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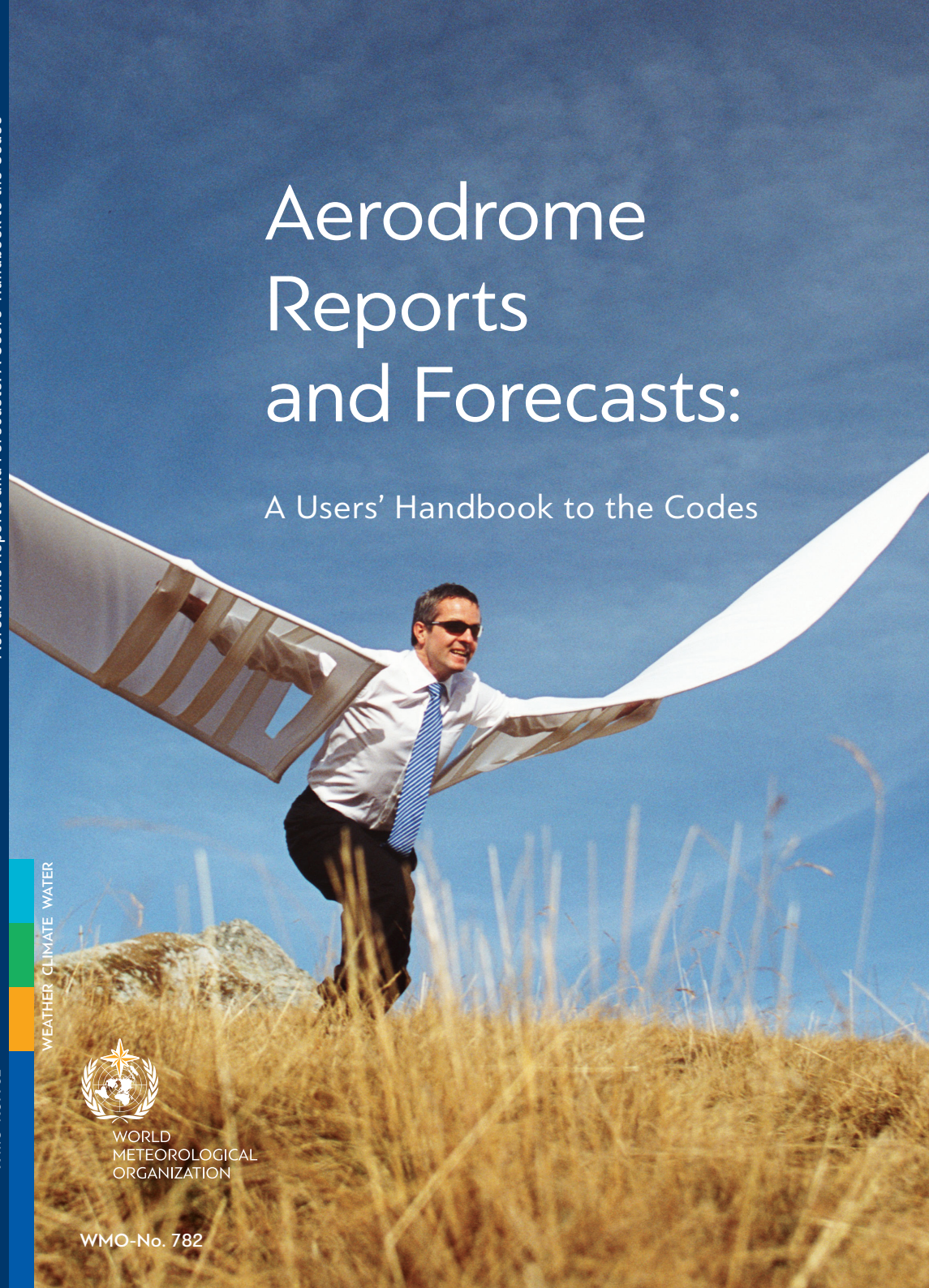
Aerodrome Reports and Forecasts: A Users' Handbook to the Codes

WMO-No. 782

WEATHER CLIMATE WATER

Aerodrome Reports and Forecasts:

A Users' Handbook to the Codes



WORLD METEOROLOGICAL ORGANIZATION

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2022 edition

WEATHER CLIMATE WATER

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FOREWORD

This booklet is a simple guide to the aeronautical meteorological codes, **METAR**, **SPECI** and **TAF**, applicable as of 4 November 2021, updated as a result of the alignment of the *Technical Regulations* (WMO-No. 49), Volume II – Meteorological Service for International Air Navigation, Parts I and II, with Amendment 80 to Annex 3 to the Convention on International Civil Aviation. It is aimed at a wide range of users such as pilots, flight dispatchers, air traffic control staff and meteorological observers at smaller aerodromes where sophisticated automated instruments are not available. Although the readers of this handbook may not be professional meteorologists, it is assumed that they have some formal meteorological training.

The handbook answers basic questions on the preparation of meteorological reports and forecasts, such as:

- The information to be included;
- The order to be used;
- How the information is to be encoded and decoded.

At the end of the booklet, explanations of weather phenomena significant to aviation are provided. For more details on the codes, the relevant sections of the WMO *Manual on Codes* (WMO-No. 306) on **METAR**, **SPECI** and **TAF** should be consulted.

METAR and **SPECI** are based on weather observations. Instruments are increasingly being used to support or even fully replace human observers. Owing to the variability of meteorological elements in space and time, to limitations of observing techniques and to limitations caused by the definitions of some of the elements, the specific value of any of the elements given in a report shall be understood by the recipient to be the best estimate of the actual conditions at the time of observation. Nevertheless, certain limitations should be understood. For instance, when visibility is 10 km or more, the human observer at the observing site, even at larger airports, should be able to see and report clouds over a wide area, including some distance on the approach. Cloud observations should be representative for the area within a radius of approximately 16 km of the aerodrome reference point but may, in some instances, be limited by obstacles (for example, airport terminal buildings) or restricted by orography. If visibility is, for instance, only 2 000 m, the field of vision is greatly reduced and patches of low cloud on the approach may not be seen or so reported. For elements that are intended to be representative for a wider area (for example, visibility, present weather and clouds), it should be

recognized that for fully automated observing systems a sufficient number of point measurements within the area of interest are to be made and then extrapolated as best as possible.

Aerodrome forecasts, in **TREND** and **TAF** forms, are not intended to provide detailed descriptions of the weather during the forecast period. The **TAF** gives the forecaster's assessment of the most likely forecast values and their significant changes during the forecast period. Any changes that take place during the forecast period are indicated only if the changes are significant. Significant changes are defined as a result of full discussions with the International Civil Aviation Organization (ICAO) and the aviation users.

PART A

AVIATION WEATHER REPORTS – METAR AND SPECI

METAR is the code name for an aerodrome routine weather report. A **METAR** is issued at hourly or half-hourly intervals.

SPECI is the code name for an aerodrome special weather report, issued using the same encoding as **METAR**. A **SPECI** can be issued at any time when certain criteria defined by ICAO or by local agreements are met (see *Technical Regulations* (WMO-No. 49), Volume II, Part II, Appendix 3, section 2.3). When a half-hourly **METAR** is issued, a **SPECI** is not required.

Both **METAR** and **SPECI** may have a **TREND** forecast appended (see Part B).

METAR or **SPECI** contains the following information in the order shown:

IDENTIFICATION GROUPS

SURFACE WIND

PREVAILING VISIBILITY

RUNWAY VISUAL RANGE (if available)

PRESENT WEATHER

CLOUD (or vertical visibility if appropriate)

AIR AND DEWPOINT TEMPERATURE

PRESSURE – QNH

SUPPLEMENTARY INFORMATION

Notes:

1. The code word **CAVOK** is used to replace the visibility, present weather and cloud groups when the three following conditions are simultaneously met:
   - Visibility is 10 km or more;
   - No clouds of operational significance – meaning there is no cloud below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater, nor cumulonimbus cloud or towering cumulus cloud at any height;
   - There is no significant weather phenomenon as specified on page 15.
2. If a meteorological element in **METAR** or **SPECI** is temporarily missing, or its value is considered temporarily as incorrect, it is replaced by a solidus (/) for each missing mandatory digit.
3. At the end of **METAR** or **SPECI**, a remarks section starting with the code word **RMK** may be appended. This section contains information required by a national authority and, as such, this information should not be disseminated internationally.

CODE FORMAT

METAR or **SPECI** or **METAR COR** or **SPECI COR** } CCCC YYGGgg**Z** { **NIL** or dddff**G**$f_m f_m$ or **AUTO** dddff**G**$f_m f_m$

ENCODE SO FAR

SPECI LUDO 211025Z

1. IDENTIFICATION GROUPS

This section will have three parts:

- The report code name (**METAR** or **SPECI**).
- The ICAO location indicator of the reporting station, for example, **LUDO**.
- The day of the month and the time of observation in hours and minutes UTC (coordinated universal time), followed by the letter **Z**.

Notes:

1. The code words **COR** or **NIL** are inserted, as appropriate, for corrected or missing reports respectively, after the code name and the date/time group.
2. The code word **AUTO** is inserted after the code name and the date/time group when the report contains a fully automated observation that is without human intervention.

The encoding on the opposite page reads:

Aerodrome special report at **LUDO** on 21st of the month at 10 hours and 25 minutes UTC, being the time of occurrence of the significant change.

CODE FORMAT

$$\text{dddff}\mathbf{G}f_mf_m \left\{ \begin{array}{c} \mathbf{KT} \\ \text{or} \\ \mathbf{MPS} \end{array} \right\} d_nd_nd_n\mathbf{V}d_xd_xd_x$$

ENCODE SO FAR

SPECI LUDO 211025Z 31015G27KT 280V350

2. SURFACE WIND

Normally, there will be a five-figure group to indicate the 10-minute mean wind speed and predominant wind direction followed by the abbreviation **KT** or **MPS** to indicate the wind speed units used, where **KT** denotes knots (kt) and **MPS** denotes metres per second (m/s). The first three figures indicate the wind direction, and the last two the wind speed.

Examples: **31015KT**

27006MPS

The surface wind direction and speed shall be reported in steps of 10° true and 1 kt (or 1 m/s), respectively. Any observed value which does not fit the reporting scale in use shall be rounded to the nearest step in the scale.

Additionally, if, during the 10 minutes preceding the observation, the maximum gust speed has exceeded the mean speed by 10 kt (5 m/s) or more, this gust will be reported by inserting the letter **G** followed by the gust speed directly after the mean speed.

Example: **31015G27KT**

If, during the 10 minutes immediately preceding the observation, the wind direction has varied by 60° or more but less than 180° and the mean wind speed is 3 kt (1.5 m/s) or more, the two extreme directions should be indicated in clockwise order, with the letter **V** inserted between the two directions.

Example: **31015G27KT 280V350**

Notes:

1. The wind reported should be the mean over the 10 minutes preceding the observation. If during this period there has been a marked discontinuity lasting at least 2 minutes, the mean values should be assessed over the period after the discontinuity. A marked discontinuity occurs when there is a wind direction change of 30° or more with a wind speed of 10 kt (5 m/s) or more, before or after the change, or a wind speed change of 10 kt (5 m/s) or more.
2. The averaging period for measuring variations from the mean wind speed (gusts) should be 3 seconds.
3. Temporarily missing wind information should be encoded as follows (for example): **///05KT** if the wind direction is missing, **270//KT** if the wind speed is missing, or **/////KT** if wind direction and wind speed are both missing.

Page intentionally left blank.

Special cases

Variable: The wind direction is encoded as **VRB** only if one of the following conditions is met:

(a) The wind speed is less than 3 kt (1.5 m/s).

Example: **VRB02KT**

(b) The wind speed is 3 kt (1.5 m/s) or higher and wind direction is varying by 180° or more and a single direction is impossible to determine, for example when a thunderstorm is over the aerodrome.

Example: **VRB28KT**

Calm: When a wind speed is less than 1 kt (0.5 m/s), the group is encoded as 00000 followed by the abbreviation for the wind speed units.

Example: **00000KT**

Speeds of 100 kt (50 m/s) or more: The wind speed shall be preceded by the letter indicator **P** and reported as **P99KT (or P49MPS)**.

Example: **240P99KT**

CODE FORMAT

VVVV or **CAVOK**	$V_N V_N V_N V_N D_v$

ENCODE SO FAR

SPECI LUDO 211025Z 31015G27KT 280V350
4000 1400SW

3. **VISIBILITY**

The group VVVV shall be used to report prevailing visibility. When horizontal visibility is not the same in different directions, and when visibility is fluctuating rapidly and the prevailing visibility cannot be determined, the group VVVV shall be used to report the lowest visibility.

Example: Prevailing visibility of 4 000 m is encoded as **4000**.

The reporting scales of visibility are as follows:

(a) In steps of 50 m if VVVV is less than 800 m;
(b) In steps of 100 m if VVVV is 800 m or more, but less than 5 km;
(c) In steps of 1 000 m if VVVV is 5 km or more, but less than 10 km;
(d) As 10 km when visibility is 10 km or more.

Directional variation in visibility $V_N V_N V_N V_N D_v$

When the horizontal visibility is not the same in different directions and when the minimum visibility is different from the prevailing visibility, and less than 1 500 m or less than 50% of the prevailing visibility, the group $V_N V_N V_N V_N D_v$ shall also be used to report the minimum visibility and its general direction.

Example: **1400SW** means that the minimum visibility equals 1 400 m with SW (south-west) as its general direction.

If the minimum visibility is observed in more than one direction, then D_v shall represent the most operationally significant direction.

Note: In AUTO reports, VVVV refers to the best practicable indications along the runway and touchdown zone. Temporarily missing visibility information should be encoded as ////.

CODE FORMAT

R$D_RD_R/V_RV_RV_RV_R$i

ENCODE SO FAR

SPECI LUDO 211025Z 31015G27KT 280V350 4000 1400SW R24/P2000

4. RUNWAY VISUAL RANGE

Where the runway visual range (RVR) can be determined and when it is reported, the group starts with the letter **R** followed by the runway designator D_RD_R and a solidus (/) followed by the RVR in metres. Usually, up to a maximum of four RVR groups may be reported, associated with the configuration of runways in operational use.

Example: **R24/1100** (runway visual range on runway 24, 1 100 m)

The reporting scales of RVR are as follows:

(a) Steps of 25 m, if RVR is less than 400 m;
(b) Steps of 50 m, if RVR is between 400 and 800 m;
(c) Steps of 100 m, if RVR is more than 800 m.

Assessed values of RVR are rounded down to the nearest lower step of the scale. For example, an assessed RVR value of 950 m for runway 24 would be rounded down to 900 m and reported as **R24/0900**.

Special cases

When the RVR is assessed to be more than 2 000 m, it should be reported as **P2000**.

Example: **R24/P2000** (prevailing visibility less than 1 500 m, RVR assessed on runway 24 to be greater than 2 000 m)

When the RVR is below the minimum value that can be assessed, the RVR should be reported as **M** followed by the appropriate minimum value that can be assessed.

Example: **R24/M0150** (runway visual range on runway 24, less than 150 m)

Notes:

1. RVR is reported as a 10-minute mean value. Where feasible, an indication of the tendency over the 10 minutes is appended to the RVR report by i as follows:
   (a) **i = U** when the runway visual range has increased during the 10 minutes preceding the observation. Example: **R24/1100U**;
   (b) **i = D** when the runway visual range has decreased during the 10 minutes preceding the observation. Example: **R24/1100D**;

(c) **i = N** indicates no distinct change in runway visual range during the 10 minutes preceding the observation. Example: **R24/1100N**;

(d) When it is not possible to determine a tendency, **i** is omitted.

2. Missing RVR information should be encoded as (for example): **R24/////**, where four solidi (**////**) are appended to the "**R24**/" designator.

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CODE FORMAT

w'w'

ENCODE SO FAR

SPECI LUDO 211025Z 31015G27KT 280V350 4000 1400SW R24/P2000 +SHRA

5. PRESENT WEATHER

Code table 4678

QUALIFIER		*WEATHER PHENOMENA*		
Intensity or proximity	*Descriptor*	*Precipitation*	*Obscuration*	*Other*
– Light	MI Shallow	DZ Drizzle	BR Mist	PO Dust/sand whirls (dust devils)
Moderate (no qualifier)	BC Patches	RA Rain	FG Fog	SQ Squalls
+ Heavy (well-developed in the case of dust/sand whirls (dust devils) and funnel clouds)	PR Partial (covering part of the aerodrome)	SN Snow	FU Smoke	FC Funnel cloud (tornado or waterspout)
	DR Low drifting	SG Snow grains	VA Volcanic ash	SS Sandstorm
	BL Blowing	PL Ice pellets	DU Widespread dust	DS Duststorm
VC In the vicinity	SH Shower(s)	GR Hail	SA Sand	
	TS Thunderstorm	GS Small hail and/or snow pellets	HZ Haze	
	FZ Freezing (supercooled)	UP Unknown precipitation		

Source: *Manual on Codes* (WMO-No. 306), Volume I.1

Once it has been decided there is a weather phenomenon to be reported (see details in chapter 'EXPLANATION OF WEATHER PHENOMENA SIGNIFICANT TO AVIATION'), the present weather is encoded by considering each column in the table above.

Example: There is rain: **RA**
It is heavy: +
It is a shower: **SH**

The encode becomes **+SHRA**.

If more than one weather phenomenon is observed, separate groups will be encoded. However, for more than one form of precipitation, these forms of precipitations will be combined in a single group with the dominant type of precipitation being reported first.

Page intentionally left blank.

Example: Moderate rain and snow with snow as the dominant precipitation should be encoded as:

SNRA

Note: The abbreviation FC is used with the intensity heavy (+) to indicate funnel cloud (tornado or waterspout) and with the intensity moderate (no qualifier) to indicate funnel cloud not reaching the ground.

There are a few restrictions on the weather phenomena, the most significant being:

- Intensity is reported only with precipitation (including showers and thunderstorms with precipitation), duststorms or sandstorms.
- Smoke, haze, widespread dust and sand (except drifting sand) are reported only when visibility has been reduced to 5 000 m or less.
- Mist is reported when visibility is reduced by water droplets to 1 000 to 5 000 m.
- Fog is reported only when visibility is reduced by water droplets to less than 1 000 m.
- Hail (**GR**) should be used only when the diameter of the largest hailstones observed is 5 mm or more. **GS** shall be used in all other cases.
- **VC** denotes approximately between 8 and 16 km of the aerodrome reference point.

Notes:

1. When visibility is 5 000 m or less, one of the phenomena **FU, HZ, DU, SA** or **BR** is reported in the **METAR/SPECI**. When visibility is above 5 000 m, the phenomena **FU, HZ, DU, SA** or **BR** are not present by definition and are therefore not reported. For instance, if visibility is 5 000 m, it will be encoded as 5000 together with the phenomena **FU, HZ, DU, SA** or **BR**, causing this reduction in visibility.
2. Whereas if visibility is 5 001 to 5 999 m this is still encoded as 5000 (rounded down to the nearest 1 000 m) in the **METAR** or **SPECI**, but the phenomena **FU, HZ, DU, SA** and **BR** will not appear.
3. The qualifier **TS** (thunderstorm) shall be used whenever thunder is heard or lightning detected at the aerodrome within the 10-minute period preceding the observation.
4. The descriptor **SH** (showers) cannot be associated with ice pellets (**PL**).
5. When an automatic observing system is used and the type of precipitation cannot be identified by this system, the abbreviation **UP** shall be used for unknown precipitation.
6. When an automatic observing system is used and when showers (**SH**) cannot be determined with a method that takes account of the presence of convective cloud, the precipitation should not be characterized as **SH**.
7. When information on present weather is temporarily missing, it should be encoded as **//**.

CODE FORMAT

$N_sN_sN_sh_sh_sh_s$
or
VV$h_sh_sh_s$
or
NSC
or
NCD

ENCODE SO FAR

SPECI LUDO 211025Z 31015G27KT 280V350 4000 1400SW R24/P2000 +SHRA FEW005 FEW010CB SCT018 BKN025

6. CLOUD or VERTICAL VISIBILITY

Cloud amount, cloud type and height of cloud base are observed and reported as necessary to describe the clouds of operational significance. Cloud groups consist of six characters under normal circumstances. The first three indicate cloud amount in oktas (eighths of the sky covered) with:

1 to 2 oktas (1/8th to 2/8ths)	being reported as	**FEW**	(few)
3 to 4 oktas (3/8ths to 4/8ths)	being reported as	**SCT**	(scattered)
5 to 7 oktas (5/8ths to 7/8ths)	being reported as	**BKN**	(broken)
8 oktas (8/8ths)	being reported as	**OVC**	(overcast)

The second three characters indicate the height of the base of the clouds of operational significance in units of 30 m (100 ft). The reporting steps are 30 m (100 ft) for height of the base of the clouds up to 3 000 m (10 000 ft) and 300 m (1 000 ft) for height of the base of the clouds 3 000 m (10 000 ft) and above.

Example: 3 oktas (3/8ths) of cloud with a base of 1 850 ft will be encoded as:

SCT018

Note: The cloud base is rounded down to the next reporting step, in this case to 1 800 ft.

Cloud type

Only the following cloud types are considered to be significant enough for aviation to be reported in addition to cloud cover and cloud base:

- Cumulonimbus cloud indicated by **CB**;
- Cumulus congestus cloud of great vertical extent indicated by **TCU**.

The abbreviation **TCU** is the ICAO-specific term for cumulus congestus and stands for "**T**owering **CU**mulus".

Reported cloud groups

The cloud group can be repeated to report different layers or masses of cloud, but the number of groups should not normally exceed three. The following criteria should be followed when selecting the cloud layers to be reported:

– The lowest individual layer (mass) of any amount;
– The next individual layer of more than 2 oktas (2/8ths);
– The next higher layer of more than 4 oktas (4/8ths).

In addition: Significant convective clouds (**CB** or **TCU**) should be reported if not already reported in one of the three groups above.

Example: If there were 1 okta (1/8th) cloud at 500 ft,

2 oktas (2/8ths) cumulonimbus cloud at 1 000 ft,

3 oktas (3/8ths) cloud at 1 800 ft,

5 oktas (5/8ths) cloud at 2 500 ft,

the reported cloud would be:

FEW005 FEW010CB SCT018 BKN025

At mountain stations, when the height of the cloud base is below station level, the cloud group should read $\mathbf{N_sN_sN_s}$**///**.

Example: **SCT///**

FEW///CB

Notes:
1. The cloud groups are reported in ascending order of height above ground level.
2. When there are no clouds below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater, and no restriction to vertical visibility and the abbreviation **CAVOK** is not appropriate, the abbreviation **NSC** (**N**il **S**ignificant **C**loud) is used.
3. When cumulonimbus (**CB**) and towering cumulus (**TCU**) have a common cloud base, the type of cloud is reported as **CB** and the amount of cloud is encoded as the sum of **CB** and **TCU** amounts at that cloud base.
4. When an automatic observing system is used and the cloud type cannot be observed by that system, the cloud type in each cloud group shall be replaced by **///**. If no clouds are detected by that system, the abbreviation **NCD** shall be used.
   Examples: **FEW004///** or **BKN050///**
5. When information on cloud base is not available, it should be encoded as **///**.
   Examples: **BKN//////** or **FEW///CB** or **SCT///**

6. When information on cloud coverage is not available, it should be encoded as ///.
   Examples: **///018CB** or **///030**
7. When no information on cloud base and coverage is available, it should be replaced by **//////**.
   Examples: **////////** or **//////CB** or **//////TCU**

Vertical visibility

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

Example: **VV003** (vertical visibility 300 ft)

When the sky is obscured but the vertical visibility cannot be assessed, the group will read **VV///**.

CAVOK

The code word **CAVOK** shall be used when the following conditions occur simultaneously at the time of the observation:

(a) Visibility is 10 km or more;
(b) No cloud of operational significance;
(c) No significant weather phenomena as indicated in Code table 4678 reproduced on page 15.

CODE FORMAT

$T'T'/T'_dT'_d$

ENCODE SO FAR

SPECI LUDO 211025Z 31015G27KT 280V350
4000 1400SW R24/P2000 +SHRA FEW005
FEW010CB SCT018 BKN025 10/03

7. AIR AND DEWPOINT TEMPERATURE

The observed air temperature and dewpoint temperature, each as two figures rounded to the nearest whole degree Celsius, should be reported as follows:

Temperatures below 0 °C will be preceded by **M** to indicate "minus".

Example: –9.5 °C is reported as **M09**.

Notes:

1. Air temperature and dewpoint temperature values of 0.5° will be rounded up to the higher whole degree.
   Example: Air temperature: 9.5 °C
   Dewpoint temperature: 3.3 °C
   Will be reported as: **10/03**

2. When information on air temperature, dew-point temperature or both are temporarily missing, it should be encoded as (for example) **///03, 10///** or **/////** respectively. In the first example, two solidi (**//**) precede the "**/**03" dew-point temperature. In the second example, two solidi (**//**) follow the "10**/**" air temperature. In the third example, air temperature and dew-point temperature are both missing (**//**) and (**//**) either side of "**/**".

CODE FORMAT

Q$P_H P_H P_H P_H$

ENCODE SO FAR

SPECI LUDO 211025Z 31015G27KT 280V350
4000 1400SW R24/P2000 +SHRA FEW005
FEW010CB SCT018 BKN025 10/03 Q0995

8. **PRESSURE – QNH**

The last group of the main part of the report should indicate the QNH (mean sea level pressure) rounded down to the nearest whole hectopascal. The group starts with the letter **Q** followed by four figures.

Example: QNH of 995.6 hPa is reported as:

Q0995

Notes:

1. In some countries, inches of mercury are used as the unit of QNH. In this case, the indicator will be **A** (instead of **Q**).
   Example: QNH of 30.05 inches is reported as:
   A3005

2. When information on pressure is temporarily missing, it should be encoded as **Q////** (or in countries using inches of mercury, encoded as **A////**).

CODE FORMAT

REw'w' { **WS R**D_RD_R or **WS ALL RWY** } { (**W**T_sT_s/**S**S') or (**W**T_sT_s/**H**$H_sH_sH_s$) }

ENCODE SO FAR

SPECI LUDO 211025Z 31015G27KT 280V350
4000 1400SW R24/P2000 +SHRA FEW005
FEW010CB SCT018 BKN025 10/03 Q0995
RERA WS R24 W19/S4

9. SUPPLEMENTARY INFORMATION

Optional elements included under supplementary information are to be included in METAR and SPECI in accordance with ICAO regional air navigation agreement. For international dissemination, this section is used to report:

- Recent weather phenomena of operational significance;
- Information on wind shear in the lower layers;
- Sea-surface temperature and the state of the sea or significant wave height.

Recent weather

Using the indicator letters **RE**, information on recent weather shall be reported, up to a maximum of three groups using the abbreviations given in section 5, if the following weather phenomena were observed during the previous hour, or since the last observation, but not at the time of observation. The time of observation is taken to cover the previous 10 minutes.

- Freezing (**FZ**) precipitation
- Moderate or heavy precipitation (including showers, **SH**)
- Moderate or heavy ice pellets (**PL**), hail (**GR**), small hail and/or snow pellets (**GS**)
- Blowing (**BL**) snow
- Sandstorm or duststorm (**SS** or **DS**)
- Thunderstorm (**TS**)
- Funnel cloud(s) (tornado or waterspout, **FC**)
- Volcanic ash (**VA**)

No intensity of significant recent weather phenomena shall be indicated.

Example: Heavy rain 20 minutes before the time of observation, with moderate rain at the time of observation, is coded as:

RERA

Notes:
1. When an automatic observing system is used and when the type of precipitation cannot be identified by this system, the abbreviation **REUP** shall be used for recent unknown precipitation.
2. When information on recent weather is temporarily missing, it should be encoded as **RE//**.

Wind shear

Where local circumstances so warrant, information on the existence of wind shear significant to aircraft operations along the take-off or approach paths in the lowest 500 m (1 600 ft) should be reported using the following groups, as necessary:

WS RD_RD_R

WS ALL RWY

where **D_RD_R** is the runway designator.

For example, **WS R24** indicates that wind shear has been reported in either the take-off or landing zones of runway 24.

Sea-surface temperature and the state of the sea or significant wave height

Information on sea-surface temperature and the state of the sea or significant wave height shall be given using the following group:

(WT_sT_s/SS') or (WT_sT_s/H$H_sH_sH_s$)

where:
- **W** is a letter indicator for the temperature of the sea surface;
- **T_sT_s** is the sea-surface temperature coded or decoded as indicated in Part A, section 7 (page 23);
- **SS'** is the state of the sea as indicated in Code table 3700 where **S** is the letter indicator and **S'** is the state of the water surface;
- **H$H_sH_sH_s$** is the significant wave height where **H** is the letter indicator and **$H_sH_sH_s$** is the significant wave height in decimetres.

Example 1: Sea-surface temperature: 18.7 °C

State of the sea: Moderate

W19/S4

Example 2: Sea-surface temperature: 12 °C

Significant wave height: 75 dm (7.5 m)

W12/H75

Note: When information on sea-surface temperature and the state of the sea or significant wave height is temporarily missing, it should be encoded as (for example) **W///S4** and **W17/S/** or **W17/H///** respectively.

COMPLETE CODE FORMAT

METAR or **SPECI** or **METAR COR** or **SPECI COR** } CCCC YYGGgg**Z**

{ **NIL** or dddff**G**$f_m f_m$ or **AUTO** dddff**G**$f_m f_m$ } { **KT** or **MPS** } $d_n d_n d_n$**V**$d_x d_x d_x$

{ VVVV or **CAVOK** } $V_N V_N V_N V_N D_v$ **R**$D_R D_R$/$V_R V_R V_R V_R$i

w'w' { $N_s N_s N_s h_s h_s h_s$ or **VV**$h_s h_s h_s$ or **NSC** or **NCD** } T'T'/T'$_d$T'$_d$ **Q**$P_H P_H P_H P_H$

REw'w' { **WS R**$D_R D_R$ or **WS ALL RWY** } { (**W**$T_s T_s$/**S**S') or (**W**$T_s T_s$/**H**$H_s H_s H_s$) }

(optional **TREND** forecast; details in PART B)

(**RMK** . . . . .)

PART B

TREND FORECASTS

TREND forecasts are appended to **METAR** or **SPECI**. The forecaster should ensure that the encoding of the forecasts follows the agreed international standard practices. The decoding of these forecasts is carried out by a variety of people: pilots, air traffic services staff, operations personnel and meteorologists. Consequently, this guidance is aimed at decoding. However, in order to overcome any confusion, the encoder may find it useful to note how the user interprets the forecast.

A TREND forecast consists of a concise statement of expected significant changes in the meteorological conditions at the aerodrome, to be appended to a routine or special report (**METAR**, **SPECI**). The period of validity of a **TREND** forecast is 2 hours from the time of the report, and this report forms an integral part of the forecast. The **TREND** forecast indicates significant changes in respect of one or more of the elements: surface wind, prevailing visibility, weather and cloud. Only those elements for which a significant change is expected are included. When no significant change is expected to occur, this is indicated by the abbreviation **NOSIG**.

Owing to the variability of meteorological elements in space and time, to limitations of forecasting techniques and to the definitions of some of the elements, the specific value of any element given in the forecast should be understood to be the most probable value that the element is likely to assume during the period of the forecast.

The forecast times of occurrence are also the forecaster's best estimate. Statistically, differences of 30 minutes between forecast and actual times will occur on a significant number of occasions.

Note: The units and scales used in **TREND** shall be the same as those used in the report to which it is appended.

CODE FORMAT

TTTTT TTGGgg
or
NOSIG

Example: BECMG FM1100

Decode: Becoming from 1100 UTC

ENCODE SO FAR

BECMG FM1100

1. CHANGE INDICATORS

When a significant change is expected in one or several of the observed elements (surface wind, prevailing visibility, weather, clouds or vertical visibility), one of the following change indicators (explained in detail below) is used for **TTTTT**:

BECMG or **TEMPO**

The change indicator is used in combination with the time group **GGgg**, preceded without a space by one of the letter indicators **FM** (from), **TL** (until) or **AT** (at), as appropriate.

TEMPO FM1030

BECMG

The change indicator **BECMG** is used to describe expected changes which reach or pass specified values at a regular or irregular rate. The period during which, or the time at which, the change is forecast to occur is indicated using the abbreviations **FM**, **TL** or **AT**, as appropriate.

(a) When a change is forecast both to begin and end within the **TREND** forecast period, the beginning and end of change are indicated by using the abbreviations **FM** and **TL**, respectively, with the associated time groups. For example, for a **TREND** forecast period from 1000 to 1200 UTC in the form:

BECMG FM1030 TL1130

(b) When the change is forecast to start at the beginning of the **TREND** period but to be completed before the end of that period, only the abbreviation **TL** and its associated time group is used to indicate the end of the change. For example, where the prevailing visibility at observation time is 6 km and is expected to decrease, becoming 3 000 m in mist until 1100 UTC:

BECMG TL1100 3000 BR

(c) When the change is forecast to begin during the **TREND** forecast period and to be completed at the end of that period, the abbreviation **FM** and its associated time group are used to indicate the beginning of the change. For example:

BECMG FM1100

(d) When the change is forecast to occur at a specific time during the **TREND** forecast period, the abbreviation **AT** followed by the associated time group is used to indicate the time of the change. For example:

BECMG AT1100

(e) When the change is forecast to start at the beginning of the **TREND** forecast period and to be completed by the end of that period, or when the change is forecast to occur within the **TREND** period but the time is uncertain, the abbreviations **FM**, **TL** or **AT** and their associated time groups are omitted and the change indicator **BECMG** is used.

(f) When changes are forecast to take place at midnight UTC, the time is indicated as follows:

(i) By 0000 when associated with **FM** and **AT**;
(ii) By 2400 when associated with **TL**.

TEMPO

The change indicator **TEMPO** is used to describe forecast temporary fluctuations in the meteorological conditions which reach or pass specified values and last for a period of less than 1 hour in each instance and in total for less than half of the forecast period during which the fluctuations are forecast to occur. The period during which the temporary fluctuations are expected to occur is indicated by using the abbreviations **FM** and/or **TL**, as appropriate, followed by a time group.

(a) When the period of temporary fluctuations is forecast to begin and end within the **TREND** forecast period, the beginning and end are indicated by using the abbreviations **FM** and **TL**, respectively, with their associated time groups. For example, for a **TREND** forecast period from 1000 to 1200 UTC, in the form:

TEMPO FM1030 TL1130

(b) When the period of temporary fluctuations is forecast to start at the beginning of the **TREND** period but to finish before the end of that period, only **TL** and its time group are used to indicate the end of the fluctuations. For example:

TEMPO TL1130

(c) When the period of temporary fluctuations is forecast to begin during the **TREND** period and to continue throughout the remainder of the period, the abbreviation **FM** and its associated time group only are used to indicate the beginning of the fluctuations. For example:

TEMPO FM1030

(d) When the period of the temporary fluctuations is forecast to start at the beginning of the **TREND** period and to continue throughout the remainder of that period, the change indicator **TEMPO** is used alone.

NOSIG

When no significant changes are forecast to occur during the **TREND** forecast period, the change indicator groups are omitted and the abbreviation **NOSIG** is used instead.

Following the change indicator groups, only the group(s) referring to the element(s) which is/are forecast to change significantly is/are included. However, in the case of clouds, if a significant change is expected, all cloud groups including any significant layer(s) or masses not expected to change are given.

Note: The indicator **PROB** shall not be used in **TREND** forecasts.

CODE FORMAT

dddff**G**$f_m f_m$ { **KT** or **MPS**

Example: 25035G50KT

Decode: Forecast surface wind 250° 35 kt with gusts to 50 kt

ENCODE SO FAR

BECMG FM1100 25035G50KT

2. **SURFACE WIND**

TREND indicates significant changes in the surface wind which involve either:

(a) A change in the mean wind direction of 60° or more, the mean speed before and/or after the change being 10 kt (5 m/s) or more; or
(b) A change in the mean wind speed of 10 kt (5 m/s) or more; or
(c) A change of wind through values of operational significance.

These values are established following consultation between the air traffic services authority, the meteorological authority and the operators concerned.

Example: An expected increase in the wind speed to 35 kt with a maximum gust of 50 kt sometime during the **TREND** period is indicated by:

BECMG 25035G50KT

CODE FORMAT

VVVV
or
CAVOK

Example: 6000

Decode: Forecast visibility 6 km

ENCODE SO FAR

BECMG FM1100 25035G50KT 6000

3. **VISIBILITY**

Change indicators are used when the prevailing visibility is expected to significantly change as follows:

(a) To improve and change to or pass through one or more of the following values: 150, 350, 600, 800, 1 500 and 3 000 m; or
(b) To deteriorate and pass through one or more of the following values: 150, 350, 600, 800, 1 500 and 3 000 m.

Depending upon the number of flights conducted in accordance with the visual flight rules, an additional value of 5 000 m may be added to the list.

Example: Temporary reductions throughout the **TREND** forecast period of the prevailing visibility to 740 m is rounded down to 700 m and indicated by:

TEMPO 0700

Note: In the case of significant changes in visibility, the phenomenon causing the reduction of visibility is also indicated if it is not already part of the present weather group in **METAR** or **SPECI**. For example, temporary deteriorations to 700 m visibility due to fog would be encoded as **TEMPO 0700 FG**.

CODE FORMAT

{ w'w'
or
NSW

Example: NSW

Decode: No significant weather

ENCODE SO FAR

BECMG FM1100 25035G50KT 6000 NSW

4. WEATHER PHENOMENA

Significant forecast weather, using the abbreviations as indicated in Part A, section 5 (page 15), is restricted to the onset, cessation or change in intensity of the following weather phenomena:

- Freezing (**FZ**) precipitation;
- Freezing fog (**FZFG**);
- Moderate or heavy precipitation (including showers, **SH**);
- Low drifting (**DR**) dust (**DU**), sand (**SA**) or snow (**SN**);
- Blowing (**BL**) dust (**DU**), sand (**SA**) or snow (**SN**);
- Duststorm (**DS**);
- Sandstorm (**SS**);
- Thunderstorm (**TS**);
- Squall (**SQ**);
- Funnel cloud (tornado or waterspout, **FC**);
- Other weather phenomena given in Code table 4678 (see page 15) which are expected to cause a significant change in visibility.

To indicate the end of the occurrence of significant weather phenomena, the abbreviation **NSW** (**N**il **S**ignificant **W**eather) replaces the group **w'w'**.

Example: For a **TREND** forecast period 0300 and 0500, a thunderstorm with rain expected between 0300 and 0430 UTC is indicated by:

TEMPO TL0430 TSRA

The cessation of significant weather at 1630 UTC is indicated by:

BECMG AT1630 NSW

CODE FORMAT

$N_sN_sN_sh_sh_sh_s$
or
VV$h_sh_sh_s$
or
NSC

ENCODE SO FAR

BECMG FM1100 25035G50KT 6000 NSW NSC

5. CLOUD *or* VERTICAL VISIBILITY

Significant changes in cloud are indicated when one or more of the following four conditions are expected:

(a) The height of the base of a cloud layer of **BKN** or **OVC** extent is below or expected to fall below 450 m (1 500 ft) and is forecast to change to or pass any one of the following values: 30, 60, 150, 300 and 450 m (100, 200, 500, 1 000 and 1 500 ft).

Example: A forecast of a lowering of the cloud base to 500 ft starting at the beginning of the **TREND** period and ending by 1130 UTC is indicated by:

BECMG TL1130 OVC005

(b) The height of the base of the cloud layer is below, or is expected to fall below, 450 m (1 500 ft), and the cloud amount is forecast to change from:

SCT or **FEW** increasing to **BKN** or **OVC** or
BKN or **OVC** decreasing to **SCT** or **FEW**

Example: A forecast of a rapid increase in stratus cloud at 1130 UTC from **SCT** to **OVC** is indicated by:

BECMG AT1130 OVC010

(c) The sky is expected to remain or become obscured, vertical visibility observations are available, and the forecast indicates changes in vertical visibility to, or passing, any one of the following values: 30, 60 or 150 m (100, 200 or 500 ft).

(d) No significant change in the clouds is expected during the period of the **TREND**, the cloud groups are not repeated and therefore no cloud details are given.

To indicate a change to no cloud below 1 500 m (5 000 ft) or the highest minimum sector altitude, whichever is the greater, and when no **CB** or **TCU** are forecast, and **CAVOK** is not appropriate, the abbreviation **NSC** (**N**il **S**ignificant **C**loud) replaces the cloud and vertical visibility groups.

Criteria for indicating changes in the **TREND** forecast, based on local aerodrome operating minima, additional to those specified above, shall be used only when these criteria have been agreed by the meteorological authority and the operator(s) concerned.

Note: In the case of significant changes in respect of cloud, all cloud groups, including layers or masses not expected to change, are indicated in TREND.

COMPLETE CODE FORMAT

TTTTT or **NOSIG**	TTGGgg	ddd**ff**(**G**$f_m f_m$)	**KT** or **MPS**

VVVV or **CAVOK**	w'w' or **NSW**	$N_s N_s N_s h_s h_s h_s$ or **VV**$h_s h_s h_s$ or **NSC**

Complete example:

BECMG FM1100 25035G50KT 6000 NSW NSC

DECODE

Becoming after 1100 UTC, surface wind 250° 35 kt, gusts to 50 kt, visibility 6 km, nil significant weather and nil significant cloud

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PART C

AERODROME FORECASTS – TAFs

Aerodrome forecasts (**TAF**s) are complete descriptions of the meteorological elements expected at and over the aerodrome throughout the whole of the forecast period, including any changes considered to be significant to aircraft operations.

TAFs are prepared by professional staff who, using the latest available regulations, ensure that internationally agreed practices are followed. The decoding of these forecasts is carried out by people of various disciplines and many will not have easy access to these regulations. Consequently, this guidance is aimed at decoders, although it may also be of interest to encoders.

As with **TREND** forecast, it should be appreciated that, owing to the variability of meteorological elements in space and time, to limitations of forecasting techniques and the definitions of some of the elements, the specific value of any element given in the forecast should be understood to be the most probable value that the element is likely to assume during the period of the forecast.

TAFs describe the forecast prevailing conditions at an aerodrome and cover a period of not less than 6 hours and not longer than 30 hours. The period of validity of **TAFs** produced by meteorological offices should be determined by ICAO regional air navigation agreement. Routine **TAFs** valid for less than 12 hours should be issued every 3 hours, and those valid for 12 hours up to 30 hours should be issued every 6 hours.

Amendments to **TAFs** are issued as and when necessary. It is assumed that a later **TAF** automatically replaces the one issued previously, and not more than one **TAF** is valid at an aerodrome at any given time.

TAFs are issued separately from **METAR** or **SPECI** and do not refer to any specific report. However, the preparation, amendment and cancellation, as necessary, of **TAFs** depends, among others, upon receipt of **METAR** or **SPECI** of that aerodrome.

Aerodrome forecasts contain specific information presented in a fixed order. The information and order are as follows:

IDENTIFICATION GROUPS

SURFACE WIND

PREVAILING VISIBILITY

Page intentionally left blank.

WEATHER

CLOUD (or vertical visibility, if appropriate)

EXPECTED SIGNIFICANT CHANGES

Notes:

1. **CAVOK** is used to replace the visibility, weather and cloud groups when the following three conditions are simultaneously met:
   - Visibility is 10 km or more;
   - No clouds of operational significance – meaning there is no cloud below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater, and no cumulonimbus or towering cumulus;
   - There are no significant weather phenomena (see Code table 4678 on page 15).
2. The forecast period of the **TAF** may be divided into two or more self-contained parts by using the indicator **FMYYGGgg**, where **FM** is the abbreviation of "from" and **YYGGgg** is the date and time in UTC. A complete description of the prevailing conditions is given at the beginning of the forecast or the self-contained parts designated **FMYYGGgg**. Forecast significant changes to these conditions are indicated as necessary.

CODE FORMAT

TAF / or / **TAF AMD** / or / **TAF COR** CCCC YYGGgg**Z** { **NIL** / or / $Y_1Y_1G_1G_1/Y_2Y_2G_2G_2$ / or / $Y_1Y_1G_1G_1/Y_2Y_2G_2G_2$ **CNL** }

Example: **TAF** LUDO 130530Z 1307/1316

Decode: Aerodrome forecast for LUDO international airport, time of origin 0530 UTC on the 13th, forecast valid for the period 0700 to 1600 UTC on the 13th

ENCODE SO FAR

TAF LUDO 130530Z 1307/1316

1. IDENTIFICATION GROUPS

This section contains multiple parts, as follows:

- The aerodrome forecast code name (**TAF**) is included at the beginning of an individual aerodrome forecast and at the beginning of a bulletin consisting of one or more aerodrome forecasts;
- The code word **AMD** if the **TAF** is amended;
- The code word **COR** if the **TAF** is corrected;
- The ICAO location indicator of the aerodrome to which the forecast refers;
- The date and time of issue of the forecast;
- The code word **NIL** if the **TAF** is missing;
- The period covered by the forecast;
- The code word **CNL** if the **TAF** is cancelled.

Example: **TAF** AMD LUDO 161500Z 1606/1712 CNL

Decode: Amended **TAF** for LUDO international airport issued on the 16th of the month at 1500 UTC cancelling the previously issued **TAF** valid from 0600 UTC on the 16th to 1200 UTC on the 17th of the month

CODE FORMAT

dddff**G**$f_m f_m$ { **KT** or **MPS** }

Example: 31015KT

Decode: Forecast surface wind 310° at 15 kt

ENCODE SO FAR

TAF LUDO 130530Z 1307/1316 31015KT

2. **SURFACE WIND**

Normally, this is a five-figure group followed by an abbreviation to indicate the wind speed units used. The first three figures indicate the wind direction from true north, and the last two the mean wind speed.

Example: **31015KT**

Additionally, if the wind is expected to be gusty and the maximum gust speed likely to exceed the mean speed by 10 kt (5 m/s) or more, this gust must be indicated using the letter **G** directly after the mean speed, followed by the gust speed.

Example: **31015G27KT**

The encode **VRB**, for variable wind direction, is used only when the mean wind speed is less than 3 kt (1.5 m/s). VRB for higher wind speeds shall be used only when the variation of wind direction is 180° or more, or when it is impossible to forecast a single wind direction, for example during a thunderstorm.

When a wind speed of 100 kt (50 m/s) or more is forecast, it should be indicated as **P99KT**.

Example: **310P99KT**

CODE FORMAT

VVVV
or
CAVOK

Example: 8000

Decode: Visibility 8 km

ENCODE SO FAR

TAF LUDO 130530Z 1307/1316 31015KT 8000

3. **VISIBILITY**

Forecast prevailing visibility is encoded as a four-figure group. As with the **METAR** code, the figures are the expected values in metres, except that **9999** indicates a prevailing visibility of 10 km or greater.

Example: A forecast prevailing visibility of 8 km is indicated as **8000**.

When the prevailing visibility cannot be forecast, the lowest forecast visibility shall be used.

CODE FORMAT

{ w'w'
or
NSW

Example: SHRA

Decode: Moderate rain shower

ENCODE SO FAR

TAF LUDO 130530Z 1307/1316 31015KT 8000 SHRA

4. **WEATHER**

Weather phenomena are forecast for an area within a radius of approximately 8 km of the aerodrome reference point, using the appropriate abbreviations given in Code table 4678 (see page 15), and are restricted to the occurrence of one or more, up to a maximum of three, of the following weather phenomena, together with their characteristics, which are deemed significant to aircraft operations:

- Freezing (**FZ**) precipitation;
- Freezing fog (**FZFG**);
- Moderate or heavy precipitation (including showers, **SH**);
- Low drifting (**DR**) dust (**DU**), sand (**SA**) or snow (**SN**);
- Blowing (**BL**) dust, sand (**SA**) or snow (**SN**);
- Duststorm (**DS**);
- Sandstorm (**SS**);
- Thunderstorm (**TS**);
- Squall (**SQ**);
- Funnel cloud (tornado or waterspout, **FC**);
- Other weather phenomena given in Code table 4678, as agreed between the authorities, service providers and users concerned.

Example: **SHRA** (moderate rain shower)

If no significant weather, as defined above, is expected to occur, the group is omitted. However, after a change group, if the weather ceases to be significant, the weather group **w'w'** is replaced by **NSW** (abbreviation for **N**i**l** **S**ignificant **W**eather).

CODE FORMAT

$N_sN_sN_sh_sh_sh_s$
or
VV$h_sh_sh_s$
or
NSC

Example: FEW005 FEW010CB SCT018 BKN025

Decode: 1 to 2 oktas (1/8th to 2/8ths) cloud with base 500 ft

1 to 2 oktas (1/8th to 2/8ths) cumulonimbus with base 1 000 ft

3 to 4 oktas (3/8ths to 4/8ths) cloud with base 1 800 ft

5 to 7 oktas (5/8ths to 7/8ths) cloud with base 2 500 ft

ENCODE SO FAR

TAF LUDO 130530Z 1307/1316 31015KT 8000
SHRA FEW005 FEW010CB SCT018 BKN025

5. CLOUD (or VERTICAL VISIBILITY)

Forecasts of cloud are to be representative of the aerodrome and its vicinity, that is, the area within a radius of approximately 16 km of the aerodrome reference point. Cloud information is presented in the same format as **METAR**. The group usually consists of six characters, the first three indicating the expected cloud amount, using the following abbreviations:

FEW	–	Few	–	1 to 2 oktas (1/8th to 2/8ths)
SCT	–	Scattered	–	3 to 4 oktas (3/8ths to 4/8ths)
BKN	–	Broken	–	5 to 7 oktas (5/8ths to 7/8ths)
OVC	–	Overcast	–	8 oktas (8/8ths)

The last three figures indicate the expected height of the base of the cloud, in units of 30 m (100 ft).

Only the cloud types cumulonimbus (**CB**) and towering cumulus (**TCU**) are indicated.

Examples: 4 oktas (4/8ths) cloud at 1 000 ft is coded as:

SCT010

7 oktas (7/8ths) cumulonimbus cloud at 1 000 ft is coded as:

BKN010CB

When the forecaster expects more than one layer or mass of cloud, additional cloud groups are given in accordance with the following:

- The lowest individual layer of any amount;
- The next individual layer covering more than 2 oktas (2/8ths);
- The next individual layer covering more than 4 oktas (4/8ths), additionally;
- Cumulonimbus cloud (**CB**) or towering cumulus cloud (**TCU**) when forecast, if not already in one of the groups above.

Normally, the number of groups will not exceed three, except that cumulonimbus will always be included if forecast.

The cloud groups are in the order of lower to higher levels of cloud base.

Example: The forecast is for 1 okta (1/8th) cloud at 500 ft
2 oktas (2/8ths) cumulonimbus at 1 000 ft
3 oktas (3/8ths) cloud at 1 800 ft
5 oktas (5/8ths) cloud at 2 500 ft

which would be encoded as:

FEW005 FEW010CB SCT018 BKN025

When the sky is expected to be obscured and information on vertical visibility is available, the cloud group is replaced by **VV**$\mathbf{h_s h_s h_s}$, where the last three figures for $\mathbf{h_s h_s h_s}$ indicate the vertical visibility in units of 30 m (100 ft).

In some regions cloud information is limited to cloud of operational significance. This is considered to be cloud below 1 500 m (5 000 ft) or the highest minimum sector altitude, whichever is the greater, and cumulonimbus or towering cumulus, whenever forecast. Therefore, when no cumulonimbus, no towering cumulus, or clouds below 5 000 ft or below the highest minimum sector altitude, whichever is the greater, are forecast and **CAVOK** is not appropriate, **NSC** (**N**il **S**ignificant **C**loud) is used.

Example: When the prevailing visibility is expected to be 8 km and altocumulus and cirrus clouds are forecast above 10 000 ft, the cloud group would be replaced by **NSC**. If the prevailing visibility is expected to be 10 km or more with the same cloud conditions, then **CAVOK** should be used.

6. EXPECTED SIGNIFICANT CHANGES

Changes in the prevailing meteorological conditions which are considered significant, and which therefore need to be indicated in the aerodrome forecast (and also the thresholds for deciding if the **TAF** should be amended), are as follows.

Surface wind

An expected significant change is indicated when the surface wind is forecast to change through operationally significant values. These values vary from one aerodrome to another and are agreed upon following discussions between the meteorological authority, the appropriate air traffic services authority and operators. In general, the following criteria is often applied:

- When the mean surface wind direction is forecast to change by 60° or more, the mean speed before and/or after the change being 10 kt (5 m/s) or more.
- When the mean surface wind speed is forecast to change by 10 kt (5 m/s) or more.
- When the variation from the mean surface wind speed (gusts) is forecast to change by 10 kt (5 m/s) or more, the mean speed before and/or after the change being 15 kt (7.5 m/s) or more.

Visibility

An expected significant change is indicated when the surface prevailing visibility is forecast to improve and change to, or pass through, one or more of the following values, or when that visibility is forecast to deteriorate and pass through one or more of the following values:

150, 350, 600, 800, 1 500 and 3 000 m

Depending upon the number of flights conducted in accordance with visual flight rules, an additional value of 5 000 m may be added.

Weather

An expected significant change is indicated when any of the weather phenomena listed below is forecast to begin, end or change in intensity:

- Freezing fog;
- Freezing precipitation;
- Moderate or heavy precipitation (including showers);

- Thunderstorm;
- Duststorm;
- Sandstorm.

Additionally, operationally significant weather phenomena such as low drifting dust, sand or snow, blowing dust, sand or snow, squall or funnel cloud (tornado or waterspout) should also be forecast (onset and cessation).

If significant weather as indicated in the main body of the **TAF** message is forecast to end, the **w'w'** group, which follows the change group, is replaced by **NSW**, the abbreviation for **N**il **S**ignificant **W**eather.

Example: **TAF LUDO 130530Z 1307/1316 31015KT 8000 RA SCT006 BKN012**
BECMG 1312/1314 NSW SCT025

Cloud height

An expected significant change is indicated when the height of the base of the lowest layer or mass of cloud covering 5 oktas (5/8ths) or more (**BKN** or **OVC**) is forecast to lift and change to, or pass through, one or more of the following values or to lower and pass through one or more of the following values:

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

Depending upon the number of flights conducted in accordance with visual flight rules, an additional value of 450 m (1 500 ft) may be added.

Cloud amount

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

- From **NSC**, **FEW** or **SCT**, increasing to **BKN** or **OVC**
  or
- From **BKN** or **OVC**, decreasing to **NSC**, FEW or **SCT**.

It is also indicated when cumulonimbus clouds are expected to develop or dissipate.

It is also indicated when vertical visibility is forecast to improve and change to, or pass through, one or more of the following values, or 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)

CAVOK

An expected significant change is indicated when conditions are forecast to change to **CAVOK**, or **CAVOK** conditions will cease (conditions requiring **CAVOK** are found in Part A, section 6 of this document).

CODE FORMAT

TTTTT or TTYYGGgg — YYGG/$Y_eY_eG_eG_e$

Example: TEMPO 1311/1316 4000 +SHRA

Decode: Temporarily between 1100 and 1600 UTC visibility 4 000 m due to heavy rain showers

ENCODE SO FAR

TAF LUDO 130530Z 1307/1316 31015KT 8000 SHRA FEW005 FEW010CB SCT018 BKN025 TEMPO 1311/1316 4000 +SHRA

7. INDICATION OF SIGNIFICANT CHANGES

(a) When one set of prevailing weather conditions is expected to change significantly and more or less completely to a different set of conditions, the time indicator group **FM**YYGGgg (where **FM** is the abbreviation for "from",YY is the date and GGgg is the time in hours and minutes UTC) is used to indicate the beginning of a self-contained part of the forecast. All conditions given before this group are superseded by conditions indicated after the group.

Example: **TAF LUDO 130530Z 1307/1316 27015KT 6000 NSC FM131215 27017KT 4000 BKN010**

(b) The groups **BECMG** YYGG/$Y_eY_eG_eG_e$ indicate a regular or irregular change to the forecast meteorological conditions expected at an unspecified time within the period YYGG to $Y_eY_eG_eG_e$. This period will normally not exceed 2 hours but will never be more than 4 hours.

The change indicator is followed by groups describing only the meteorological elements which are forecast to change significantly. However, in the case of significant changes in cloud, all the cloud groups as set out in Part C, section 5 (page 57), including layers or masses not expected to change, should be indicated.

Unless a further set of change groups is used, the conditions given after **BECMG** YYGG/$Y_eY_eG_eG_e$ are expected to prevail from the date and time $Y_eY_eG_eG_e$ to the end of the forecast period.

Example: **TAF LUDO 130530Z 1307/1316 27015KT 6000 NSC BECMG 1310/1312 4000 BKN010**

Decode:

The forecast conditions start to change at 1000 UTC and the prevailing conditions for the period 1200 to 1600 UTC are expected to be:

Surface wind: 270° at 15 kt

Visibility: 4 000 m

Weather: None significant to operations

Cloud: 5 to 7 oktas (5/8ths to 7/8ths) with a base of 1 000 ft

(c) The groups **TEMPO** YYGG/$Y_eY_eG_eG_e$ indicate temporary fluctuations in the forecast meteorological conditions which may occur at any time during the period YYGG to $Y_eY_eG_eG_e$. The meteorological conditions following these groups are expected to last less than 1 hour in each instance and in aggregate less than half the period indicated by YYGG/$Y_eY_eG_eG_e$.

Note: If a temporary fluctuation persists longer than 1 hour or in aggregate more than half the forecast period, these conditions would be the predominant ones and the change indicator **BECMG** should be used.

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CODE FORMAT

{ **PROB**C_2C_2 or **PROB**C_2C_2 **TTTTT** or **TTTTT** } **YYGG/$Y_eY_eG_eG_e$**

or

TTYYGGgg

Example: PROB30 TEMPO 1314/1316 TSRA SCT005 BKN010CB

Decode: Moderate probability temporarily on the 13th between 1400 and 1600 UTC of thunderstorm with moderate rain and 1 to 4 oktas (1/8th to 4/8ths) cloud at 500 ft and 5 to 7 oktas (5/8ths to 7/8ths) cumulonimbus at 1 000 ft

ENCODE SO FAR

TAF LUDO 130530Z 1307/1316 31015KT 8000 SHRA FEW005 FEW010CB SCT018 BKN025 TEMPO 1311/1416 4000 +SHRA PROB30 TEMPO 1314/1316 TSRA SCT005 BKN010CB

(d) When the confidence in forecasting alternative values is not high, yet the forecast element being considered is significant to aircraft operations, the groups **PROB**C_2C_2 YYGG/$Y_eY_eG_eG_e$ are used. C_2C_2 indicates the percentage probability of occurrence, with only the values 30% or 40% being used. The **PROB** group is always followed by a time group YYGG/$Y_eY_eG_eG_e$(example 1) or a change group and a time group TTTTT YYGG/$Y_eY_eG_eG_e$ (example 2).

Example 1:

TAF LUDO 132030Z 1322/1407 27003KT 4000 SCT008 BECMG 1403/1405 1500 BR BKN004 PROB30 1405/1407 0800 FG

Decoded, this indicates that the visibility will fall to 1 500 m by 0500 UTC on the 14th with a moderate probability of fog with a visibility of 800 m between 0500 and 0700 UTC on the same day (14th).

Example 2:

TAF LUDO 130530Z 1307/1316 27015KT 9999 SCT015 TEMPO 1311/1316 4000 +SHRA BKN010CB PROB30 TEMPO 1314/1316 TSRA

Decoded, this indicates that, on the 13th, heavy showers of rain are likely after 1100 UTC with a moderate probability of a thunderstorm with moderate rain after 1400 UTC.

Note: It is assumed that, if the probability of an occurrence is 50% or greater, confidence is high and the alternative values are indicated using **BECMG, TEMPO** or **FM**, as appropriate. When the probability of occurrence is less than 30%, it is not considered significant from an operational point of view and the associated phenomena are therefore not mentioned.

TEMPO, which means that the fluctuations will occur for less than half of the time, should not be confused with a probability of 30% or 40%. With **TEMPO**, the forecaster is confident that the temporary fluctuations will take place; with **PROB30** there is only a moderate probability that they will occur.

(e) The number of change and probability groups should be kept to a minimum and should not normally exceed five groups.

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Amendments

When an aerodrome forecast **TAF** requires amendment in accordance with Part C, section 6 (page 59), the amended forecast is indicated by inserting **AMD** after **TAF** in the identifier, and this new forecast covers the remaining validity period of the original **TAF**.

Example: **TAF AMD LUDO 130820Z 1308/1316 . . .**

Note: The time of issue of this **TAF AMD** is 0820 UTC but the forecast is valid from 0800 to 1600 UTC.

Regional code forms:

Forecast maximum and minimum temperatures (**TX**T_FT_F/$Y_FY_FG_FG_F$**Z TN**T_FT_F/$Y_FY_FG_FG_F$**Z**)

This forecast maximum/minimum group is used only if agreed regionally and is included here for the sake of completeness. A full description of this code can be found in the *Manual on Codes* (WMO-No. 306).

COMPLETE CODE FORMAT

TAF / or / **TAF AMD** / or / **TAF COR** CCCC YYGGgg**Z** { **NIL** or $Y_1Y_1G_1G_1/Y_2Y_2G_2G_2$ }

ddd ff **G** $f_m f_m$ { **KT** or **MPS** } { VVVV or **CAVOK** } w'w' { $N_sN_sN_sh_sh_sh$ or **VV**$h_sh_sh_s$ or **NSC** }

(**TX**$T_FT_F/Y_FY_FG_FG_F$ **Z** **TN**$T_FT_F/Y_FY_FG_FG_F$**Z**)

{ **PROB**C_2C_2 or **PROB**C_2C_2 **TTTTT** or **TTTTT** or **TTYYGGgg** } **YYGG/**$Y_eY_eG_eG_e$ ddd ff **G** $f_m f_m$ { **KT** or **MPS** } { VVVV or **CAVOK** }

{ w'w' or **NSW** } { $N_sN_sN_sh_sh_sh_s$ or **VV**$h_sh_sh_s$ or **NSC** }

Complete example:

TAF LUDO 130530Z 1307/1316 31015KT 8000 SHRA FEW005 FEW010CB SCT018 BKN025 TEMPO 1311/1316 4000 +SHRA PROB30 TEMPO 1314/1316 TSRA SCT005 BKN010CB

DECODE

Aerodrome forecast for LUDO international airport, time of origin 0530 UTC on the13th, valid for the period 0700 on the 13th to 1600 UTC on the 13th. Surface wind 310° 15 kt, visibility 8 km, moderate rain shower, cloud 1 to 2 oktas (1/8th to 2/8ths) base 500 ft, 1 to 2 oktas (1/8th to 2/8ths) cumulonimbus base 1 000 ft, 3 to 4 oktas (3/8ths to 4/8ths) base 1 800 ft, 5 to 7 oktas (5/8ths to 7/8ths) base 2 500 ft. Temporarily between 1100 and 1600 UTC same day, visibility 4 000 m in heavy rain showers, with a moderate probability temporarily between 1400 and 1600 UTC of a thunderstorm with moderate rain, cloud 3 to 4 oktas (3/8ths to 4/8ths) base 500 ft and 5 to 7 oktas (5/8ths to 7/8ths) cumulonimbus base 1 000 ft

EXPLANATION OF WEATHER PHENOMENA SIGNIFICANT TO AVIATION

Note: Current automatic weather observing systems cannot detect some of the following weather phenomena with sufficient quality, while others may not be able to detect them at all. Such weather phenomena may include but not be limited to: volcanic ash (**VA**), dust (**DU**), sand (**SA**), dust/sand whirls (**PO**) or funnel cloud (**FC**). The same limitations can apply to some weather characteristics such as shallow (**MI**), blowing (**BL**) or drifting (**DR**).

1. **Drizzle (DZ)**

Fairly uniform precipitation in very fine drops of water with a diameter of less than 0.5 mm. The impact of drizzle droplets falling on a water surface is imperceptible, but continuous drizzle may produce a runoff from roofs and runway surfaces. The drops can only reach the ground without evaporating if they fall from very low clouds. Generally, the heavier the drizzle, the lower the cloud base. Visibility is inversely related to both the intensity of precipitation and the number of droplets. Light drizzle corresponds to negligible runoff from roofs; heavy drizzle to a rate of accumulation of 0.5 mm/hour or more.

2. **Rain (RA)**

Precipitation of liquid water droplets of appreciable size (greater than 0.5 mm). Raindrops form in quite deep clouds where there is vertical motion capable of supporting sizeable water droplets. The heavier the rain, the deeper the clouds producing it. Intermittent rain of moderate or heavy intensity indicates that cells with locally strong updraughts are present.

3. **Snow (SN)**

Solid precipitation of single or agglomerated ice crystals falling from a cloud. At very low temperatures, snowflakes are small and their structure simple. At temperatures close to freezing point, the individual flakes may be composed of a large number of ice crystals (predominantly star-shaped) and the flakes may have a diameter greater than 25 mm.

4. **Snow grains (SG)**

The frozen equivalent of drizzle. They are very small and opaque white particles of ice that fall from stratiform clouds. These particles are fairly flat or elongated and their diameter is generally less than 1 mm.

5. **Ice pellets (PL)**

Transparent or translucent ice particles that cannot be crushed easily and have a diameter of 5 mm or less. They are formed from freezing raindrops or largely melted snowflakes which can indicate that at higher levels freezing rain may be present, with the danger of severe icing after take-off or during descent/landing. Ice pellets may occur before or after freezing rain.

6. **Hail (GR)**

Transparent or partly or completely opaque pieces of ice (hailstones) with a diameter generally between 5 mm and 50 mm. Very large stones weighing 1 kg or more have been observed.

7. **Small hail and/or snow pellets (GS)**

The abbreviation GS is used to report two different types of precipitation:

(a) Small hail
Translucent ice particles with a diameter up to 5 mm which, when falling on hard ground, bounce with an audible sound. Small hail consists of snow pellets totally or partially encased in a layer of ice and is an intermediate stage between snow pellets and hailstones.

(b) Snow pellets
White, opaque and approximately round ice particles, often falling together with snow at a temperature near 0 °C. Snow pellets normally have a diameter of 2 mm to 5 mm, are crisp and easily crushed and rebound when falling on a hard surface.

Note: [concerning 6 and 7 above] Large cumulonimbus clouds are the main "factories" where hail is produced in the atmosphere. Significant cloud depth (vertical extent) and extremely vigorous updraughts within the cloud are necessary to suspend these ice particles long enough for them to grow through accretion. Some of the hail is ejected out of the side or top of the cloud before it has completely formed, leading to reports of snow pellets.

8. **Mist (BR)**

The suspension of microscopic water droplets or wet hygroscopic particles in the air, reducing on their own the horizontal visibility to 1 000 to 5 000 m.

9. **Fog (FG)**

The suspension in the air of very small (usually microscopic) water droplets, reducing on their own the horizontal visibility to less than 1 000 m.

10. **Smoke (FU)**

The suspension in the air of small particles produced by combustion (for example, from industry or wildfires), reducing horizontal visibility to 5 000 m or less. It should be noted that smoke may be reported with a horizontal visibility of less than 1 000 m, if there are no suspended water droplets and the relative humidity is not greater than about 90%.

11. **Volcanic ash (VA)**

Atmospheric dust or particles varying considerably in size, originating from active volcanoes (on land or sub-marine). The small particles often penetrate the stratosphere and remain suspended for a long period. Larger particles remain within the troposphere and can be carried by the wind to different regions of the Earth. Scavenging by rainfall and gravity eventually leads to the removal of volcanic ash from the atmosphere. Larger particles, or a concentration of smaller ones, can considerably damage aircraft, including their engines.

12. **Widespread dust (DU)**

The reduction of horizontal visibility to 5 000 m or less caused by the suspension in the air of small particles of dust raised from the ground.

13. **Sand (SA)**

The reduction of horizontal visibility to 5 000 m or less caused by the suspension in the air of small particles of sand raised from the ground.

14. **Haze (HZ)**

The suspension in the air of extremely small dry particles invisible to the naked eye and sufficiently numerous to give the air an opalescent appearance with a reduction in horizontal visibility to 5 000 m or less.

15. **Dust/sand whirls (dust devils) (PO)**

A rapidly rotating column of air over a dry and dusty or sandy ground carrying dust and other light material picked up from the ground. Dust or sand whirls are of a few metres in diameter. Normally in the vertical, they extend no higher than 200 to 300 ft, but in very hot desert regions they may reach 2 000 ft.

16. **Squall (SQ)**

A strong wind that rises suddenly, generally lasting for at least 1 minute. It is distinguished from a gust by its longer duration. The sudden increase in wind speed is at least 16 kt (8 m/s), the speed rising to 22 kt (11 m/s) or more and

lasting at least 1 minute. Squalls are often associated with large cumulonimbus clouds and violent convective activity, extending some kilometres horizontally and several thousands of feet vertically.

17. **Funnel cloud (tornado or waterspout) (FC)**

A phenomenon consisting of an often violent whirlwind, indicated by the presence of a cloud column or funnel-shaped cloud, extending downwards from the base of cumulonimbus cloud but not necessarily reaching the ground. The diameter can vary from a few metres to some hundreds of metres. A well-developed funnel cloud is called a tornado if over land and a waterspout if over water. The most violent tornado can have associated wind speeds of up to about 300 kt (150 m/s).

18. **Sandstorm (SS)**

An ensemble of particles of sand energetically lifted by a strong and turbulent wind. The forward portion of the sandstorm may have the appearance of a wide and high wall. The height to which sand is raised will increase with increasing wind speed and instability.

19. **Duststorm (DS)**

Particles of dust energetically lifted by a strong and turbulent wind. Duststorms are usually associated with hot, dry and windy conditions, especially just ahead of vigorous cold fronts that can be cloud free. Dust particles typically have a diameter of less than 0.08 mm and consequently can be lifted to far greater heights than sand.

20. **Shallow (MI)**

This descriptor is used only with fog (**FG**) when the observed horizontal visibility is 1 000 m or more, but, when between the ground and 2 m above the ground (the assumed eye level of the observer), there is a layer in which the apparent visibility is less than 1 000 m. Operationally, shallow fog (**MIFG**) may cause problems because runway markings and lights may be concealed from view.

21. **Patches (BC)**

This descriptor is used only with fog (**FG**) and indicates that there are fog patches randomly covering the aerodrome. Hence, although the horizontal visibility as reported in **METAR** or **SPECI** is 1 000 m or more, the observer can see areas where the apparent visibility is less than 1 000 m.

22. **Partial (covering part of the aerodrome) (PR)**

This descriptor is used only with fog (**FG**) and indicates that a substantial part of the aerodrome is covered by fog, while the remainder is clear.

23. **Low drifting (DR)**

This descriptor indicates that dust (**DU**), sand (**SA**) or snow (**SN**) has been raised by the wind to a height of less than 2 m (the assumed eye level of the observer).

24. **Blowing (BL)**

This indicates that dust (**DU**), sand (**SA**) or snow (**SN**) has been raised by the wind to a height greater than 2 m (the assumed eye level of the observer) and that consequently horizontal visibility has been reduced.

25. **Shower(s) (SH)**

Precipitation, often short-lived and sometimes heavy, falling from convective clouds. A shower is characterized by the suddenness with which it starts and stops (arrives and departs), and generally by large and rapid changes in precipitation intensity.

26. **Thunderstorm (TS)**

One or more sudden electrical discharges, manifested by a flash of light (lightning) and a sharp or rumbling sound (thunder). Thunderstorms are associated with convective clouds (cumulonimbus) and are usually accompanied by precipitation. The associated cumulonimbus has vertical updraughts that may reach 30 m/s in the more vigorous cells. Downdraughts also occur, especially in the later stages of development, with speeds of about half of those for updraughts.

27. **Freezing (supercooled) (FZ)**

This descriptor is used only with fog (**FG**), drizzle (**DZ**) or rain (**RA**) when the waterdrop temperature is below 0 °C (supercooled). On impact with the ground or an aircraft, the drops of supercooled water form a mixture of water and clear ice. Freezing fog normally deposits rime, rarely clear ice.

28. **Precipitation intensity criteria**

Drizzle	Light: rate < 0.1 mm/h	Generally reduces visibility, but not to less than 5 km
	Moderate: 0.1 ≤ rate < 0.5 mm/h	Generally reduces visibility to between 1 000 m and 5 km
	Heavy: rate ≥ 0.5 mm/h	Generally reduces visibility to below 1 000 m
Rain (including showers)	Light: rate < 2.5 mm/h	Light rain can reduce visibility, but generally not to less than 10 km. Light showers can reduce visibility to 5 to 10 km.
	Moderate: 2.5 ≤ rate <10.0 mm/h	Moderate rain can reduce visibility to 5 to 10 km. Moderate showers can reduce visibility to below 5 km.
	Heavy: rate ≥ 10.0 mm/h	Heavy rain can reduce visibility to below 5 km. Heavy showers can reduce visibility to 1 000 m.
Snow (including showers)	Light: rate < 1.0 mm/h (liquid water equivalent)	Generally reduces visibility, but to no less than 1 000 m
	Moderate: 1.0 ≤ rate < 5.0 mm/h (liquid water equivalent)	Generally reduces visibility to between 400 and 1 000 m
	Heavy: rate ≥ 5.0 mm/h (liquid water equivalent)	Generally reduces visibility to below 400 m

Note: Great care must be taken when interpreting observations of light snow without understanding the potential hazard to aircraft operations. The accumulation of snow on aircraft prior to take-off represents a significant safety hazard because of possible loss of lift and increasing drag during take-off. The accumulation of as little as 0.8 mm of snow or ice on the upper wing surface can result in a loss of lift and therefore endanger flight safety. Areas of standing water, snow and ice can pose a hazard to taxiing, departing and arriving aircraft due to the changes in the surface friction coefficient yielding abnormal braking action/performance.

AERODROME WEATHER REPORT – METAR AND SPECI DECODE

IDENTIFICATION GROUPS

METAR or **SPECI**	COR	CCCC	YYGGggZ	NIL	**AUTO**	dddffG**f**$_m$f$_m$ **KT** or **MPS**

- **METAR** – Aviation routine weather report code name
- **SPECI** – Aviation special weather report code name
- COR – Code word used as appropriate
- CCCC – ICAO four-letter location indicator
- YYGGggZ – Indicator of UTC; In individual messages, day of the month and time of observation in hours and minutes UTC
- NIL – Code word used as appropriate
- **AUTO** – Fully automated observation indicator

SURFACE WIND (dddffG**f**$_m$f$_m$ **KT** or **MPS**)

- Wind speed units used
- Maximum wind speed (gust) – if necessary
- Indicator of **G**ust – if necessary
- Mean wind speed (10-min mean or since discontinuity)
- Mean wind direction in degrees true rounded off to nearest 10° (**VRB** = **V**ari**B**le when ff < 3 kt)
- 00000 = calm
- P99 KT (P49 MPS) mean ff or f$_m$f$_m$ = 100 KT (50 MPS) or more

Followed when there is a variation in wind direction of 60° or more but less than 180° and wind speed ≥ 3 KT by group below:

d$_n$d$_n$d$_n$**V**d$_x$d$_x$d$_x$

- Extreme direction of wind
- Indicator of **V**ariability
- Other extreme direction of wind (measured clockwise)

PREVAILING VISIBILITY (VVVV)

Prevailing visibility in metres or lowest visibility if visibility is not the same and fluctuating and the prevailing visibility cannot be determined

9999 = 10 km or more

Followed when visibility is not the same and minimum visibility = prevailing and visibility < 1 500 m or visibility < 50% of prevailing by the group below:

V$_n$V$_n$V$_n$V$_n$ NDV

- Lowest visibility
- **Followed by**
- V$_n$V$_n$V$_n$V$_n$D$_v$
- Lowest visibility
- Abbreviation for no directional variations
- General direction of lowest visibility or most operationally significant direction of visibility observed in more than one direction

RUNWAY VISUAL RANGE (RVR) WHERE REQUIRED, UP TO FOUR ACTIVE RUNWAYS

RD$_R$D$_R$/V$_R$V$_R$V$_R$V$_R$i

- Indicator of **R**VR
- Runway designator – for parallel runways may have **LL**, **L**, **C**, **R** or **RR** appended (**L** = left; **C** = centre; **R** = right)
- Mean RVR (10-min mean) at the touchdown zone: P2000 = more than 2 000 m; M0050 = less than 50 m
- RVR tendency indicator over past 10 min: **U** = upward; **D** = downward; **N** = no distinct change; **0unit**ted if impossible to determine

Replaced when there are significant variations in RVR by the group below:

RD$_R$D$_R$/V$_R$V$_R$V$_R$V$_R$i

- Indicator of **R**VR
- Runway designator – for parallel runways may have **LL**, **L**, **C**, **R** or **RR** appended
- RVR (10-min mean) at the touchdown zone
- RVR tendency indicator

Note:
25 m STEP if RVR < 400 m
50 m STEP if RVR 400 ≤ RVR < 800 m
100 m STEP if RVR ≥ 800 m

PRESENT WEATHER (w'w')

Present weather (see table w'w')

Followed when there is a variation in wind direction of 60° or more but less than 180° and wind speed ≥ 3 KT by group below:

d$_n$d$_n$d$_n$**V**d$_x$d$_x$d$_x$

- Extreme direction of wind
- Indicator of **V**ariability
- Other extreme direction of wind (measured clockwise)

CLOUDS[a] (N$_s$N$_s$N$_s$h$_s$h$_s$h$_s$ (cc))

RVR tendency indicator over past 10 min: **U** = upward; **D** = downward; **N** = no distinct change; **0unit**ted if impossible to determine

Cloud amount: **FEW** – **FEW** (1–2 oktas); **SCT** – **SC**a**T**tered (3–4 oktas); **BKN** – **B**ro**K**e**N** (5–7 oktas); **OVC** – **OV**er**C**ast (8 oktas)

Height of base of clouds in units of 30 m (100 ft)

Cloud type – only **CB** (cumulonimbus) or **TCU** (**T**owering **CU**mulus) indicated, or /// if it cannot be observed by automatic system

Replaced when sky is obscured and information on vertical visibility is available by the group below:

VVh$_s$h$_s$h$_s$

- Indicator of **V**ertical **V**isibility
- Vertical visibility in units of 30 m (100 ft) /// = vertical visibility unavailable

Replaced when there are no such clouds, no restriction on vertical visibility and **CAVOK** is not appropriate by:

NSC

Nil **S**ignificant **C**loud

Replaced when automatic system is used and no cloud detected by:

NCD

No **C**loud **D**etected

CAVOK

Ceiling **A**nd **V**isibility **OK**. **Replaces** visibility, RVR, present weather and cloud if: (1) Visibility is 10 km or more; (2) No cumulonimbus cloud, no towering cumulus and no cloud below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater, and (3) No significant present weather (see table w'w')

TEMP. AND DEW-POINT (T'T'/T'$_d$T'$_d$)

- Temperature in whole degrees Celsius (if below 0 °C preceded by **M**)
- Dewpoint temperature in whole degrees Celsius (if below 0 °C preceded by **M**)

PRESSURE (QP$_H$P$_H$P$_H$P$_H$)

- Indicator of **Q**NH in hectopascals: if **Q** – **A** then QNH is in inches
- QNH rounded down to the whole nearest hectopascal or to tenths and hundredths of an inch, depending on indicator

SUPPLEMENTARY INFORMATION

RECENT WEATHER (RE w'w')

- Indicator of **RE**cent weather
- **RE**cent weather since previous report (intensity NOT to be reported)

WIND SHEAR (WS RD$_R$D$_R$)

- **W**ind **S**hear
- **RUNWAY**
- Runway designator – for parallel runways may have **LL**, **L**, **C**, **R** or **RR** appended (**L** = left; **C** = centre; **R** = right)

Replaced when all runways are affected by wind shear by:
WS ALL RWY

SEA-SURFACE TEMPERATURE AND STATE OF THE SEA OR SIGNIFICANT WAVE HEIGHT ((W$_S$T$_S$/SS') (W$_S$T$_S$/HH$_S$H$_S$))

- Significant wave height, in decimetres
- Group indicator letter
- Temperature in whole degrees Celsius
- Group indicator letter
- S' state of the sea (see code S')
- Temperature in whole degrees Celsius
- H indicator of the significant wave height
- Temperature in whole degrees Celsius

TREND FORECAST
TWO HOURS FROM TIME OF OBSERVATION

CHANGE INDICATORS (TTTTT or **NOSIG**)

- **BECMG** = **BEC**o**M**i**G** or **TEMPO** = **TEMPO**rary – see **TAF** decode for definitions
- **NOSIG** = **NO SIG**nificant change

CHANGE AND TIME (TTGGgg)

- Can be **AT** or **FM** = **F**rom**M** or **TIL** = **TIL**
- Time group in hours and minutes UTC

FORECAST WIND (ddd**f**f**G**f$_m$f$_m$ **KT** or **MPS**)

- Wind speed units
- Forecast maximum wind speed (gust)
- Indicator of **G**ust
- Forecast mean wind speed
- Forecast mean wind direction in degrees true, rounded to nearest 10° (**VRB** = **V**ari**B**le)
- 00000 = calm

FORECAST VISIBILITY (VVVV)

- Forecast prevailing visibility in metres 9999 = 10 km or more

FORECAST WEATHER (w'w')

- Forecast significant weather (see table)

Replaced when significant weather ends by:

NSW

Nil **S**ignificant **W**eather

FORECAST CLOUDS OF OPERATIONAL SIGNIFICANCE OR VERTICAL VISIBILITY (N$_s$N$_s$N$_s$h$_s$h$_s$h$_s$ (cc))

- Forecast cloud amount
- Forecast height of base of cloud
- Cloud type – only **CB**

Replaced when sky expected to be obscured and vertical visibility forecasts are undertaken by:

VVh$_s$h$_s$h$_s$

- Indicator of Vertical Visibility
- Vertical visibility in units of 30 m (100 ft)

Replaced when no **CB** and no cloud below 1 500 m (5 000 ft) or highest minimum sector altitude, whichever is greater, are forecast and **CAVOK** is not appropriate by:

NSC

Nil **S**ignificant **C**loud

RMK

Information included by national decision but not disseminated internationally

w'w' – SIGNIFICANT PRESENT, FORECAST AND RECENT WEATHER

QUALIFIER		WEATHER PHENOMENA		
INTENSITY OR PROXIMITY	DESCRIPTOR	PRECIPITATION	OBSCURATION	OTHER
1	2	3	4	5
– Light	**MI** Shallow	**DZ** Drizzle	**BR** Mist	**PO** Dust/sand whirls (dust devils)
Moderate (no qualifier)	**BC** Patches	**RA** Rain	**FG** Fog	**SQ** Squalls
+ Heavy or well-developed in the case of **PO** and **FC**	**PR** Partial (covering part of the aerodrome)	**SN** Snow	**FU** Smoke	**FC** Funnel cloud(s) (tornado or waterspout)
VC In the vicinity	**DR** Low drifting	**SG** Snow grains	**VA** Volcanic ash	**SS** Sandstorm
	BL Blowing	**PL** Ice pellets	**DU** Widespread dust	**DS** Duststorm
	SH Shower(s)	**GR** Hail	**SA** Sand	
	TS Thunderstorm	**GS** Small hail and/or snow pellets	**HZ** Haze	
	FZ Freezing (supercooled)	**UP** Unknown precipitation		

Notes:
1. The w'w' groups are constructed by considering columns 1 to 5 in the table above in sequence, that is, intensity, followed by description, followed by weather phenomena. An example could be: **+SHRA** (heavy shower(s) of rain).
2. A precipitation combination has dominant type first.
3. **DR** (low drifting) less than 2 m above the ground, **BL** (blowing) 2 m or more above the ground.
4. **GR** is used when hailstone diameter is 5 mm or more. When less than 5 mm, **GS** is used.
5. **BR** – visibility at least 1 000 m but not more than 5 000 m. **FG** – visibility less than 1 000 m.
6. **VC** – between 8 and 16 km of the aerodrome reference point.

S' STATE OF THE SEA

Code figure	Descriptive terms
0	Calm (glassy)
1	Calm (rippled)
2	Smooth (wavelets)
3	Slight
4	Moderate
5	Rough
6	Very rough
7	High
8	Very high
9	Phenomenal

[a] Clouds of operational significance (i.e. below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater, and **CB** or **TCU**).

Abbreviated decode of **METAR** and **SPECI**
For details of codes, see *Manual on Codes*, (WMO-No. 306).

World Meteorological Organization
Weather · Climate · Water

January 2022

AERODROME FORECAST – TAF DECODE

IDENTIFICATION GROUPS

TAF or **TAF AMD** or **TAF COR**	CCCC	YYGGggZ	NIL	Y$_1$Y$_1$G$_1$G$_1$/Y$_2$Y$_2$G$_2$G$_2$	CNL

- **TAF** or **TAF AMD** or **TAF COR** – Code names for aerodrome forecast, amended aerodrome forecast and corrected aerodrome forecast, respectively
- CCCC – ICAO four-letter location indicator
- YYGGggZ – Date and time of issue of forecast in UTC; Indicator of UTC
- NIL – Indicator of missing forecast
- Y$_1$Y$_1$G$_1$G$_1$/Y$_2$Y$_2$G$_2$G$_2$ – Period of validity, beginning on Y$_1$Y$_1$ day of month at G$_1$G$_1$ (UTC) and ending on Y$_2$Y$_2$ day of month at G$_2$G$_2$ (UTC)
- CNL – Indicator of cancelled forecast

FORECAST SURFACE WIND (ddd**f**f**G**f$_m$f$_m$ **KT** or **MPS**)

- Wind speed units used
- Maximum wind speed (gust)
- Indicator of **G**ust
- Mean wind speed
- Mean wind direction in degrees true rounded to nearest 10° (**VRB** = **V**ari**B**le when ff < 3 kt)
- 00000 = calm
- P99 KT (P49 MPS) mean f$_m$f$_m$ = 100 KT (50 MPS) or more

FORECAST PREVAILING VISIBILITY (VVVV)

Prevailing visibility in metres 9999 = 10 km or more

Replaced when significant weather phenomenon forecast to end by:

NSW

Nil **S**ignificant **W**eather

FORECAST SIGNIFICANT WEATHER (w'w')

Forecast significant weather (see table w'w' for **METAR**/**SPECI** decode)

FORECAST CLOUD AMOUNT AND HEIGHT[a] (N$_s$N$_s$N$_s$h$_s$h$_s$h$_s$ (cc))

Cloud type – only **CB** (cumulonimbus) and **TCU** (towering cumulus) are indicated

Height of base of cloud in units of 30 m (100 ft)

Cloud amount: **FEW** – **FEW** (1–2 oktas); **SCT** – **SC**a**T**tered (3–4 oktas); **BKN** – **B**ro**K**e**N** (5–7 oktas); **OVC** – **OV**er**C**ast (8 oktas)

Replaced when sky is expected to be obscured and information on vertical visibility is available by:

VVh$_s$h$_s$h$_s$

- Indicator of **V**ertical **V**isibility
- Vertical visibility in units of 30 m (100 ft)

Replaced when no **CB**, no **TCU** and no cloud below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater, is forecast and **CAVOK** is not appropriate by:

NSC

Nil **S**ignificant **C**loud

CAVOK

Ceiling **A**nd **V**isibility **OK**. **Replaces** visibility, weather and cloud if:
(1) Visibility is forecast to be 10 km or more
(2) No cumulonimbus cloud, no towering cumulus and no other cloud forecast below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater, and
(3) No significant weather forecast (see Table: Aerodrome Weather Report – **METAR** and **SPECI**)

SIGNIFICANT CHANGES IN FORECAST CONDITIONS INDICATED BY:

PROBABILITY (**PROB**C$_2$C$_2$)

- **PROB**ability
- Only 30 or 40 used, indicating 30% or 40%

DATE AND TIME (YYGG/Y$_e$Y$_e$G$_e$G$_e$)

- Beginning day and time (UTC) YYGG and end day and time (UTC) Y$_e$Y$_e$G$_e$G$_e$ of forecast period

Probability is used to indicate the probability of occurence of:
(a) an alternative element or elements
(b) temporary fluctuations

CHANGE (TTTTT)

Type of significant changes:
BECMG – **BEC**o**M**i**G**, used where changes are expected to reach or pass through specified values at a regular or irregular rate
TEMPO – **TEMPO**rary fluctuations of less than one hour and in aggregate less than half the period indicated by YYGG/Y$_e$Y$_e$G$_e$G$_e$

DATE AND TIME (YYGG/Y$_e$Y$_e$G$_e$G$_e$)

- Beginning day and time (UTC) YYGG and end day and time (UTC) Y$_e$Y$_e$G$_e$G$_e$ of forecast period

OR

If one set of weather conditions is expected to change more or less completely to a different set of conditions, thus indicating the beginning of another self-contained part of the forecast, by:

TTYYGGgg

This takes the form **FM**YYGGgg where **FM** is the abbreviation for **FroM** and YYGGgg is the time in hours and minutes UTC. All forecast conditions before this group are superseded by conditions indicated after the group.

BY REGIONAL AGREEMENT

FORECAST TEMPERATURE

(**TX**YYT$_F$T$_F$/Y$_e$Y$_e$G$_F$G$_F$**Z** **TN**YYT$_F$T$_F$/Y$_e$Y$_e$G$_F$G$_F$Z)

- **TX**, **TN** Indicators of maximum and minimum forecast temperatures, respectively
- YYT$_F$T$_F$ Date and forecast temperatures at G$_F$G$_F$
- Temperatures below 0 °C preceded by **M**
- Y$_e$Y$_e$G$_F$G$_F$ Date and time UTC to which forecast temperature refers
- **Z** Indicator of UTC

[a] Clouds of operational significance (i.e. below 1 500 m (5 000 ft) or below highest minimum sector altitude, whichever is greater, and **CB** or **TCU**).

Note: Meteorological offices to issue 30-h **TAF**s are determined by regional air navigation agreement.

Abbreviated decode of **TAF**
For details of codes, see *Manual on Codes*, (WMO-No. 306).

World Meteorological Organization
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