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Case studies supporting IEC 62232 – Determination of RF field strength, power density and SAR in the vicinity of radiocommunication base stations for the purpose of evaluating human exposure

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IEC TR 62669, which is a Technical Report, 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. This edition constitutes a technical revision.

The text of this Technical Report is based on the following documents:

Enquiry draft	Report on voting
106/473/DTR	106/482A/RVDTR

Full information on the voting for the approval of this Technical Report 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.

When referring to subdivisions of IEC 62232:2017, the number of the subdivision is followed by "(IEC 62232:2017)" in order to differentiate from subdivisions of the current document. For example:

- "defined in 6.4 (IEC 62232:2017)" should be read as "defined in 6.4 of IEC 62232:2017";
- "see 8.2" should be read as "see 8.2 of IEC TR 62669:2019".

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- withdrawn,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 contains a series of case studies for the evaluation of electromagnetic (EM) sources transmitting in the frequency range 110 MHz to 100 GHz (including consideration of ambient sources from 100 kHz to 300 GHz) to support the methods specified in IEC 62232:2017.

Case studies presented in this document have been chosen to illustrate typical RF exposure assessments for the most common types of base stations (BS) deployed in mobile and wireless networks, such as small cells, street cells, macro base stations, and parabolic dish antennas used for wireless transmission or mobile backhaul.

The methodologies and approaches described in this document can be useful for the assessment of early 5G products and networks. Clause 13 is dedicated to the introduction, rationale and guiding principles for the implementation of RF exposure assessment using the actual maximum transmitted power or EIRP. While this approach is applicable to any type of BS, it is particularly important for BS using massive MIMO, which are intended to be introduced more predominantly in 5G networks. Multiple examples of case studies with BS using massive MIMO are provided in Clause 13 to Clause 16.

This document is informative. Each use case is described in the main body of the document and includes "lessons learned" and recommendations for improving IEC 62232:2017. More details, rationale and examples of reports are included in annexes.

CASE STUDIES SUPPORTING IEC 62232 – 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, which is a Technical Report, presents a series of case studies in which electromagnetic (EM) fields are evaluated in accordance with IEC 62232:2017. The case studies presented in this document involve intentionally radiating base stations (BS). The BS transmit on one or more antennas using one or more frequencies in the range 110 MHz to 100 GHz and RF exposure assessments take into account the contribution of ambient sources at least in the 100 kHz to 300 GHz frequency range.

Each case study has been chosen to illustrate a typical BS evaluation scenario and employs the methods detailed in IEC 62232:2017. The case studies are provided for guidance only and are not a substitute for a thorough understanding of the requirements of IEC 62232:2017. Based on the lessons learned from each case study, recommendations about RF assessment topics to be considered in the next revision of IEC 62232 are proposed. The methodologies and approaches described in this document are useful for the assessment of early 5G products introduced for consumer trials or deployments.

This document provides background and rationale for applying a compliance approach based on the actual maximum transmitted power or EIRP. Guidance for collecting and analysing information about the transmitted power of a base station and evaluating its actual maximum RF exposure based on modelling studies or measurement studies on operational sites (in networks, sub-networks or field trials) is also presented.

2 Normative references

IEC 62232:2017, *Determination of RF field strength, power density and SAR in the vicinity of radiocommunication base stations for the purpose of evaluating human exposure*

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