

METAR decoding in Europe

METAR - Aerodrome Actual Met Report

The **METAR** is a report giving the **actual weather conditions** at an aerodrome at the time of the report. METAR's are issued every 30 minutes during the opening hours of the aerodrome.

METAR Decode

A European **METAR** signal may comprise up to 10 components - preceded by a 3 component identifier.

Identifier Components

1. **Report Type** - METAR
2. **Location Indicator** - ICAO four letter aerodrome code.
3. **Time** - The time of the observation in UTC (GMT) in hours and minutes followed by the letter Z (the universal indication that GMT time is being reported).

Example: **METAR EHAM 1050Z**

Let us look at a typical example:

METAR EHAM 1050Z 24015KT 9000 RA SCT025 BKN040 10/09 Q1010 NOSIG

Note here that not all the 10 weather components are shown. If no data is recorded at the time of observation then certain fields (RVR, weather, wind shear) may be omitted altogether. In addition the cloud component may be used more than once if several cloud layers are present.

I'll continue with a more detailed description of each field and we shall come back to the METAR for EHAM (Amsterdam) at the end.

METAR Component Decode

1. Wind

Wind is given as direction in degrees true followed by the average wind speed.

Example:24015KT - indicates that the wind is blowing from the southwest at 15 kts..

Note: KMH (Kilometres per hour) or MPS (Metres per second) may also be found in this group e.g 34025KPH.

If the wind is gusting this will be shown by a further group of figures preceded by the letter G. Example:

24015G27KT

this indicates that the average wind is 240 at 15 kts but gusts to 27 kts are recorded.

If the wind is calm then 00000KT will be shown.

A variable wind direction will be shown by VRB e.g. VRB02KT would indicate that the wind was only 2 kts

but would not be blowing from any fixed direction.

If the wind is greater than 3 kt and the direction is varying by 60 degrees or more then the actual values must be recorded. Example:

31015G27KT 280V360

shows that the wind is blowing from the northwest at 15 kts with gusts to 27 kts but that the wind direction is varying from 280 to 360 degrees. Not very nice...

2. Visibility

Visibility is recorded as a four figure group in metres (2000 metres is roughly 1 nm).

If **0000** is shown it would indicate that the visibility is less than 50 metres.

If **9999** is shown it indicates that the visibility is 10 km or more.

If local conditions vary greatly then two groups may be displayed showing the visibility variation in different sectors e.g.

1000NW 6000S

- showing that the visibility to the northwest of the aerodrome is only 1000 metres but is 6 km to the south.

3. RVR (Runway Visual Range)

Runway Visual Range is an indication of the real visibility as measured down the runway either electronically or manually. RVR is taken when the Met visibility drops below 1500 metres and it will therefore only be shown occasionally in METAR reports. RVR visibility will always be prefixed by the letter R followed by the runway for which the value has been taken. Example:

R24/1200 - RVR for runway 24 is 1200 metres

It may be of interest to you to know that the RVR value recorded is significant to pilot operations. If the RVR value is below that published for the approach procedure then the aircraft **CANNOT MAKE AN APPROACH**. The aircraft must either remain in the holding pattern until the weather improves or it must divert.

4. Weather

Weather is identified by one or more two letter groups. The full list is not very long so I shall include them all here - even the more obscure phenomena ...

DZ	Drizzle
RA	Rain
SN	Snow
GR	Hail
SQ	Squalls
GS	Small Hail
SG	Snow Grains
IC	Diamond Dust
PE	Ice Pellets
BR	Mist
FG	Fog

FU	Smoke
HZ	Haze
VA	Volcanic Ash
DU	Widespread dust
SA	Sand
SS	Sandstorm
DS	Duststorm
FC	Funnel Cloud
We may also describe these in more detail with a two letter prefix.	
MI	Shallow
BC	Patches
DR	Drifting
BL	Blowing
SH	Showers
TS	Thunderstorm
FZ	Supercooled (Freezing)
Slight or heavy conditions may also be described by using a - or + sign before the two letter code. Examples of some combinations:	
RA	= Rain
SHRA	= Rain Showers
FZFG	= Freezing fog
-DZ	= Slight Drizzle
+SHSN	= Heavy snow showers
MIFG	= Shallow fog
CB	Cumulonimbus
TCU	Towering CB

5. Cloud

Usually this is a six figure group and one that most of you will already recognise. The group consists of three letters that describe the cloud cover followed by three figures for cloud height ABOVE AERODROME LEVEL. Cloud amount is given as;

- FEW** Few. This indicates 1 or 2 oktas of cloud.
- SCT** Scattered. This indicates 3 or 4 oktas of cloud.
- BKN** Broken. This indicates 5 to 7 oktas of cloud.
- OVC** Overcast. This indicates 8 oktas (solid cloud cover).

Cloud height is given by the next three figures which show the altitude in hundreds of feet. i.e. 040 is 4000 ft, 004 is 400 feet, 200 is 20,000 ft. Examples:

- SCT020** - Scattered at 2000 ft.
- BKN005** - Broken cloud at 500 feet.
- OVC250** - Overcast at 25,000 feet.

A METAR may contain several cloud layers so you may get: **SCT025 BKN070 BKN120 -**

showing scattered cloud at 2500 ft, broken cloud at 7000 feet and again at 12,000 feet.

SKC (Sky Clear) will be used if no cloud layers are observed.

CAVOK will also be used if no cloud exists below 5000 ft AND the visibility is greater than 10 km AND there is no fog, precipitation or snow.

CB will be used to emphasise Cumulonimbus formation - **BKN015CB**

TCU will be used to signify Towering CB formation

In conditions of fog when the cloud cover cannot be seen then the vertical visibility will be reported using VV as the code.

e.g. **VV003** = vertical visibility 300 feet.

If the fog is so bad that no measurement can be taken then you may possibly see **VV///** in a METAR.

6. Temperature and Dew Point

Temperature and Dew Point are both measured in Centigrade. A minus value is preceded by the letter M. Examples:

25/12 = Temp 25°C, Dew Point 12°C, or

00/M02= Temp 0°C, Dew Point -2°C.

7. QNH (Barometric Pressure)

QNH (zračni tlak na letališču reduciran na morski nivo!) is rounded down to the next whole millibar and reported as a four figure group preceded by Q. If the value is less than 1000mbs then the first digit will be 0.

Examples;

Q0996, Q1030.

To explain this further may I just add that if you set the QNH value on your altimeter then the height displayed on the instrument will be your height above sea level. If you are on the ramp then your altimeter should read airport elevation.

One other side factor of pressure is on aircraft performance. If QNH is low then an aircraft will perform much more badly (less lift, slow climb, poor engine performance) because it is operating in less dense air.

8. Recent Weather

This may be included if appropriate using the weather codes above, prefixed with RE (for recent).

Example **RERA** for recent rain..

9. Wind Shear

Again this will only be included if appropriate. The code WS is used followed by the runway affected.

Example:

WS LDG RWY28L or WS TKOF RWY08

10. Trend

This is only available at selected airfields. It is intended to indicate significant changes of weather in the two hours after the observation is made. If the change is temporary then **TEMPO** is used followed by the predicted conditions. If the change is permanent them **BECMG** (Becoming) will be used. Example:

TEMPO 3000 SHRA = temporary visibility 3000 metres with rain showers.

BECMG 33035KT = becoming 35 kts of wind from 330.

NOSIG = no significant changes in weather.

Putting it all together

OK, that's the details so lets take a look at some examples. First we look again at the METAR I copied from Amsterdam earlier:

METAR EHAM 1050Z 24015KT 9000 RA SCT025 BKN040 10/09 Q1010 NOSIG

This is a typical METAR and is quite easy to decode.

The report was measured at 1050 UTC and it shows that Amsterdam was reporting a wind of 240 at 15 kts, the visibility was 9km (9000m), it was raining, cloud was scattered at 2500 ft and broken at 4000 ft. Temperature was 10C and dew point 9C, the sea level pressure (QNH) was 1010 mb and there was no significant change expected in the next two hours.

This would seem to indicate the passing of a slow frontal system across the area with only a slow improvement in weather conditions during the day. A look at nearby airport METAR information showed similar conditions.



A METAR can be quite brief sometimes:

METAR EGLL 0920Z 26005KT CAVOK 15/14 Q1013 NOSIG

This shows that Heathrow at 0920 UTC was giving a slight 5kt westerly wind with no cloud or visibility problems, a moderate temp of 15C and normal pressure of 1013.



On the other hand, in bad weather a METAR can look much different....

Have a look at this one at Dusseldorf in poor visibility:

METAR EDDL 1550Z 26005KT 0550 R23L/0450 FZFG OVC002 M02/M02 Q0994 BECMG OVC005

which shows a met visibility of 550 metres and a RVR reading on 23L of 450 metres in freezing fog with a 200 ft cloudbase. Temp and Dew Point are down at -2C and the trend is of little consolation with the cloud only forecast to increase to 500 feet.



Here is one for Dublin:

METAR EIDW 0900Z 24035G55KT 210V270 1700 +SHRA BKN007 OVC015CB 08/07 TEMPO 3500

A nasty cold and windy day with strong gusty 35 kt wind up to 55kts at times and swinging from 210 to 270 degrees. Visibility is reduced to 1700 metres in heavy rain showers and a low cloud cover of 700 feet and solid Cumulonimbus at 1500 ft to add to the misery. At least they expect the visibility to increase to 3500 metres even if only temporarily.



METAR LFPG 1250Z 28010KT 8000 HZ SCT070 BKN240 28/22 Q1003 NOSIG

TAF

In [meteorology](#) and [aviation](#), **TAF** is a format for reporting [weather forecast](#) information, particularly as it relates to aviation. "TAF" is an acronym of **Terminal Aerodrome Forecast** or, in some countries, **Terminal Area Forecast**. Generally a 24-hour forecast, it complements and uses similar encoding to [METAR](#) reports.

This TAF example is from [Calgary International Airport](#), [Calgary](#), [Alberta](#), and was released on [October 19, 2006](#) at 2038 [UTC](#):

```
TAF CYYC 192038Z 192118 17008KT P6SM SCT020 OVC080 TEMPO 2203 P6SM -SHRA
BECMG 2223 24007KT
FM0300Z 32010KT P6SM SCT007 BKN060
FM0600Z 33015KT P6SM SCT010 BKN040 TEMPO 0612 5SM -RASN BR OVC010
FM1200Z 34015G25KT P6SM SCT010 OVC030 TEMPO 1218 2SM -SHSN OVC010
RMK NXT FCST BY 00Z=
```

- **TAF** indicates that the following is a terminal area forecast.
- **CYYC** indicates that the report came from [Calgary International Airport](#).
- **192038Z** indicates that the report was issued at 2038 UTC on the 19th of the month.
- **192118** indicates that the report is valid from 2100 UTC on the 19th until 1800 UTC on the following day.
- **17008KT** indicates that the wind is forecasted in the first part of the forecast (2100 to 0300 UTC) to be from 170 degrees at 8 [knots](#).
- **P6SM** indicates that visibility is forecasted to be at least six statute miles. Forecasted visibility of six miles or more is always referred to as P6SM. If meters are used there are no additional characters (same as METAR).
- **SCT020 OVC080** indicates that clouds are forecasted to be scattered at 2000 feet and overcast at 8000 feet.
- Additionally a min. and max. temperature group can be used here. The format is:
TXtTt/HHZTNtTt/HHZ - Forecast Max and Min temperature
TX - Indicator for Maximum temperature
TtTt - Temperature value in Celsius
TN - Indicator for Minimum temperature
HH - Forecast hour, i.e. the time(hour) when the temperature is expected
Z - Time Zone indicator, Z=GMT.
- 3 modifiers can be used to identify the time of specific events: **TEMP** (Temporary fluctuation in some of the elements lasting for periods of 30 minutes or more but not longer than one hour), **BECMG** (Becoming - Used to indicate a gradual change in some of the forecast elements) and **FMHHmm** (From).
- **TEMPO 2203 P6SM -SHRA** indicates that between 2200 and 0300 there may be at times light [rain](#) showers with visibility of at least six statute miles.
- **BECMG 2223 24007KT** indicates that a wind shift to 240 degrees at 7 knots is forecasted to occur between 2200 and 2300 UTC.
- **FM0300Z 32010KT P6SM SCT007 BKN060** indicates that beginning at 0300 UTC the wind will be from 320 degrees at 10 knots, visibility will be at least six statute miles, and clouds will be scattered at 700 feet and broken at 6000 feet.
- **FM0600Z 33015KT P6SM SCT010 BKN040 TEMPO P612 5SM -RASN BR OVC010** indicates that beginning at 0600 UTC the wind will be from 330 degrees at 15 knots, visibility will be at least six statute miles, and clouds will be scattered at 1000 feet and broken at 4000 feet. There is forecasted to be at times between 0600 and 1200 hours visibility at 5 statute miles, rain showers, snow showers, and mist with an overcast layer of cloud at 1000 feet.
- **FM1200Z 34015G25KT P6M SCT010 OVC030 TEMPO 1218 2SM -SHSN OVC010** indicates that beginning at 1200 UTC the wind will be from 340 degrees at 15 knots gusting to 25 knots, visibility will be at least six statute miles, and clouds will be scattered at 1000 feet and overcast at 3000 feet. There is also forecasted to be at times between 1200 and 1800 hours light snowshowers, visibility of two statute miles, and an overcast layer of cloud at 1000 feet.
- **RMK NXT FCST BY 00Z** indicates that the next forecast will be issued by 0000 UTC.