
WHAT'S A DECIBEL?

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So, what’s a decibel then?

There are various dictionary definitions but essentially, they say that it is “a unit used to measure the intensity of a sound by comparing it with a given level on a logarithmic scale.”

It is in fact one tenth of a Bel, hence the name. So, the decibel is a logarithmic way of describing a ratio to base 10.

This means that a change of 1 Bel (i.e. 10dB) equates to a 10-fold increase in sound energy, so a 20dB increase equates to a 100-fold increase in sound energy (10x10), and 30dB equates to a 1000-fold increase (10x10x10) etc.

What’s a logarithm then? A logarithm is just a way of comparing very large differences.

Our ears are incredibly sensitive; we can hear everything from a pen writing on a piece of paper to a jet engine taking off.

In terms of power the jet engine is about 1,000,000,000,000 times more powerful than the smallest audible sound – that’s a huge difference, so a logarithmic scale is used to help close this gap.

On the decibel scale the smallest audible sound is 0dB, a sound 10 times more powerful is 10dB, a sound 100 times more powerful is 20dB, a sound 1000 times more powerful is 30dB etc.

So, decibels are just units on a scale, 0dBA is 1 and one of the quietest things we are likely to hear and 120dBA is 1,000,000,000,000 (i.e. 12 noughts) is one of the loudest we are likely to hear.

If the sound energy is doubled the increase in decibels is 3dB, and this holds true regardless of the starting point. Strangely this means that 1dB + 1dB = 4dB, but equally 80dB + 80dB = 83dB! A tripling of the sound energy is equal to a 5dB increase.

Loudness – Logarithmic scale

| Sound Level dBs | Relative energy K/pa |
|-----------------|----------------------|
| 120 | 1,000,000,000,000 |
| 110 | 100,000,000,000 |
| 100 | 10,000,000,000 |
| 90 | 1,000,000,000 |
| 80 | 100,000,000 |
| 70 | 10,000,000 |
| 60 | 1,000,000 |
| 50 | 100,000 |
| 40 | 10,000 |
| 30 | 1,000 |
| 20 | 100 |
| 10 | 10 |

