

# Metrics Matter

**Using the right metric to measure noise annoyance from aircraft is very important. Each of them measures something slightly different.**

## The LAeq Metric

The number of aircraft passing over an area during a 16 hour day is counted. The noise of each plane is measured in decibels (db). The noise is then averaged out for the day. This is then turned into an annual average.

There are three criticisms made of the LAeq metric:

- It includes periods, even days, when there may be no aircraft.
- It gives too much weight to the noise of each aircraft (which has gone down over the years) and insufficient weight to the number of aircraft (which has risen).
- The 'A' weighting which is used doesn't fully capture the low-frequency noise emitted by aircraft. A number of acousticians argue that for aircraft noise which contains a lot of low-frequency noise 'C' weighting is preferable. Certainly where 'C' weighting has been used, the noise recorded from each plane goes up.

However, despite these criticisms many acousticians argue that the LAeq metric provides a broadly accurate way of measuring annoyance from aircraft noise.

## The Lden Metric

Lden averages the noise out over an 8 hour day, a 4 hour evening and an 8 hour night, with 5 and 10 decibels added to the evening and night figures respectively to account for generally lower background levels at those times. The World Health Organisation (WHO) has started using Lden, as does the European Commission, as they believe it is more meaningful than LAeq. **Lnight** averages the noise only during the night period and is also used by WHO.

## The 'N' Metric

This measures the number of planes going over a house which are above a given decibel level. So, for example, N60 would show the number of planes over 60 decibels which fly over a home during a given period.

## Missing Metrics?

Areas which may only get planes for part of the year but get a lot of them when they do may miss out on annual metrics. For example, some areas in London are just overflowed when an east wind is blowing (about 30% of the time in a typical year) but get a lot of planes when they are overflowed. A metric for just those days they are overflowed needs to be used.

## A Suite of Metrics

More than one metric can be used to measure noise annoyance in any one place. This is what the UK Government now recommends and what Heathrow Airport does. For example, a metric which uses averages could be used along with an 'N' metric.

## What is a noise contour?

Most airports produce noise contours. They usually are annual contours. They show the level of aircraft noise in an area averaged out over a year. So, for example, 65dbLAeq contour indicates the area when the noise averages out at 65 decibels or more over the course of the year.

### **What is a safe level of annoyance?**

The World Health Organisation says that the daytime safe level for aircraft is 45Lden and at night 40Lnight. These are lower levels than previously thought safe. WHO arrived at these figures in this way: when 10% of people said they were annoyed by aircraft noise (during the day) at a given level, that level became the safe level. WHO is *not* saying that *most* people will be annoyed or experience health problems from aviation noise at 45Lden. But what it *is* saying is that, in its view, *enough* people will do so for it to be the recommended guideline.

WHO's night time guidelines, generally, are lower because the evidence showed that regular sleep disturbance can have a worse impact on health than annoyance. Therefore the benchmark was set at a lower level. The recommended threshold was the level at which 3% of people were 'highly sleep-disturbed'.

WHO is talking about levels of outdoor noise. Indoors, the noise can be 10 decibels lower even if the window is open; 15 decibels lower with a half open window; and 25 decibels less if the window is shut. Other studies confirm that noise annoyance can occur at low levels. For example, a recent report from the UK Civil Aviation Authority, SoNA (Survey of Noise Attitudes, 2014), found that 7% of people become significantly annoyed at 51LAeq and 9% at 54LAeq. Slightly different metrics and a less dramatic finding that WHO but spelling out a similar message.

**The UK Government now officially accepts 51LAeq and 54LAeq as the levels of aircraft noise annoyance. These levels are considerably lower than previous Government policy.**

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