This is a free page sample. Access the full version online.

NSAI Standards

Irish Standard
I.S. EN 50413:2019

Basic standard on measurement and calculation procedures for human exposure to electric, magnetic and electromagnetic fields (0 Hz - 300 GHz)

© CENELEC 2019 No copying without NSAI permission except as permitted by copyright law.

This is a free page sample. Access the full version online.

I.S. EN 50413:2019

Incorporating amendments/corrigenda/National Annexes issued since publication:

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation — recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

This document replaces/revises/consolidates the NSAI adoption of the document(s) indicated on the CEN/CENELEC cover/Foreword and the following National document(s):

NOTE: The date of any NSAI previous adoption may not match the date of its original CEN/CENELEC document.

This document is based on:	*Published:*
EN 50413:2019	2019-10-25

This document was published under the authority of the NSAI and comes into effect on:	ICS number:
2019-11-14	17.200.20 33.100.01 NOTE: If blank see CEN/CENELEC cover page

NSAI	T +353 1 807 3800	Sales:
1 Swift Square,	F +353 1 807 3838	T +353 1 857 6730
Northwood, Santry	E standards@nsai.ie	F +353 1 857 6729
Dublin 9	W NSAI.ie	W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

This is a free page sample. Access the full version online.

National Foreword

I.S. EN 50413:2019 is the adopted Irish version of the European Document EN 50413:2019, Basic standard on measurement and calculation procedures for human exposure to electric, magnetic and electromagnetic fields (0 Hz - 300 GHz)

This document does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

For relationships with other publications refer to the NSAI web store.

Compliance with this document does not of itself confer immunity from legal obligations.

In line with international standards practice the decimal point is shown as a comma (,) throughout this document.

This is a free page sample. Access the full version online.

This page is intentionally left blank

This is a free page sample. Access the full version online.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50413

October 2019

ICS 17.200.20; 33.100.01

Supersedes EN 50413:2008 and all of its amendments and corrigenda (if any)

English Version

Basic standard on measurement and calculation procedures for human exposure to electric, magnetic and electromagnetic fields (0 Hz - 300 GHz)

Norme de base pour les procédures de mesures et de calculs pour l'exposition des personnes aux champs électriques, magnétiques et électromagnétiques (0 Hz - 300 GHz)

Grundnorm zu Mess- und Berechnungsverfahren der Exposition von Personen in elektrischen, magnetischen und elektromagnetischen Feldern (0 Hz bis 300 GHz)

This European Standard was approved by CENELEC on 2019-09-23. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

© 2019 CENELEC All rights of exploitation in any form and by any means reserved worldwide for CENELEC Members.

Ref. No. EN 50413:2019 E

This is a free page sample. Access the full version online.

Contents

Page

European foreword 4
1 Scope 5
2 Normative references 5
3 Terms and definitions 6
4 General 12
4.1 General remarks 12
4.2 Exposure assessment approaches 12
4.3 Characterization of the field source 12
4.4 Static and low frequency fields 13
4.5 High frequency range 13
4.6 Multiple frequency fields and multiple sources 13
5 Assessment of human exposure by measurement 13
5.1 General remarks 13
5.2 Electromagnetic field measurement 14
5.2.1 Measurement instrumentation 14
5.2.2 Measurement protocol 15
5.3 Body current measurement 17
5.4 Contact current measurement 17
5.5 SAR measurement 17
5.6 Uncertainty of measurement 18
5.7 Calibration 19
5.7.1 Low frequency range 19
5.7.2 High frequency range 19
6 Assessment of exposure by calculation 19
6.1 Low frequency 19
6.2 High frequency 19
6.3 Uncertainty of calculation 20
7 Assessment report 20
7.1 General 20
7.2 Items to be recorded in the assessment report 20
7.2.1 Assessment method 20
7.2.2 Presentation of the measurement results 20
7.2.3 Presentation of the calculation results 21
Annex A (informative) Uncertainty assessment for the measurement of EMF 22
A.1 Steps in establishing an uncertainty budget 22
A.1.1 Selection of uncertainty contributions 22
A.1.2 Classes of uncertainty contributions 22
A.1.3 Probability distribution and standard uncertainty of each contribution 23
A.1.3.1 General 23
A.1.3.2 Normal 23
A.1.3.3 Rectangular 23
A.1.3.4 U-shaped 23
A.1.3.5 Triangular 24

This is a free page sample. Access the full version online.

A.1.4 Combined standard uncertainty 24
A.1.4.1 Sensitivity coefficients 24
A.1.4.2 Correlated input quantities 24
A.1.4.3 Combined standard uncertainty 25
A.1.5 Expanded uncertainty 25
A.2 Examples for uncertainty budgets 25
A.2.1 General 25
A.2.2 Example of an uncertainty budget for field strength measurement using a system with antenna and spectrum analyser 25
A.2.3 Example of an uncertainty budget for field strength measurement using a broadband measurement system 26
Bibliography 27

This is a free page sample. Access the full version online.

European foreword

This document (EN 50413:2019) has been prepared by CLC/TC 106X “Electromagnetic fields in the human environment”.

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2020-09-23
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2022-09-23

This document supersedes EN 50413:2008 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

This is a free page sample. Access the full version online.

1 Scope

This document provides general methods for measurement and calculation of quantities associated with human exposure to electromagnetic fields in the frequency range from 0 Hz to 300 GHz. It is intended specifically to be used for the assessment of emissions from products and comparison of these with the exposure limits for the general public given in Council Recommendation 1999/519/EC, and those given for workers in Directive 2013/35/EU, as appropriate. It also is intended to be used for assessment of human exposure to electromagnetic fields in the workplace to determine compliance with the requirements of Directive 2013/35/EU.

This standard deals with quantities that can be measured or calculated external to the body, notably electric and magnetic field strength or power density, and includes the measurement and calculation of quantities inside the body that form the basis for protection guidelines. In particular the standard provides information on:

— definitions and terminology,

— characteristics of electromagnetic fields,

— measurement of exposure quantities,

— instrumentation requirements,

— methods of calibration,

— measurement techniques and procedures for evaluating exposure,

— calculation methods for exposure assessment.

Where an applicable electromagnetic field standard specific to a product or technology exists it is expected to be used rather than this document. EN 62311:—, Table 1 gives a list of relevant standards.

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.

Council Recommendation 1999/519/EC of 12 July 1999, *on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz), Official Journal, L199, of 1999-7-30, p.59-70*

Directive 2013/35/EU of 26 June 2013, *on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields). Official Journal, L179, of 2013-6-29, p. 1–21*

EN 61786-1:2014, *Measurement of DC magnetic, AC magnetic and AC electric fields from 1 Hz to 100 kHz with regard to exposure of human beings - Part 1: Requirements for measuring instruments (IEC 61786-1:2013)*

EN 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 62232:2017)*

EN 62311:—,[1] *Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz) (IEC 62311:—)*

ISO/IEC Guide 98-3:2008, *Uncertainty of measurement – Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

[1] Under preparation. Stage at time of Formal Vote: FprEN 62311:2019.

SAI GLOBAL

This is a free preview. Purchase the entire publication at the link below:

Product Page

Looking for additional Standards? Visit Intertek Inform Infostore

Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation