

STN	Základná norma na postup merania a výpočtu expozície osôb elektrickými, magnetickými a elektromagnetickými poliami (0 Hz - 300 GHz)	STN EN 50413 36 7940
------------	--	--

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

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 02/20

Obsahuje: EN 50413:2019

Oznámením tejto normy sa od 23.09.2022 ruší
STN EN 50413 (36 7940) z augusta 2009

130275

EUROPEAN STANDARD

EN 50413

NORME EUROPÉENNE

EUROPÄISCHE NORM

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

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

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

EN 50413:2019 (E)**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.

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)*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN

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