

STN	Základná norma na hodnotenie expozície pracovníkov elektrickým a magnetickým poľami zo zariadení a inštalácií na výrobu, prenos a distribúciu elektriny	STN EN 50647 36 7947
------------	--	--

Basic standard for the evaluation of workers exposure to electric and magnetic fields from equipment and installations for the production, transmission and distribution of electricity

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. 09/17

Obsahuje: EN 50647:2017

125490

Úrad pre normalizáciu, metrológiu a skúšobníctvo Slovenskej republiky, 2017
Podľa zákona č. 264/1999 Z. z. o technických požiadavkách na výrobky a o posudzovaní zhody a o zmene a doplnení niektorých zákonov v znení neskorších predpisov sa slovenská technická norma a časti slovenskej technickej normy môžu rozmnožovať alebo rozširovať len so súhlasom slovenského národného normalizačného orgánu.

EUROPEAN STANDARD

EN 50647

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 2017

ICS 17.220.20; 17.240

English Version

Basic standard for the evaluation of workers' exposure to electric and magnetic fields from equipment and installations for the production, transmission and distribution of electricity

Norme fondamentale pour l'évaluation de l'exposition des travailleurs aux champs électriques et magnétiques produits par les équipements et installations de production, transport et distribution d'électricité

Basisnorm für die Evaluierung der beruflichen Exposition gegenüber elektrischen und magnetischen Feldern ausgehend von Komponenten und Anlagen zur Erzeugung, Übertragung und Verteilung elektrischer Energie

This European Standard was approved by CENELEC on 2017-04-10. 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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, 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: Avenue Marnix 17, B-1000 Brussels

Contents	Page
European foreword.....	4
3.1 Terms and definitions	6
3.2 Physical quantities and units	8
3.3 Abbreviations	8
6.1 General.....	11
6.2 Exposure assessment regarding external fields.....	11
6.2.1 General.....	11
6.2.2 Harmonics of magnetic field.....	12
6.2.3 Harmonics of electric field.....	12
6.3 Numerical calculation of induced electric fields inside the human body.....	13
8.1 General.....	13
8.2 Simplified criteria for compliance with action levels	15
8.2.1 General.....	15
8.2.2 Magnetic fields	15
8.2.3 Electric fields	16
8.3 Assessment using measurements or calculations	17
8.3.1 General.....	17
8.3.2 Magnetic fields	17
8.3.3 Electric fields	18
9.1 General.....	19
9.2 Simplified criteria for compliance with exposure limit values	19
9.2.1 General.....	19
9.2.2 Magnetic fields	20
9.2.3 Electric fields	21
9.3 Assessment using dosimetry and considerations for non-uniform fields	21
13.1 Workers at particular risk	23
13.2 Other requirements	23
Annex A (informative) Assessment of harmonics in magnetic fields.....	24
A.1 Introduction	24
A.2 Assessment Method using TEI	24
A.3 Assessment using the weighted peak function	26
A.4 Simplified assessment procedure for public grids	28
Annex B (normative) 50 Hz magnetic field sources in the environment of equipment and installations for production, transmission and distribution of electricity	29
B.1 General.....	29
B.2 Currents in single conductors	29
B.3 Currents in circuits.....	31
B.4 Assessing magnetic fields exposures	31
B.5 Check list for assessing compliance for magnetic fields	33
Annex C (informative) Examples of application of the different assessment criteria.....	34

C.1	Assessment for air-cored reactors: Simplified calculation of the magnetic field under a vertical air-cored self-inductance	34
C.2	Assessment for insulated cables: Calculation of compliance distances for typical XLPE cables.....	36
C.3	Assessment for exposure to electric fields considering different coupling conditions	38
Annex D (informative)	Method for deriving Exposure-Limit-Equivalent-Fields (LEFs)	41
D.1	Introduction.....	41
D.2	Method.....	41
D.3	Selection of the reference model:.....	42
D.4	Reference organs and data	42
D.5	Uncertainty assessment	43
D.6	Deriving the Exposure-Limit-Equivalent-Field (LEF)	44
Annex E (informative)	Considerations about DC magnetic fields in electrical companies.....	45
E.1	Introduction.....	45
E.2	Exposure of workers to DC magnetic field in electrical companies	45
E.3	Attention points	45
Annex F (informative)	contact currents	46
F.1	Introduction.....	46
F.2	Influence of electric fields	46
F.2.1	General	46
F.2.2	Person isolated (at floating potential), capacitive coupling to ground	46
F.2.3	Person at earth potential, isolated object.....	47
F.2.4	Spark discharges.....	48
F.3	Influence of magnetic fields	48
F.3.1	General	48
F.3.2	Working adjacent to live circuits	48
F.4	Summary	49
Annex G (informative)	Exposure during transient and fault conditions	50
G.1	Introduction.....	50
G.2	Faults	50
G.2.1	Overview.....	50
G.2.2	Short-circuit currents during faults.....	50
G.2.3	Prevention and protection against faults.....	50
G.2.4	Magnetic field exposures during faults.....	51
G.3	Switching transients	51
G.4	Lightning strikes.....	51
G.5	Inrush currents	51
G.6	Compliance of short-duration events with the Directive.....	52
	Bibliography.....	53

European foreword

This document [EN 50647:2017] 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) 2018-04-10
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2020-04-10

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 European Standard provides a general procedure to assess workers' exposure to electric and magnetic fields (EMF) in work places associated with the production, transmission and distribution of electric energy, and to demonstrate compliance with exposure limit values and action levels as stated in the Council and European Parliament "EMF" Directive 2013/35/EU [11].

NOTE 1 The Council and European Parliament Directive 2013/35/EU will be transposed into national legislation in all the EU member countries. It is important that users of this standard consult the national legislation related to this transposition in order to identify the national regulations and requirements. These national regulations and requirements may have additional requirements that are not covered by this standard

It has the role of a specific workplace standard. It takes into account the non-binding application guide for implementing the EMF Directive [10] and it defines the assessment procedures and compliance criteria applicable to the electric industry.

The frequency range of this standard covers from DC to 20 kHz, which is sufficient to include the power frequency used for electric power supply systems throughout Europe (50 Hz) and the various harmonics and inter-harmonics occurring in the supply system. In this extremely low frequency range, electric and magnetic fields are independent and, therefore, they both have to be addressed in the exposure assessment.

NOTE 2 Electrical companies also use radio frequency transmissions to operate and maintain their networks and power plants. Similarly, other exposures to EMF may occur during maintenance operations, for instance, due to the use of hand-held electrical tools. All these EMF sources are outside the scope of this standard.

NOTE 3 Regarding EMF in the low frequency range, the scientific basis of the EMF directive is the ICNIRP health guidelines published in 2010 [13]. Reference is made to this scientific basis when necessary for justifying or clarifying some of the technical statements of the present document.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 61786-1, *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)*

EN 50527-1, *Procedure for the assessment of the exposure to electromagnetic fields of workers bearing active implantable medical devices - Part 1: General*

EN 50527-2-1, *Procedure for the assessment of the exposure to electromagnetic fields of workers bearing active implantable medical devices - Part 2-1: Specific assessment for workers with cardiac pacemakers*

IEC 61786-2, *Measurement of DC magnetic, AC magnetic and AC electric fields from 1 Hz to 100 kHz with regard to exposure of human beings - Part 2: Basic standard for measurements*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN