

ILNAS

Institut luxembourgeois de la normalisation
de l'accréditation, de la sécurité et qualité
des produits et services

ILNAS-EN 50413:2019

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

Grundnorm zu Mess- und
Berechnungsverfahren der Exposition
von Personen in elektrischen,
magnetischen und elektromagnetischen

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

10/2019



National Foreword

This European Standard EN 50413:2019 was adopted as Luxembourgish Standard ILNAS-EN 50413:2019.

Every interested party, which is member of an organization based in Luxembourg, can participate for FREE in the development of Luxembourgish (ILNAS), European (CEN, CENELEC) and International (ISO, IEC) standards:

- Participate in the design of standards
- Foresee future developments
- Participate in technical committee meetings

<https://portail-qualite.public.lu/fr/normes-normalisation/participer-normalisation.html>

THIS PUBLICATION IS COPYRIGHT PROTECTED

Nothing from this publication may be reproduced or utilized in any form or by any mean - electronic, mechanical, photocopying or any other data carries without prior permission!

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