Assistive Listening Systems: A Quick Guide to Loops

This document is designed to give an overview of the NZ Laws and Regulations that cover Hearing Aid Loops. It should not be construed as a formal statement of the obligations defined in the various documents mentioned.

The NZ regulations allow for one of three options when hearing assistance is specified. These include IR, RF and Magnetic Induction via loops. This document is primarily discussing the loop option. In particular, where they may be specified and what standard they must comply with.

AS60118.4 is the technical standard for a magnetic loop and it identifies measurable criteria, and the clear implication of this is that systems must be carefully designed and installed, and subsequently tested to confirm compliance.

The Regulations

New Zealand Building Code

NOTE: This is the regulation has been in force since 2004 and applies to all **new** buildings meeting the following criteria OR any buildings that are **being altered, added to or are changing their** use e.g. retail complex being turned into a cinema complex. This is usually triggered by the consent process, where it would be noted and added to the consent, whereby it is put on the BWOF (Building Warrant of Fitness) and in turn, the compliance schedule. Failure to comply has serious consequences including fines.

Clause G5.3.5 and 5.3.6
The regulation stipulates ***where*** a listening enhancement system is to be installed as well as the required signage.

Clause G5 stipulates the following and is the **first criteria** that needs to be met.

(a) *Communal Non-residential assembly spaces occupied by more than 250 people,
(b) Any theatre, cinema, or public hall,
(c) Assembly spaces in old people's homes occupied by more than 20 people.

Provisions shall be made to accommodate people with disabilities in rooms and areas used for meetings, entertainment, assembly and recreation.

*Communal Non-Residential is defined as *a building or meeting place for people where care and service is provided by people other than the principle users.*
These are covered under 4.0.2 and 4.0.3 of the Brookers Building Law Handbook 2008 and include: churches, cinemas, clubrooms, halls, museums, public swimming pools, stadiums, theatres, early childhood centres, colleges, day care institutions, centres for handicapped persons, kindergartens, schools and universities. (Ref: Brookers Building Law Handbook 2008 Section 4.0)

G5/AS1 People with Disabilities

This section of G5 points to NZS4121 as an acceptable solution standard.

3.0.1 Acceptable activity space shall comply with NZS 4121.

NZS 4121:2001

This is the document which ***sets the technical standard*** for Hearing Enhancement systems under section 12.2.2 and **Appendix H.**

NZS4121 is used once the prerequisites of Clause G5 indicate that a Hearing Enhancement Solution is required.

12.2.2 Listening Systems states: "*in buildings that provide a sound amplification system; a listening system which will enable enhanced hearing by people with hearing aids shall be installed to cover the* ***total area of the room****".*
This part of the standard which requires the presence of a sound amplification system is the **second criteria**.

The combination of G5/3/5 and NZS4121:2001 determine when and where a Hearing Enhancement System are to be installed.

Appendix H states what the acceptable solutions are. They include Induction Loops, Infra-Red (IR) and Radio Frequency (RF) as outlined below. **(see end of this document for Pros and Cons for the different acceptable solutions)*

NZS4121 also calls to AS1088-4 (now been updated to AS60118-4/2007) which adopts the international hearing aid loop standard IEC60118-4. All Univox loop designs are designed to this standard.

AS60118.4 – Technical Standard for Loops

Defines the performance criteria of an induction loop system.

The key elements are:

- **Field Strength** in the specified listening area shall be -20dB re 1A/m average, using a 1kHz sinusoidal input, with a **variation of +/-3dB**. (equivalent to 0dB on 400mA/m meter such as Univox FSM 2.0)
- **Environmental Magnetic Background noise** shall be no higher than -40dB A-weighted 1A/m measured with the loop system off (equivalent of -32dB on 400mA/m meter such as Univox FSM 2.0)
- **Frequency Response** of the system shall be from 100Hz to 5000Hz. The variation should be no more than +/-3dB from the value taken at 1kHz.

Building Act Regulations 2005 Compliance Schedule SS12 (update 2012)

This is the section that covers the ***testing*** of any Audio Loops or other Assistive Listening Systems using Form 12A. This testing is usually done by local Council registered IQP's.

In particular, it calls for six monthly testing of Audio Loops to the AS60118-4/2007 standard (updated from AS1088-4 in 2012) as well as testing for IR and RF systems.

SS 12/1 Audio loops
The six-monthly inspection and testing of:

- Magnetic field strength in the specified area.
- Magnetic background noise interference from other equipment. (e.g. an adjacent loop system, electrical fittings, heating systems etc.)
- Sound amplification installations consisting of loop systems should be tested for SPL and distortion. Where room acoustics have been altered since the last inspection, the sound system should also be tested for spectrum analysis and speech intelligibility (RASTI).

SS 12/2 Systems with Receivers
The six-monthly inspection and testing of:

- Signal transmission strength

- If after testing adjustments cannot be made to remove dead spots, mark areas that do not comply.
- Check the specified number of receivers are available for use.

Visually inspect and test:

- Cords
- Connectors
- Teleloop (where used)
- Stethoclip, earplugs
- Headset.

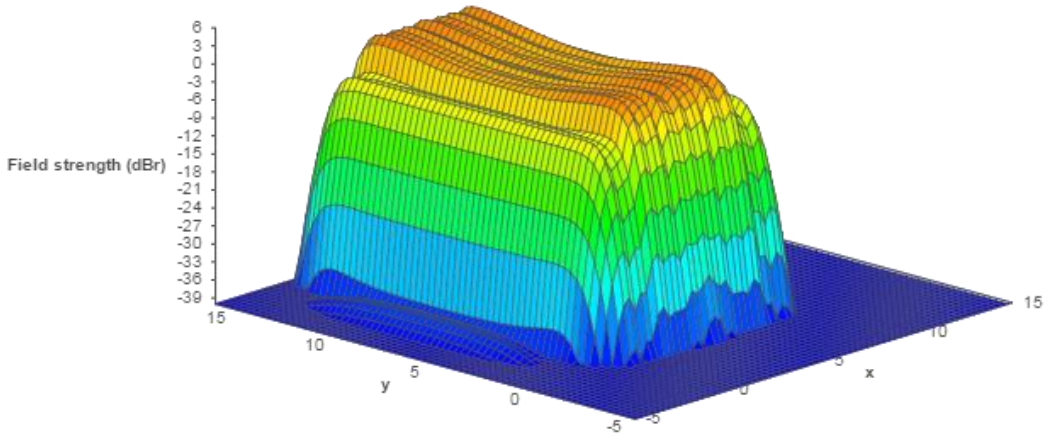
Systems using receivers should be maintained:

- Earplugs, headset covers or ear pads should be sanitised and sealed in a bag or replaced after each use
- Batteries charged between each use.
- If equipment is faulty or not operating as it should it must be repaired without delay.

Pacific Audio Visual Ltd represents Univox loop amps from Sweden. They have been in business since 1965 and have an excellent on-line software design facility to allow us to designs for loops at the early stages of a project. The software allows us to design a loop to comply to the IEC 60118-4 standard whilst taking into account the shape, size and floor construction of the building. We can also design side by side loops and take into account confidentiality by using our Ultra Low Spill design.

We are more than happy to assist with any designs as we want to ensure the installation meets the standard required.

www.univox.eu



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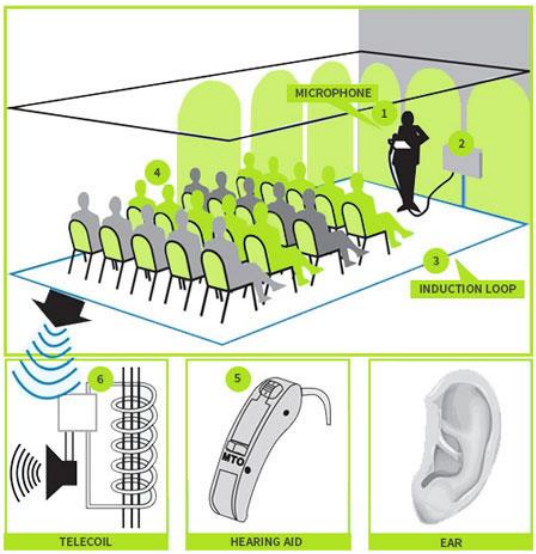
Assistive Listening Systems: System Pros and Cons

It can be confusing to figure out the best solution from the various technologies that are acceptable solutions as per NZS 4121:2001 so here is a quick run down on the Pros and Cons.

"Appendix H (in NZS 4121:2001 states what the acceptable solutions are Induction Loops, Infra-Red (IR) and Radio Frequency (RF) as outlined below. **(see end of this document for Pros and Cons for the different acceptable solutions)"*



Induction Loops:

How it works:
An Induction Loop System consists of a loop – or array of looped – cables which are positioned or installed around a designated area of coverage (such as a room, building or reception desk,) an induction loop amplifier and an audio source.

By connecting an audio source, (which could be a microphone, DSP output or a television for instance) to the induction loop amplifier, the audio signal is transmitted via the loop cable and received as a wireless signal by the hearing aid or loop receiver device.

The 'loop' of cable generates a magnetic field signal throughout the area of coverage, transmitting the audio signal which can be received by the telecoil of hearing aids, cochlear implants and specific loop receiver devices with a T-Coil fitted.

To use the induction loop system, the hearing aid user simply switches his or her hearing aid to the **"T" position**. This provides **'**noise-free**'** transmission of the required audio source, defining a more 'pure' signal, rather than the 'overall' sound received by a hearing aid or cochlear implant used in 'standalone' mode – which will not only amplify the required audio, but will also pick-up all other ambient sounds in the area such as other voices, traffic noise or dragging of chairs.

- **Pros:**

- A good solution for transient areas such as service counters, libraries, airports, train and bus stations.
- **System does not require any extra equipment such as receivers.**
- Easy to use.
- Discrete and dignified for listeners with T-Coils inside their hearing aids or cochlear implants.
- Minimal maintenance once installed.
- Compliant solution with a proven track record.
- Great for large, public venues and serves an unlimited number of people.

- **Cons:**

- **Requires complex designs to avoid overspill between adjoining rooms in both horizontal and vertical planes.**
- May not be practical in some installations.
- **More expensive to install.**
- Can be prone to electrical interference.
- Frequency band limited and mono only so not particularly "Hi-Fi".
- No privacy as signal is universal and not encrypted.
- Cannot support multiple signals at once.

Infra-Red:

How it works:

An Infra-Red system consists of an emitter panel which radiates invisible infrared signals throughout the room being covered to dedicated receivers connected to either a personal neck loop or headphones.

Emitters are available in different sizes, depending on the area of coverage and number of channels required. Input to an infrared system can come from a microphone, sound system or another audio source. The presenter speaks to the participants using an existing microphone and the audio input produces an electrical signal which contains the audio information.
The electrical signal is then fed to the infrared modulator, which prepares the signal for infrared transmission. The processed signal is then fed to the emitter, which produces the invisible infrared light and radiates it into the room.
Infrared receivers convert the infrared light back to audio. Participants requiring hearing assistance each use an infrared receiver to listen to the presenter.

- **Pros:**

- **Easy to install and cost effective.**
- **Supports high quality, stereo audio when used with headphones. Great for Theatres.**
- Can support multiple sources (normally up to two in one area)
- More Privacy as signal does not travel through solid surfaces (windows must be covered). Ideal for Council Chambers and Court Rooms for confidentiality.

- **Cons:**

- **Requires receivers for everyone.**
- Both headphone output and neck-loop listening devices must be available at public facilities.
- **Facility owners are required to maintain, clean, dispense, collect receivers and keep receiver batteries charged.**
- A sufficient number of emitters must be installed to ensure that objects in the room (columns, chairs, etc.) do not interfere with signal transmission as IR energy travels in straight lines, requiring "line of sight" between the emitters and the photosensitive cells on the listener's receiver. Listeners also need to be advised to wear the receiver with the photosensitive cell facing out into the room in order not to block the cell with clothing etc.
- Not practical for outdoor applications (sunlight interference).

RF (Radio Frequency):

How it works:

An RF system is like a small local low power radio station that transmits to dedicated receivers. The system consists of a small base station transmitter set to transmit on a fixed frequency, which is picked by a dedicated receiver that the user wears. They can listen to this signal via a neck loop (generate a personal magnetic field) or headphones.

- **Pros:**

- **Easy to install and cost effective.**
- **Supports high quality, mono audio when used with headphones. Great for Theatres.**
- Receivers can be worn discreetly under clothing.
- Can cover large areas.
- **Several channels can operate concurrently to cover adjacent rooms. (Lounges, Dining Rooms etc) – Useful in open areas with multiple signals such as lounges, TV and dining rooms.**
- Encrypted systems available.
- **No privacy as signal travels through solid surfaces.**
- Receivers can be tuned across any of the transmitter frequencies so can be repurposed across the venue.

- Good solution for outdoor areas with great coverage and extension antenna options.

- **Cons:**

- **Requires dedicated receivers for everyone.**
- Both headphone output and neck-loop listening devices must be available at public facilities.
- **Facility owners are required to maintain, clean, dispense, collect receivers and keep receiver batteries charged.**