



**Title:** Verification testing of a web-based Personal Sound Attenuation (fit-testing) system.

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## Summary

Audiology Online Limited commissioned Positive Acoustics to undertake testing of an online system designed for the measurement of the level of attenuation (insertion loss) of hearing protection systems (HPDs) in real world usage.

The test is an adapted form of Real Ear Attenuation Threshold (REAT) test and is similar to that defined by ISO 4869-2: 2018 although with a number of adaptations. In particular it uses pure tones (as per audiometric screening) rather than filtered pink noise. The test is aimed at the home user for a form of 'fit testing' that would allow them to assess the actual as opposed to the specified level of protection offered by their HPDs.

Testing was undertaken on 20 inexperienced volunteer subjects (11 male and 9 female) who had been provided with custom-made earplugs (using an ER-17 filter). Users self-selected a hearing threshold value for pure tones at octave values from 250 Hz to 8 kHz with and without earplugs inserted, and the attenuation at each frequency was calculated and used to determine SNR, HML, APV and Group Attenuation values.

Results indicated that the test gave an acceptable level of reliability, with performance in line with other studies of hearing protection in real use of inexperienced subjects. Mean values were around 6 dB below manufacturer specification, which is in line with a range of other studies, in particular the HSE study of 2008.

The general conclusion is that this system provides an acceptable means of a user testing their Personal Sound Attenuation (PSA) in order to assess the actual as opposed to specified level of attenuation provided by earplugs. It is recommended to implement a Personal Attenuation Rating (PAR) calculation to produce a single number value which can be considered a comparison of an individual's attenuation to the published SNR or NRR values.

It is recommended that a study testing trained users is considered in order to assess if reliability is improved with user training in earplug fitment.

A study using the same test with small loudspeakers to test over the ear HPDs is considered insufficiently reliable at this stage to be usable, and requires further testing.