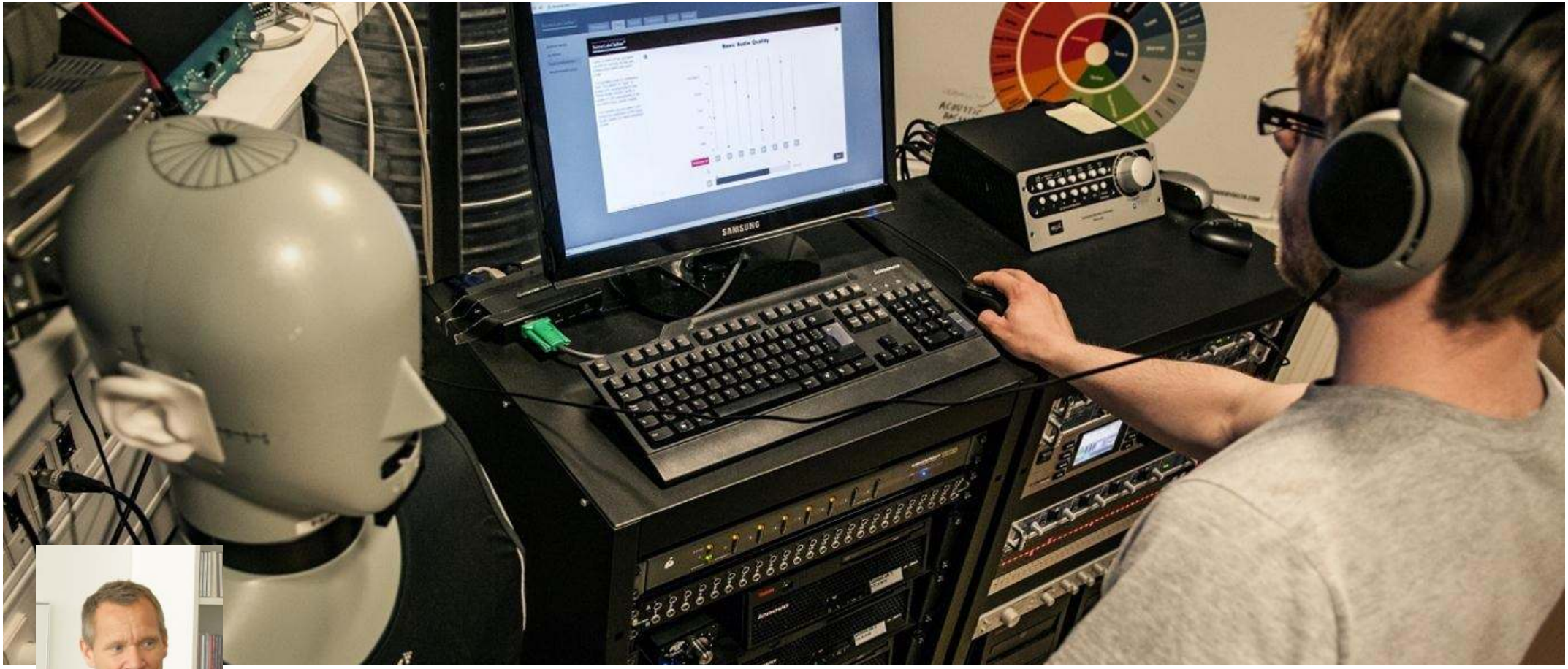
Technical specifications. What do they mean?



Technical specifications are the result of different kinds of tests. How do they influence your music experience?

Ole Witthøft,
Founder of
System Audio A/S

The myths are almost endless

The myths are almost standing in line when we talk about technical specifications on a loudspeaker. Many ask: How many Watts do they take? Because loudspeakers should be able to handle a lot of Watts. Or do they?

Talking about technical specifications is really about finding useful and reliable information on a loudspeaker.

But are the numbers really able to give you a kind of safety?

Can you compare the technical specifications and find the best loudspeaker?

Find the answers here.

Also read:

How to find the best loudspeakers

System Audio A / S has manufactured loudspeakers since 1984.
They have won numerous awards for their sound, design and technology.
SA speakers are sold in 41 countries.

Fact

Watt is the unit for measuring electrical power.

Power from the amplifier runs through the wire in the loudspeaker's voice coil.
The coil's capacity to cope with electric power, determines the loudspeaker's "Watts".
The picture shows the voicecoil from a woofer.

What does Watt mean?

Some people talk about Watt when trying to evaluate the quality of a loudspeaker.

Watt is a unit for measuring electrical power and the Watts of a loudspeaker is the effect that a loudspeaker can withstand under specific conditions.

It is good to know how many Watts a loudspeaker can tolerate, but it is equally important to know that:

* Watt does not tell you how loud the loudspeaker can play. Here you have to know the loudspeaker's operating power, in order to convert it to dB (deciBel = sound pressure).
* Watt does not tell you if the amplifier can damage the loudspeaker. Loudspeakers are more often destroyed by distortion than electrical power.
* Watt does not inform about sound quality. The sound quality is difficult to measure and power handling has under no circumstance any influence.
* Watt does not inform about the loudspeaker's expected lifetime (durability).
* Watt does not tell you whether the loudspeaker is a good match with the rest of your music system.

Conclusion

It is good idea to buy good loudspeakers but information about Watt tells you nothing about the quality. Loudspeakers that are tested to the same standard can be directly compared. But tests can be made to different standards and therefore some loudspeakers can not be compared.

What is operating power?

Operating power, efficiency or sensitivity. Three terms to describe the loudspeaker's ability to convert the electrical signal from the amplifier into sound.

A relatively high operating power means that a loudspeaker will require a more powerful amplifier, to be able to play as loud as a loudspeaker with a higher operating power.

Differences in operating power explains why some loudspeakers play louder than the others when connected to an amplifier and the volume knob is in the same position.

This means that:

You can calculate the loudspeaker's maximum sound pressure level if you also know about the power handling (Watt).

Fact

Sensitivity indicates how many Watt the loudspeaker has to receive to reproduce a sound pressure level of 96 dB at 1 meter.

Conversion from operating power the sound pressure (dB)

When the electrical power to a loudspeaker is doubled, the sound pressure is doubled. This corresponds to 3 dB.

Therefore, you can calculate how loud a loudspeaker can play if you know its power handling.

Example: A speaker has an operating power of 5 watts and a power handling of 160 Watt.

5 Watt provides 96 dB.
The power is now doubled, so the sound pressure is doubled, etc. It means that:
10 Watt provides 99 dB.
20 Watt provides 102 dB.
40 Watt provides 105 dB.
80 Watt provides 108 dB.
160 Watt provides 111 dB.

The above applies for a 1 meter distance from the loudspeaker.

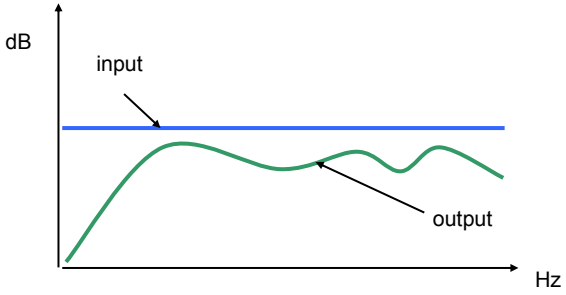
What is frequency response?

The human ear can hear from 20 Hz to 20,000 Hz. 20 Hz is a deep rumble that can be experienced in a thunderstorm. Very deep tones are felt as much as they are heard. 20,000 Hz corresponds to the high and sharp sounds from a bat. Ordinary music contains frequencies from approx. 60 Hz to approx. 12,000 Hz, so it is important that the loudspeaker is able to cover this range. If the loudspeaker covers a wider range, the sound quality is improved.

It is not enough if a loudspeaker can reproduce all frequencies. It must be able to reproduce them in the right balance to avoid distortion.

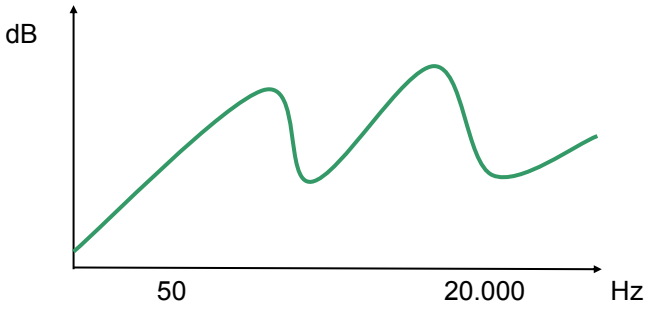
Fact

Frequency response is measured in Hertz (Hz) and it is being specified as ”from Hz” and ”to Hz”.



Identical specifications may sound very differently

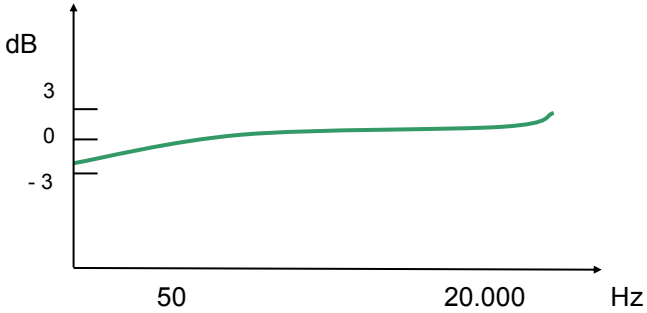
1.



If the frequency response is specified as 50 - 20,000 Hz on a loudspeaker like Example 1, the information is highly insufficient. All loudspeakers can live up to this.

You need to know the tolerances in dB.

2.



Note, that the loudspeaker in Example 2 is specified to have a frequency response 50-20000 Hz, just like Example 1!

However, here you are informed about + /- 3 dB tolerances and you see a much smoother frequency response.
This is a much better sounding loudspeaker than Example 1!

What does impedance mean?

An amplifier "feels" the impedance of a loudspeaker as a resistance that it has to ”push” the music signal through. If the speaker did not represent a resistance, the amplifier would be damaged.

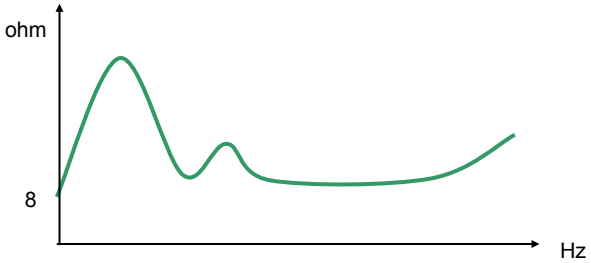
The impedance usually varies between 4 and 16 ohms, and the vast majority of modern amplifiers are designed to operate under these conditions.

Note:

* The impedance is actually the single technical specification that can really tell whether a loudspeaker is a suitable match for a given amplifier.

* Normally, "4 ohms," "6 ohms" or "8 ohm" is a minimum of information.

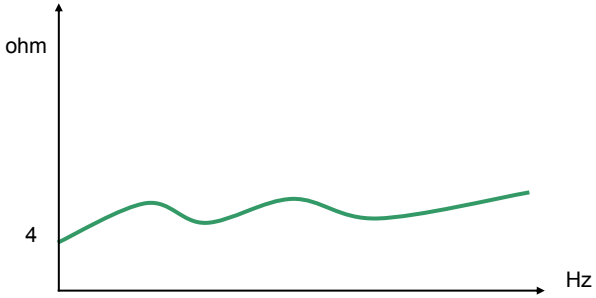
* The impedance is never 4 ohms or 8 ohms. It varies a great deal through the audible frequency range. The amplifier sounds better, if the loudspeaker has only small variations in impedance.



Example 1

The impedance response of an 8 ohm loudspeaker, where the impedance is specified as. 8 ohm.

The curve has steep slopes and the amplifier will shift current and voltage against (phase shift).
It reduces audio quality.



Example 2

Impedance response of a 4 ohm loudspeaker.

Example 2 is easier for the amplifier to operate than Example 1 Not because the impedance is lower, but because it has less variation.

Also read:

How to find the best loudspeakers

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