EESTI STANDARD EVS-EN IEC/IEEE 63184:2025

Assessment Methods of the Human Exposure to Electric and Magnetic Fields from Wireless Power Transfer Systems - Models, Instrumentation, Measurement and Computational Methods and Procedures (Frequency Range of 3 kHz to 30 MHz)

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ICS 31.220.10

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN IEC/IEEE 63184

April 2025

ICS 17.220.20; 17.240

English Version

Assessment methods of the human exposure to electric and magnetic fields from wireless power transfer systems - Models, instrumentation, measurement and computational methods and procedures (frequency range of 3 kHz to 30 MHz) (IEC/IEEE 63184:2025)

Méthodes d'évaluation de l'exposition humaine aux champs électriques et magnétiques produits par les systèmes de transfert de puissance sans fil - Modèles, instrumentation, méthodes et procédures de mesure et de calcul (Plage de fréquences comprise entre 3 kHz et 30 MHz) (IEC/IEEE 63184:2025)

Bewertungsmethoden für die Exposition des Menschen gegenüber elektrischen und magnetischen Feldern von drahtlosen Energieübertragungssystemen - Modelle, Instrumente, Mess- und Berechnungsmethoden und -verfahren (Frequenzbereich von 3 kHz bis 30 MHz) (IEC/IEEE 63184:2025)

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Ref. No. EN IEC/IEEE 63184:2025 E

European foreword

The text of document 106/669/FDIS, future edition 1 of IEC/IEEE 63184, prepared by TC 106 "Methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC/IEEE 63184:2025.

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• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2026-04-30
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IEC 62233:2005	NOTE	Approved as EN 62233:2008
IEC 62311:2019	NOTE	Approved as EN IEC 62311:2020 (not modified)
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IEC/IEEE 63195-2:2022	NOTE	Approved as EN IEC/IEEE 63195-2:2023 (not modified)
ISO/IEC 17025:2017	NOTE	Approved as EN ISO/IEC 17025:2017 (not modified)
ISO 19363:2020	NOTE	Approved as EN ISO 19363:2021 (not modified)

IEC/IEEE 63184

Edition 1.0 2025-02

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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IEC/IEEE 63184:2025-02(en-fr)

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IEC/IEEE 63184

Edition 1.0 2025-02

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 17.220.20; 17.240

ISBN 978-2-8327-0139-3

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FOREWORD

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IEC/IEEE 63184 was prepared by IEC technical committee 106: Methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure, in cooperation with International Committee on Electromagnetic Safety (ICES) of the IEEE Standards Association, under the IEC/IEEE Dual Logo Agreement between IEC and IEEE. It is an International Standard.

This document is published as an IEC/IEEE Dual Logo standard.

The text of this International Standard is based on the following IEC documents:

Draft	Report on voting
106/669/FDIS	106/685/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with the rules given in the ISO/IEC Directives, Part 2, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications/.

This first edition of IEC/IEEE 63184 cancels and replaces the first edition of IEC PAS 63184 published in 2021. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) lower frequency bound changed from 1 kHz to 3 kHz;
b) clarified contact currents as indirect effects in assessment procedures;
c) in measurement methods applied the formulas of SAR and internal electric field;
d) in computational assessment methods added specifications for averaging of current density and internal E-field;
e) updated uncertainty of computational methods;
f) introduced test reporting contents guidance.

The IEC Technical Committee and IEEE Technical Committee have decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

The wireless power transmission systems described in the scope of this document require particularly developed procedures and protocols for the assessment of human exposure. Such systems are increasingly being implemented in a wide range of applications at different frequency ranges from consumer electronics (e.g. mobile phones, tablet PCs) to automotive (electric vehicles). Human exposure to electric and magnetic fields is limited to avoid established adverse health effects, including electrostimulation of nervous tissues and thermal effects, as well as contact currents. A published ITU-R report (ITU-R SM.2303-3 [1][1]) on WPT systems specifies RF exposure assessment methodologies, yet no definitive assessment method was introduced. An exposure assessment method of WPT for EV charging systems was specified in IEC 61980-3:2022 [2]; however, there are currently no other detailed product standards related to WPT systems. Because WPT systems will continue to become ubiquitous in a multitude of applications in the future, IEC and IEEE established a joint working group to address WPT system assessment methods related to human exposures to electric, magnetic, and electromagnetic fields.

In this document, the basic methods to assess both direct and indirect effects of exposure to WPT systems, case studies, and relevant research are specified. These methods mainly focus on frequencies between 3 kHz and 30 MHz and consider both electrostimulation and thermal effects. Future editions will consider extended guidance for assessments of exposure from capacitive WPT systems.

1 Numbers in square brackets refer to the Bibliography.

ASSESSMENT METHODS OF THE HUMAN EXPOSURE TO ELECTRIC AND MAGNETIC FIELDS FROM WIRELESS POWER TRANSFER SYSTEMS – MODELS, INSTRUMENTATION, MEASUREMENT AND COMPUTATIONAL METHODS AND PROCEDURES (FREQUENCY RANGE OF 3 kHz TO 30 MHz)

1 Scope

The objective of this document is to specify methods to assess human exposure to electromagnetic fields generated by stationary wireless power transfer (WPT) in terms of specific absorption rate (SAR), internal electric fields[2] or current density, and contact currents. The frequency range covered by this document is from 3 kHz to 30 MHz. This document focuses on exposures from inductive WPT systems and specifies:

- general compliance assessment procedures;
- measurement methods;
- computational assessment methods;
- assessment combining measurement and computational methods.

This document does not consider the immunity of cardiac implantable electrical devices to radiated disturbances from WPT systems.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61786-1:2013, *Measurement of DC magnetic, AC magnetic and AC electric fields from 1 Hz to 100 kHz with regard to exposure of human beings – Part 1: Requirements for measuring instruments*
IEC 61786-1:2013/AMD1:2024

IEC 61786-2:2014, *Measurement of DC magnetic, AC magnetic and AC electric fields from 1 Hz to 100 kHz with regard to exposure of human beings – Part 2: Basic standard for measurements*

IEC/IEEE 62209-1528:2020, *Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Part 1528: Human models, instrumentation, and procedures (Frequency range of 4 MHz to 10 GHz)*

IEC/IEEE 62704-1:2017, *Determining the peak spatial-average specific absorption rate (SAR) in the human body from wireless communications devices, 30 MHz to 6 GHz – Part 1: General requirements for using the finite difference time-domain (FDTD) method for SAR calculations*

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2 Internal electric field is associated with exposure assessments of nerve stimulation effects; further information is available in e.g. [5].

IEC/IEEE 62704-4:2020, *Determining the peak spatial-average specific absorption rate (SAR) in the human body from wireless communications devices, 30 MHz to 6 GHz – Part 4: General requirements for using the finite element method for SAR calculations*

3 Terms and definitions

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

ISO, IEC, and IEEE maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp
- IEEE Dictionary Online: available at http://dictionary.ieee.org

3.1
exposure
<of a body> situation that occurs wherever a person is subjected to electric, magnetic, or electromagnetic fields

3.2
basic restriction
BR
maximum permissible field level induced in the body of a person exposed to electric, magnetic or electromagnetic fields below which established adverse health effects are assumed not to occur

Note 1 to entry: Examples of basic restrictions can be found in International Commission on Non-Ionizing Radiation Protection (ICNIRP) Guidelines [3], [4], [5] and in Annex II of the European Union (EU) Council Recommendation 1999/519/EC [6].

Note 2 to entry: Documents issued by the IEEE ICES TC 95, such as [7] and [8], refer to the basic restrictions as dosimetric reference limits (DRL).

Note 3 to entry: European Union (EU) Directive 2013/35/EU [9] refers to basic restrictions as "exposure limit values" (ELVs), i.e. "values established on the basis of biophysical and biological considerations, in particular on the basis of scientifically well-established short-term and acute direct effects, i.e. thermal effects and electrical stimulation of tissues."

3.3
reference level
maximum permissible level of the incident electric, magnetic, or electromagnetic fields below which the basic restrictions are assumed not to be exceeded

Note 1 to entry: Examples of reference levels can be found in ICNIRP Guidelines [3], [4], [5] and in Annex II of the European Union (EU) Council Recommendation 1999/519/EC [6].

Note 2 to entry: Documents issued by the IEEE ICES TC 95, such as [7] and [8], refer to the reference levels as exposure reference levels (ERL).

Note 3 to entry: European Union (EU) Directive 2013/35/EU [9] refers to reference levels as "action levels (ALs)," i.e. "operational levels established for the purpose of simplifying the process of demonstrating the compliance with relevant ELVs or, where appropriate, to take relevant protection or prevention measures specified in this Directive."

3.4
direct effect
biological effect resulting from exposure of the body to electric, magnetic, or electromagnetic fields without interaction with a conducting object