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POWERING INTELLIGIBILITY

A Guide To Specifying Loop Systems to Comply with IEC 60118-4: 2006

About This Guide.

This is a step by step guide to producing a specification for an induction loop system.
Each section covers a specific aspect of the specification with an explanation of its relevance.

Once completed, the information can be used to generate a system design to satisfy the requirements of the IEC Loop System performance Standard IEC60118-4:2006.

If the system is installed using 2.5mm copper tape or twin core 2.5mm^2 cable and the displacement of the loop from the listening plain is no more than 2.5m, the appropriate amplifier can be selected from the table on page 17 on page

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Section 1. Room Function(s)

What is the room/space to be looped used for?

By understanding the function or purpose of the room a more appropriate specification for the induction loop system can be determined. By answering these questions, the type and quantity of microphones can be determined (Radio Microphones give the most flexibility, but even then, a decision on whether to use hand held, headset, boundary or a combination needs to be made)

Does the room already have a sound reinforcement system?

If yes, a feed from this system to the induction loop generally gives the best results. The Loop amplifier will need a suitable line input to connect to the system. If no, microphones to feed the loop system will need to form part of the specification.

Is the seating fixed or can it be moved to better accommodate the event taking place?

This affects how much flexibility there needs to be with loop coverage and will also impact on what type and how many microphones are needed.

Will presenters always address the audience from the same position?

Will the audience participate in discussions? If the presenter is at a Podium for example, a wired microphone is a practical input feed for the loop.

Is the room used for 'round table' discussions, like a boardroom?

Boundary microphones on or above the table are a good option. UnivoxAudio offer an FM radio boundary microphone for this application, which can also be used with a headset.

Is there any other AV equipment used in the room? If yes, the audio output(s) should be fed to the loop; therefore, input connections to the loop amplifier must match.

The following questions guide how the system should be tested with respect to the international standard.

Will people be standing when listening to the Loop ?

If Yes, The Field strength of the system must be within standard at a height of 1.7m

Will people be sitting when listening to the Loop ?

If Yes, The Field strength of the system must be within standard at a height of 1.2m.

Will people be either standing or sitting when listening to the Loop system?

If Yes, The field strength of the system must be within standard at both heights. (1.2m and 1.7m)

Will people be bowing or tilting their heads when listening to the loop?

They could be praying or simply looking down to write notes. Only a SuperLoop™ system can provide even field strength in this case.

Section 1. Room Function			
		Notes	
Does the room already have a sound reinforcement system?	Yes No		
Is the seating fixed?	Yes No		
Will presenters always address the audience from the same position?	Yes No		
Will the audience participate in discussions?	Yes No		
Is the room used for 'round table' discussions, like a boardroom?	Yes No		
Is there any other AV equipment used in the room?	Yes No	How many at line level? How many at MIC level	…….. ……
Will people be standing?	Yes No	Yes = listening plane 1.7m	
Will people be sitting?	Yes No	Yes=listening plane 1.2m	
Will people be bowing or tilting their heads?	Yes No	If Yes, use a SuperLoop™ System for best results	
From the information collected in section 1 define the input requirements for the system			

Note

In some applications, like a theatre or cinema it may seem obvious as to how the space is used, but the assumptions should still be stated.

Section 2. Background Magnetic Noise

How high is the background magnetic noise?

If the back ground magnetic noise is too high such that it will make the induction loop system unusable then the source of the background magnetic noise must be found and rectified before an induction loop system is installed.

The background magnetic noise should be no worse than -32dBA. Ideally, it should be no worse than -47dBA.

Where the back ground magnetic noise is no worse than -22dBA, further measurements of the frequency components of the noise should be made to assess how much in band interference there actually is.

Some installations where the recorded noise level is -15dBA will still benefit from a loop system if the main components of the noise are outside the frequency response of the hearing aid.

Sources of Magnetic Interference (Background magnetic noise)

Power distribution rooms - Magnetic fields in this location can be very high. This is due to unbalanced loading of the supply. It is undesirable but sometimes unavoidable. Fortunately, it is generally not an issue in modern buildings. However, where it is a problem, magnetic fields decay very rapidly with distance. The field strength should be below -32 dBA just a few metres away from the room or the cables carrying the unbalanced current.

Low voltage lighting - The transformers associated with low voltage lighting will generate magnetic interference. Most of the energy will be at 50Hz and odd harmonics, so below the T-coil frequency response. It will also decay rapidly with distance.

Faulty wiring installations- For efficient electrical energy transmission, the supply and return conductors should run in the some conduit and in as close proximity to each other as insulation will allow. In this case magnetic fields created by the currents flowing in the 2 cables cancel ie. no magnetic interference is generated. Where there is a fault condition and the return current takes a different route eg through a safety ground, the magnetic fields will not cancel. This is a fault and the electrician should be called to rectify it as a matter of urgency.

In the UK, old building regulations allowed the supply and return conductors for lighting systems to take different routes, effectively making a 50Hz induction loop. This is now considered bad practice and is not allowed under new British Standards.

Electric motors, transformers, cathode ray tubes (old TV's and Monitors) are all sources of magnetic interference but the magnetic field is very localised and will fall below the required level within a few centimetres to a few metres depending on just how large the generated field is.

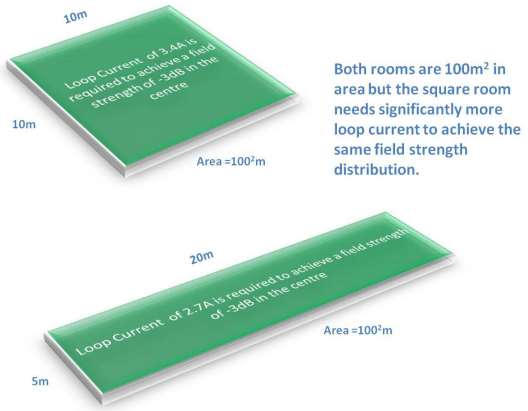
Section 2. Background Magnetic Noise		
		Notes
Is the level of background magnetic noise acceptable?	Yes No	
From the information collected in section 2 state what if any action on noise reduction needs to be taken before proceeding with the installation		

Section 3. Area Coverage and Room Height

What size is the room?

Knowing the length and width of the room to be looped is essential, but sometimes knowing the height to the ceiling and the distance between floors is also useful.

The area of the loop gives the first indication of how much current the amplifier will need to deliver. The aspect ratio and in particular just how close to being a square the room is gives us the next. A loop covering a square room will need to be driven with a higher current than one covering a rectangular room of the same area.



Univox™ specify area coverage for a square loop with 1.2m displacement from the listening plane to deliver a minimum field strength of -3dB in the centre of the room in a free field.

Knowing the height of the ceiling and the floor to floor distance is required:-
If the loop is to be installed at ceiling height or within a false ceiling (The greater the distance between the loop and the listening plane, ear height, the more current in the loop required)

If vertically adjacent rooms will have induction loops operating simultaneously at any time spill control becomes a requirement of the specification and the distance between floors is a factor.

Section 3. Area Coverage and room Height			
What Size is the room L x W (m)	L= W=	Area=	
What height is the ceiling (m)	H_{fc}=	Where a loop is to be fitted into a ceiling greater than 2.5m high call UnivoxAudio for advice	
What is the distance between floors (m)	H_{ff}=		
From the information collected in section 3 state the area coverage required	.....m^2		

Section 4. Loop Location

Where can the loop be installed?

Understanding where it is practical to install the loop is critical to the system power requirements.

Will it be installed at floor or ceiling level?

If the loop is installed at a height greater than 2.5m then a higher loop current is required to achieve the correct field strength. Call UnivoxAudio for advice.

What restrictions are there to the loop cables making multiple crossings of the room?

In new builds and refurbishments, there is normally access to the floor before the floor finish is laid making multiple cable crossings of the room practical.
If there is a ceiling void, eg a suspended ceiling, multiple cable crossing of the room is often still practical.
Where multiple cable crossings of the room are not possible, the only loop viable configuration is a perimeter Loop

Will flat copper tape overcome this?

4. Loop Location		
Will the loop be installed at floor level?	Maximum loop width is 20m free field	
Will the loop be installed at ceiling level?		
Can the loop cables make multiple crossings of the room.	If it is not possible or practical for the loop cables to make multiple crossings of the room, the only viable loop type is a Perimeter Loop	

Tick Viable Loop Options After Completing Section 4 (At this stage all configurations may be viable)	
Perimeter Loop	
Figure 8 Loop	
Cancellation loop	
Super 8 Loop ™	
SuperLoop™	

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Section 5. Construction Metal

Is there construction metal in the floor or ceiling?
If so, what is it?
Constructional metal in the same plane as the loop will absorb the signal. The more metal there is, the higher its conductivity and the closer it is to the loop, the more this loss will be. Aluminium, which is more conductive than steel will cause greater signal loss given the same construction.

Depending on the construction and metal type, the maximum width of the loop must be reduced, **The Table below gives a guide to the maximum loop width for different floor and ceiling constructions and listening heights**

Table 1. Maximum loop width as a factor of construction metal for different heights

Floor Type	Maximum loop width Listening plane 1.2m	Maximum loop width Listening plane 1.7m
No metal in floor 1	20m	22m
Standard reinforced concrete 2	7m	5m to 7m
Heavy reinforced concrete 3	4m	4m
Metal system floor 4,5 Steel deck 6	3m	3m
Suspended ceiling 7 Glass/Metal 8	3m	3m

Note: the figures quoted are for guidance only. If the room is wider than the recommended maximum, then divide the room into smaller, equal loops and use a Multi-loop design (Figure 8, Super 8™, SuperLoop™)

5. Construction Metal			
Is the floor made from non metallic materials?	Yes No	*Use Multi loops if the width is > 20m for seated users or 22m for standing users	.
Is the floor standard reinforced concrete?	Yes No	*De-rate the area coverage specification for the amplifier by 20%	
Is the Floor Heavy reinforced Concrete?	Yes No	*De-rate the area coverage specification for the amplifier by 30% Use Multi-loops if the width is >4m	
Is the Floor A steel raised access type?	Yes No	*De-rate the area coverage specification for the amplifier by 50% Use Multi-loops if the width is >3m	
Is the Floor Steel Deck?	Yes No	*De-rate the area coverage specification for the amplifier by 50% Use Multi-loops if the width is >3m	
Will the loop be installed above a suspended ceiling?	Yes No	*De-rate the area coverage specification for the amplifier by 50% Use Multi-loops if the width is >3m	
Amplifier De-rating Factor			

Tick Viable Loop Options After Completing Section 5	
Perimeter Loop	
Figure 8 Loop	
Cancellation loop	
Super 8 Loop ™	
SuperLoop™	

Section 6. Spill Control

Is Spill Control required in 1, 2 or more directions?
Why is It necessary?

If another induction loop system will be operated in a horizontally or vertically adjacent room then spill control in that direction will be required. Where spill control is required in only one or 2 directions then Figure 8 or Anti-phase super 8™ loops are an option. A SuperLoop™ will always provide the best performance and where spill control is required in more than 2 directions in the horizontal plane, it is the only choice.

An FM or IR assistive listening system which uses a neck loop to transmit to the hearing aid will also be susceptible to spill. (It will not create spill into other locations)

For confidential meetings spill control will be required. Spill control reduces the level of the signal outside of the room. It does not eliminate it. It will help to prevent someone accidently hearing what is being said in the room, but it will not stop them from listening in if they want to. The only assistive listening technology that provides secrecy for meetings is IR, Infrared.

Diagram illustrating some typical room uses – *Spill control is not always necessary*

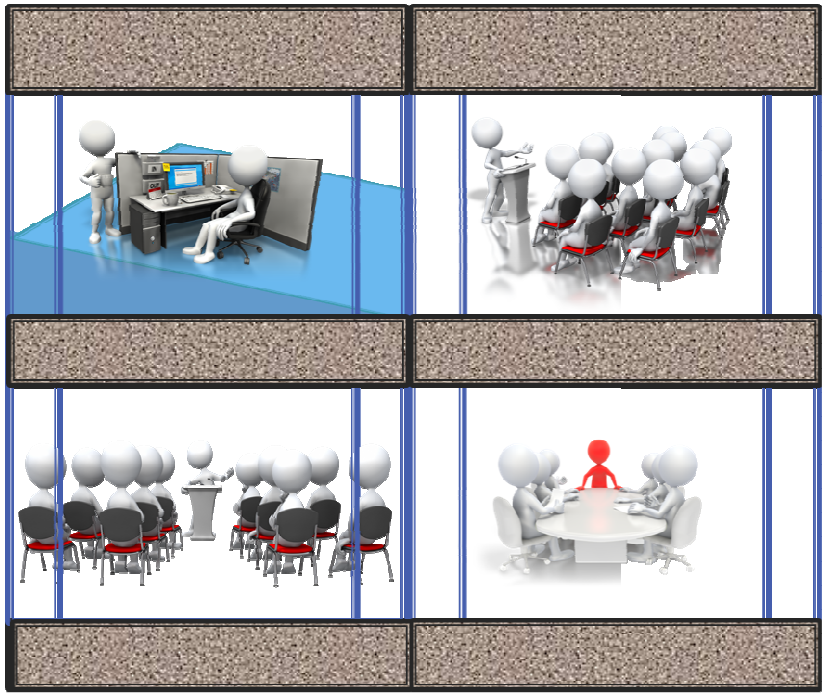

Table to show the Spill control properties of different loop configurations

Loop Configurations	Spill Control					
	1 Direction	2 Directions	3 Direction	4 Directions	Floor Above	Floor Below
Perimeter Loop	✗	✗	✗	✗	✗	✗
Cancellation Loop	✓	✓	✗	✗	✗	✗
Figure 8 Loop	✓	✓	✗	✗	✓	✓
Super 8++ Loop™	✗	✗	✗	✗	✗	✗
Super8 I – Loop™	✓	✓	✗	✗	✓	✓
SuperLoop®	✓	✓	✓	✓	✓	✓

6. Spill Control			
Is Horizontal Spill Control Required?	Yes No	How many directions? *Use a Multi Loop System If Spill control in more than 2 directions, is required use a SuperLoop™ system	
Is Vertical Spill Control Required above the loop?	Yes No	**Use a Multi-Loop system	
Is Vertical Spill Control required below the loop?	Yes No	**Use a Multi Loop System	
From section 5 and 6 determine what loop type to use			

System Specification	
Area (m^2)	
Loop Location	
Loop Displacement	
Spill Control	
Amplifier de-rating factor (For Metal Construction type)	
Loop Type	
Amplifier Model	
Microphones	
Loop Cable (type and Length)	
Loop Listener	
Customer	
Contact Name	
Prepared By	
Date	

Amplifier Selection

Where the system is to be installed using a twin core 2.5mm cable or copper tape and the loop displacement from the listening plane is within 2.5m, the appropriate amplifier can be selected from the table opposite.

Multiply the area coverage for the given amplifier and loop type by the amplifier de-rating factor. The result should be no less than the are coverage required

If you would like to install a system using different cable type, or where the loop displacement from the listening plane exceeds 2.5m please consult UnivoxAudio

Univox® Amplifier Range		
Amplifier	**Square area Coverage**	**Multi-Loop Area Coverage**
PLS 100	300m²	450m²
PLS300	420m²	900m²
PLS700	700m²	1800m²
PLS900	700m²	1800m²
SLS100		300m²
SLS300		420m²
SLS700		700m²
SLS900		700m²
DLS30	30m²	
DLS50	50m²	
Auto Loop	50m²	
DLS70	70m²	
TV200	200m²	
TLS2	For trains/buses/coaches	
AC/DC100	For buses/coaches/lifts	

Notes

" Making life better for hard of hearing people"

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