 300M (TREND BECMG AT1130 CLD OVC 1000FT)
	Cloud type (C)[9]		CB *or* TCU	—			TREND TEMPO TL1530 HVY SHRA CLD BKN CB 360M (TREND TEMPO TL1530 HVY SHRA CLD BKN CB 1200FT)
	Height of cloud base *or* the value of vertical visibility (C)[9]		nn[n][n]M (*or* nnn[n]FT)	[VER VIS nn[n]M (*or* VER VIS nnn[n]FT)]			

Notes.—

1. Fictitious location.
2. Optional values for one or more runways.
3. Optional values for one or more sections of the runway.
4. To be included in accordance with 4.1.5.2 c).
5. To be included in accordance with 4.1.5.2 b) 1).
6. To be included if visibility or RVR < 1 500 m.
7. To be included in accordance with 4.3.6.4 d).
8. To be included in accordance with 4.3.6.4 c).
9. To be included whenever applicable.
10. One or more, up to a maximum of three groups, in accordance with 4.4.2.7 a), 4.8.1.1 and Appendix 5, 2.2.4.3.
11. Precipitation types listed under 4.4.2.3 a) may be combined in accordance with 4.4.2.7 c) and Appendix 5, 2.2.4.2. Only moderate or heavy precipitation to be indicated in trend forecasts in accordance with Appendix 5, 2.2.4.2.
12. Up to four cloud layers in accordance with 4.5.4.2 e).
13. Abbreviated plain language may be used in accordance with 4.8.1.2.
14. To be included in accordance with Chapter 6, 6.3.2.
15. Number of change indicators to be kept to a minimum in accordance with Appendix 5, 2.2.1, normally not exceeding three groups.

Table A3-2. Template for METAR and SPECI

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

Note 1.— The ranges and resolutions for the numerical elements included in METAR and SPECI are shown in Table A3-5 of this appendix.

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

Element as specified in Chapter 4	*Detailed content*	*Template(s)*			*Examples*	
Identification of the type of report (M)	Type of report (M)	METAR, METAR COR, SPECI *or* SPECI COR			METAR METAR COR SPECI	
Location indicator (M)	ICAO location indicator (M)	nnnn			YUDO[1]	
Time of the observation (M)	Day and actual time of the observation in UTC (M)	nnnnnnZ			221630Z	
Identification of an automated or missing report (C)[2]	Automated *or* missing report identifier (C)	AUTO *or* NIL			AUTO NIL	
END OF METAR IF THE REPORT IS MISSING.						
Surface wind (M)	Wind direction (M)	nnn	VRB		24015KMH (24008KT) 19022KMH (19011KT) 00000KMH (00000KT) 140P199KMH (140P99KT)	VRB04KMH (VRB02KT)
	Wind speed (M)	[P]nn[n]				
	Significant speed variations (C)[3]	G[P]nn[n]			12012G35KMH (12006G18KT) 24032G54KMH (24016G27KT)	
	Units of measurement (M)	KMH (*or* KT)				
	Significant directional variations (C)[4]	nnnVnnn	—		02020KMH 350V070 (02010KT 350V070)	
Visibility (M)	Prevailing *or* minimum visibility (M)[5]	nnnn		C A V O K	0350 7000NDV 9999	CAVOK
	Unidirectional visibility (C)[6]	NDV			0800	
	Minimum visibility (C)[7]	nnnn			2000 1200NW 6000 2800E	
	Direction of the minimum visibility (C)[7]	N *or* NE *or* E *or* SE *or* S *or* SW *or* W *or* NW				
RVR (C)[8]	Name of the element (M)	R			R32/0400 R12R/1700 R10/M0050 R14L/P2000	
	Runway (M)	nn[L]/*or* nn[C]/ *or* nn[R]/				
	RVR (M)	[P *or* M]nnnn			R16L/0650 R16C/0500 R16R/0450 R17L/0450	

Element as specified in Chapter 4	*Detailed content*	*Template(s)*			*Examples*
	RVR variations (C)[9]	V[P *or* M]nnnn			R20/0700V1200 R19/0350VP1200
	RVR past tendency (C)[10]	U, D *or* N			R12/1100U R26/0550N R20/0800D R09/0375V0600U R10/M0150V0500D
Present weather (C)[2, 11]	Intensity *or* proximity of present weather (C)[12]	– *or* +	—	VC	
	Characteristics and type of present weather (M)[13]	DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* FZUP[6] *or* SHGR *or* SHGS *or* SHRA *or* SHSN *or* SHUP *or* TSGR *or* TSGS *or* TSRA *or* TSSN *or* TSUP *or* UP[6]	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 UP FZUP TSUP FZUP
Cloud (M)[14]	Cloud amount and height of cloud base *or* vertical visibility (M)	FEWnnn *or* SCTnnn *or* BKNnnn *or* OVCnnn *or* /////[6]	VVnnn *or* VV///	NSC *or* NCD[6]	FEW015 VV005 OVC030 VV/// NSC SCT010 OVC020 BKN025///
	Cloud type (C)[2]	CB *or* TCU *or* ///[6]	—		BKN009TCU NCD SCT008 BKN025CB /////CB
Air and dew-point temperature (M)	Air and dew-point temperatures (M)	[M]nn/[M]nn			17/10 02/M08 M01/M10
Pressure values (M)	Name of the element (M)	Q			Q0995 Q1009 Q1022 Q0987
	QNH (M)	nnnn			
Supplementary information (C)	Recent weather (C)[2, 11]	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 *or* REUP[6] *or* REFZUP[6] *or* RETSUP[6] *or* RESHUP[6]			REFZRA RETSRA
	Wind shear (C)[2]	WS Rnn[L] *or* WS Rnn[C] *or* WS Rnn[R] *or* WS ALL RWY			WS RWY03 WS ALL RWY
	Sea-surface temperature and state of the sea (C)[15]	W[M]nn/Sn			W15/S2

Element as specified in Chapter 4	*Detailed content*		*Template(s)*				*Examples*
	State of the runway (C)[16]	Runway designator (M)	R nn[L]/ *or* Rnn[C]/ *or* Rnn[R]/			R/SNOCLO	R99/421594 R/SNOCLO R14L/CLRD//
		Runway deposits (M)	n *or* /	CLRD//			
		Extent of runway contamination (M)	n *or* /				
		Depth of deposit (M)	nn *or* //				
		Friction coefficient or braking action (M)	nn *or* //				
Trend forecast (O)[17]	Change indicator (M)[18]		NOSIG	BECMG *or* TEMPO			NOSIG BECMG FEW020
	Period of change (C)[2]			FMnnnn *and/or* TLnnnn *or* ATnnnn			
	Wind (C)[2]			nnn[P]nn[n][G [P]nn[n]]KMH (*or* nnn[P]nn[G[P] nn]KT)			TEMPO 25070G100KMH (TEMPO 25035G50KT)
	Prevailing visibility (C)[2]			nnnn		C A V O K	BECMG FM1030 TL1130 CAVOK BECMG TL1700 0800 FG BECMG AT1800 9000 NSW BECMG FM1900 0500 +SNRA BECMG FM1100 SN TEMPO FM1130 BLSN TEMPO FM0330 TL0430 FZRA
	Weather phenomenon: intensity (C)[12]			– *or* +	—	N S W	
	Weather phenomenon: characteristics and type (C)[2, 11, 13]			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		
	Cloud amount and height of cloud base *or* vertical visibility (C)[2]			FEWnnn *or* SCTnnn *or* BKNnnn *or* OVCnnn	VVnnn *or* VV///	N S C	TEMPO TL1200 0600 BECMG AT1200 8000 NSW NSC BECMG AT1130 OVC010
	Cloud type (C)[2]			CB *or* TCU	—		TEMPO TL1530 +SHRA BKN012CB

Notes.—

1. Fictitious location.
2. To be included whenever applicable.
3. To be included in accordance with 4.1.5.2 c).
4. To be included in accordance with 4.1.5.2 b) 1).
5. To be included in accordance with 4.2.4.4 b).
6. For automated reports only.
7. To be included in accordance with 4.2.4.4 a).
8. To be included if visibility or RVR < 1 500 m; for up to a maximum of four runways in accordance with 4.3.6.5 b).
9. To be included in accordance with 4.3.6.6 b).
10. To be included in accordance with 4.3.6.6 a).
11. One or more, up to a maximum of three groups, in accordance with 4.4.2.7 a), 4.8.1.1 and Appendix 5, 2.2.4.2.
12. To be included whenever applicable; no qualifier for *moderate* intensity in accordance with 4.4.2.6.
13. Precipitation types listed under 4.4.2.3 a) may be combined in accordance with 4.4.2.7 c) and Appendix 5, 2.2.4.2. Only moderate or heavy precipitation to be indicated in trend forecasts in accordance with Appendix 5, 2.2.4.2.
14. Up to four cloud layers in accordance with 4.5.4.2 e).
15. To be included in accordance with 4.8.1.5 a).
16. To be included in accordance with 4.8.1.5 b).
17. To be included in accordance with Chapter 6, 6.3.2.
18. Number of change indicators to be kept to a minimum in accordance with Appendix 5, 2.2.1, normally not exceeding three groups.

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

Change indicator	*Time indicator and period*	*Meaning*	
NOSIG	—	no significant changes are forecast	
BECMG	FM$n_1n_1n_1n_1$ TL$n_2n_2n_2n_2$	the change is forecast to	commence at $n_1n_1n_1n_1$ UTC and be completed by $n_2n_2n_2n_2$ UTC
	TLnnnn		commence at the beginning of the trend forecast period and be completed by nnnn UTC
	FMnnnn		commence at nnnn UTC and be completed by the end of the trend forecast period
	ATnnnn		occur at nnnn UTC (specified time)
	—		a) commence at the beginning of the trend forecast period and be completed by the end of the trend forecast period; *or* b) the time is uncertain
TEMPO	FM$n_1n_1n_1n_1$ TL$n_2n_2n_2n_2$	temporary fluctuations are forecast to	commence at $n_1n_1n_1n_1$ UTC and cease by $n_2n_2n_2n_2$ UTC
	TLnnnn		commence at the beginning of the trend forecast period and cease by nnnn UTC
	FMnnnn		commence at nnnn UTC and cease by the end of the trend forecast period
	—		commence at the beginning of the trend forecast period and cease by the end of the trend forecast period

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

Element as specified in Chapter 4		*Range*	*Resolution*
Runway:		01 – 36	1
Wind direction:	°true	010 – 360	10
Wind speed:	KMH	1 – 399*	1
	KT	1 – 199*	1
Visibility:	M	0 – 800	50
	M	800 – 5 000	100
	KM	5 – 10	1
RVR:	M	0 – 400	25
	M	400 – 800	50
	M	800 – 2 000	100
Vertical visibility:	M	0 – 600	30
	FT	0 – 2 000	100
Clouds: height of cloud base:	M	0 – 3 000	30
	FT	0 – 10 000	100
Air temperature; Dew-point temperature:	°C	–80 – +60	1
QNH; QFE:	hPa	0500 – 1 100	1

* There is no aeronautical requirement to report surface wind speeds of 200 km/h (100 kt) or more; however, provision has been made for reporting wind speeds up to 399 km/h (199 kt) for non-aeronautical purposes, as necessary.

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

Element as specified in Chapter 4		*Range*	*Resolution*
Runway:	(no units)	01 – 36	1
Wind direction:	°true	000 – 360	10
Wind speed:	KMH	00 – 399*	1
	KT	00 – 199*	1
Visibility:	M	0000 – 0800	50
	M	0800 – 5 000	100
	M	5 000 – 9 000	1 000
	M	9 000 – 9 999	999
RVR:	M	0000 – 0400	25
	M	0400 – 0800	50
	M	0800 – 2 000	100
Vertical visibility:	30's M (100's FT)	000 – 020	1

Element as specified in Chapter 4			*Range*	*Resolution*
Clouds: height of cloud base:		30's M (100's FT)	000 – 100	1
Air temperature; Dew-point temperature:		°C	–80 – +60	1
QNH:		hPa	0850 – 1 100	1
Sea-surface temperature:		°C	–10 – +40	1
State of the sea:		(no units)	0 – 9	1
State of the runway	Runway designator:	(no units)	01 – 36; 88; 99	1
	Runway deposits:	(no units)	0 – 9	1
	Extent of runway contamination:	(no units)	1; 2; 5; 9	—
	Depth of deposit:	(no units)	00 – 90; 92 – 99	1
	Friction coefficient/braking action:	(no units)	00 – 95; 99	1

* There is no aeronautical requirement to report surface wind speeds of 200 km/h (100 kt) or more; however, provision has been made for reporting wind speeds up to 399 km/h (199 kt) for non-aeronautical purposes, as necessary.

Example A3-1. Routine report

a) Local routine report (same location and weather conditions as METAR):

MET REPORT YUDO 221630Z WIND 240/15KMH VIS 600M RVR RWY 12 TDZ 1000M MOD DZ FG CLD SCT 300M OVC 600M T17 DP16 QNH 1018 HPA TREND BECMG TL1700 VIS 800M FG BECMG AT1800 VIS 10KM NSW

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

METAR YUDO 221630Z 24015KMH 0600 R12/1000U DZ FG SCT010 OVC020 17/16 Q1018 BECMG TL1700 0800 FG BECMG AT1800 9999 NSW

Meaning of both reports:

Routine report for Donlon/International* issued on the 22nd of the month at 1630 UTC; surface wind direction 240 degrees; wind speed 15 kilometres per hour; visibility (along the runway(s) in the local routine report; prevailing visibility in METAR) 600 metres; runway visual range representative of the touchdown zone for runway 12 is 1 000 metres and the runway visual range values have shown an upward tendency during previous 10 minutes (RVR tendency to be included in METAR only); and moderate drizzle and fog; scattered cloud at 300 metres; overcast at 600 metres; air temperature 17 degrees Celsius; dew-point temperature 16 degrees Celsius; QNH 1 018 hectopascals; trend during next 2 hours, visibility (along the runway(s) in the local routine report; prevailing visibility in METAR) becoming 800 metres in fog by 1700 UTC; at 1800 UTC visibility (along the runway(s) in the local routine report; prevailing visibility in METAR) becoming 10 kilometres or more and nil significant weather.

* Fictitious location

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

Example A3-2. Special report

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

SPECIAL YUDO 151115Z WIND 050/25KT MAX37 MNM10 VIS 1200M RVR RWY 05 ABV 1800M HVY TSRA CLD BKN CB 500FT T25 DP22 QNH 1008 HPA TREND TEMPO TL1200 VIS 600M BECMG AT1200 VIS 8KM NSW NSC

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

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

Meaning of both reports:

Special report for Donlon/International* issued on the 15th of the month at 1115 UTC; surface wind direction 050 degrees; wind speed 25 knots gusting between 10 and 37 knots (minimum wind speed not to be included in SPECI) visibility 1 200 metres (along the runway(s) in the local special report); prevailing visibility 3 000 metres (in SPECI) with minimum visibility 1 200 metres to north east (directional variations to be included in SPECI only); RVR above 1 800 metres on runway 05 (RVR not required in SPECI with prevailing visibility of 3 000 metres); thunderstorm with heavy rain; broken cumulonimbus cloud at 500 feet; air temperature 25 degrees Celsius; dew-point temperature 22 degrees Celsius; QNH 1 008 hectopascals; trend during next 2 hours, visibility (along the runway(s) in the local special report; prevailing visibility in SPECI) temporarily 600 metres from 1115 to 1200, becoming at 1200 UTC visibility (along the runway(s) in the local special report; prevailing visibility in SPECI) 8 kilometres, thunderstorm ceases and nil significant weather and nil significant cloud.

* Fictitious location

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

Example A3-3. Volcanic activity report

VOLCANIC ACTIVITY REPORT YUSB* 231500 MT TROJEEN* VOLCANO N5605 W12652 ERUPTED 231445 LARGE ASH CLOUD EXTENDING TO APPROX 30000 FEET MOVING SW

Meaning:

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

* Fictitious location

APPENDIX 5. TECHNICAL SPECIFICATIONS RELATED TO FORECASTS

(See Chapter 6 of this Annex.)

1. CRITERIA RELATED TO TAF

1.1 TAF format

1.1.1 TAF shall be issued in accordance with the template shown in Table A5-1 and disseminated in the TAF code form prescribed by the World Meteorological Organization.

Note.— The TAF code form is contained in WMO Publication No. 306, Manual on Codes*, Volume I.1, Part A — Alphanumeric Codes.*

1.1.2 **Recommendation**.— *TAF should be disseminated, under bilateral agreements between States in a position to do so, in the WMO BUFR code form, in addition to the dissemination of the TAF in accordance with 1.1.1.*

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

1.2 Inclusion of meteorological elements in TAF

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

1.2.1 Surface wind

Recommendation.— *In forecasting surface wind, the expected prevailing direction should be given. When it is not possible to forecast a prevailing surface wind direction due to its expected variability, for example, during light wind conditions (less than 6 km/h (3 kt)) or thunderstorms, the forecast wind direction should be indicated as variable using "VRB". When the wind is forecast to be less than 2 km/h (1 kt), the forecast wind speed should be indicated as calm. When the forecast maximum speed (gust) exceeds the forecast mean wind speed by 20 km/h (10 kt) or more, the forecast maximum wind speed should be indicated. When a wind speed of 200 km/h (100 kt) or more is forecast, it should be indicated to be more than 199 km/h (99 kt).*

1.2.2 Visibility

Recommendation.— *When the visibility is forecast to be less than 800 m, it should be expressed in steps of 50 m; when it is forecast to be 800 m or more but less than 5 km, in steps of 100 m; 5 km or more but less than 10 km, in kilometre steps; and when it is forecast to be 10 km or more, it should be expressed as 10 km, except when conditions of CAVOK are forecast to apply. The prevailing visibility should be forecast. When visibility is forecast to vary in different directions and the prevailing visibility cannot be forecast, the lowest forecast visibility should be given.*

1.2.3 Weather phenomena

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

- *freezing precipitation*
- *freezing fog*
- *moderate or heavy precipitation (including showers thereof)*
- *low drifting dust, sand or snow*
- *blowing dust, sand or snow*
- *duststorm*
- *sandstorm*
- *thunderstorm (with or without precipitation)*
- *squall*
- *funnel cloud (tornado or waterspout)*
- *other weather phenomena given in Appendix 3, 4.4.2.3, only if they are expected to cause a significant change in visibility.*

The expected end of occurrence of those phenomena should be indicated by the abbreviation "NSW".

1.2.4 Cloud

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

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

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

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

d) cumulonimbus clouds, whenever forecast and not already included under a) to c).

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

1.2.5 Temperature

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

1.3 Use of change groups

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

1.3.1 **Recommendation.—** *The criteria used for the inclusion of change groups in TAF or for the amendment of TAF should be based on the following:*

a) when the mean surface wind direction is forecast to change by 60° or more, the mean speed before and/or after the change being 20 km/h (10 kt) or more;

b) when the mean surface wind speed is forecast to change by 20 km/h (10 kt) or more;

c) when the variation from the mean surface wind speed (gusts) is forecast to increase by 20 km/h (10 kt) or more, the mean speed before and/or after the change being 30 km/h (15 kt) or more;

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

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

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

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

1) 150, 350, 600, 800, 1 500 or 3 000 m; or

2) 5 000 m in cases where significant numbers of flights are operated in accordance with the visual flight rules;

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

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

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

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

h) when the height of base of the lowest layer or mass of cloud of BKN or OVC extent is forecast to lift and change to or pass through one or more of the following values, or when the height of the lowest layer or mass of cloud of BKN or OVC extent is forecast to lower and pass through one or more of the following values:

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

2) 450 m (1 500 ft) in cases where significant numbers of flights are operated in accordance with the visual flight rules;

i) when the amount of a layer or mass of cloud below 450 m (1 500 ft) is forecast to change:

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

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

j) when the vertical visibility is forecast to improve and change to or pass through one or more of the following values, or when the vertical visibility is forecast to deteriorate and pass through one or more of the following values: 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft); and

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

Note.— Other criteria based on local aerodrome operating minima are to be considered in parallel with similar criteria for the issuance of SPECI developed in response to Appendix 3, 2.3.2 l).

1.3.2 **Recommendation.—** *When a change in any of the elements given in Chapter 6, 6.2.3 is required to be indicated in accordance with the criteria given in 1.3.1, the change indicators "BECMG" or "TEMPO" should be used followed by the time period during which the change is expected to occur. The time period should be indicated as the beginning and end of the period in whole hours UTC. Only those elements for which a significant change is expected should be included following a change indicator. However, in the case of significant changes in respect of cloud, all cloud groups, including layers or masses not expected to change, should be indicated.*

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

1.3.4 **Recommendation.—** *The change indicator "TEMPO" and the associated time group should be used to describe expected frequent or infrequent temporary fluctuations in the meteorological conditions which reach or pass specified threshold values and last for a period of less than one hour in each instance and, in the aggregate, cover less than one-half of the forecast period during which the fluctuations are expected to occur. If the temporary fluctuation is expected to last one hour or longer, the change group "BECMG" should be used in accordance with 1.3.3 or the validity period should be subdivided in accordance with 1.3.5.*

1.3.5 **Recommendation.—** *Where one set of prevailing weather conditions is expected to change significantly and more or less completely to a different set of conditions, the period of validity should be subdivided into self-contained periods using the abbreviation "FM" followed immediately by a four-figure time group in whole hours and minutes UTC indicating the time the change is expected to occur. The subdivided period following the abbreviation "FM" should be self-contained and all forecast conditions given before the abbreviation should be superseded by those following the abbreviation.*

1.4 Use of probability groups

Recommendation.— *The probability of occurrence of an alternative value of a forecast element or elements should be indicated, as necessary, by use of the abbreviation "PROB" followed by the probability in tens of per cent and the time period during which the alternative value(s) is (are) expected to apply. The probability information should be placed after the element or elements forecast and be followed by the alternative value of the element or elements. The probability of a forecast of temporary fluctuations in meteorological conditions should be indicated, as necessary, by use of the abbreviation "PROB" followed by the probability in tens of per cent, placed before the change indicator "TEMPO" and associated time group. A probability of an alternative value or change of less than 30 per cent should not be considered sufficiently significant to be indicated. A probability of an alternative value or change of 50 per cent or more, for aviation purposes, should not be considered a probability but instead should be indicated, as necessary, by use of the change indicators*

"BECMG" or "TEMPO" or by subdivision of the validity period using the abbreviation "FM". The probability group should not be used to qualify the change indicator "BECMG" nor the time indicator "FM".

1.5 Numbers of change and probability groups

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

1.6 Dissemination of TAF

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

2. CRITERIA RELATED TO TREND FORECASTS

2.1 Format of trend forecasts

Trend forecasts shall be issued in accordance with the templates shown in Appendix 3, Tables A3-1 and A3-2. The units and scales used in the trend forecast shall be the same as those used in the report to which it is appended.

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

2.2 Inclusion of meteorological elements in trend forecasts

2.2.1 General provisions

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

2.2.2 Surface wind

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

a) a change in the mean wind direction of 60° or more, the mean speed before and/or after the change being 20 km/h (10 kt) or more;

b) a change in mean wind speed of 20 km/h (10 kt) or more; and

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

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

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

2.2.3 Visibility

When the visibility is expected to improve and change to or pass through one or more of the following values, or when the visibility is expected to deteriorate and pass through one or more of the following values: 150, 350, 600, 800, 1 500 or 3 000 m, the trend forecast shall indicate the change. When significant numbers of flights are conducted in accordance with the visual flight rules, the forecast shall additionally indicate changes to or passing through 5 000 m.

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

2.2.4 Weather phenomena

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

— freezing precipitation
— moderate or heavy precipitation (including showers thereof)
— thunderstorm (with precipitation)
— duststorm
— sandstorm
— other weather phenomena given in Appendix 3, 4.4.2.3, only if they are expected to cause a significant change in visibility.

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

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

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

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

2.2.5 Clouds

When the height of the base of a cloud layer of BKN or OVC extent is expected to lift and change to or pass through one or more of the following values, or when the height of the base of a cloud layer of BKN or OVC extent is expected to lower and pass through one or more of the following values: 30, 60, 150, 300 and 450 m (100, 200, 500, 1 000 and 1 500 ft), the trend forecast shall indicate the change. When the height of the base of a cloud layer is below or is expected to fall below or rise above 450 m (1 500 ft), the trend forecast shall also indicate changes in cloud amount from SKC, FEW, or SCT increasing to

BKN or OVC, or changes from BKN or OVC decreasing to SKC, FEW or SCT. When no cumulonimbus and no cloud below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater, are forecast and "CAVOK" and "SKC" are not appropriate, the abbreviation "NSC" shall be used.

2.2.6 Vertical visibility

When the sky is expected to remain or become obscured and vertical visibility observations are available at the aerodrome, and the vertical visibility is forecast to improve and change to or pass through one or more of the following values, or when the vertical visibility is forecast to deteriorate and pass through one or more of the following values: 30, 60, 150 or 300 m (100, 200, 500 or 1 000 ft), the trend forecast shall indicate the change.

2.2.7 Additional criteria

Criteria for the indication of changes based on local aerodrome operating minima, additional to those specified in 2.2.2 to 2.2.6, shall be used as agreed between the meteorological authority and the operator(s) concerned.

2.3 Use of change groups

Note. — Guidance on the use of change indicators in trend forecasts is given in Table A3-3.

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

2.3.2 The change indicator "BECMG" shall be used to describe forecast changes where the meteorological conditions are expected to reach or pass through specified values at a regular or irregular rate. The period during which, or the time at which, the change is forecast to occur shall be indicated, using the abbreviations "FM", "TL", or "AT", as appropriate, each followed by a time group in hours and minutes. When the change is forecast to begin and end wholly within the trend forecast period, the beginning and end of the change shall be indicated by using the abbreviations "FM" and "TL", respectively, with their associated time groups. When the change is forecast to commence at the beginning of the trend forecast period but be completed before the end of that period, the abbreviation "FM" and its associated time group shall be omitted and only "TL" and its associated time group shall be used. When the change is forecast to begin during the trend forecast period and be completed at the end of that period, the abbreviation "TL" and its associated time group shall be omitted and only "FM" and its associated time group shall be used. When the change is forecast to occur at a specified time during the trend forecast period, the abbreviation "AT" followed by its associated time group shall be used. When the change is forecast to commence at the beginning of the trend forecast period and be completed by the end of that period or when the change is forecast to occur within the trend forecast period but the time is uncertain, the abbreviations "FM", "TL" or "AT" and their associated time groups shall be omitted and the change indicator "BECMG" shall be used alone.

2.3.3 The change indicator "TEMPO" shall be used to describe forecast temporary fluctuations in the meteorological conditions which reach or pass specified values and last for a period of less than one hour in each instance and, in the aggregate, cover less than one-half of the period during which the fluctuations are forecast to occur. The period during which the temporary fluctuations are forecast to occur shall be indicated, using the abbreviations "FM" and/or "TL", as appropriate, each followed by a time group in hours and minutes. When the period of temporary fluctuations in the meteorological conditions is forecast to begin and end wholly within the trend forecast period, the beginning and end of the period of temporary fluctuations shall be indicated by using the abbreviations "FM" and "TL", respectively, with their associated time groups. When the period of temporary fluctuations is forecast to commence at the beginning of the trend forecast period but cease before the end of that period, the abbreviation "FM" and its associated time group shall be omitted and only "TL" and its associated time group shall be used. When the period of temporary fluctuations is forecast to begin during the trend forecast period and cease by the end of that period, the abbreviation "TL" and its associated time group shall be omitted and

only "FM" and its associated time group shall be used. When the period of temporary fluctuations is forecast to commence at the beginning of the trend forecast period and cease by the end of that period, both abbreviations "FM" and "TL" and their associated time groups shall be omitted and the change indicator "TEMPO" shall be used alone.

2.4 Use of the probability indicator

The indicator "PROB" shall not be used in trend forecasts.

3. CRITERIA RELATED TO FORECASTS FOR TAKE-OFF

3.1 Format of forecasts for take-off

Recommendation.— *The format of the forecast should be as agreed between the meteorological authority and the operator concerned. The order of the elements and the terminology, units and scales used in forecasts for take-off should be the same as those used in reports for the same aerodrome.*

3.2 Amendments to forecasts for take-off

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

4. CRITERIA RELATED TO AREA FORECASTS FOR LOW-LEVEL FLIGHTS

4.1 Format and content of GAMET area forecasts

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

4.2 Amendments to GAMET area forecasts

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

Note.— Specifications regarding the issuance of AIRMET information amending the area forecast in respect of weather phenomena hazardous for low-level flights are given in Appendix 6.

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

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

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

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

b) the elements in area forecasts for low-level flights as given in Table A5-4 except elements concerning:

   1) upper winds and temperatures; and

   2) forecast QNH.

Note.— Guidance on the use of terms "ISOL", "OCNL" and "FRQ" referring to cumulonimbus and towering cumulus clouds, and thunderstorms is given in Appendix 6.

4.4 Exchange of area forecasts for low-level flights

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

Table A5-1. Template for TAF

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

Note 1.— The ranges and resolutions for the numerical elements included in TAF are shown in Table A5-3 of this appendix.

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

Element as specified in Chapter 6	*Detailed content*	*Template(s)*			*Examples*	
Identification of the type of forecast (M)	Type of forecast (M)	TAF *or* TAF AMD *or* TAF COR			TAF TAF AMD	
Location indicator (M)	ICAO location indicator (M)	nnnn			YUDO[1]	
Time of issue of forecast (M)	Day and time of issue of the forecast in UTC (M)	nnnnnnZ			160000Z	
Identification of a missing forecast (C)	Missing forecast identifier (C)	NIL			NIL	
END OF TAF IF THE FORECAST IS MISSING.						
Days and period of validity of forecast (M)	Days and period of the validity of the forecast in UTC (M)	nnnn/nnnn			1606/1624 0812/0918	
Identification of a cancelled forecast (C)	Cancelled forecast identifier (C)	CNL			CNL	
END OF TAF IF THE FORECAST IS CANCELLED.						
Surface wind (M)	Wind direction (M)	nnn *or* VRB[2]			24015KMH; VRB04KMH (24008KT); (VRB02KT) 19022KMH (19011KT)	
	Wind speed (M)	[P]nn[n]			00000KMH (00000KT) 140P199KMH (140P99KT)	
	Significant speed variations (C)[3]	G[P]nn[n]			12012G35KMH (12006G18KT) 24032G54KMH (24016G27KT)	
	Units of measurement (M)	KMH (*or* KT)				
Visibility (M)	Prevailing visibility (M)	nnnn		C A V O K	0350 7000 9000 9999	CAVOK
Weather (C)[4, 5]	Intensity of weather phenomena (C)[6]	– *or* +	—			
	Characteristics and type of weather phenomena (C)[7]	DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* SHGR *or*	IC *or* FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* SQ *or* PO *or* FC *or* TS *or* BCFG *or*		RA +TSRA –FZDZ PRFG +TSRASN SNRA FG	HZ FG

Element as specified in Chapter 6	*Detailed content*	*Template(s)*				*Examples*
		SHGS *or* SHRA *or* SHSN *or* TSGR *or* TSGS *or* TSRA *or* TSSN		BLDU *or* BLSA *or* BLSN *or* DRDU *or* DRSA *or* DRSN *or* FZFG *or* MIFG *or* PRFG		
Cloud (M)[8]	Cloud amount and height of base or vertical visibility (M)	FEWnnn *or* SCTnnn *or* BKNnnn *or* OVCnnn	VVnnn *or* VV///	NSC		FEW010 VV005 OVC020 VV/// NSC SCT005 BKN012
	Cloud type (C)[4]	CB	—			SCT008 BKN025CB
Temperature (O)[9]	Name of the element (M)	TX				TX25/1013Z TN09/1005Z TX05/2112Z TNM02/2103Z
	Maximum temperature (M)	[M]nn/				
	Day and time of occurrence of the maximum temperature (M)	nnnnZ				
	Name of the element (M)	TN				
	Minimum temperature (M)	[M]nn/				
	Day and time of occurrence of the minimum temperature (M)	nnnnZ				
Expected significant changes to one or more of the above elements during the period of validity (C)[4, 10]	Change or probability indicator (M)	PROB30 [TEMPO] *or* PROB40 [TEMPO] *or* BECMG *or* TEMPO *or* FM				
	Period of occurrence or change (M)	nnnn/nnnn				
	Wind (C)[4]	nnn[P]nn[n][G[P]nn[n]]KMH *or* VRBnnKMH (*or* nnn[P]nn[G[P]nn]KT *or* VRBnnKT)				TEMPO 0815/0818 25070G100KMH (TEMPO 0815/0818 25035G50KT) TEMPO 2212/2214 17025G50KMH 1000 TSRA SCT010CB BKN020 (TEMPO 2212/2214 17012G25KT 1000 TSRA SCT010CB BKN020)
	Prevailing visibility (C)[4]	nnnn			C A V O K	BECMG 3010/3011 00000KMH 2400 OVC010 (BECMG 3010/3011 00000KT 2400 OVC010) PROB30 1412/1414 0800 FG
	Weather phenomenon: intensity (C)[6]	– or +	—	NSW		BECMG 1412/1414 RA TEMPO 2503/2504 FZRA TEMPO 0612/0615 BLSN PROB40 TEMPO 2923/3001 0500 FG
	Weather phenomenon: characteristics and type (C)[4, 7]	DZ *or* RA *or* SN *or* SG *or* PL *or* DS *or* SS *or* FZDZ *or* FZRA *or* SHGR *or* SHGS *or*	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*			

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

Notes.—

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

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

Change or time indicator		*Time period*	*Meaning*	
FM		$n_dn_dn_hn_hn_mn_m$	used to indicate a significant change in most weather elements occurring at n_dn_d day, n_hn_h hours and n_mn_m minutes (UTC); all the elements given before "FM" are to be included following "FM" (i.e. they are all superseded by those following the abbreviation)	
BECMG		$n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$	the change is forecast to commence at $n_{d1}n_{d1}$ day and $n_{h1}n_{h1}$ hours (UTC) and be completed by $n_{d2}n_{d2}$ day and $n_{h2}n_{h2}$ hours (UTC); only those elements for which a change is forecast are to be given following "BECMG"; the time period $n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$ should normally be less than 2 hours and in any case should not exceed 4 hours	
TEMPO		$n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$	temporary fluctuations are forecast to commence at $n_{d1}n_{d1}$ day and $n_{h1}n_{h1}$ hours (UTC) and cease by $n_{d2}n_{d2}$ day and $n_{h2}n_{h2}$ hours (UTC); only those elements for which fluctuations are forecast are to be given following "TEMPO"; temporary fluctuations should not last more than one hour in each instance, and in the aggregate, cover less than half of the period $n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$	
PROBnn	—	$n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$	probability of occurrence (in %) of an alternative value of a forecast element or elements; nn = 30 or nn = 40 only; to be placed after the element(s) concerned	—
	TEMPO	$n_{d1}n_{d1}n_{h1}n_{h1}/n_{d2}n_{d2}n_{h2}n_{h2}$		probability of occurrence of temporary fluctuations

Table A5-3. Ranges and resolutions for the numerical elements included in TAF

Element as specified in Chapter 6		*Range*	*Resolution*
Wind direction:	° true	000 – 360	10
Wind speed:	KMH KT	00 – 399* 00 – 199*	1 1
Visibility:	M M M M	0000 – 0800 0800 – 5 000 5 000 – 9 000 9 000 – 9 999	50 100 1 000 999
Vertical visibility:	30's M (100's FT)	000 – 020	1
Cloud: height of cloud base:	30's M (100's FT)	000 – 100	1
Air temperature (maximum and minimum):	°C	–80 – +60	1

* There is no aeronautical requirement to report surface wind speeds of 200 km/h (100 kt) or more; however, provision has been made for reporting wind speeds up to 399 km/h (199 kt) for non-aeronautical purposes, as necessary.

Table A5-4. Template for GAMET

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

Element	*Detailed content*	*Template*	*Examples*
Location indicator of FIR/CTA (M)	ICAO location indicator of the ATS unit serving the FIR or CTA to which the GAMET refers (M)	nnnn	YUCC[1]
Identification (M)	Message identification (M)	GAMET	GAMET
Validity period (M)	Day-time groups indicating the period of validity in UTC (M)	VALID nnnnnn/nnnnnn	VALID 220600/221200
Location indicator of meteorological office (M)	Location indicator of meteorological office originating the message with a separating hyphen (M)	nnnn-	YUDO-[1]
Name of the FIR/CTA *or* part thereof (M)	Location indicator and name of the FIR/CTA, *or* part thereof for which the GAMET is issued (M)	nnnn nnnnnnnnnn FIR[/n] [BLW FLnnn] *or* nnnn nnnnnnnnnn CTA[/n] [BLW FLnnn]	YUCC AMSWELL FIR/2 BLW FL120 YUCC AMSWELL FIR

Element	*Detailed content*	*Template*			*Examples*
		Identifier and time	*Content*	*Location*	
Indicator for the beginning of Section I (M)	Indicator to identify the beginning of Section I (M)	SECN I			SECN I
Surface wind (C)	Widespread surface wind exceeding 60 km/h (30 kt)	SFC WSPD: [nn/nn]	[n]nn KMH *(or* [n]nn KT)	[N of Nnn *or* Snn] *or* [S of Nnn *or* Snn] *or* [W of Wnnn *or* Ennn] *or* [E of Wnnn *or* Ennn] *or* [nnnnnnnnn][2]	SFC WSPD: 10/12 65 KMH SFC WSPD: 40 KT E OF W110
Surface visibility (C)	Widespread surface visibility below 5 000 m including the weather phenomena causing the reduction in visibility	SFC VIS: [nn/nn]	nnnn M FG *or* BR *or* SA *or* DU *or* HZ *or* FU *or* VA *or* PO *or* DS *or* SS *or* DZ *or* RA *or* SN *or* SG *or* IC *or* FC *or* GR *or* GS *or* PL *or* SQ		SFC VIS: 06/08 3000 M BR N of N51

Element	*Detailed content*	*Template*			*Examples*
		Identifier and time	*Content*	*Location*	
Sea-surface temperature and state of sea (O)	Sea-surface temperature and state of the sea if required by regional air navigation agreement	SEA:	Tnn HGT [n]n M		SEA: T15 HGT 5 M
Volcanic eruptions (M)	Name of volcano	VA:	nnnnnnnnn *or* NIL		VA: ETNA

Notes.—

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

Example A5-1. TAF

TAF for YUDO (Donlon/International):*

TAF YUDO 160000Z 1606/1624 13018KMH 9000 BKN020 BECMG 1606/1608 SCT015CB BKN020 TEMPO 1608/1612 17025G45KMH 1000 TSRA SCT010CB BKN020 FM161230 15015KMH 9999 BKN020

Meaning of the forecast:

TAF for Donlon/International* issued on the 16th of the month at 0000 UTC valid from 0600 UTC to 2400 UTC on the 16th of the month; surface wind direction 130 degrees; wind speed 18 kilometres per hour; visibility 9 kilometres, broken cloud at 600 metres; becoming between 0600 UTC and 0800 UTC on the 16th of the month, scattered cumulonimbus cloud at 450 metres and broken cloud at 600 metres; temporarily between 0800 UTC and 1200 UTC on the 16th of the month surface wind direction 170 degrees; wind speed 25 kilometres per hour gusting to 45 kilometres per hour; visibility 1 000 metres in a thunderstorm with moderate rain, scattered cumulonimbus cloud at 300 metres and broken cloud at 600 metres; from 1230 UTC on the 16th of the month surface wind direction 150 degrees; wind speed 15 kilometres per hour; visibility 10 kilometres or more; and broken cloud at 600 metres.

* Fictitious location

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

Example A5-2. Cancellation of TAF

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

TAF AMD YUDO 161500Z 1606/1624 CNL

Meaning of the forecast:

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

* Fictitious location

4.1.4 **Recommendation**.— *The forms and the legend of charts included in flight documentation should be printed in English, French, Russian or Spanish. Where appropriate, approved abbreviations should be used. The units employed for each element should be indicated; they should be in accordance with Annex 5.*

4.2 Charts in flight documentation

4.2.1 Characteristics of charts

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

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

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

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

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

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

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

g) labels on the charts for flight documentation should be clear and simple and should present the name of the world area forecast centre or, for non-WAFS products, the originating centre, the type of chart, date and valid time and, if necessary, the types of units used in an unambiguous way.

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

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

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

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

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

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

4.2.2 Set of charts to be provided

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

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

4.2.3 Height indications

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

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

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

4.3 Specifications related to low-level flights

4.3.1 In chart form

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

a) information from relevant SIGMET and AIRMET messages;

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

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

4.3.2 In abbreviated plain language

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

a) SIGMET and AIRMET information; and

b) GAMET area forecasts.

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