



SLOVENSKI STANDARD
SIST EN 303 348 V1.2.1:2021

01-september-2021

Gonilniki za avdiofrekvenčne indukcijske zanke do 45 amperov v frekvenčnem območju od 10 Hz do 9 kHz - Harmonizirani standard za dostop do radijskega spektra

Audio frequency induction loop drivers up to 45 amperes in the frequency range 10 Hz to 9 kHz - Harmonised Standard for access to radio spectrum

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ETSI EN 303 348 V1.2.1 (2021-06)



**Audio frequency induction loop drivers up to 45 amperes
in the frequency range 10 Hz to 9 kHz;
Harmonised Standard for access to radio spectrum**

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Foreword

This Harmonised European Standard (EN) has been produced by ETSI Technical Committee Electromagnetic compatibility and Radio spectrum Matters (ERM).
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The present document has been prepared under the Commission's standardisation request C(2015) 5376 final [i.8] to provide one voluntary means of conforming to the essential requirements of Directive 2014/53/EU on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC [i.1].

Once the present document is cited in the Official Journal of the European Union under that Directive, compliance with the normative clauses of the present document given in table A.1 confers, within the limits of the scope of the present document, a presumption of conformity with the corresponding essential requirements of that Directive and associated EFTA regulations.

National transposition dates	
Date of adoption of this EN:	26 May 2021
Date of latest announcement of this EN (doa):	31 August 2021
Date of latest publication of new National Standard or endorsement of this EN (dop/e):	28 February 2022
Date of withdrawal of any conflicting National Standard (dow):	28 February 2023

Modal verbs terminology

In the present document "shall", "shall not", "should", "should not", "may", "need not", "will", "will not", "can" and "cannot" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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Introduction

Audio Frequency Induction Loop System (AFILS) has been on the market since the middle of the twentieth century, with the first recognizable patents appearing circa 1938. AFILS are primarily used to facilitate improved communication to people with impaired hearing and are an important tool in the reduction of discrimination against disabled people. They are also used in a number of industries including Broadcast and studio.

The present document covers the "drivers" for the loop antenna and represents the performance of equipment which is currently on the market, which has not previously been subjected to compliance to a "radio" directive.

AFILS are installed in places of worship, places of entertainment, places of education, ticket booths and service counters, etc. as well as in domestic situations, providing huge benefits to users with impaired hearing.

AFILS provide an audio frequency magnetic field that couples with a receiving coil (telecoil) fitted in hearing aids, cochlear implants, loop listeners and testing devices. This magnetic field is generated in a wire loop that is fed by an audio frequency driver which is capable of driving current through the "induction loop" which, in turn, is fed from external signals such as those generated by microphones, audio-visual equipment and musical instruments.

AFILS operate below 9 kHz and have a very limited range (some few metres) and there is no known evidence of interference with radio equipment.

AFILS are provided in a range of sizes and can cover areas up to approximately 3 000 m². They are also used in vehicles and lifts and interaction with structural metal means that a complete AFILS can only be tested when fitted in their final location. This means that the "Loop" is as an external antenna which is not covered by the Radio Equipment Directive [i.1] and the present document only covers "Drivers".

The market for AFILS is relatively small compared with technologies such as RFID, and is physically separated from most radio systems, so the opportunity for mutual interference problems is reduced compared to other users of the spectrum in this frequency range.

As AFILS drivers use base band audio signals without additional carrier tones, and so when no input signal is present, there will be no output signal and so no magnetic field will be generated, ensuring spectrum efficiency.

The present document has been developed in response to Directive 2014/53/EU [i.1] and is the first radio standard that has been produced for AFILS equipment and has been prepared to allow the assessment of audio frequency induction loop drivers and receivers for compliance with Directive 2014/53/EU [i.1].

1 Scope

The present document specifies technical characteristics and methods of measurements for audio frequency induction loop drivers operating from 10 Hz to 9 kHz used in Audio Frequency Induction Loop System (AFILS) with an upper limit of 45 A_{rms}.

NOTE 1: The object of an AFILS is to transmit an audio signal to people with hearing difficulties. The receiver in this case is normally a hearing aid or cochlear implant with a built in telecoil, both of which are covered by ETSI EN 300 422-4 [i.11].

These radio equipment types are capable of operating in the frequency band within the 10 Hz to 9 kHz range:

- with (an) output connection(s);
- for audio frequency baseband transmission (un-modulated and without the use of a carrier).

The present document covers induction loop drivers with output connectors. Integral antenna systems are covered by ETSI EN 300 422-4 [i.11].

NOTE 2: The relationship between the present document and essential requirements of article 3.2 of Directive 2014/53/EU [i.1] is given in annex A.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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- | | |
|-----|---|
| [1] | Void. |
| [2] | CEPT/ERC/Recommendation 74-01E (Siófok 98, Nice 99, Sesimbra 02, Hradec Kralove 05, Cardiff 11): "Unwanted Emissions in the Spurious Domain". |

2.2 Informative references

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- | | |
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| [i.1] | Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC. |
| [i.2] | Void. |

- [i.3] Void.
- [i.4] IEC 60118-4:2014: "Electroacoustics - Hearing aids - Part 4: Induction loop systems for hearing aid purposes - Magnetic field strength".
- [i.5] Void.
- [i.6] Void.
- [i.7] Void.
- [i.8] Commission Implementing Decision C(2015) 5376 final of 4.8.2015 on a standardisation request to the European Committee for Electrotechnical Standardisation and to the European Telecommunications Standards Institute as regards radio equipment in support of Directive 2014/53/EU of the European Parliament and of the Council.
- [i.9] Void.
- [i.10] Void.
- [i.11] ETSI EN 300 422-4: "Wireless Microphones; Audio PMSE up to 3 GHz; Part 4: Assistive Listening Devices including personal sound amplifiers and inductive systems up to 3 GHz; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU".

3 Definition of terms, symbols and abbreviations

3.1 Terms

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For the purposes of the present document, the terms given in Directive 2014/53/EU [i.1] and the following apply:

artificial loop: load equal to the nominal resistance and impedance of the loop specified by the manufacturer

audio frequency induction loop driver: audio amplifier designed to drive audio-frequency current in an inductive loop, thus generating an audio-frequency magnetic field

Audio Frequency Induction Loop System (AFILS): system including induction loop driver(s), microphones and/or other signal sources, in which a magnetic field is created by the flow of audio-frequency current in a conductor arranged in the form of a loop or coil

clipping: form of waveform distortion that occurs when an induction loop driver is overdriven and attempts to deliver an output voltage or current beyond its maximum capability

conducted measurements: measurements that are made using a direct connection to the equipment under test

hearing aid: personal amplification system, worn entirely on the listener, which is designed to enable a person with impaired hearing to hear more easily

hearing instrument: hearing aid or cochlear implant

hearing loop system: non-technical name for AFILS used by the hard-of-hearing community

in band emissions: emissions on a frequency or frequencies which are inside the necessary bandwidth (10 Hz to 9 kHz)

induction loop: current carrying loop or coil of an AFILS used to create the magnetic field

NOTE: This is equivalent to the term "antenna" used in other ETSI documents and is used in the present document as it is the term commonly understood by the AFILS industry.

induction loop driver: audio driver designed to drive an induction loop

NOTE: This is equivalent to the term "transmitter" used in other ETSI documents and is used in the present document as it is the term commonly understood by the AFILS industry.

induction loop listener: portable listening device that is designed to give an audible output in response to signals produced by an AFILS

induction loop monitor receiver: equipment designed to verify the performance of an AFILS by audio and visual means:

- a) providing visible indication that it is powered and indicating when the strength of the magnetic field produced by the loop falls within a specified range; and
- b) providing an audio-frequency output by which the sound quality of the AFILS transmissions can be assessed

induction loop system: See AFILS.

internal loop: loop designed as a fixed part of the equipment, without the use of an external connector and as such which cannot be disconnected from the equipment by the user

loop: See induction loop.

loop listener: See induction loop listener.

metal compensation: method of compensating for amplitude and frequency dependant magnetic field losses due to the interaction of the magnetic field generated by the loop with nearby metal

mobile audio frequency induction loop driver: equipment normally installed in a vehicle (bus, coach, train, etc.)

out of band emissions: emissions on a frequency or frequencies immediately outside the necessary bandwidth (10 Hz to 9 kHz), but excluding spurious emissions

phased loop array: system of overlapping loops in which the currents are out of phase with each other used to provide an even field strength and to limit overspill of the magnetic field

portable audio frequency induction loop driver: driver intended to be carried or attached

radiated measurements: measurements which involve the absolute measurement of a radiated field

rated load: load, stated by the manufacturer, to which the driver output is connected for measurement purposes

reference magnetic field strength level: 0 dB reference for magnetic field strength levels, which is $400 \text{ mA}\cdot\text{m}^{-1}$

spurious emissions: emissions on a frequency or frequencies which are outside the necessary bandwidth (10 Hz to 9 kHz) and the level of which may be reduced without affecting the corresponding transmission of information

NOTE: Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude out-of-band emissions.

telecoil: magnetic pickup coil intended to receive signals from an audio frequency induction loop system

NOTE: A telecoil can be part of a hearing aid, cochlear implant, or of any other device for receiving signals from an audio frequency induction loop system in accordance with IEC 60118-4 [i.4].

3.2 Symbols

For the purposes of the present document, the following symbols apply:

A	ampere
C	correction factor
E	electrical field strength
f	frequency
f_C	centre frequency in Hz
H	magnetic field strength
H _f	H-field-strength limit
H _C	H-field strength at the centre of the frequency of interest
H _S	H-field-strength limit for radiated spurious emissions
I _C	audio frequency in band output current