

## Speed of sound

The **speed of sound** ( $c$ ) indicates how quickly sound spreads. Only the medium in which the sound spreads, not the frequency ( $f$ ), plays any role in this.

The speed of sound does not drop off, the greater the distance from the source; in other words, sound does not slow down.

The **sound velocity** states at which speed molecules vibrate about their rest position. It is not to be confused with the speed of sound.

### Calculating the speed of sound

The following formula is used for calculating the speed of sound:

Speed of sound = wavelength · frequency

$$c = \lambda \cdot f$$

$\lambda$  (Greek: lambda): wave length

The speed of sound is measured in m/s (meters per second).

### Speed of sound in air

In the air, sound travels 1,000 m in about 3 seconds.

The speed of sound in the air is not constant, but depends on the temperature. It is about 331 m/s at approx. 0 °C.

The following approximation provides sufficient accuracy:

$$c = 331 + 0.6 \cdot \theta$$

$c$  = speed of sound in m/s,  $\theta$  = air temperature in °C

### Examples of the speed of sound in various media

The speed of sound varies according to the medium

Medium	$c$ [m/s]
Air	331 m/s
Alcohol	1,207 m/s
Aluminium	5,000 m/s
Helium	965 m/s
Ice	3,250 m/s
Iron	5,120 m/s
Lead	1,210 m/s
Water	1,497 m/s