

UNDERSTANDING EAR DEFENDERS

Exposure to loud noise can cause irreversible damage to your hearing. This damage can be sudden, or it can develop over a long period of time. What is important is that once damage to your ears occurs, there is **NO** cure.

Protect your hearing – it's the law!

Under European law, employers must provide hearing protection for workers in environments where noise levels **are higher than 80dB**. Where noise exposure is **higher than 87dB**, the use of hearing protection is mandatory.



Ear defenders must be worn beyond this point

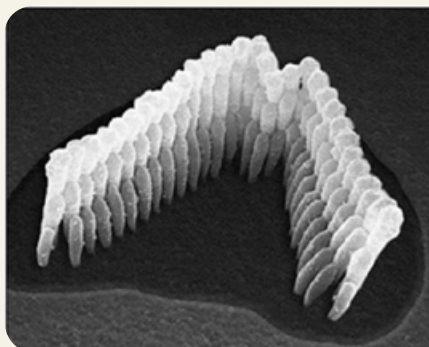
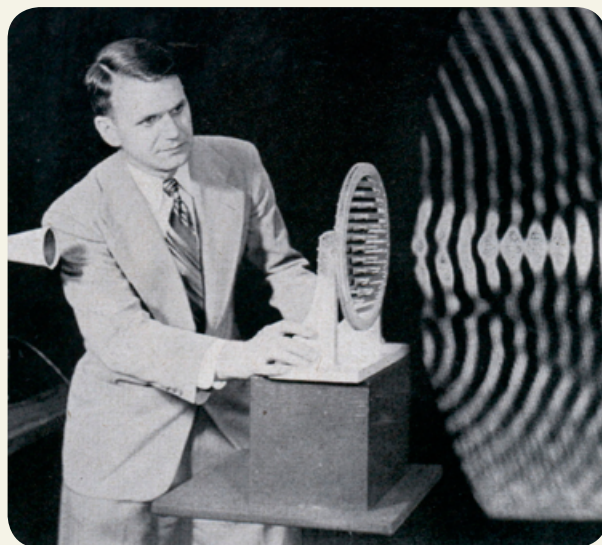
THE BASICS OF SOUND

When an object vibrates it causes air particles to move. When these air particles bump into the particles around them, they vibrate too, and so on, **creating sound waves**.

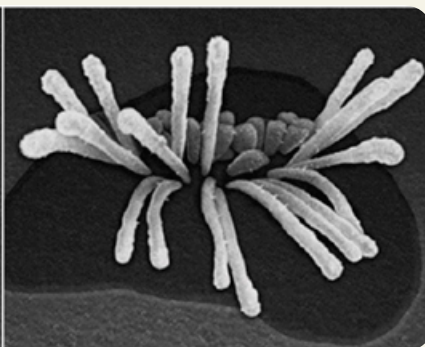
When these vibrating air particles or sound waves enter your ear, they are transmitted to tiny **hair-like cells** tucked away deep inside our inner ear, which transmit signals to your brain.

If the **vibrations are too strong**, these cells get damaged, and as more of these cells are damaged, fewer impulses are sent to your brain, resulting in loss of hearing.

These cells cannot be repaired, which is why getting the right protection from the start is vital.



Healthy hair cells



Damaged hair cells

CHOOSING EAR DEFENDERS

First you need to know **what kind of sound** is around you, which you can find out with a **sound meter reading** or a professional sound evaluation of your working environment.

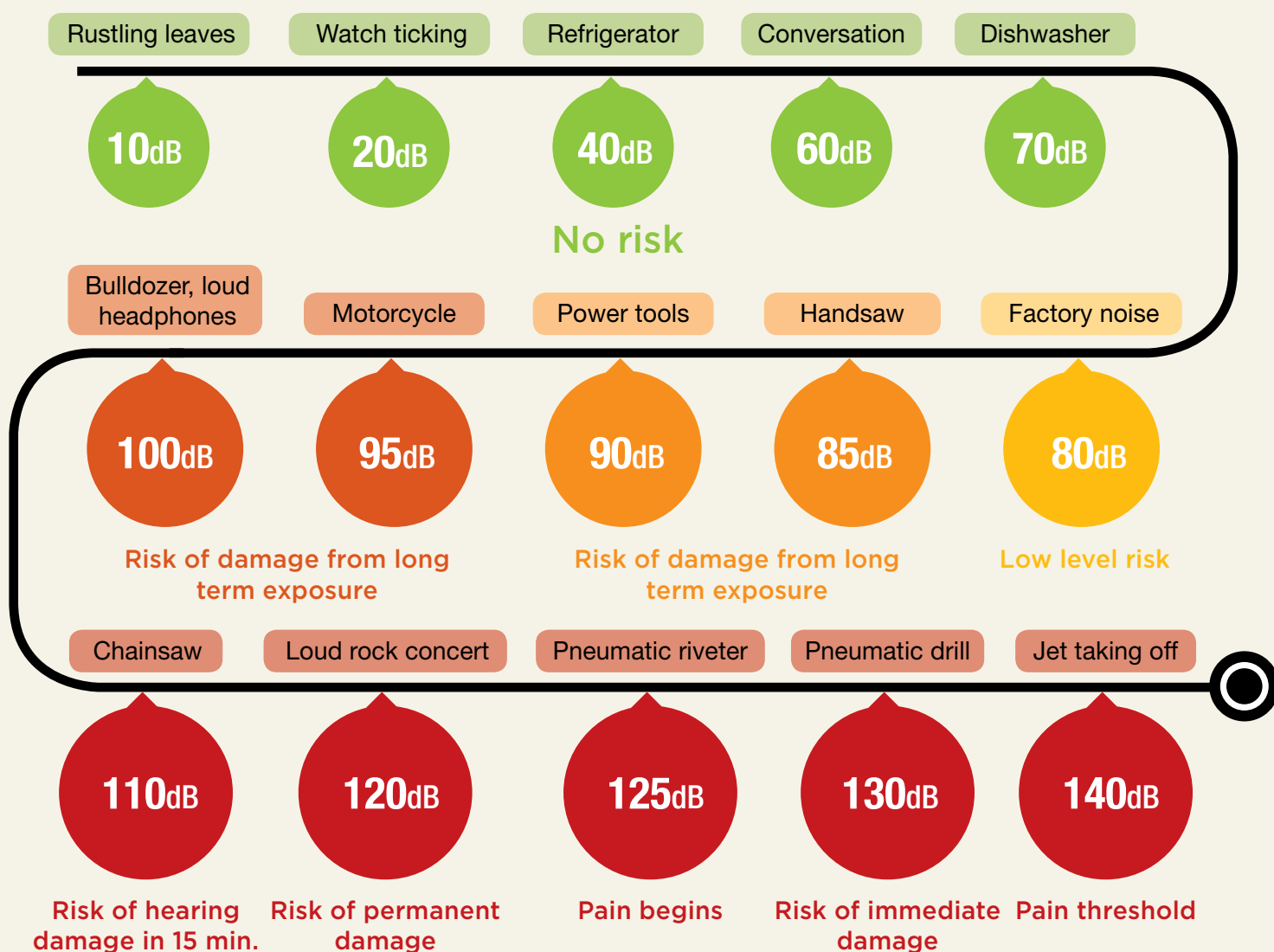
Sound level meters measure the pressure of sound waves in units called **decibels**. They also measure frequency weightings, giving two important readings: the **A-weighted** and **C-weighted** frequency readings, which represent what the human ear actually hears at different frequency levels.

There are **three methods** for assessing which ear defenders are suitable for your workplace.



METHOD 1: DECIBELS AND SNR

Ear defenders reduce or **attenuate** sound by differing amounts. Looking at the number of decibels reduced by ear defenders is the **most basic way** of calculating the level of protection you need. **This table shows typical decibel levels of familiar sounds.**



When you look at the information on different ear defenders, you will see a table of numbers, or attenuation values. These numbers tell you how much sound is reduced by the ear defenders, so you can assess whether the protection offered is suitable for the noise in your environment.

Let's take a look at the attenuation chart for the Peltor Optime I ear muff:

The **Single Number Rating (SNR)** found at the bottom of each table is the average degree of noise cancellation that the ear defender provides, in other words how many decibels will be reduced.

Optime I Head Band Version (H510A)								
Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Mf (dB)	14.1	11.6	18.7	27.5	32.9	33.6	36.1	35.8
sf (dB)	4.0	4.3	3.6	2.5	2.7	3.4	3.0	3.8
APVf (dB)	10.1	7.3	15.1	25.0	30.1	30.2	33.2	32.0
SNR = 27dB H = 32dB M = 25dB L = 15dB								

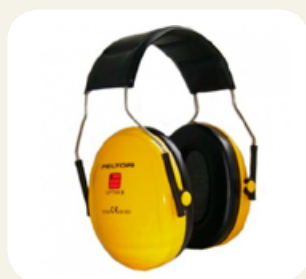
You need to make sure that the noise that reaches the ear through the ear defenders is **lower than 85dB and ideally between 70 and 80dB**. If it is still higher, you may also have to use **double protection** with **ear plugs**, which can increase the SNR by 5 to 10dB.

So for example:



HAND DRILL
(100dB)

—



PELTOR OPTIME I
SNR: 27dB

=

73dB
Safe Level

Don't over-do it! If you are isolated and can't hear what is going on around you, you may be tempted to take your protectors off, which would put you at risk. So avoid ear defenders that reduce the sound level reaching the ear to below 70dB.

METHOD 2: HML CALCULATION

Some ear defenders are more effective at reducing sounds at certain frequencies. If you buy an ear defender which is more effective at low frequencies and you have a lot of high frequency sound around you, you may not get the protection you need and may still be at risk.

The table of figures that comes with each ear defender also includes **HML values**, which represent how the defender performs at **high, medium and low frequencies**, for example:

Optime I Head Band Version (H510A)								
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Mf (dB)	14.1	11.6	18.7	27.5	32.9	33.6	36.1	35.8
sf (dB)	4.0	4.3	3.6	2.5	2.7	3.4	3.0	3.8
APVf (dB)	10.1	7.3	15.1	25.0	30.1	30.2	33.2	32.0
SNR = 27dB H = 32dB M = 25dB L = 15dB								

You can calculate the suitability of hearing protection using these three figures, plus the **A-weighted and C-weighted frequency readings** of your workplace using an HML calculator, such as [this one](#) published by the UK Health and Safety Executive (HSE).

This is accepted as a basic but reliable method.

METHOD 3: OCTAVE BAND ANALYSIS

An in-depth noise survey of your environment will give you what is called an ‘Octave Band Analysis’, which in layman’s terms basically tells you the levels of noise at different frequencies.

The table of values with each ear defender also includes APVs, which tell you the number of decibels reduced at each frequency.

Optime I Head Band Version (H510A)								
Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
Mf (dB)	14.1	11.6	18.7	27.5	32.9	33.6	36.1	35.8
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SNR = 27dB H = 32dB M = 25dB L = 15dB								

Using these two sets of figures **is the most accurate way** of calculating whether an ear defender provides the right level of hearing protection. You can use the HSE calculator [here](#).

OTHER FACTORS TO CONSIDER

Comfort

Once you know which level of protection you need, make sure that you choose a headset that you or your staff will find comfortable to wear, without wanting to take off. This can be an issue with people who have long hair or wear glasses.

Compatibility with other protective equipment

You also need to ensure that the model you choose is compatible with other protective equipment such as visors and hard hats. Most models come in neckband versions, which are ideal for use with safety equipment; and hard hat versions that slot onto helmets.

It’s important to remember that hard hat models provide lower attenuation than headband versions.



Neckband version



Helmet version

WHAT TYPE OF EAR DEFENDER DO YOU NEED?

Passive ear defenders (ear muffs)



You work in an environment where noise is constantly above 80dB, such as a factory, construction site or airport, and you and your staff need protection at **all times**.

This type of hearing protector **blocks out all loud sounds**, but may make hearing quiet sounds like conversations difficult.

This is the most **cost-effective** type of hearing protection.

[Click here](#) to see our range of passive ear defenders.

Level dependent ear defenders



You work in a very noisy environment, but you need to hear what is going on around you, such as conversations and alarms.

Level dependent or 'active listening' ear defenders filter loud sounds, but amplify quiet sounds, so you are not isolated.

You can adjust the level and frequency of the sounds that reach your ear, while **instantly blocking sudden noises**. This is especially useful for sounds like gunshots, jet engines, drills, etc.

[Click here](#) to see our range of level dependent ear defenders.

Ear defender headsets with microphone



You work in a loud environment, but **staying in touch is vital** – by telephone, mobile or two-way radio.

Some ear defenders have built-in Bluetooth so you can pair them with your mobile. Others can be attached to your cordless phone or 2-way radio.

Some ear defender headsets are also **level dependent**, allowing you to adjust the levels of sounds that reach your ears.

[Click here](#) to see our range of ear defender headsets.

Ear defenders with built-in 2-way radio



An ideal solution if you need to **communicate by PMR446 2-way radio** in extremely noisy environments.

Especially useful for people who need their **hands free** to keep working and talking.

Some models also have **Bluetooth**, so you can also pair them with your mobile, and switch between mobile calls and radio conversations.

[Click here](#) to see our range of ear defenders with built-in walkie talkie.