# HOW THE DUBS WORK

The DUBS AF units have two paths for audio through them:

1. A low pass path
2. A high pass path

The low pass path consists of two chambers, each filled with a reticulated foam (open cells in the foam). The sound enters through a small diameter tube to the outside, then enters the first large chamber. At the other end of the chamber, the sound enters another small diameter tube that connects to the second large chamber. After passing through the second chamber, the sound enters a final small diameter tube where it exits inside your ear. The large expansion areas serve to cut off high frequencies, so you only hear low frequencies from this combination.

The high pass path consists of a single small diameter tube, connecting the outside world to your ear. There is a small, controlled leak on this tube which consists of a very short, smaller diameter tube. Sound enters the tube from the outside, low frequency sounds are “bled off” by this controlled leak, and high frequency sounds continue through to your ear.

When you wear the DUBS you hear the summation of the output of these two paths.

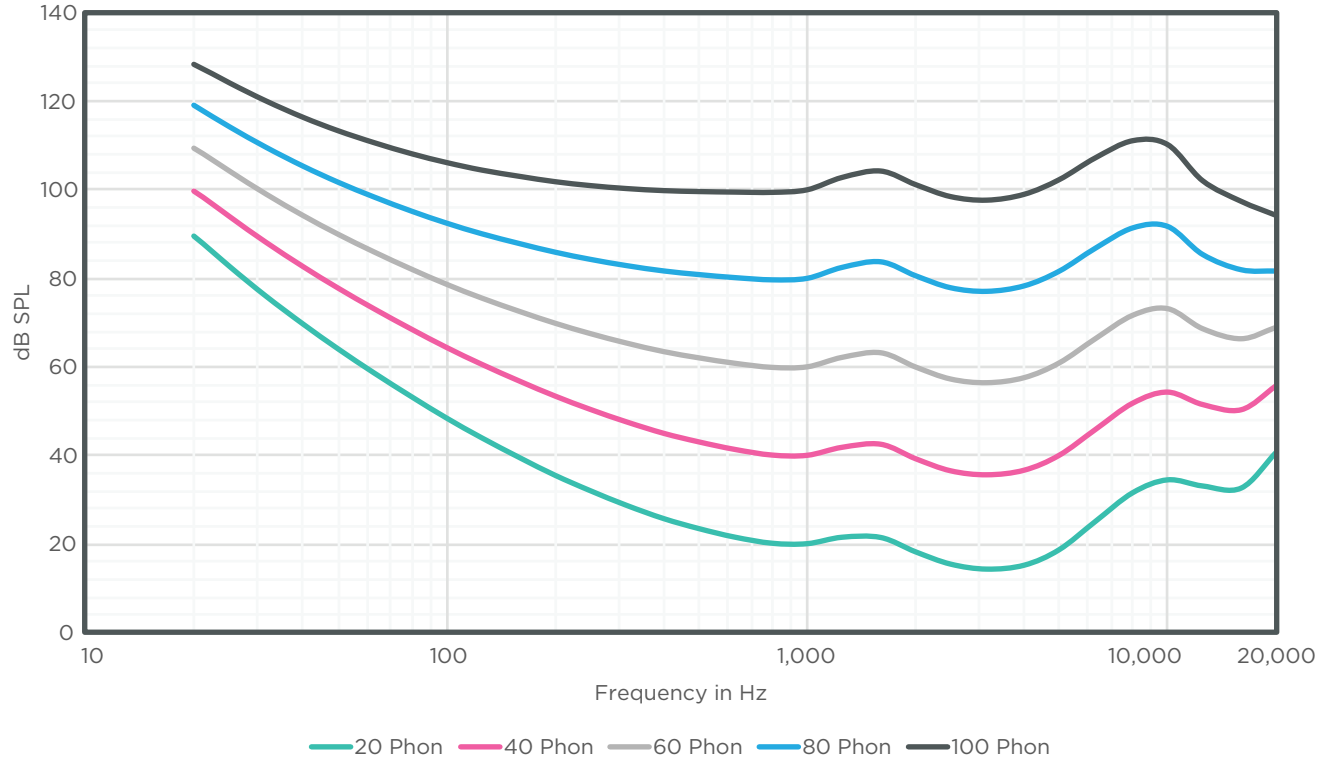
## WHY WE CHOSE THIS METHOD

We chose this combination of filters to match the way the ear’s sensitivity to sound changes over loudness. Our ears hear different tones with different levels of sensitivity based upon the loudness of the signal. This change is characterized in a set of curves summarized in the graph ISO226:2003, more often referred to as the Fletcher Munson curves. We used the filters elements to provide a response curve that approximates how our hearing sensitivity changes as we lower the volume about 12 dB – as we move from one Fletcher Munson curve to another. So when your favorite club, musician or DJ gets the sound set just right, and you use your DUBS Acoustic Filters to turn the volume down, you still get the same sonic experience.

## WHY WE CHOSE THE MATERIALS WE DID

Normal earplugs use one or two materials for convenience and cost reduction- but we don’t make normal earplugs. The 6 different materials within DUBS Acoustic Filters were chosen to provide the best audio fidelity. For example, we make extensive use of ultrasonic welding within the molded components. We chose to use ABS as it welds very well with minimal distortion. We chose to use a polyurethane reticulated foam within the low pass chambers as they best slowed the speed of sound through our filters. We chose the TPE outer ring based upon feel and comfort when pressed against your ear, silicone for the bud as it is comfortable, conforming, soft and easy to clean, and stainless steel for the metal grille because not only is it incredibly strong, but will never rust or exhibit discoloration.

## ISO 226:2003 Equal Loudness Curves




## DUBS Acoustic Filters Attenuation Curve