

Loudness level

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What is loudness?

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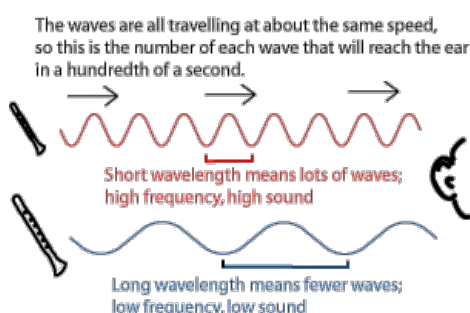
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Loudness is the certain criterion of a sound, which correlate with physical strength of sound(amplitude). Loudness also can scaling a sound, extending from quiet to loud. Sometimes, loudness is confused with other measures of sound strength, such as sound pressure, sound intensity and sound power. However, loudness is much more complex than other types of sound strength. Besides, loudness is also affected by additional parameters other than sound pressure, for example, frequency, bandwidth and duration.



Unit of loudness(level)

Characteristic of loudness can be shown by certain graph, equal loudness curve. Loudness(or loudness level) can be measured by the phon.

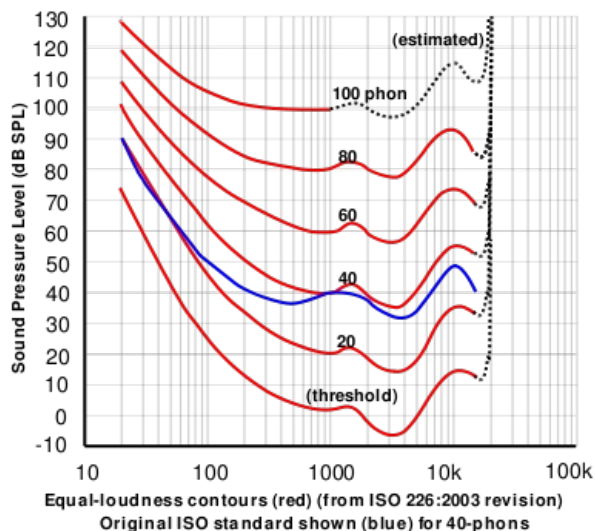


Phon

The phon is a unit of loudness level for pure tones. Its purpose is to compensate for the effect of frequency on the perceived loudness of tones. This unit was proposed by S. S. Stevens. By definition, the number of phon of a sound is the dB SPL of a sound at a frequency of 1 kHz that sounds just as loud. This implies that 0 phon is the limit of perception, and inaudible sounds have negative phon levels. The phon unit is not an SI unit in metrology. As a result, phon shows that perception of sound can be changed by frequency.

Equal loudness graph(ELG)

An equal-loudness graph is a measure of sound pressure (dB, SPL), over the frequency spectrum, for which a listener perceives a constant loudness when presented with pure steady tones. The unit of measurement for loudness levels is the phon, and is arrived at by reference to equal-loudness contours. The sensitivity of the human ear changes as a function of frequency, as shown in the equal-loudness graph. Each line on this graph shows the SPL required for frequencies to be perceived as equally loud. It also shows that humans with good hearing are most sensitive to sounds around 2–4 kHz, with sensitivity declining to either side of this region. A complete model of the perception of loudness will include the integration of SPL by frequency and the duration of each.



References

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