



Air Flow Control™ Technology

Bilsom® recently introduced Air Flow Control™ technology into its Leightning® and Thunder® series earmuffs. What is Air Flow Control?

Air Flow Control [AFC] is the solution to a problem typically seen with traditional earmuffs – they attenuate very well in high frequencies, but poorly in the low frequencies. Thus, traditional earmuffs do not provide optimal overall protection for environments with high levels of low-frequency noise. AFC delivers superior low-frequency attenuation and performs more consistently across the whole frequency range without increasing the size or weight of the earmuff. In fact, overall attenuation improves because of the better low-frequency attenuation!

So, how does it work?

First, think about sound and the ear. Sound waves travel through the air and are collected by the outer ear. When wearing an earmuff, there are three ways that sound waves can bypass the earmuff and still enter the ear canal:

- **Leakage** – sound waves move around the earmuff, entering through gaps in the ear cushion seal
- **Penetration** – sound that transmits directly through the shell of an earmuff
- **Vibration** – movement or subtle shaking of the earmuff as a whole

It's a challenge for earmuff designers to minimize these three pathways of sound entering the ear canal without increasing the earmuff's size or weight. However, Bilsom engineers have been able to decrease vibration without adding any additional weight to the earmuff through AFC, thus providing better low frequency attenuation and a higher overall Noise Reduction Rating [NRR].

Inside the snap-in AFC ear cushion [Figure 1], a series of holes along the bottom of the ear cushion allows the cushion to breathe easier. The holes connect to baseplate chambers that channel the air out of the base of the cushion. This flow of air is further controlled by a non-woven layer inside the ear cushion designed to keep high-frequency resonance out of the hearing range. The result is a controlled flow of air that dampens low-frequency vibrations while still keeping excellent high-frequency attenuation.

Figure 1.

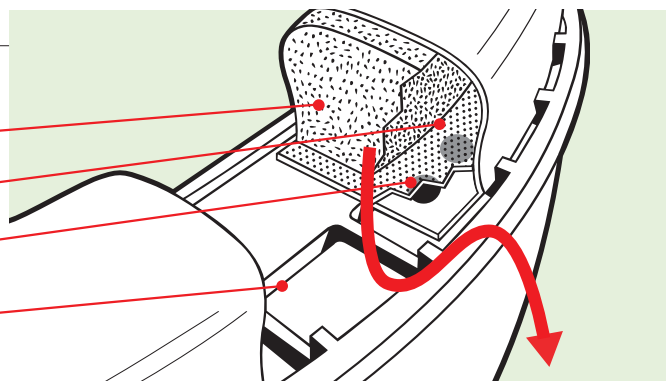
Air Flow Control Earmuff cross-section

Foam

Non-Woven Area

Ear Cushion Holes

Baseplate Chamber



AFC is comparable to a car’s shock absorber, which is literally designed to absorb shock and dampen vibrations from the road. As the car encounters bumps on the road, pistons move in and out to absorb the vibrations, providing a smooth ride. The ear cushions of an earmuff work in a similar manner. When traditional adhesive ear cushions are compressed, the air inside can only escape through a single pinhole. This makes the ear cushion stiff, and more likely to transmit vibrations, especially in low frequencies, just as a stiff shock absorber would transmit vibrations and cause a bumpy ride. However, by giving the air a pathway out, the ear cushion is less stiff and does not transmit sound wave vibrations through the earcup.

Compared to other earmuffs, earmuffs with AFC provide better low-frequency attenuation, while maintaining superior high-frequency attenuation. The result is a better overall attenuation, especially in slimline and medium-sized earmuffs. Table 1 shows how AFC boosts the NRR of the Bilsom® Thunder® T2 earmuff from 26 to 28, with a significant increase in attenuation in the 125–500 frequencies.

Table 1.

Bilsom® Thunder® T2 Attenuation Comparison with/without Air Flow Control™										
Frequency in Hz	125	250	500	1000	2000	3150	4000	6300	8000	NRR
T2 without AFC	16.8	20.2	31.8	40.3	38.1	39.4	38.1	40.1	41.8	26
T2 with AFC	22.3	28.1	34.7	37.2	36.2	36.8	36.8	38.8	38.8	28

Innovations such as Air Flow Control help to encourage workers to wear their earmuffs on the job and achieve 100% wear-time. Users gain significantly more protection from hazardous low-frequency noise, without any increase in size or weight of the earmuff.

– Brad Witt, Audiology & Regulatory Affairs Manager
 Phil Coons, Technical Services
 Bacou-Dalloz Hearing Safety Group

Sound Source is a periodic publication of the Bacou-Dalloz Hearing Safety Group, addressing questions and topics relating to hearing conservation and hearing protection. **⚠️WARNING:** It does not provide important product warnings and instructions. Bacou-Dalloz recommends all users of its products undergo thorough training and that all warnings and instructions provided with the products be thoroughly read and understood prior to use. It is necessary to assess hazards in the work environment and to match the appropriate personal protective equipment to particular hazards that may exist. At a minimum, a complete and thorough hazard assessment must be conducted to properly identify the appropriate personal protective equipment to be used in a particular work environment. FAILURE TO READ AND FOLLOW ALL PRODUCT WARNINGS AND INSTRUCTIONS AND TO PROPERLY PERFORM A HAZARD ASSESSMENT MAY RESULT IN SERIOUS PERSONAL INJURY, ILLNESS OR DEATH. For further information on this or other hearing conservation topics, contact Technical Support at 800/977-9177. © Bacou-Dalloz Hearing Safety Group