

GOOD PRACTICE GUIDE HEARING LOOP SYSTEMS



A GUIDE TO BEST PRACTICE FOR SERVICE PROVIDERS

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ABOUT THIS GUIDE

This is a guide for service providers, employers and businesses.

Topics covered in this guide include how hearing loop systems work, how to look after them and how to make your business more accessible to people who are hard of hearing.

This guide will help to make sure that whatever investment is made produces the best possible return for both the service provider and the customer.

ABOUT IAHA

The International Association of Hearing Accessibility (IAHA) is an association of the major assistive listening technologies (ALTs) , aiming to support good assistive listening installations around the world.

The association can provide support and guidance to anyone interested in hearing loop or assistive listening systems.

CONTACT IAHA

If you would like further information on assistive listening technologies or for all general, membership and technical enquiries, please contact:

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SOME FACTS ABOUT HEARING LOSS

Hearing loss can be caused by a number of factors and can affect all age groups and socio-economic conditions. According to a 2021 estimate by the World Health Organization (WHO) 430+ million people worldwide, more than 5% of the world population, require rehabilitation to address their 'disabling' hearing loss i.e. a loss greater than 35 decibels (dB) in the better ear. The number of people worldwide with all levels of hearing loss is rising; it is estimated that by 2050 one in every ten people will have disabling hearing loss..

- Worldwide, approximately a quarter of people over 60 years of age are affected by disabling hearing loss.
- Statistics from Western countries show that, on average, more than 10% of the population is hard of hearing, i.e. have a hearing loss greater than 20 decibels (dB).
- One of the main impacts of hearing loss is on the individual's ability to communicate with others. Spoken language development is often delayed in children who experience hearing loss.
- Limited access to services and exclusion from communication can have a significant impact on everyday life, causing feelings of loneliness, isolation and frustration, particularly among older people with hearing loss.



- Adults with hearing loss have a much higher unemployment rate.
- Among those who are employed, a higher percentage of people with hearing loss are in the lower grades of employment compared with the general workforce.
- Improving access to education and vocational rehabilitation services, and raising awareness especially among employers about the needs of people with hearing loss, would decrease unemployment rates among this group.
- In addition to the economic impact of hearing loss at an individual level, hearing loss substantially affects social and economic development in communities and countries. WHO estimates that unaddressed hearing loss poses an annual global cost of US\$ 980 billion. This includes health sector costs (excluding the cost of hearing devices), costs of educational support, loss of productivity, and societal costs.

Source: <https://www.who.int/news-room/fact-sheets/detail/deafness-and-hearing-loss>

Following The Universal Declaration of Human Rights, adopted by the United Nations (UN) General Assembly on 10 December 1948, the UN developed the 'UN Convention on the Rights of People with Disabilities' CRPD 2006. The UN convention has resulted in many countries developing their own legislation, specifying how the rights of people with disabilities will be protected, including the rights of those who experience hearing loss.

The use of hearing assistive technology, and services such as hearing loop systems, alerting devices, speech transfer systems can further improve access to communication for people with hearing loss.

From a service providers perspective: in addition to complying with legislation and any moral benevolence, it makes financial sense to be accessible – for example:

"In the USA, Deaf and hard of hearing consumers are part of the third largest market segment (\$85 billion) when looking at disposable income by disability type and have the largest discretionary income (\$9 billion).

The market potential is even larger when one considers the friends, family members, caregivers, colleagues, and others who are connected to consumers with disabilities."

Source: U.S. Office of Disability Employment Policy, 2018

WHAT ARE HEARING LOOPS?

A hearing loop system is used to make communication easier for hearing instrument wearers. It provides an electromagnetic signal that is picked up by a hearing instrument when this is set to its 'T' (Telecoil) setting.

The technology has been around for many years and is relatively straightforward in its basic form. However, many loop systems do not work well for hearing instrument users because of a lack of understanding of the technology and the user's needs.

HOW THEY WORK

Sound is transmitted from a sound source, for example a person speaking, through a sound system to an induction loop driver.

The driver converts the source to an electromagnetic field, via a loop, which is picked up wirelessly by a Telecoil (T-coil) in a hearing aid or cochlear implant. This electromagnetic energy is converted back into an audio signal within the hearing aid.

Hearing aids typically have an effective range of approximately 2 metres*; however, connection to a hearing loop system can provide the wearer with an audio signal enhanced to compensate for their specific hearing loss and one with much of the background noise removed, making sound clearer and more

intelligible for them.

For more information on how loops and T-coils work together see <https://iaha.info/>

WHO BENEFITS FROM HEARING LOOPS?

People with hearing loss may find it difficult to hear the spoken word in places where there is ambient noise or poor room acoustics (which can create feelings of isolation for them). This can include:

- Classrooms and courtrooms
- Conference and meeting rooms
- Auditoriums and theatres
- Houses of worship
- Arenas and stadiums
- Museums and theme parks
- Hotels and hospitality
- Hospitals, retirement and nursing homes
- Service counters in: banks, retail stores, food stores, airport, bus and train hubs
- Taxis, buses, trains
- Ticket machines, ATMs, automatic check outs, door entry, lifts / elevators and intercom systems

Loops can also be used effectively in private settings such as TV and home theatre lounges.

A correctly installed loop system can help overcome these problems and reduce the effects of background noise.

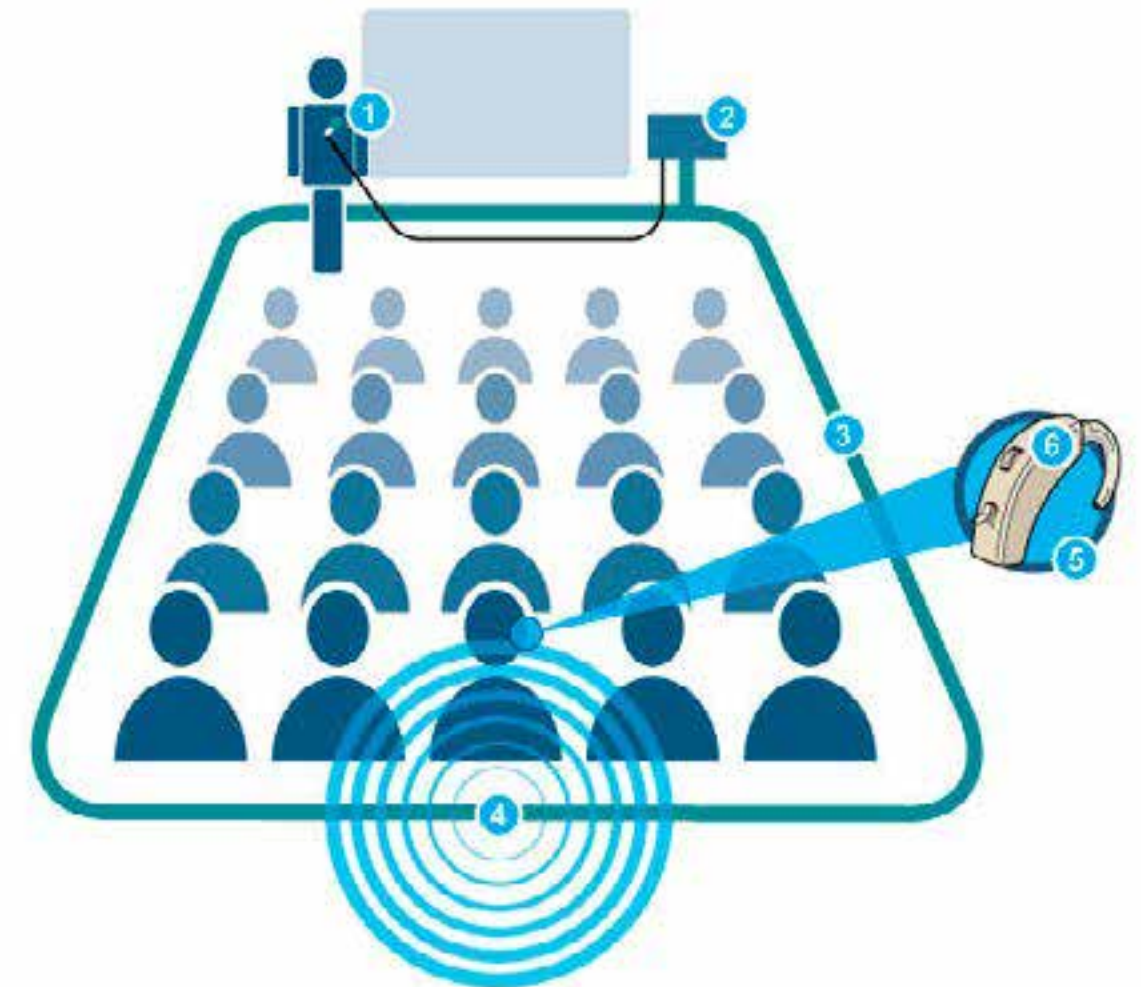
ADVANTAGES FOR OPERATORS

- Minimal time and capital overhead for facility providing assistance to T-coil users
- Non T-coil users can use loop receivers with headsets
- Can be used outdoors
- Well suited for walk up / walk through (transient) locations
- Have sound quality standard (IEC60118-4) for installations
- More options for integration in various applications and OEM

ADVANTAGES FOR END USERS

- T-coil users receive sound invisibly, simply and directly to their own hearing aid:
 - Maintains privacy/discretion
 - No hygiene concerns, compared to systems where shared receivers are dispensed
- Latency (transmission time delay) is not an issue with hearing loop technology

*Source: BS 8300-2 Design of accessible and inclusive built environment: Buildings – Code of practice



TYPES OF HEARING LOOPS

FIXED OR COUNTER LOOP (FOR ONE-TO-ONE USE)



These systems are designed for one-to-one use and are normally found at service tills, bank counters (where glazed security screens are used the loop is often provided in conjunction with a duplex intercom system), reception desks and checkouts.

The loop aerial is often mounted under the counter.

Another version of this called an 'above counter loop' can be found in Supermarkets and retail environments.

Fixed loops should always be considered as the appropriate solution in service till/counter/checkout applications.

PORTABLE LOOP (FOR ONE-TO-ONE USE)

Many service providers have used portable loop systems as a way of enabling them to 'tick a box' to say they had loop provision, which in many cases has proven to be of very limited benefit the end user. To use a portable system properly its batteries need to be charged-up, it must be easily accessible to staff and positioned correctly for the talker and the user (which means staff must be trained accordingly).

Many hearing instrument wearers do not like to ask to use this kind of equipment as it can bring attention to their disability. Because of these challenges many service providers are now specifying fixed loops as the best way for hearing instrument wearers to access their goods and services.

Portable loop systems are often fitted with an omnidirectional microphone which in most cases will only achieve as good an effect as the microphone in the user's hearing instrument. A portable loop will provide a much better performance for the user if an external microphone is used that is placed close to the sound source.

PORTABLE ROOM LOOPS

These systems will normally be provided in a carry case and will come in the format of a perimeter loop; they will need to be set up by a competent person within the organisation prior to any event/meeting they are being used for.

ROOM LOOPS

Room loop systems are designed to provide hearing loop facilities over a much wider area, for example meeting rooms, auditoriums and lecture halls, school rooms, places of worship and entertainment venues.

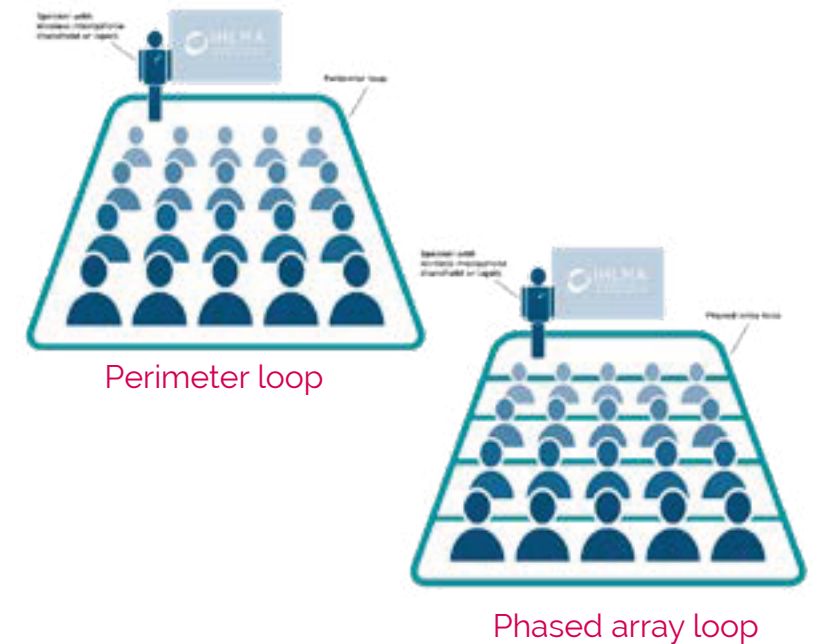
It is important to note there are many different loop designs and the selection process is a very important part of ensuring the correct loop system is best for you. How the room is used, room area and the construction of the building are all factors which need to be covered in ensuring that the correct solution is specified.

There are a range of room hearing loop solutions available ranging from a basic perimeter loop to low-spill phased array system that substantially reduces the amount of electromagnetic field that can 'spill over' into the space served by other loops or that might cause confidentiality problems.

NECK LOOPS

A neck loop provides a magnetic signal for a hearing aid with a telecoil (as all NHS hearing aids have). It is connected to a source of audio signals, such as a smartphone, a TV or an alternative hearing system receiver (radio or infra-red).

Personal neckloops are compatible with all T-coil enabled Hearing Aids. They do not drain the hearing aid battery like other listening devices can and they are generally much more reasonably priced.



OTHER KINDS OF LOOP SYSTEMS

Hearing loop systems can also be found in other applications for example vehicles (taxis), lifts (elevators), help points, self-service checkouts, etc.

PROVIDING HEARING LOOPS

WHY SHOULD I PROVIDE HEARING LOOPS?

As a service provider you should provide hearing loops because it will make your goods and services accessible and raise customer service levels, therefore increasing and opening new revenue streams.

Also, many countries have enacted legislation that makes discrimination against the hearing-impaired unlawful. For example; the UK's Equality Act 2010 states that you must make 'reasonable adjustments' so that your service is accessible.

Without making these changes you may be discriminating against disabled people, and you could face legal action.

Other potential benefits include

- an improved image over your competitors
- not letting your competitors use this service as an advantage
- customer loyalty
- increased and improve brand awareness

WHERE CAN I BUY HEARING LOOPS?

Hearing loop systems can be purchased from a number of suppliers.

When you select a supplier, be sure that they have specialist knowledge of loop systems and that the product conforms to the relevant standards (see standards section).

Often loop manufacturers don't install their

products so approved installers need to be sourced. For example the ISCVE website www.iscve.org.uk can offer a guide to suitable installers in the UK. Please contact the manufacturer or manufacturers representative to find a suitable local installer.

Any person intending to specify, design, install or maintain a Hearing Loop should know and understand the requirements of the IEC 60118-4 standard.

DO I NEED SPECIALIST ADVICE?

Yes, specialist advice is imperative if you want your loop system to operate properly and provide a real benefit to the hearing instrument wearer thus making your organisation accessible to this large user group.

HOW WILL MY LOOPS BE INSTALLED?

Before a loop system is fitted, the installer should carry out a site survey. This will include testing the site for electromagnetic background noise, because electrical equipment and AC power wiring can interfere with hearing instruments on the 'T' setting. The installer will also need to determine the area that needs to be covered and whether any surrounding metal in the construction of the building might need to be taken into account in the design of the hearing loop system.

If you are installing more than one loop or if there is an existing hearing loop nearby you will need to ensure their signals don't overlap thus

compromising privacy; your installer will be able to advise on this. Positioning of the loop is critical; if this is not fitted correctly it will not provide the required signal for the user.

Finally, the choice of sound source and type and positioning of any microphones must be considered. Where live speech is the intended audio signal for any assistive listening system the microphone is a critical component. Normally a directional (eg. cardioid) microphone is best and should be close to the person talking to ensure a good signal to noise ratio.

In spaces where there are multiple sound sources or flexible room configurations, more advanced audio systems may be required with multiple microphones and suitable signal processing.

HOW DO I LET USERS KNOW WHERE HEARING LOOPS ARE?

It is important to let hearing instrument wearers know if a loop is installed and where it is located. As part of the installation, your installer must provide one or more standard 'T' loop signs like this.

These should be set apart from other signage and be very visible. In the case of service tills, bank counters, reception desks and checkouts the sign must be placed at the point where the loop equipment is effective. In the case of a meeting room, the loop sign should be placed at the entrance of the room.

Don't forget to tell people on your website and in your promotional materials that you are accessible.



ENSURING THE BEST USER EXPERIENCE

STANDARDS

In terms of hearing loops, the purpose of standards is to ensure that systems are compatible (i.e. guaranteed to work) with hearing instruments.

The most often quoted standard is the international standard IEC 60118-4. If a hearing loop system complies with this, it guarantees that the following conditions are met:

- The background electromagnetic noise is sufficiently quiet.
- The electromagnetic field is strong (loud) enough, but not too strong
- The frequency response (tone) of the signal is correct for hearing instruments to handle.
- The orientation of the electromagnetic field is correct.

Other standards may sometimes be mentioned:

- International Standard IEC 62489-1 defines the characteristics of components used to build a loop system.
- IEC TR 63079:2017+A2:2020 is a code of practice for loop designers, installers, owners and maintainers and makes reference to other products such as loop monitors.

In some situations, it may not be possible to install a hearing loop system that is fully compliant with IEC 60118-4. In such a case, a judgement has to be made whether 'something is better than nothing', and that must depend on how far below the required performance the best possible installation falls..

There are other more general standards with which loop systems must comply, covering things like accidental interference with other devices, and electrical safety.

HOW DO I LOOK AFTER HEARING LOOPS?

Hearing loop systems need regular maintenance to ensure they are functioning properly, just like any other electronic equipment. It is not acceptable to rely on customers reporting problems with loops – you must be proactive in ensuring systems are fully functional at all times. To make sure you are providing an accessible service, induction loops should be monitored and checked at regular intervals, e.g. monthly, and before each major event.

Your installer may provide you with a 'personal listener', which allows anyone to listen to the hearing loop sound; this is useful for periodic testing of the equipment.

The checks should be performed by a properly trained person and the results should be recorded for audit purposes. An annual check should also be performed by your specialist supplier, ensuring the system is tested to the IEC 60118-4 standard.

For best practice, a confidence signal should be provided in the absence of the programme audio and a fixed monitoring device installed so that non-technical staff and the general public can easily verify the functioning of the hearing loop both during and prior the start of an event.

WHAT ELSE DO I NEED TO DO?

As well as having hearing loops fitted and regularly maintained, it is vital that staff, including new employees, are aware that a loop system(s) is fitted, how it functions and how to use it. Without staff being trained in this way, customers and service users will find your service very difficult to use. A 'personal listener', for example, as mentioned earlier in this guide, will allow staff to experience the loop system in a similar way to a hearing instrument wearer.

COMMON ISSUES

Many hearing loop systems have been fitted throughout the world but unfortunately a large number do not work for the hearing instrument wearer and are often only provided as a 'box ticking' exercise, which can lead to:

- The wrong equipment being specified
- Loops installed incorrectly
- Loops not maintained
- Loops not commissioned correctly
- Installations away from where the user expects them to be
- Poor staff awareness which can lead to them not being switched on!

Organisations that provide hearing loop facilities for their customers need to ensure that the equipment provides a real benefit for the user. Otherwise, the investment will be wasted and hearing instrument wearers left frustrated, the venue will get a bad reputation, and a bad reputation means lost business.



USEFUL SOURCES OF INFORMATION

ADVOCACY GROUPS

- Age UK
- British Deaf Association
- Carers UK
- Deafness Resource Centre
- DeafPlus
- Healthy Hearing
- Hearing Loss Association of America
- RNID
- Saga
- The Deaf Institute
- The Hearing Review
- The Salvation Army

PROFESSIONAL BODIES

- Academy of Doctors of Audiology (ADA)
- American Academy of Audiology
- American Speech-Language-Hearing Association (ASHA)
- Associação Portuguesa de Audiologistas (APtA)
- Asociacion Espanola de Audiologistas (AEDA)
- Audiological Section, Polish Society of Otorhinolaryngologists, Head and Neck Surgeons
- Audiologie-Kommission, Swiss Society of Oto-Rhino-Laryngology, Head and Neck Surgery
- British Academy of Audiology
- British Society of Audiology

- British Society of Hearing Aid Audiologists
- Canadian Academy of Audiology
- Danish Association for Better Hearing (organisation for the hard of hearing)
- Deutsche Gesellschaft für Audiologie
- Estonian Society of Audiology (ESA)
- European Federation and Hard of Hearing (EFHOH)
- Finnish Audiological Society
- Hørselshemmedes Landsforbund (The Norwegian Association for the Hard of Hearing)
- Icelandic Audiological Society
- Icelandic Hearing Society (organisation for the hard of hearing)
- Icelandic Otolaryngological Society
- International Society of Audiology
- Irish Academy of Audiology - iada.ie
- Italian Society of Audiology and Phoniatry - Società Italiana di Audiologia e Foniatria (S.I.A.F.)
- Italian Society of Audiometry Technicians - Associazione Italiana Tecnici Audiometristi (AITA)
- National Deaf Children's Society
- National Institute on Deafness and Other Communication Disorders (NIDCD)
- Nederlandse Vereniging voor Audiologie (NVA)
- Nordic Audiological Society
- Norges Døveforbund (The

- Norwegian Association of the Deaf)
- Norsk Audiografforbund (The Norwegian Association of Audiologists)
- Norsk Audiopedagogisk Forening (Norwegian Association of Audiotherapists)
- Norsk Forening for otorhinolaryngology hode- og halskirurgi
- Norsk Teknisk Audiologisk Forening (Norwegian Association for Technical Audiology)
- Norwegian Association of Audiology Assistants
- Other Audiological societies
- Romanian Society of Audiology
- Russian Society of Audiology
- Section of Audiology, Slovak Society of ORL HNS
- Société Française d'Audiologie
- Swedish Society of Audiology (Svenska Audiologiska Sällskapet, SAS)
- The Israeli Speech Hearing and Language Association

EQUIPMENT PERFORMANCE STANDARDS

- IEC 60118-0:2015
Electroacoustics - Hearing aids - Part 0: Measurement of the performance

- characteristics of hearing aids
- IEC 60118-4:2014+AMD1:2017 CSV
Electroacoustics - Hearing aids - Part 4: Induction-loop systems for hearing aid purposes - System performance requirements
- IEC 62489-1:2010+AMD1:2014+AMD2:2017 CSV
Electroacoustics - Audio-frequency induction loop systems for assisted hearing - Part 1: Methods of measuring and specifying the performance of system components
- IEC 62489-2:2014
Electroacoustics - Audio-frequency induction loop systems for assisted hearing - Part 2: Methods of calculating and measuring the low-frequency magnetic field emissions from the loop for assessing conformity with guidelines on limits for human exposure
- IEC TR 63079:2017
+AMD1:2018+AMD2:2020 CSV
Code of practice for hearing-loop systems (HLS)

- ETSI EN 300 422-4 V2.1.1 (2017-05)
Wireless Microphones; Audio PMSE up to 3 GHz

ACCESSIBILITY STANDARDS

- ADA Standards for Accessible Design
- BS 8300 Design of an accessible and inclusive built environment.
- BS EN 17210:2021 Accessibility and usability of the built environment - Functional requirements.

CONTACT IAHA

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GLOSSARY

A

ADA Standard 219:

Refers to the American Disabilities Act (ADA) General Guidelines (2010) Section 219 which require assistive listening systems in spaces where communication is integral to the space and audio amplification is provided and in courtrooms.

Assistive Listening Technology:

A device or system that enables people with hearing loss to access sound being transmitted through a sound system or public address system.

B

BS 8300:

Design of buildings and their approaches to meet the needs of disabled people. Code of practice.

BS 8300 looks at the design of buildings and their ability to meet the requirements of disabled people. By offering best-practice recommendations, this standard explains how architectural design and the built environment can help disabled people to make the most of their surroundings.

D

Decibels (dB):

The decibel is used in hearing loop technology to express magnetic field strengths and sound pressure levels. It is a special form of unit that allows very large numbers and very small numbers to be expressed as less extreme numbers. For example, human hearing covers a sound pressure range from the quietest sound to the 'threshold of pain' of 10 million, which can be expressed as 140 dB.

E

Electromagnetic interference (EMI):

EMI is the interference caused by one electrical or electronic device to another by the electromagnetic fields generated by its operation.

BS EN 17210:

Accessibility and usability of the built environment. Functional requirement. This document describes basic, minimum functional requirements and recommendations for an accessible and usable built environment which will facilitate equitable and safe use for a wide range of users, including persons with disabilities.

H

Hearing Loop:

Hearing loops, audio induction loops, or audio frequency induction loops (AFILs) are an assistive listening technology that uses a loop or loops of cable or copper tape around a room or area. An amplified sound signal from a sound system or microphone is input into a hearing loop driver or amplifier which in turn drives a current around the loop creating an electromagnetic field. That field can then be picked up by a Telecoil / T-coil in a hearing aid, cochlear implant or loop receiver which transmits the received signal into the devices amplifier and speaker and into the ear.

Hearing loss:

Hearing loss is a common problem caused by noise, aging, disease, trauma and heredity. The four different levels of hearing loss are defined as: Mild (25-45dB loss), Moderate (40-75dB loss), Severe (75-90dB loss) and Profound (>90dB loss)

I

IEC60118-4:

System performance requirements. Electroacoustics – Hearing aids – Part 4: Induction-loop systems for hearing aid purposes.

The performance criteria for hearing loops are set out in standard IEC-60118-4 and include:

- low magnetic background noise - for intelligibility and comfort
- correct field strength - setting a suitable signal level
- even field strength - for consistency of signal
- flat frequency response - essential to maintain intelligibility

IEC 62489-1:

Electroacoustics - Audio-frequency induction loop systems for assisted hearing - Part 1: Methods of measuring and specifying the performance of system components

This standard applies to the components of audio-frequency induction-loop systems for assisted hearing. This standard is intended to encourage accurate and uniform presentation of manufacturers' specifications, which

can be verified by standardized methods of measurement.

L

Latency:

Latency is a short period of delay (usually measured in milliseconds) between when an audio signal enters a system and when it emerges. Potential contributors to latency in an audio system include analog-to-digital conversion, buffering, digital signal processing, transmission time, digital-to-analog conversion and the speed of sound in the transmission medium. Latency can be a critical for assistive listening solutions and sound reinforcement systems. Excessive latency can significantly damage a user's experience.

Loop receiver:

A loop receiver is a device fitted with a Telecoil / T-coil allowing it to pick up signals from a hearing loop. This enables those without hearing aids or cochlear implants to hear the audio output of a loop system.

S

Signage:

Signs indicating the availability of a hearing loop or other assistive listening technology are an essential part of an assistive listening system. It allows users to identify where a service is available and, in the case of hearing loops, hearing aids and cochlear implants, discreetly switch their device over to the T or MT setting giving them access to the audio output of the loop. For WiFi systems signs can point to an app using a QR code or web link. For other technologies such as Infrared or FM/Radio correct signage indicates a service is available and where to obtain a receiver.

Signal to noise ratio:

SNR or signal-to-noise ratio is the ratio between the desired information or the power of a signal and the undesired signal or the power of the background noise.

T

Telecoils, T-coils:

A telecoil is a small coil of wire wrapped around a small rod inside most behind the ear, receiver in the ear and open fit hearing aids. The coil works as a small receiver which picks up signals from a hearing loop system or neck-loop that acts as an electromagnetic field. Hearing aids with an activated telecoil can convert this electromagnetic field into a sound signal.



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