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**Electric welding equipment – Assessment of restrictions related to human exposure to electromagnetic fields (0 Hz to 300 Hz) –
Part 3: Resistance welding equipment**

**Matériels de soudage électrique – Évaluation des restrictions relatives à l'exposition humaine aux champs électromagnétiques (0 Hz à 300 GHz) –
Partie 3: Matériels de soudage par résistance**



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Partie 3: Matériels de soudage par résistance**

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CONTENTS

FOREWORD.....	6
1 Scope.....	8
2 Normative references	8
3 Terms, definitions, quantities, units, constants and symbols	9
3.1 Terms and definitions.....	9
3.2 Quantities and units	11
3.3 Constants	11
3.4 Symbols.....	12
4 Requirements.....	12
5 Assessment methods.....	13
5.1 General.....	13
5.2 Methods based on reference levels.....	13
5.2.1 General	13
5.2.2 Assessment based on measured magnetic field	14
5.2.3 Assessment based on measured welding current.....	16
5.3 Methods based on assessment of corporal quantities (basic restrictions).....	18
5.3.1 General	18
5.3.2 Method based on coupling coefficients	19
5.3.3 Method based on the correction factor	21
5.3.4 Method based on the human model simulation.....	22
5.3.5 Result comparison	24
6 Measurement considerations	24
6.1 Measurement instruments for magnetic fields or exposure levels	24
6.1.1 General	24
6.1.2 Probe(s)	25
6.1.3 Handheld field meter	25
6.1.4 Measurement system with separate elements	25
6.2 Instruments for recording	26
6.2.1 Welding current recording.....	26
6.2.2 Magnetic field recording.....	26
6.3 Signal processing (applicable to any welding current waveform)	27
6.3.1 General	27
6.3.2 Application of the weighted peak method in the time domain	27
6.3.3 Spatial averaging.....	27
6.3.4 Time averaging.....	27
6.4 Uncertainty of assessment	27
7 Computational assessment methods.....	28
7.1 General.....	28
7.2 Quasi-static approximation.....	28
7.3 Human body models for simulation	28
7.4 Computational assessment against the basic restrictions	29
8 Source model	30
8.1 General.....	30
8.2 Source model example.....	30
9 EMF data sheet and assessment report.....	32
Annex A (informative) Example of assessment based on the individual components	34

A.1	General.....	34
A.2	Welding current generator.....	34
A.3	Coupling coefficient of welding circuit	37
A.4	Welding-system	38
Annex B	(informative) Example datasheets	40
B.1	Example current generator datasheet.....	40
B.2	Example datasheet of the welding circuit	41
B.3	Example datasheets of equipment assembly	42
Annex C	(informative) Coupling coefficient method	45
C.1	Principle	45
C.2	Validation of this method.....	45
C.2.1	Context.....	45
C.2.2	Basic restriction against health effects	46
C.2.3	Basic restriction against sensory effects	46
C.3	Conclusion.....	47
Annex D	(informative) Correction factor method.....	49
D.1	General.....	49
D.2	Principle	49
D.3	Example of correction factor finding	50
D.3.1	Context.....	50
D.3.2	Correction factor for the trunk and limbs	50
D.3.3	Correction factor for the head	50
D.4	Conclusion.....	51
Annex E	(informative) Example of exposure assessments on a welding machine	52
E.1	General.....	52
E.2	Description of the spot welding workstation.....	52
E.3	Exposure conditions.....	52
E.4	Main simulation parameters and results	54
E.4.1	Main simulation parameters	54
E.4.2	Simulation results	55
E.5	Exposure assessments	55
E.5.1	General	55
E.5.2	Method based on magnetic field calculation.....	55
E.5.3	Method based on coupling coefficients	55
E.5.4	Method based on the correction factor	56
E.5.5	Method based on the human model	56
E.6	Conclusion.....	57
Annex F	(informative) Computational methods	58
F.1	General.....	58
F.2	SPFD method	58
F.3	Quasi-static – Finite element method	58
F.4	Impedance method	59
F.5	Hybrid technique of FEM and SPFD method	60
F.6	Computation of the magnetic vector potential.....	60
Annex G	(informative) Averaging algorithms	62
G.1	Current density averaging over an area	62
G.1.1	General	62
G.1.2	Calculation of the current density in a Cartesian voxel.....	62

G.1.3	Calculation of the current density in a tetrahedron	63
G.1.4	Calculation of J_{avg}	63
G.2	E-field averaging in a cubical volume	64
G.3	E-field averaging along an averaging distance	64
G.3.1	General	64
G.3.2	Algorithm to construct the integration path	65
Annex H (informative)	Correspondence table between time domain and frequency domain	66
Bibliography		68
Figure 1	– Exposure measurement at the head position	15
Figure 2	– Exposure measurement at trunk position	15
Figure 3	– Exposure measurement at limb positions (hands and thigh)	16
Figure 4	– Compliance perimeters according to reference levels (action levels)	18
Figure 5	– Compliance perimeters according to basic restrictions (exposure limit values)	21
Figure 6	– Magnetic field around the human body obtained by source modelling	23
Figure 7	– Example of induced electric field in a human body exposed to a welding gun ($I = 1\text{kA}$ to 50 Hz)	24
Figure 8	– Welding current flowing in a ($a \times b$) rectangular loop configuration	31
Figure A.1	– Assessment of a complete welding system	34
Figure A.2	– Typical component based assessment	34
Figure A.3	– LF-AC (left) and MF-DC (right) current waveforms	35
Figure A.4	– Combined ELV for the sensory and health effects applicable to the head	35
Figure A.5	– Current exposure indices over the time for two welding technologies	36
Figure A.6	– Geometry of the stationary spot welding gun	37
Figure A.7	– Welding electric circuit model (in m) and one point of interest along the X axis	37
Figure A.8	– Coupling coefficient CC_{BI} along the X axis	38
Figure A.9	– Exposure index (AL) along the X axis	38
Figure A.10	– Exposure index (ELV) along the X axis	39
Figure B.1	– Example datasheet of the power source	40
Figure B.2	– Example datasheet of the electrode assembly	41
Figure B.3	– Datasheet example of the welding system	42
Figure B.4	– Example datasheet of the welding system (continuation)	43
Figure B.5	– Example datasheet of the welding system (continuation)	44
Figure C.1	– Distribution of human to disk model exposure index ratios (health effects of ELV on trunk and hands)	46
Figure C.2	– Distribution of human to disk model exposure index ratios (sensory and health effects of ELV on the head)	47
Figure D.1	– Distribution of correction factor k_E for health effects on trunk and hands	50
Figure D.2	– Distribution of correction factor k_E for effects on the head (sensory and health)	51
Figure E.1	– Welding gun and its electric circuit model (yellow dash segments)	53
Figure E.2	– Magnetic field distribution around the exposed body	53

Figure E.3 – Configuration and electric field distribution on the exposed body (for 1 kA at $f = 50$ Hz)	54
Figure E.4 – Electric field distribution on hands (for 1 kA at $f = 50$ Hz)	54
Figure G.1 – Field components on voxel edges	63
Table 1 – Examples of human models to determine induced electric fields in the low frequency range	29
Table A.1 – Current exposure index for LF-AC technology ($I_{\text{rms}} = 11,4$ kA)	36
Table A.2 – GP current exposure index for LF-AC technology ($I_{\text{rms}} = 11,4$ kA)	36
Table C.1 – Representative disk radius (geometric model)	45
Table C.2 – Coupling coefficients	47
Table E.1 – Coupling coefficients for the magnetic field and on human model	55
Table E.2 – Results based on magnetic field calculation	55
Table E.3 – Results based on coupling coefficients	56
Table E.4 – Results based on the correction factor	56
Table E.5 – Results based on human model	56
Table H.1 – Transcription of formulae	66

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRIC WELDING EQUIPMENT – ASSESSMENT OF RESTRICTIONS RELATED TO HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS (0 HZ TO 300 GHZ) –

Part 3: Resistance welding equipment

FOREWORD

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IEC 62822-3 has been prepared by IEC technical committee 26: Electric welding. It is an International Standard.

This second edition cancels and replaces the first edition published in 2017. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) inclusion of the uncertainties in the results of the assessment;
- b) simplification of the methods of exposure assessment.

The text of this International Standard is based on the following documents:

Draft	Report on voting
26/744/FDIS	26/745/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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ELECTRIC WELDING EQUIPMENT – ASSESSMENT OF RESTRICTIONS RELATED TO HUMAN EXPOSURE TO ELECTROMAGNETIC FIELDS (0 HZ TO 300 GHZ) –

Part 3: Resistance welding equipment

1 Scope

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

More generally, this document covers equipment for which the welding current flows in an electrical circuit whose geometry cannot be changed and regardless of the technology of the current generator (for example LF-AC, MF-DC for spot or seam welding or capacitive discharge used for stud welding).

NOTE 1 Allied processes such as resistance hard and soft soldering or resistance heating achieved by means comparable to resistance welding equipment are included as well.

This document specifies procedures for the assessment of human exposure to magnetic fields produced by resistance welding equipment. It 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 62311 or relevant basic standards will apply.

This document aims to propose methods for providing EMF exposure data that can be used to assist in the assessment of the workplace, especially when the conditions of use of the equipment are not known. When these are technically constrained (for example, a double hand control imposes the position and posture of the user), the data can be directly exploitable if they fall within the scope specified by the manufacturer or the integrator.

Other standards can apply to products covered by this document. In particular this document cannot be used to demonstrate electromagnetic compatibility with other equipment. It does not specify any product safety requirements other than those specifically related to human exposure to electromagnetic fields.

This document proposes several methods to assess the exposure to EMF, from simple to sophisticated, with the latter providing more precise assessment.

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 (IEV) – Part 851: Electric welding* (available at www.electropedia.org)

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

IEC 60974-6, *Arc welding equipment – Part 6: Limited duty equipment*

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 61786-2:2014, *Measurement of DC magnetic, AC magnetic and AC electric fields from 1 Hz to 100 kHz with regard to exposure of human beings – Part 2: Basic standard for measurements*

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

IEC 62822-1:2016, *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, quantities, units, constants and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-851, IEC 60974-1, IEC 60974-6, 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 restriction

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

Note 1 to entry: Basic restrictions are also named dosimetric reference limits (DRLs) and exposure limit values (ELVs).

3.1.2

coupling-coefficient

CC_{YX}

relation allowing to estimate Y from X

EXAMPLE CC_{EI} gives the maximum induced electric field inside a region of the human body according a unit welding current.

Note 1 to entry: Keeping in mind that the electric conductivity can be frequency dependent, a conversion between CC_{JI} and CC_{EI} or CC_{JB} and CC_{EB} is possible with the relation given in Formula (1)

$$J(j\omega) = \sigma(j\omega) \cdot E(j\omega) \quad (1)$$