



**Telephony for hearing impaired people;  
Inductive coupling of telephone earphones  
to hearing aids;  
Part 2: Cellular speech terminals**

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Reference

DES/STQ-197

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Keywords

coupling, hearing aid, inductive, telephony

**ETSI**

650 Route des Lucioles  
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C  
Association à but non lucratif enregistrée à la  
Sous-Préfecture de Grasse (06) N° 7803/88

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## Foreword

This final draft ETSI Standard (ES) has been produced by ETSI Technical Committee Speech and multimedia Transmission Quality (STQ), and is now submitted for the ETSI standards Membership Approval Procedure.

The present document is part 2 of a multi-part deliverable. Full details of the entire series can be found in part 1 [2].

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# 1 Scope

The present document applies to wireless terminals designed to be used with inductive coupling to hearing aids with a T-coil. It sets forth uniform methods of measurement and parametric requirements for the electromagnetic and operational compatibility of hearing aids used with wireless terminals, including cellular phones, and Voice-over-Internet-Protocol devices, operating in the range of 698 MHz to 3 GHz.

Other types of wireless technologies (e.g. Bluetooth<sup>®</sup> radio technologies) are also used for coupling hearing aids with other equipments. They are out of the scope of the present document.

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## 2 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 reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://docbox.etsi.org/Reference>.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

### 2.1 Normative references

The following referenced documents are necessary for the application of the present document.

- [1] ANSI C63.19-2011: "American National Standard Methods of Measurement of Compatibility between Wireless Communication Devices and Hearing Aids".
- [2] ETSI ES 200 381-1: "Telephony for hearing impaired people; Inductive coupling of telephone earphones to hearing aids; Part 1: Fixed-line speech terminals".
- [3] IEC 61672-2:2003: "Electroacoustics - Sound level meters - Part 2: Pattern evaluation tests".

### 2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

Not applicable.

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## 3 Definitions and abbreviations

### 3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

**A-weighting:** acoustical weighting according to IEC 61672-2:2003 [3]

**sound pressure level:** acoustic sound pressure level is expressed in decibels relative to 1 Pascal (or dBPa)

### 3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply, as defined in ANSI C63.19-2011 [1]:

WD	Wireless communications device
ABM1	Audio band magnetic signal – desired
ABM2	Audio band magnetic signal – undesired

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## 4 Introduction

### 4.1 General

It is recognised that there is a sizeable proportion of mobile telephone users that have difficulty in conversing over a mobile telephone connection due to hearing loss. To alleviate these difficulties special means have been provided in many national systems to enable hearing impaired users to couple their hearing aids inductively to the mobile telephone receiver, and a number of national/international specifications define characteristics for this form of coupling. The present document addresses the requirements for successful inductive coupling of hearing aids to mobile telephone sets.

Furthermore, it is also recognised that many hearing impaired users are able to have satisfactory mobile telephone conversations while coupling their hearing aids acoustically to the mobile telephone receiver, or even using the mobile telephone handset without a hearing aid. This latter situation is possible due to the fact that, under good conditions, a mobile telephone connection can be louder than a face-to-face conversation over a 1 metre air path by up to 30 dB.

The inclusion of inductive coupling does not reduce or replace existing technical standards that apply to a handset. Inductive coupling can be combined with other additional functionality, such as amplification or extra earpieces, provided specifically for people with special needs.

### 4.2 Background

Magnetic induction systems incorporated in telephone handsets generate an alternating magnetic field with special characteristics which make the field detectable by hearing aids equipped with induction pick-up coils.

Reception of an audio-frequency signal via an induction pick-up coil can often allow an acceptable signal-to-noise ratio to be achieved in cases where the acoustical reception would otherwise be degraded by background noise.

After an extensive review of global standards in this area it was determined that the most advanced work in this area has been carried out by the ANSI C63 committee, and documented in ANSI C63.19-2011 [1]. It was not found possible to reproduce the test procedures in the EN mainly due to the length of the documentation resulting from the complexity of the test procedure. As a result the present document will reference the relevant sections of ANSI C63.19-2011 [1].

The reason why the present document and ES 200 381-1 [2] differ in complexity and test methods is due to the fact that in normal operation a wireless terminal is generating an RF field which is used as the main communications link at the same time as the magnetic field passes the audio component to the hearing aid. More details are available in section 1 of ANSI C63.19-2011 [1].

Performance of the wireless terminal based upon ANSI C63.19-2011 [1] is reported in 4 classes that the hearing aid community can understand without having to know the technical background. These are rated from T1 to T4, T1 being the poorest, and T4 the best.

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## 5 Requirements

### 5.1 Introduction

The requirements for mobile and wireless phones that have a T-coil mode, shall meet all the following requirements:

- Signal intensity (defined as "field intensity of the desired signal at the center of the audio band" in ANSI 63.19-201 [1]).
- Frequency response (defined as "frequency response of the desired signal measured across the audio band" in ANSI 63.19-201 [1]).
- Signal quality (defined as "the difference between the desired and undesired magnetic fields" in ANSI 63.19-201 [1]).

## 5.2 Signal intensity

The wireless terminal under test shall meet the T-coil magnetic signal intensity per section 8.3.1 of ANSI C63.19-2011 [1].

## 5.3 Frequency response

The wireless terminal under test shall meet the T-coil frequency response per section 8.3.2 of ANSI C63.19-2011 [1].

## 5.4 Signal quality

The wireless terminal under test shall meet T-coil signal quality [(signal + noise)-to-noise ratio in decibels] of > 20 dB (corresponding to t3 in ANSI C63.19-2011 [1]).

When the wireless terminal under test meets T-coil signal quality [(signal + noise)-to-noise ratio in decibels] of > 30 dB (corresponding to t4 in ANSI C63.19-2011 [1]), a symbol (t4) may be put on the terminal and on any associated information about it. This symbol may be complemented by a text such as: "the terminal identified with a "T<sub>4</sub>" provides an improved signal to noise ratio for the benefits of persons with hearing disabilities".

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# 6 Measurement procedures

## 6.1 Introduction

The procedures for the measurement of the T-coil signal from the mobile terminal are based upon ANSI C63.19-2011 [1].

Three quantities of the T-coil signal from the wireless terminal are measured and evaluated:

- 1) the field intensity of the desired signal at the center of the audio band;
- 2) the frequency response of the desired signal measured across the audio band;
- 3) the signal quality, which is defined as the difference between the desired and undesired magnetic field levels, will be referenced by the value (in decibels) of the measured signal to noise ratio.

The T-coil mode categorisation from ANSI C63.19-2011 [1] per table 8.5 is out of the scope of the present document, but "t3" and "t4" defined in clause 5 refer to this table.

## 6.2 Test facilities, equipment and configurations

The test facilities and equipment to be used are specified per section 7.2 "Test facilities and equipment" of ANSI C63.19-2011 [1].

The test configurations and setups to be used are specified per section 7.3 of ANSI C63.19-2011 [1].

The noise level in the test system or from the environment as per section 7.3.1 of ANSI C63.19-2011 [1] should not be referred to the category limit as specified in section 8.3 of ANSI C63.19-2011 [1]. Instead this will be at least 10 dB below the measured signal quality per section 7.4.5 or 7.5.4 of ANSI C63.19-2011 [1] or below the device ABM2 level of the device being measured.

## 6.3 Measurement procedures

The measurement procedures are fully described per section 7.4. and 7.5 of ANSI C63.19-2011 [1], in which:

- section 7.4 specifies the preferred measurement procedure for T-coil fields; and
- section 7.5 specifies the alternative measurement procedures using a broadband signal source.

For the calculation of signal quality there will be no classification made of T category per section 7.4.5 or 7.5.4 of ANSI C63.19-2011 [1]. Instead the lowest value in decibels of the signal quality measurements will be reported.

As a consequence the classification of the signal quality result per section 7.4.1 step g) of ANSI C63.19-2011 [1] shall not apply.

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## Annexe A (normative): Excerpts from ANSI C63.19-2011

The Permission letter and relevant pages-A are contained in archive es\_20038102v010100m0.zip which accompanies the present document.

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## Annex B (informative): Bibliography

- ETSI ETS 300 381: "Telephony for hearing impaired people; Inductive coupling of telephone earphones to hearing aids".

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## History

<b>Document history</b>		
V1.1.0	August 2012	Membership Approval Procedure    MV 20121005: 2012-08-06 to 2012-10-05