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**Procedure for the assessment of the
exposure of workers to
electromagnetic fields**

Procédure pour l'évaluation de
l'exposition des travailleurs aux champs
électromagnétiques

Verfahren für die Beurteilung der
Exposition von Arbeitnehmern
gegenüber elektromagnetischen Feldern

12/2008



National Foreword

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de l'exposition des travailleurs
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CENELEC

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

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Foreword

This European Standard was prepared by the Technical Committee CENELEC TC 106X, Electromagnetic fields in the human environment.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50499 on 2008-10-21.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2009-11-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2011-11-01

This European Standard has been prepared under Mandate M/351 given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EC Directive 2004/40/EC.

This standard is intended to be a standard under which other standards related to the assessment of a work place can be used.

The approaches outlined in this standard, are intended to be simple, allowing most employers to make an assessment with the minimum of technical knowledge and effort.

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1 Scope

The scope of this European Standard is to provide a general procedure in order to assess workers' exposure to electric, magnetic and electromagnetic fields in a work place to demonstrate compliance with exposure limit values and action values as stated in the Council and European Parliament Directive 2004/40/EC.

The purpose of this European Standard is to

- specify how to perform an initial assessment of the levels of workers' exposure to electromagnetic fields (EMF), if necessary including specific exposure assessment of such levels by measurements and/or calculations,
- determine whether it is necessary to carry out a detailed risk assessment of EMF exposure.

This European Standard can be used by employers for the risk assessment and, where required, measurement and/or calculation of the exposure of workers. Based on specific workplace standards it can be determined whether preventive measures/actions must be taken to comply with the provisions of the Directive.

The frequencies covered are from 0 Hz to 300 GHz.

NOTE 1 This European Standard is written under Mandate M/351 and relates to the exposure limits as specified in the Directive 2004/40/EC. It is intended to protect workers from risks to their health and safety arising or likely to arise from exposure to electromagnetic fields (0 Hz to 300 GHz) during their work. However, this and other directives may include additional measures for the protection of specific groups of workers and/or specific work places for which the employer is required to investigate other protective measures as a part of the overall risk assessment. See Annex A.

NOTE 2 The Council and European Parliament Directive 2004/40/EC will be transposed into national legislation in all the EU member countries. It is recommended 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.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 50371, *Generic standard to demonstrate the compliance of low power electronic and electrical apparatus with the basic restrictions related to human exposure to electromagnetic fields (10 MHz – 300 GHz) – General public*

EN 50400, *Basic standard to demonstrate the compliance of fixed equipment for radio transmission (110 MHz – 40 GHz) intended for use in wireless telecommunication networks with the basic restrictions or the reference levels related to general public exposure to radio frequency electromagnetic fields, when put into service*

EN 50413, *Basic standard on measurement and calculation procedures for human exposure to electric, magnetic and electromagnetic fields (0 Hz – 300 GHz)*

EN 60335-2-29, *Household and similar electrical appliances – Safety – Part 2-29: Particular requirements for battery chargers (IEC 60335-2-29)*

EN 60335-2-45, *Household and similar electrical appliances – Safety – Part 2-45: Particular requirements for portable heating tools and similar appliances (IEC 60335-2-45)*

EN 60745-1, *Hand-held motor-operated electric tools – Safety – Part 1: General requirements* (IEC 60745-1, mod.)

EN 61029-1, *Safety of transportable motor-operated electric tools – Part 1: General requirements* (IEC 61029-1, mod.)

EN 62226-1, *Exposure to electric or magnetic fields in the low and intermediate frequency range – Methods for calculating the current density and internal electric field induced in the human body – Part 1: General* (IEC 62226-1)

EN 62226-2-1, *Exposure to electric or magnetic fields in the low and intermediate frequency range – Methods for calculating the current density and internal electric field induced in the human body – Part 2-1: Exposure to magnetic fields – 2D models* (IEC 62226-2-1)

EN 62226-3-1, *Exposure to electric or magnetic fields in the low and intermediate frequency range – methods for calculating the current density and internal electric field induced in the human body – Part 3-1: Exposure to electric fields – Analytical and 2D numerical models* (IEC 62226-3-1)

EN 62311, *Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz – 300 GHz)* (IEC 62311, mod.)

ETSI TR 101 870, *Fixed radio transmitter sites – Exposure to non-ionising electromagnetic fields – Guidelines for working conditions*

1999/519/EC, *Council Recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)*

2004/40/EC, *Directive 2004/40/EC of the European Parliament and of the Council of 29 April 2004 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields) (18th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)*

Further information on the scopes of these standards can be obtained from a national standardisation body who is a member of CENELEC or at the CENELEC web site www.cenelec.eu.

3 Terms and definitions

3.1

action values

magnitude of directly measurable parameters provided in terms of electric field strength (E), magnetic field strength (H), magnetic flux density (B) and power density (S), contact current and limb induced current at which one or more of the specified measures in this Directive must be undertaken. Compliance with these values will ensure compliance with the relevant exposure limit values (from 2004/40/EC)

3.2

employer

any natural or legal person who has an employment relationship with the worker and has responsibility for the undertaking and/or establishment (from 89/391/EEC)

3.3

equipment

for the purpose of this standard, the term equipment is understood in a broad sense covering all sources of electromagnetic emission, including devices, products, instrumentation, installations and prototypes under development

3.4**exposure**

exposure occurs whenever and wherever a person is subjected to external electric, magnetic or electromagnetic fields or to contact current

3.5**exposure limits**

guideline or restriction values on exposure that are given in international or national standards, guidelines or directives on human exposure to electromagnetic fields. For Directive 2004/40/EC the exposure limits are the action values and the exposure limit values and also the other specific requirements in that directive to avoid other risks related to workplace exposure to electromagnetic fields

3.6**exposure limit values**

limits on exposure to electromagnetic fields which are based directly on established health effects and biological considerations. Compliance with these limits will ensure that workers exposed to electromagnetic fields are protected against all known adverse health effects (from 2004/40/EC)

3.7**risk assessment**

process of determining compliance of a work place environment with the limits set in the Directive 2004/40/EC by performing the actions stated in Article 4 of the Directive 2004/40/EC

3.8**work place**

location where workers have access as part of their duties

3.9**worker**

any person employed by an employer, including trainees and apprentices but excluding domestic servants (from 89/391/EEC)

4 General considerations on assessment**4.1 Introduction**

This clause describes the general concept of an initial assessment of a work place, how to compare assessment results with the action values and exposure limits, and further actions if needed.

The exposure to be assessed is at the work place(s) where a worker is permitted to be present. Work place exposure level is assessed at locations ("work spaces") to which a worker would have access as part of their duties, and its contributors are emissions from equipment affecting that location.

Other health and safety issues covered by the Directive, in particular workers with active implanted medical devices (AIMDs), pregnant workers, and indirect effects shall be addressed, e.g. as outlined in Annex A.

Annex B offers two forms that may be used to document the result of the assessment.

4.2 Overview of risk assessment procedure

The flowchart presented in Figure 1 shows graphically the assessment process. Prior to commencing the assessment process, and in order to determine what level of work place assessment, if any, is necessary the work place must first be characterised. This requires the employer to establish what electrical equipment exists in the work place and is emitting electromagnetic fields into the work place.