

In-the-canal hearing aids (ITC)

Device for receiving, amplifying, and modulating environmental sound and voices for a person with hearing problems. An in-the-canal hearing aid can be worn in the ear canal. An in-the-ear hearing aid is a digital electronic device with different electronic components housed in a very small custom-made case. The main components are microphone, amplifier circuitry, sound processor, miniature loudspeaker/receiver, and battery. In-the-canal hearing aids carry sounds from the environment into the ear, make low sounds louder, loud sounds more comfortable, and modulate them. In-the-ear hearing aids are custom made (worn at the entrance of the ear canal) and powered with a small hearing aid battery.

Possible configuration variants concern the dimensions and how deep the device is placed into the ear canal (complete-in-the-canal or CIC, worn in the first part of canal or invisible-in-the-canal or IIC or mini-CIC, worn in the middle of the ear canal), and batteries (replaceable or rechargeable).

- **Product Classification**
 - APL (WHO Assistive Product Priority List): 17 (Hearing aids (digital) and batteries)
 - ISO 9999:2022: 220612 (In-the-ear hearing aids)
- **Possible configuration variants**

None specified.
- **Possible accessories or optional components**
 - Noise reduction.
 - No manual controls (such as volume wheels or program button on the apparatus, adjustments need to be made via a dedicated external device).
 - Wireless connectivity (can be connected to smartphone).
 - Remote controls.
 - Variable programming.
 - Bluetooth connectivity.
- **Product goals**

Activities or functions the product is mainly intended to support, according to WHO ICF Classification:

 - Hearing [\[b230\]](#).
 - Listening [\[d115\]](#).
 - Understanding spoken words [\[d310\]](#).
- **Indicated impairments**

Difficulties the product is mainly intended to address, according to the WHO ICF Classification:

 - Hearing [\[b230\]](#) (any type of unilateral or bilateral mild to moderate hearing loss).
- **Contraindicated impairments**

Difficulties for which the product may be inappropriate:

 - Severe hearing loss (due to the very small dimension, very small batteries, and limited amplification).
 - Temporary hearing loss that can be completely treated by medical intervention that will restore normal hearing (due e.g., to earwax small object occlusion).
 - Difficulty in fine hand use.
 - Profound hearing loss (due to the very small dimension, very small batteries, and limited amplification).
- **Indicated environments**

Specific environments in which the product should be used:

None specified.

- **Contraindicated environments**

Environments in which the product may be inappropriate:

- Underwater.
- Windy places (strong wind may create noises because the microphone is not protected).

- **Other indicated factors**

Other factors or situations the product is intended to address:

None specified.

- **Other contraindicated factors**

Other factors or situations in which the product may be inappropriate:

- Need to connect to inductive hearing loops (the product has no telecoil sensor integrated).
- Use by children.

- **Points to be considered in product selection**

- Before selecting an in-the-canal hearing aid, ensure that the hearing loss is not due to a removable obstacle in the ear canal.
- Hearing assessment (audiogram) and diagnostic of hearing are necessary for adequate and personalized selection of an in-the-ear hearing aid.
- Digital in-the-canal hearing aids are suitable for any kind of hearing loss (conductive, sensorineural, and mixed); they improve mild to moderate hearing loss (due to less powerful amplification) mainly for adults (not for children); they are easy to clean.
- An in-the-canal (ITC) hearing aid is custom molded, suitable for all kind of hearing loss (conductive, sensorineural, mixed, improve mild), and improve mild to moderate hearing loss in adults, but it is not indicated for children. It is less likely to pick up wind noise and it is partially visible in the ear. It uses small batteries with shorter life (batteries exchange or recharge more frequently) and can be difficult to handle (not suitable for dexterity issues or grasping limitation. They are some features on the apparatus, but it may be difficult to adjust due to its small size. The in-the-canal hearing aid is susceptible to earwax clogging the speaker.
- The smallest version of in the canal hearing aids, the invisible-in-the-canal devices (IITC), cannot be connected to a smartphone app, as it is placed deep inside the ear. It is suitable for user wearing helmets, headphones, or headgear. It is susceptible to earwax clogging the speaker and is unsuitable for users with dexterity issues, or potentially with visual impairments.
- Consider the cost of hearing aid batteries when they need to be replaced; in-the-ear device batteries have shorter battery life, batteries must be available.
- Rechargeable batteries are recommended if daily access to electric current is guaranteed; choose extra rechargeable batteries if daily access is not guaranteed or power bank recharger.
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- For hearing loss associated to tinnitus, select in-the-canal hearing aid with tinnitus masking.
- Ensure that the device is programmable and contains programs for noise reduction and for the sound scenery of the environment where the device will be used.
- For use in connection to smart phones, ensure that the in-the canal hearing aid is equipped with a Bluetooth technology connectible to iOS and Android phones, televisions, tablets, and other favorite audio devices.
- Once all points above have been addressed, the style of the in-canal ear hearing aid and level of amplification be identified: this will allow calculation of the price class of the hearing aid and the various features required.

- **Points to be considered in product fitting**

- The in-the-canal hearing aid must stay firmly and comfortable in the ear canal.
- An impression of the ear canal is needed for custom made in the canal hearing aids; the in-the-canal must fit perfectly and comfortable in the canal.
- The volume (gain) remote control is used to adjust the amount of amplification needed for linear hearing loss (same gain for all frequency).
- Different amplification for different frequency loss (low, middle, high) should be adjusted by an audiologist or a hearing aid specialist, able to modify the software parameters of the digital sound processor; In-the-canal hearing aids should be especially programmed to match the results of the users hearing test.

- Ensure that the user can switch on/off the hearing aid, manage the remote-control function, fit the device in the canal and take it off.
- Ensure that the user can change the battery or recharge correctly the batteries, can clean and dry the hearing aid, and can store the device correctly when not used.
- Ensure that left and right hearing aid are easily distinguishable in case of bilateral hearing loss.
- **Points to be considered in product use**
 - If the user does not use the hearing aid (for example at night), carefully store them, always in the same place, carry them in a special case (for blind or visually impaired user tactile markers may be needed on the case for left and right device), and keep it away from heat or heat sources, as they can damage the device.
 - Charge batteries during the night.
 - Do not use hearing aids underwater.
 - Ensure that batteries have enough charge during use; backup battery are recommended.
- **Points to be considered in product maintenance / follow-up**
 - Regularly (daily) clean the device, dry them accurately.
 - Regularly control if batteries are charged or need to be exchanged.
 - Regularly inspect the fitting in the canal and sure a firm fitting.
 - In case of frequent sound feedback issues (hearing aid starts whistling), consult a hearing aid center for technical control.
 - In case of increased problems with listening or understanding, repeat a hearing test and a functional test of the hearing aid.
- **Examples of products available on the market**
 - Live product search in the EASTIN website <https://www.eastin.eu/en/searches/products/list?iso=220612>

Source

This Fact Sheet was compiled in 2021 by an international team of experts, to provide the initial knowledge base for a project ("An online system to assist the selection of assistive product") supported by the World Health Organization in 2020-2021 within the GATE Initiative (Global collaboration on Assistive Product). Fact Sheets were compiled for each of the 50 types of products included in the WHO APL (Assistive Product Priority List).

The team was composed of Renzo Andrich (Italy, group leader), Natasha Layton (Australia), Stefan von Prondzinski (Italy), Jerry Weisman (USA), Silvana Contepomi (Argentina) and Hasan Minto (Pakistan).

The project led to a prototype online tool called ASPREX (ASsistive PProduct EXplorer). At the end of the project, it was transferred to a WHO collaborating center (the Global Disability Hub in the UK), in view of possible future developments.