IEC 62232

Edition 2.0 2017-08

INTERNATIONAL STANDARD

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Determination of RF field strength, power density and *SAR* in the vicinity of radiocommunication base stations for the purpose of evaluating human exposure

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 13.280; 17.240 ISBN 978-2-8322-4635-1

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CONTENTS

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International Standard IEC 62232 has been prepared by IEC technical committee 106: Methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure.

This second edition cancels and replaces the first edition published in 2011 and constitutes a technical revision.

The significant changes with respect to the previous edition are the following:

a) Increased frequency range from 110 MHz to 100 GHz (including consideration of ambient sources 100 kHz to 300 GHz);
b) product compliance – determination of compliance boundary information for an RBS product before it is placed on the market;
c) product installation compliance – determination of the total RF exposure levels before the product is put into service;

d) simplified document structure and methods of assessment for new technologies such as LTE–TDD, FDD and WiFi.

This publication contains attached files in the form of a CD-ROM for the paper version and embedded files for the electronic version. These files are intended to be used as a complement and do not form an integral part of the standard.

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

FDIS	Report on voting
106/397/FDIS	106/406/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

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

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

This document addresses the evaluation of radiofrequency (RF) field strength, power density or specific absorption rate (*SAR*) levels in the vicinity of radiocommunication base stations (RBS), also called product or Equipment Under Test (EUT), intentionally radiating in the frequency range 110 MHz to 100 GHz according to the scope (see Clause 1). It does not address the evaluation of current density which exposure guidelines often do not consider to be relevant when evaluating RF fields in the intended RBS operating frequency range.

This document specifies the RF exposure evaluation methods to be used for product compliance, product installation compliance and in-situ RF exposure assessments. It does not define human exposure limits, also called "exposure limits". When implementing RF exposure assessments, the surveyor refers to the set of exposure limits applicable where exposure takes place.

Clause 2, Clause 3 and Clause 4 address normative references, terms and definitions, and symbols and abbreviated terms, respectively.

Clause 5 provides a quick start guide and details how to use this document.

Clause 6 describes the three main application areas of this document: RF exposure evaluation methods for product compliance, product installation compliance, and in-situ RF exposure assessments. Further details are provided in Annex C.

Clause 7 provides guidelines on how to select the evaluation method. Further details are provided in Annex A.

Clause 8 defines the RF exposure evaluation methods to be used and refers to further details in Annexes B and F.

Clause 9 addresses the estimation of uncertainty and refers to Annex E for further details.

Clause 10 describes reporting requirements for the evaluation or assessment.

Annexes and the bibliography are referenced extensively to provide useful clarifications or guidance.

Additional guidance can be found in IEC TR 62669 which includes a set of worked case studies giving practical examples of the application of this document.

DETERMINATION OF RF FIELD STRENGTH, POWER DENSITY AND *SAR* IN THE VICINITY OF RADIOCOMMUNICATION BASE STATIONS FOR THE PURPOSE OF EVALUATING HUMAN EXPOSURE

1 Scope

This document provides methods for the determination of radio-frequency (RF) field strength and specific absorption rate (*SAR*) in the vicinity of radiocommunication base stations (RBS) for the purpose of evaluating human exposure.

This document:

a) considers intentionally radiating RBS which transmit on one or more antennas using one or more frequencies in the range 110 MHz to 100 GHz;

b) considers the impact of ambient sources on RF exposure at least in the 100 kHz to 300 GHz frequency range;

c) specifies the methods to be used for RF exposure evaluation for compliance assessment applications, namely:

   1) product compliance – determination of compliance boundary information for an RBS product before it is placed on the market;

   2) product installation compliance – determination of the total RF exposure levels in accessible areas from an RBS product and other relevant sources before the product is put into service;

   3) in-situ RF exposure assessment – measurement of in-situ RF exposure levels in the vicinity of an RBS installation after the product has been taken into operation;

d) describes several RF field strength and *SAR* measurement and computation methodologies with guidance on their applicability to address both the in-situ evaluation of installed RBS and laboratory-based evaluations;

e) describes how surveyors, with a sufficient level of expertise, establish their specific evaluation procedures appropriate for their evaluation purpose;

f) provides guidance on how to report, interpret and compare results from different evaluation methodologies and, where the evaluation purpose requires it, determine a justified decision against a limit value;

g) provides short descriptions of the informative example case studies given in the companion Technical Report IEC TR 62669 [1].

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 62209-1, *Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures – Part 1: Procedure to determine the specific absorption rate (SAR) for hand-held devices used in close proximity to the ear (frequency range of 300 MHz to 3 GHz)*

IEC 62209-2, *Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures – Part 2: Procedure to determine the specific absorption rate (SAR) for wireless communication devices used in close proximity to the human body (frequency range of 30 MHz to 6 GHz)*

IEC 62479, *Assessment of the compliance of low power electronic and electrical apparatus with the basic restrictions related to human exposure to electromagnetic fields (10 MHz – 300 GHz)*

IEC 62311, *Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz – 300 GHz)*