

# EUHA Guideline

## Hearing aid fitting using percentile analysis

Guideline 04-01 - v2.0: 10 Oct 2013

**EUHA**

Europäische Union der  
Hörgeräteakustiker e.V.

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Published by Europäische Union der Hörakustiker e.V.  
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## 1. Introduction

In-situ percentile analysis is a suitable tool for fitting hearing systems as it takes account of the individual characteristics of a person's hearing. It uses real-life signals (speech) to measure hearing with hearing aids in place. This paper is aimed at offering a brief introduction to percentile analysis for fitting hearing aids. The description of a specific target gain (fitting rationale) is not part of this paper.

## 2. Target

Using percentile analysis, a hearing system is to be matched to a certain target. In the process, audibility is to be increased such that it contributes to improved speech intelligibility. The hearing aid acoustician must be able to find a balance between the following two extremes for his/her customer:

- **Hearing-deprived customer** without any previous experience and tolerating only little loudness: presetting is performed based on modest insertion gain.
- **Experienced hearing aid user:** the aim is to maximise speech intelligibility in quiet and in noise.

**Note:** On principle, it is important to find a balance between speech intelligibility and acceptance. Full restoration of audibility may result in reduced acceptance and even reduced intelligibility. Gradual fitting is used to harmonise intelligibility and acceptance.

## 3. Fitting procedure

- Programming First Fit using a suitable procedure
- Presetting approximating target

Step 1, setting maximum output sound pressure level (SPL): presentation of the EUHA MPO signal (see ch. 4). The SPLs measured (peaks values or 100th percentile) must not exceed SPL-corrected uncomfortable level (UCL) for sounds in the band concerned. If required, output level limitation must be readjusted.

Step 2, presentation of ISTS at 65 dB SPL, matching LTASS (Long-Term Average Speech Spectrum) to target contour. The 30th percentile around 1 kHz should be above the hearing threshold in quiet.

Step 3, presentation of ISTS at 80 dB SPL, matching LTASS to target contour.

Step 4, presentation of ISTS at 50 dB SPL, matching LTASS to target contour.

**Please note:**

- Step 1: First Fit programming may result in too much limitation. We recommend re-adjusting limitation.
- Steps 2, 3, 4: Changes in gain and/or compression may affect any other input levels. The sequence 65, 80, 50 dB SPL has turned out to be best practice for a number of manufacturer-specific modules. On some cases, the sequence 50, 80, 65 dB SPL may be more appropriate (e.g. if AGC does not take effect at 50 dB SPL).
- 15 to 20 sec should be a sufficient duration of time for a cursory measurement (steps 2 to 4).
- In general, it is recommended to perform in-situ measurements.
- Adaptive parameters should be switched on.

#### 4. Specifications of the EUHA MPO signal

ISTS is presented at 55 dB SPL together with short, loud sequential sinusoids. Before adding the sinusoids to the ISTS, ISTS should be presented by itself for 5 s to produce a stable speech environment for the hearing aid. The sinusoids have the following characteristics:

level = 90 dB SPL

frequencies = 0.5, 1, 2, 3, 4 kHz

duration = 250 ms (signal) plus 25 ms (slopes) each

pauses = 250 ms

This results in an overall duration of 7.75 seconds (incl. a 250 ms pause after the 4 kHz sinusoid).

The signal can be downloaded from <http://euha.org/ak-perzentile/EUHA-MPO-Signal-Version-2.zip>.

For reasons of stability, the measurement should be performed twice.

## 5. Glossary

**MPO:**

Maximum Power Output. A hearing aid's maximum output level according to the current setting.

**First Fit:**

Initial setting of the hearing system based on the hearing impaired person's auditory characteristics. This basic setting is the starting point for any further steps in the fitting process.

**Presetting:**

Targeted modifications to the First Fit, based on the hearing aid acoustician's experience and skills, selection of a target construction; as a rule, setting the hearing aid using in-situ fitting based on percentile analysis.

**Fine-tuning:**

Customisation of the presetting based on the customer's individual feedback. Improving speech intelligibility taking account of acceptance. Tools used in the fine-tuning process include, in particular, in-situ percentile analysis and real-life simulations matched to the customer's personal experience. Direct paired comparison using different setting options.

**Paired comparison:**

Direct comparisons performed in immediate succession (direct paired comparison) using different hearing aid settings.

**Comparative fitting:**

Competing hearing systems that have been fine-tuned are compared using speech audiometry.

**Gradual fitting:**

Gradual fitting is used for hearing-deprived customers. One starts off with an acceptable setting that is then gradually, in several temporal steps, approximated to the compensation of hearing loss required. Gradual fitting is a method supporting acclimatisation.