



Serenity

intelligent hearing protection

PHONAK

communication systems



«The day will come that the human being has to fight
against noise like the fight against Cholera and Pestilence.»

Robert Koch, discoverer of the tuberculosis bacillus

Dear Hearing Protection Customer,

A leading company like Phonak should offer much more than only hearing systems for the hearing impaired. Prevention of hearing loss is just as important. The problems of hearing loss and tinnitus, two major consequences of noise, are not to be underestimated. Stress at the work floor, hindering of communication and potential lawsuits against employers who failed to protect their employees against noise, require professional solutions. Those who need hearing protection will benefit tremendously from Phonak - its knowledge and resources - with new and significantly improved products. That is why 'hearing protection' is one of the main focus points of Phonak's global strategy. A dedicated 'earcare' team has been set up of top level researchers, engineers and audiologists with the assignment to bring highly needed innovation to this field.

Modern day hearing protection systems are only successful if they are:

- Proven effective for each individual ear
- Extremely comfortable to wear
- Tailor made for individual damping and communication needs
- Reasonably priced.

The Serenity product family offers you exactly that. The thorough audiological knowledge at Phonak and state of the art, laser based production technologies result in effective and comfortable hearing protection. The unique combination with industry-standard, miniaturized communication solutions initiates a new era in high-tech hearing protection.

I'd like to invite you to use Serenity as your new preferred choice for hearing protection. Only the latest technology is good enough to preserve the priceless sense of hearing of those in your organization who are exposed to noise. You will be absolutely thrilled by the quality and flexibility of the Phonak earcare solution.

With warmest regards,

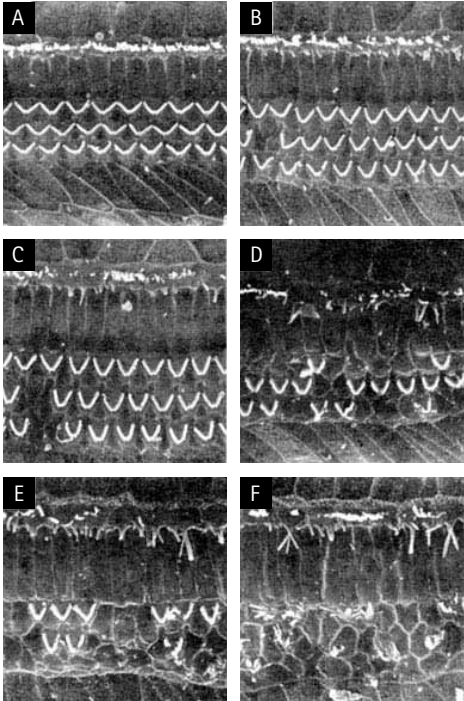
Dr. Valentin Chaperero Rueda

CEO Phonak Group



Dr. Valentin Chaperero Rueda , CEO Phonak Group

Consequences of noise



From completely healthy (A) to the point of severely damaged (F) hair cells / stereocilia

Pictures by courtesy of Brian C. J. Moore, Prof. of Auditory Perception, University of Cambridge (UK)

Noise can be described as sound that is unwanted or affects health. Noise can have detrimental physiological, psychological, social or economical effects on those exposed, depending on the sound pressure level, frequency spectrum, exposure patterns and communications environment.

Noise at work is a frequent reason for occupational diseases and is proven to have adverse physiological effects when the average level in a working day exceeds 80 dB SPL. In the long run, permanent, noise-induced hearing loss becomes a serious health threat. The hair cells in the cochlea (inner ear) are damaged and irreversible hearing loss occurs.

Typical consequences of noise

Physiological:

- Temporary or permanent hearing threshold shift
- Tinnitus
- Quality of sleep

Psychological:

- Stress
- Nervousness
- Reduced concentration
- Diminished ability to learn
- Degraded performance

Social:

- Difficulties in communication
- Isolation

Economical:

- Medical expenses
- Recompense for occupational disability
- Increased error rates
- Decreased job productivity

Unbearable ringing in the ear



Hans Wenger, 63

Hans Wenger was 30 years old when he experienced hearing loss during his work as a technical instructor in the army's arms technician school.

"I was standing near the muzzle, while I was explaining something to a student. To be able to talk to the student and to understand him, I was not wearing hearing protection at the time. At that very moment another student fired a shot with this gun without my order."

From that moment on Hans Wenger, today 63 years old, had high frequency hearing loss in both ears, combined with a tinnitus, a constant ringing in the ears.

"At the beginning the tinnitus was unbearable. I heard the ringing night and day. Bit-by-bit I got used to it and now I "only" hear the tinnitus when I am talking about it."

Tinnitus is probably the most annoying and least known consequence of noise.

Regulations worldwide

Mandatory use of hearing protection

Country	8-hour Exposure Limit	Impulse Noise Limit
EU	85 dBA	137 dBC _{pk}
Australia	85 dBA	140 dBC _{pk}
Canada	87 dBA	140 dBC _{pk}
New Zealand	85 dBA	140 dBC _{pk}
South Africa	85 dBA	135 dBC _{pk}
USA	85-90 dBA ¹	140 dBC _{pk}
¹ NIOSH and Military: 85 dBA, OSHA: 90 dBA		pk = peak

Facts and figures:

- Third most common reason for disability pensions
- EU 2000: 6000 new pensions every year
- 4 times higher unemployment rates for workers with hearing loss
- 16% of soldiers returning from Iraq have significant hearing loss
- US\$ 805 million spent by the US Department of Veterans Affairs for hearing loss and tinnitus each year
- Of the roughly 40 million Americans suffering from hearing loss, 10 million can be attributed to Noise-Induced Hearing Loss (NIHL)

Dangerous noise levels



Shooting approx. 140–160 dB



Wood grinding approx. 90 dB



Rotary printing approx. 86 dB



Starting jet approx. 130 dB



Separation grinding machine approx. 110 dB



Fire brigade approx. 83 dB

Now is the time for
intelligent hearing protection.

Serenity DPC

The new top solution for dynamic hearing protection combined with communication



Dynamic hearing Protection with 2-way Communication

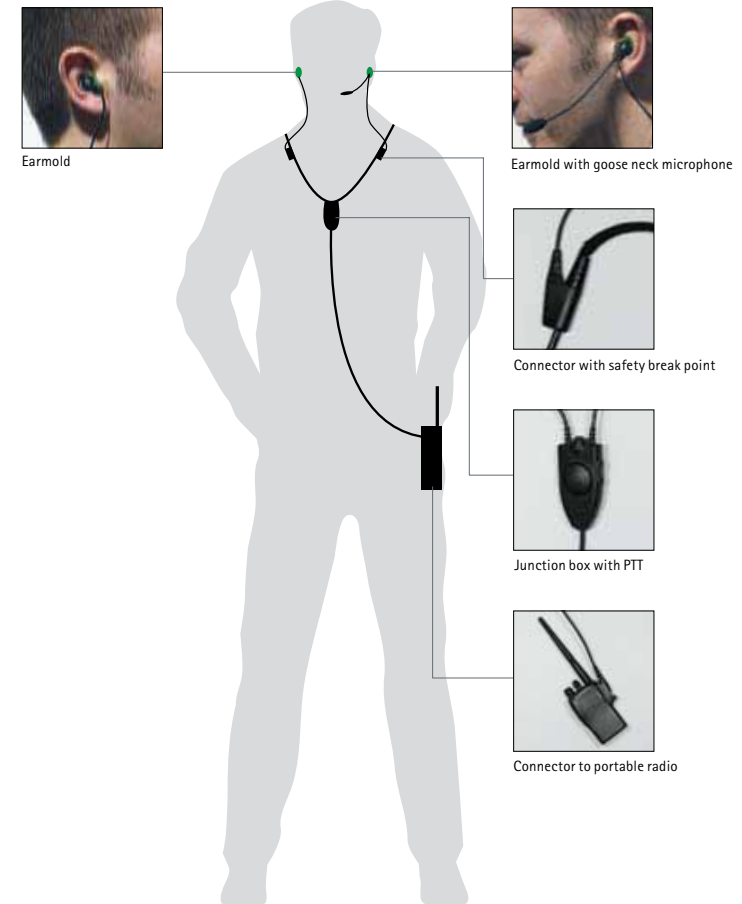
Typical fields of application

- Special intervention teams
- Special investigation organizations
- Rescue services
- Building and construction
- Exploration and mining
- Airports, traffic and logistics
- Recreational and military shooting
- Security firms and event control

Where impulse noises or unpredictable changes in noise levels occur and where ambient awareness and reliable communication is crucial.

Serenity DPC: 10 most important benefits

1. Dynamic, noise-dependent hearing protection
 - In quiet: full transparency to ensure ambient awareness
 - In noise: safe limitation of noise levels
2. Miniature, binaural ear microphones for excellent localization of life-saving signals
3. Protection against impulse noises
4. Clear speech transmission – even in noise or during vigorous body movement
5. Flexible connectivity to most portable radios
6. Integrated, push-to-talk button (PTT)
7. Rugged design for use in harsh environments
8. Powered by radio system or standard AAA battery
9. Reusable system for other user's ear molds
10. No interference with other protective equipment



Serenity SPC

Hearing protection with crystal clear communication



Static hearing Protection with 2-way Communication

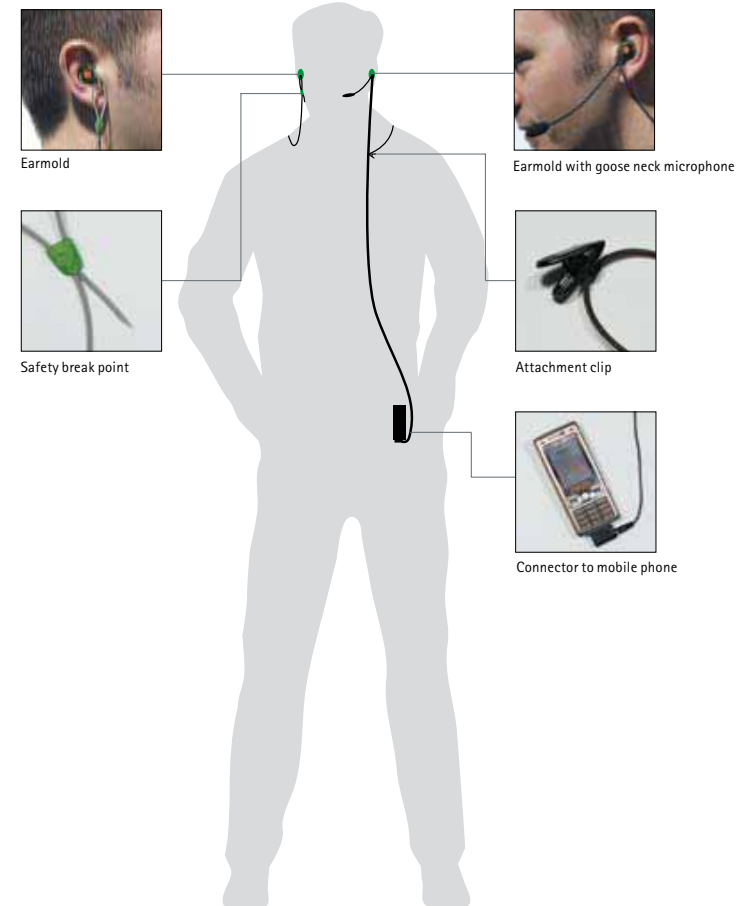
Typical fields of application

- Chemical and paper industries
- Building and construction
- Exploration and mining
- Airports
- Road and railroad maintenance
- Rescue services
- Recreational and military shooting
- Security firms and event control
- Motorcycle police

Wherever reliable and undisturbed communication in noisy environments is required.

Serenity SPC: 10 most important benefits

1. Integrated communication headset
 - Uninterrupted communication even in the most demanding listening environments
 - No interruption of protection during calls
2. Speech comprehension in noisy environments
3. Clear speech transmission – even in noise or during vigorous body movement
4. Flexible connectivity to most mobile and cordless phones
5. Reusable headsets for other user's ear molds
6. Assured protection
7. Multiple attenuation filters for different noise conditions
8. Outstanding comfort during prolonged usage
9. No interference with other protective equipment
10. Cost efficient reproduction of replacements



Serenity SP

Safe, modular hearing protection with outstanding comfort



Static hearing Protection

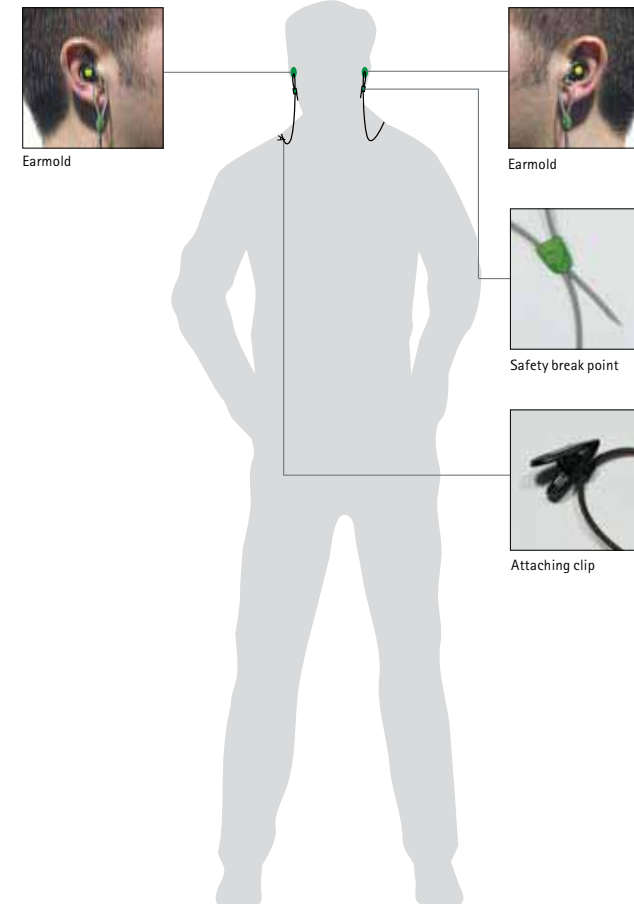
Typical fields of application

- Heavy industries
- Small production plants industries
- Metalworking, automotive and electronics industries
- Chemical and paper industries
- Food and drug production
- Building and construction
- Traffic and logistics
- Road and railroad maintenance

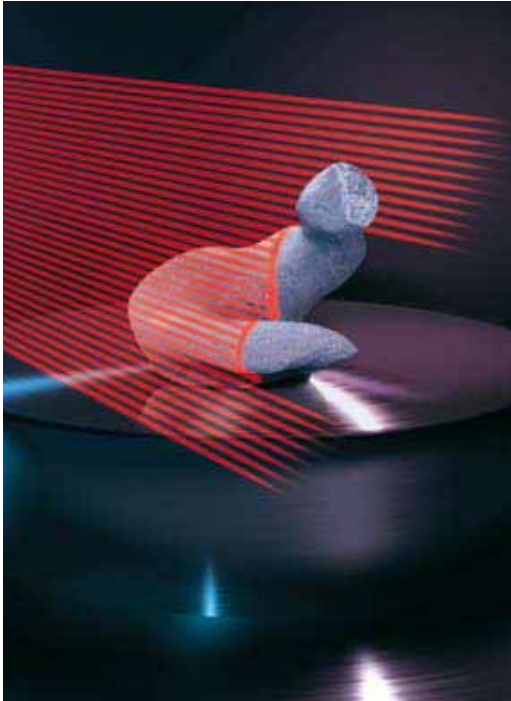
For any workplace with a constant noise level. Flexible to upgrade with communication and/or dynamic protection.

Serenity SP: 10 most important benefits

1. Assured protection with every use, provable with PAC system
2. Multiple attenuation filters - preserving ambient awareness in varying noise conditions
3. Outstanding comfort during prolonged usage
4. Feather-light with no constant pressure to head or ears
5. Biocompatible and skin friendly
6. Robust, resistant to mechanical, thermal or chemical stresses
7. No interference with other protective equipment, such as glasses, helmets or masks
8. Cost efficient reproduction of lost earmolds
9. Modular system with interchangeable attenuation filters
10. Upgradeable with communication and/or dynamic protection



High-tech laser manufacturing



3D scanning of the ear impression

Digitizing the ear's anatomy

Each human ear is unique, like a fingerprint. An accurate impression is taken from the outer ear using 2-component silicone. Using a precision 3D scanner, the impression is then digitized into 100,000 data points to an accuracy of 50 μm . All impressions are stored electronically, ensuring no loss of quality. Lost earmolds can be quickly reproduced.

CAD-based design for a perfect fit

With Digital Modelling Software, sealing and retention areas are precisely defined. In pressure sensitive areas of the ear, size is reduced, while in retention areas size may be enlarged.

Ear mold construction

With Selective Laser Sintering (SLS), custom-made earmolds are produced layer-by-layer in 0.1 mm steps. Nylon powder is melted using a CO₂ Laser. Statistical process control and continuous calibration ensure high precision. The result is a biocompatible, custom-made earmold with outstanding comfort, perfect hold in the ear and no irritation.



Earmold with earJack™ Adapter

Phonak Attenuation Control System (PAC)

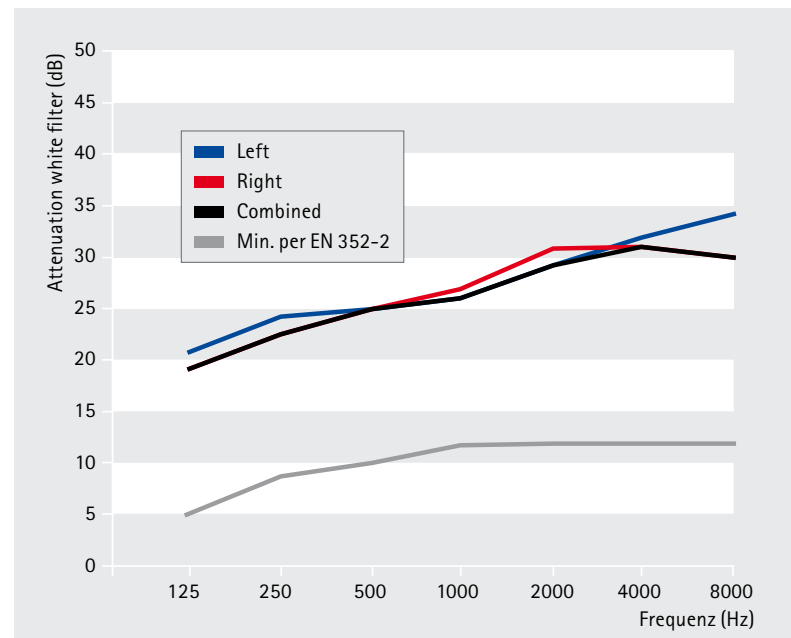
Measurement of attenuation performance with PAC system

In terms of comfort, otoplastic hearing protection offers clear advantages when compared to standard hearing protection. But comfort alone is not enough.

- The attenuation performance of hearing protection depends considerably on the accuracy of its shape.
- For this reason, government safety organizations highly recommend individual controls.

Phonak has developed a special process, which controls and documents actual in-situ attenuation performance.

This Phonak Attenuation Control (PAC) system, quickly measures attenuation levels for individual users. Measurements at multiple frequencies are performed simultaneously for the left and right ear. The specialized software stores the results and indicates with a visual cue (a green light) the adequacy (or otherwise) of the hearing protection. Individual certificates are then printed or filed electronically. As the ear's anatomy may change slowly over time, e.g. when substantially reducing body weight, repeated measurements help to maintain an effective hearing protection program. Thereby offering companies and their employees hearing safety they can rely on.



Attenuation measurement with PAC System

Guaranteed safety thanks to the unique measurement of attenuation performance.

Famous satisfied customers

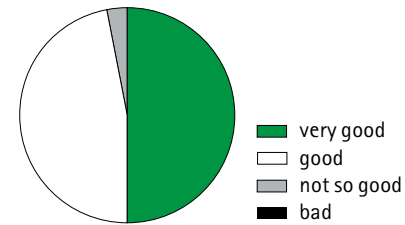
Since the launch of Serenity in 2005 our products have been very well received by many well-known and respected companies.

Nestlé, Michelin, Philip Morris, ThyssenKrupp, Jet Aviation, Roche, Gillette to name just a few.

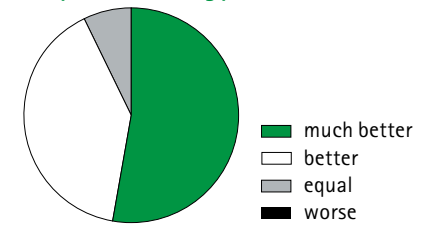
Why don't you join these companies and provide your workers with intelligent hearing protection?

Our customer satisfaction survey will give you an insight into why they appreciate Serenity so much!

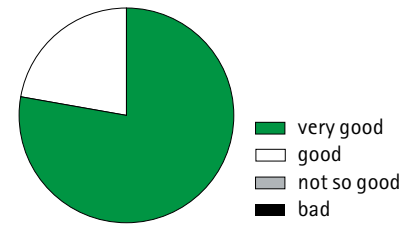
Acceptance by the employees



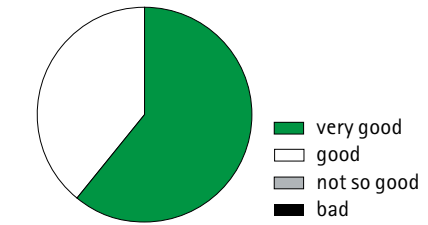
Wearing comfort compared to the previous hearing protection



How do you rate the competence of Phonak staff?



Measurement of attenuation performance with PAC (on-site)



Dynamic hearing protection combined with communication, when lives are at stake.



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PHONAK
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