

### Is it possible to measure down to and below the human hearing threshold?

Yes, it is possible if Low-noise microphones are used. Low-noise microphones are measurement microphones with very high sensitivity that are used to measure weak acoustic signals with low sound pressure levels (below 15/20 dB). This means that they can be used to measure and record acoustic signals that can't be picked up by regular measurement microphones but can be heard by humans. These can be unwanted noises coming from consumer electronic devices like washing

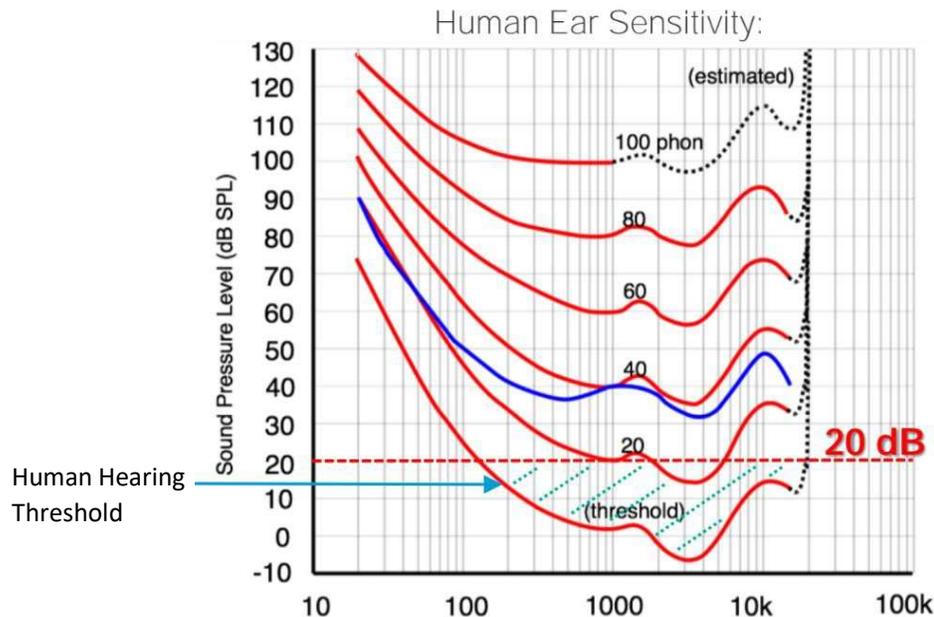


Figure 1. Curves showing the human hearing sensitivity. The 20dB line represents the typical noise floor for a ½" measurement microphone.

machines, laptops or smart speakers or even in the automotive industry for cabin noise measurements. These signals can be recorded for sound quality evaluation or for signal characterization, in order to improve the device and make it quieter.

The chart below is showing the equal loudness contour curves that describe the sensitivity changes of the typical human hearing system depending on the sound pressure level and frequency. The 20dB line is representing the typical noise floor for a ½" measurement microphone.

Low-noise microphones can typically measure down to 6.5 dBA (GRAS 40HH, 40HL, 40HT and 47HC) which is lower in level than every other standard measurement microphone but above the human hearing threshold. But when we look at frequency bands separately, we can see that it is actually possible to measure below the human hearing threshold of 0dB:

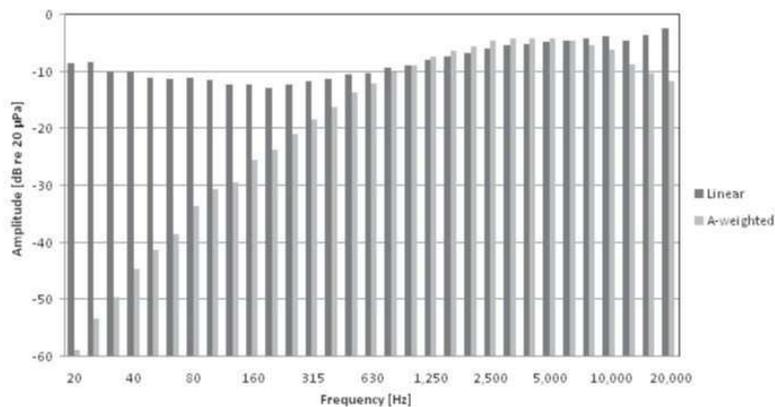


Figure 2. Noise floor for GRAS 40HL low-noise microphone

GRAS also offers the [40HF Low-noise microphone](#), which is our microphone with the highest sensitivity (1100 mV/Pa). This high sensitivity allows the microphone to be able to measure down to -2 dBA (below the human hearing threshold):

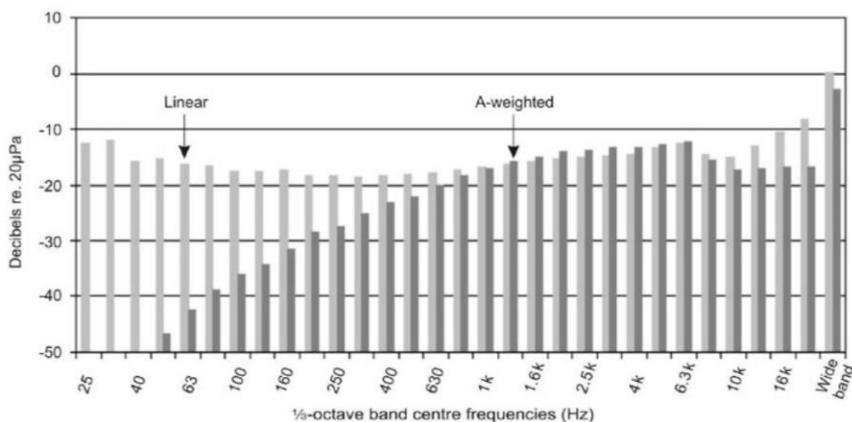


Figure 3. 40HF 1" low-noise microphone noise floor.