

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



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

**Électroacoustique – Appareils de correction auditive –  
Partie 4: Systèmes de boucles d'induction utilisées à des fins de correction  
auditive – Exigences de performances système**

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**ELECTROACOUSTICS –  
HEARING AIDS –****Part 4: Induction-loop systems for hearing aid purposes –  
System performance requirements**

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**IEC 60118-4 edition 3.1 contains the third edition (2014-12) [documents 29/855/FDIS and 29/861/RVD] and its amendment 1 (2017-11) [documents 29/952/CDV and 29/961/RVC].**

**In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.**

International Standard IEC 60118-4 has been prepared by IEC technical committee 29: Electroacoustics.

This third edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition: Addition of Annexes G, H and I where more information is provided about practical considerations and methods of measurement.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 60118 series, published under the general title *Electroacoustics – Hearing aids*, can be found on the IEC website.

The committee has decided that the contents of the base publication and its amendment will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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## INTRODUCTION

Audio-frequency induction-loop systems are widely used to provide a means for hearing aid users, whose hearing aids are fitted with induction pick-up coils, generally known as 'telecoils', to minimise the problems of listening when at a distance from a source of sound, shielded from the person speaking by a protective window, and/or in a background noise. Background noise and distance are two of the main causes of hearing aid users being unable to hear satisfactorily in other than face-to-face quiet conditions. Induction-loop systems have been widely installed in churches, theatres and cinemas, for the benefit of hearing-impaired people. The use of induction-loop systems has been extended to many transient communication situations such as ticket offices, bank counters, drive-in/drive-through service locations, lifts/elevators etc. The widespread provision of telephone handsets that provide inductive coupling to hearing aids is another significant application, where ITU-T Recommendation P370 [1]<sup>1</sup> applies.

Transmission of an audio-frequency signal via an induction-loop system can often establish an acceptable signal-to-noise ratio in conditions where a purely acoustical transmission would be significantly degraded by reverberation and background noise.

One form of audio frequency induction-loop system comprises a cable installed in the form of a loop usually around the perimeter of a room or area in which a group of hearing impaired persons wish to listen. The cable is connected via an amplifier to a microphone system or other source of audio signal, such as a radio receiver, CD player etc. The amplifier produces an audio-frequency electric current in the induction loop cable, causing a magnetic field to be produced inside the loop. The design and implementation of the induction loop is determined by the construction of the building in which it is installed, particularly by the presence of large amounts of iron, steel or aluminium in the structure. In addition the layout and position of electrical cables and equipment may generate high levels of background audio frequency magnetic fields that may interfere with the reception of the loop signal.

Another form of induction-loop system employs a small loop, intended for communication with a hearing-aid user in its immediate vicinity. Examples are: neck loops, ticket-counter systems, self-contained 'portable' systems and chairs incorporating induction loops. (See Annex A)

The pick-up device for an audio-frequency induction-loop system is usually a personal hearing aid, of a type fitted with a pick-up coil (telecoil); however, special induction loop receivers may be used in certain applications.

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<sup>1</sup> Numbers in square brackets refer to the Bibliography.

## ELECTROACOUSTICS – HEARING AIDS –

### Part 4: Induction-loop systems for hearing aid purposes – System performance requirements

#### 1 Scope

This part of IEC 60118 is applicable to audio-frequency induction-loop systems producing an alternating magnetic field at audio frequencies and intended to provide an input signal for hearing aids operating with an induction pick-up coil (telecoil). Throughout this standard, it is assumed that the hearing aids used with it conform to all relevant parts of IEC 60118.

This standard specifies requirements for the field strength in audio-frequency induction loops for hearing aid purposes, which will give adequate signal-to-noise ratio without overloading the hearing aid. The standard also specifies the minimum frequency response requirements for acceptable intelligibility.

Methods for measuring the magnetic field strength are specified, and information is given on appropriate measuring equipment (see Annex B), information that should be provided to the operator and users of the system (see Annex C), and other important considerations.

This standard does not specify requirements for loop driver amplifiers or associated microphone or audio signal sources, which are dealt with in IEC 62489-1, or for the field strength produced by equipment, such as telephone handsets, within the scope of ITU-T P.370.

#### 2 Normative references

[IEC 60118-4:2014](https://standards.iteh.ai/catalog/standards/iec/07c39892-fd21-41e3-997e-b1cc7fbfd89a/iec-60118-4-2014)

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The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60268-3:2013, *Sound system equipment – Part 3: Amplifiers*

IEC 60268-10:1991, *Sound system equipment – Part 10: Peak programme level meters*

IEC 61672-1:2013, *Electroacoustics – Sound level meters – Part 1: Specifications*

IEC 62489-1:2010, *Electroacoustics – Audio-frequency induction-loop systems for assisted hearing – Part 1: Methods of measuring and specifying the performance of system components*

#### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

**3.1 reference magnetic field strength level**

level of 0 dB referred to a magnetic field strength of 400 mA/m

Note 1 to entry: This is measured as specified in 8.2.

**3.2 useful magnetic field volume**

volume (of 3-dimensional space) within which the system provides hearing-aid users with a signal of acceptable quality (see 8.4)

Note 1 to entry: In the first edition of this standard, the concept of 'specified magnetic field area' was defined, because that edition did not consider the very important 'height' dimension (the perpendicular distance between the hearing aid pick-up coil and the plane of the loop). See Annex E.

Note 2 to entry: The base area of the useful magnetic field volume is often different from the plan area of the induction loop.

**3.3 telecoil**

inductor with an open magnetic circuit, intended for detecting the magnetic fields of audio-frequency induction-loop systems

**3.4 automatic gain control AGC**

process or device by which the gain of an amplifier is controlled by the level of the output signal so as to reduce changes in this level as compared with the changes in the input signal

Note 1 to entry: Frequently, automatic gain control is used to keep the output signal level nearly constant.

Note 2 to entry: There is a consistent but more general definition in IEC 60118-7, but this standard may have a limited future, so the IEV definition is preferred.

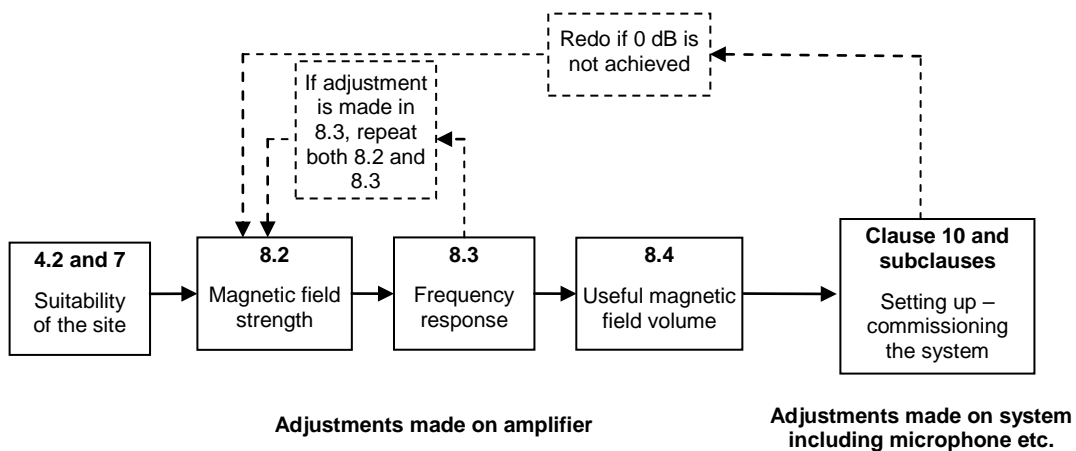
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**4.1 Procedure for setting up and commissioning an audio-frequency induction loop system**

The flow chart in Figure 1 shows the sequence of operations detailed in this standard.



**Figure 1 – Flow chart for the operations in this standard**