



DPC: 25/30511218 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

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- iii) requires additional national guidance or information

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



26/775/CD

COMMITTEE DRAFT (CD)

PROJECT NUMBER: IEC 62822-2 ED2	
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IEC TC 26 : ELECTRIC WELDING		
SECRETARIAT: Austria	SECRETARY: Mr Josef Feichtinger	
OF INTEREST TO THE FOLLOWING COMMITTEES:	HORIZONTAL FUNCTION(S):	
ASPECTS CONCERNED: Safety		

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TITLE:

Electric welding equipment - Assessment of restrictions related to human exposure to electromagnetic fields (0 Hz to 300 GHz) - Part 2: Arc welding equipment

NOTE FROM TC/SC OFFICERS:

Link to Committee Draft (CD) online document:

<https://osd.iec.ch/#/editor/archive/0b24141d-fdea-0753-e063-1a10000a3686/en/CD/1>

How to access

This link leads you to the Online Standards Development (OSD) platform for National Mirror Committee's (NMC) comments. The project draft may be found further down this document.

Resource materials

We recommend NCs to review the available materials to better understand the member commenting on the OSD platform. This includes the:

- OSD NC roles overview: [here](#)
- How to add and submit comments to the IEC: [here](#)

Contact

Should you require any assistance, please contact the IEC IT Helpdesk at helpdesk@iec.ch.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

Electric welding equipment - Assessment of restrictions related to human exposure to electromagnetic fields (0 Hz to 300 GHz) - Part 2: Arc welding equipment –

FOREWORD

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International Standard IEC 62822–2 has been prepared by IEC technical committee 26: Electric welding.

The text of this standard is based on the following documents:

FDIS	Report on voting
26/584/FDIS	26/591/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62822 series, published under the general title *Electric welding equipment – Assessment of restrictions related to human exposure to electromagnetic fields (0 Hz to 300 GHz)*, can be found on the IEC website.

150 The committee has decided that the contents of this publication will remain unchanged until the
151 stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to
152 the specific publication. At this date, the publication will be

- 153 • reconfirmed,
- 154 • withdrawn,
- 155 • replaced by a revised edition, or
- 156 • amended.

157 **NOTE** The 'colour inside' logo on the cover page of this publication indicates that it contains colours which
158 are considered to be useful for the correct understanding of its contents. Users should therefore print this
159 document using a colour printer.

160

1 Scope

This part of IEC 62822 applies to equipment for arc welding and allied processes designed for occupational use by professionals.

NOTE 1 Typical allied processes are electric arc cutting and arc spraying.

This document specifies methods for the assessment of human exposure to magnetic fields produced by arc welding. This document covers non-thermal biological effects in the frequency range from 0 Hz to 10 MHz and defines standardized test scenarios.

NOTE 2 The general term “field” is used throughout this document for “magnetic field”.

NOTE 3 For the assessment of exposure to electric fields and thermal effects, the methods specified in IEC 62822–1 apply.

This document does not define methods for workplace assessment regarding the risks arising from electromagnetic fields (EMF). However, the EMF data that results from the application of this document can be used to assist in workplace assessment.

It does not specify any product safety requirements other than those specifically related to human exposure to electromagnetic fields.

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.

IEC 60050–851:2008, *International Electrotechnical Vocabulary – Part 851: Electric welding*

IEC 60974–1, *Arc welding equipment – Part 1: Welding power sources*

IEC 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 61786–2, *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*

IEC 62822–1, *Electric welding equipment – Assessment of restrictions related to human exposure to electromagnetic fields (0 Hz to 300 GHz) – Part 1: Product family standard*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050–851, IEC 60974–1 and the following, apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1.1**basic restrictions**

exposure limit value

restrictions on exposure to electric, magnetic and electromagnetic fields that are based directly on established health effects and biological considerations

3.1.2**exposure index**

EI

result of the evaluation of exposure to (both sinusoidal and non-sinusoidal) EMF, expressed as a fraction or percentage of the permissible values

Note 1 to entry: Fractions higher than 1 (100 %) represent exceeding the permissible values.

3.1.3**general public**

individuals of all ages and of varying health conditions

Note 1 to entry: Varying ages and health conditions can increase the individuals susceptibilities to EMF.

3.1.4**occupational use**

workers at their workplaces performing their regular or assigned job activities

Note 1 to entry: A worker is any person employed by an employer, including trainees and apprentices.

3.1.5**health effects**

adverse effects, such as thermal heating or stimulation of nerve and muscle tissue as a result of human exposure to EMF

3.1.6**intracorporeal**

situated or occurring within the body

3.1.7**non-thermal effects**

the stimulation of muscles, nerves or sensory organs as a result of human exposure to EMF

3.1.8**reference levels**

action levels

directly measurable quantities, derived from basic restrictions, provided for practical exposure assessment purposes

Note 1 to entry: Respect of the reference levels will ensure respect of the relevant basic restriction. If the reference levels are exceeded, it does not necessarily follow that the basic restriction will be exceeded.

3.1.9**sensory effects**

transient disturbed sensory perceptions and minor changes in brain functions as a result of human exposure to EMF

3.2 Quantities and units

The internationally accepted SI units are used throughout this document.

Physical quantity	Symbol	Unit	Dimension
Current density	J	Ampere per square metre	$A\ m^{-2}$

Electric conductivity	σ	Siemens per metre	S m ⁻¹
Electric current	I	Ampere	A
Electric field strength	E	Volt per metre	V m ⁻¹
Frequency	f	Hertz	Hz
Magnetic flux density	B	Tesla	T (Vs m ⁻²)
Permeability	μ	Henry per metre	H m ⁻¹

3.3 Constants

Physical constant	Symbol	Magnitude	Dimension
Permeability of free space	μ_0	$4 \cdot \pi \cdot 10^{-7}$	H m ⁻¹

3.4 Abbreviated terms

ICNIRP International Commission on Non-Ionizing Radiation Protection

EMF electromagnetic fields

IEEE Institute of Electrical and Electronics Engineers

PNS peripheral nervous system

CNS central nervous system

4 Requirements

Equipment shall be assessed as defined in [Clause 7](#), using the methods given in [Clause 5](#) and the conditions defined in [Clause 6](#). The results shall be reported as specified in [Clause 7](#).

5 Assessment methods

5.1 General considerations

5.1.1 Time averaging

Time averaging of exposure is not permitted for non-thermal effects unless the applied national or international requirements explicitly specify time averaging procedures.

5.1.2 Spatial averaging of external field values

Reference levels are typically based on spatial averaging over the relevant part of the body. If spatial averaging of exposure is not excluded and no specific procedures are defined in applicable national and international requirements, the procedures detailed in the relevant subclauses of [6.1](#) shall be applied.

5.1.3 Spatial averaging of intracorporeal values

If spatial averaging of exposure is not excluded and no specific procedures are specified in applicable national and international requirements, the procedures detailed in the relevant subclauses of [5.3](#) and [6.1](#) shall be applied.

5.1.4 Equipment with pulsed or non-sinusoidal welding current

5.1.4.1 General

Several methods for the assessment of pulsed and non-sinusoidal fields are available. For the purpose of this standard, only the weighted peak methods as given in [5.1.4.2](#) and [5.1.4.3](#) are applicable. For additional information, see IEC 61786-2. The result of these calculation methods is the exposure index (EI).

NOTE Applications of the weighted peak method in time domain or frequency domain are mathematically equivalent and give exactly the same results, if applied correctly. For some cases, e.g. when large numbers of spectral components have to be considered for the complete analysis of a signal, the application of the time domain method can be less complex.

Phase angles used for the weighted peak methods are given in [Table 1](#).

Table 1 – Phase angles of weighting function or summation function

proportionality p_A^a	$1/f^2$	$1/f$	f^0 (constant)	f
phase angle φ_i^b	180°	90°	0°	-90°
^a p_A is the proportionality factor defining the variation of the basic restriction/reference level as specified in the applicable national and international requirements. ^b φ_i is the phase angle of the weighting function or summation function.				

5.1.4.2 Weighted peak method in the time domain

For time domain evaluation, an evaluation system which incorporates a weighting function is applicable. The evaluation shall be based on the peak value of the weighted signal. This method can be used for both external field levels and intracorporeal metrics.

For comparison with the given exposure levels, the weighting function shall have a frequency response which matches the applicable national and international requirements, so that the weighting and summation of spectral components occurs in the time domain.

Further information on this method is given in IEC 62311.

The attenuation and phase angles of the weighting functions can be approximated with electronic or digital filters. The attenuation shall not deviate more than 3 dB and the phase angles not more than 90° from the piecewise linear frequency response. The piecewise linear values for phase angles are given in [Table 1](#).

5.1.4.3 Weighted peak method in the frequency domain

For frequency domain evaluation, a phase corrected summation of the weighted spectral components of the signal is applicable. The evaluation shall be based on the peak value of the weighted signal as given in [Formula \(1\)](#). This method can be used for both external field levels and intracorporeal metrics.

The sum of the weighted spectral components shall not exceed 1 at any time t within the evaluation interval, which shall be one period of the pulsed or non-sinusoidal signal. The time increments used for evaluation shall be less than or equal to 1/10 of the period of the highest relevant spectral component, as defined in [5.1.5.4](#).

$$\left| \sum_i \frac{A_i}{L_i} \cos(2 \cdot \pi \cdot f_i \cdot t + \theta_i + \varphi_i) \right| \leq 1 \quad (1)$$

where

A_i is the amplitude of the spectral component at frequency f_i ;

L_i is the applicable limit at frequency f_i

f_i is the frequency of the spectral component i ;

θ_i is the phase angle of the spectral component at frequency f_i ;