

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

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 62822-3:2018 sisaldab Euroopa standardi EN IEC 62822-3:2018 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 62822-3:2018 consists of the English text of the European standard EN IEC 62822-3:2018.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 16.02.2018.	Date of Availability of the European standard is 16.02.2018.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 25.160.30

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:
Koduleht www.evs.ee; telefon 605 5050; e-post info@evs.ee

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Homepage www.evs.ee; phone +372 605 5050; e-mail info@evs.ee

English Version

Electric welding equipment - Assessment of restrictions related
to human exposure to electromagnetic fields (0 Hz to 300 Hz) -
Part 3: Resistance welding equipment
(IEC 62822-3:2017)

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
(IEC 62822-3:2017)

Einrichtungen zum Widerstandsschweißen - Bewertung
elektrischer Schweißeinrichtungen in Bezug auf
Begrenzungen der Exposition von Personen gegenüber
elektromagnetischen Feldern (0 Hz - 300 GHz) - Teil 3:
Grundnorm für Widerstandsschweißeinrichtungen
(IEC 62822-3:2017)

This European Standard was approved by CENELEC on 2017-10-20. 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: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 26/626A/FDIS, future edition 1 of IEC 62822-3, prepared by IEC/TC 26 "Electric welding" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62822-3:2018.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2018-08-16
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2021-02-16

This document supersedes EN 50505:2008.

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.

Endorsement notice

The text of the International Standard IEC 62822-3:2017 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
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	EN 61786-1	-
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 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	EN 62226-2-1	-
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	EN 62822-1	-

CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references.....	7
3 Terms, definitions, quantities, units and constants.....	8
3.1 Terms and definitions.....	8
3.2 Quantities and units.....	9
3.3 Constants.....	10
4 Requirements.....	10
5 Coupling coefficients.....	10
5.1 General.....	10
5.2 Conductive disks.....	12
5.3 Anatomical body models for numerical calculations.....	14
6 Source model.....	14
6.1 General.....	14
6.2 Single cable.....	15
6.3 Parallel cables.....	15
6.4 Rectangular loop.....	16
7 Assessment methods.....	18
7.1 General.....	18
7.2 General considerations.....	18
7.2.1 Time averaging.....	18
7.2.2 Spatial averaging.....	18
7.2.3 Frequency range limitations.....	18
7.2.4 Measurement instruments.....	19
7.2.5 Uncertainty of assessment.....	19
7.3 Equipment with sinusoidal welding current.....	19
7.4 Equipment with pulsed or non-sinusoidal welding current.....	20
7.4.1 General.....	20
7.4.2 Derivation of the weighting function from limits for field quantities.....	20
7.4.3 Application of the weighted peak method in the frequency domain.....	22
7.4.4 Application of the weighted peak method in the time domain.....	23
7.5 Method based on measuring of external field levels.....	23
7.5.1 General.....	23
7.5.2 Measurement equipment.....	23
7.5.3 Spatial averaging.....	24
7.5.4 Exposure of the head.....	24
7.5.5 Exposure of the trunk.....	25
7.5.6 Exposure of the limbs.....	25
7.6 Assessment procedure.....	26
7.6.1 General.....	26
7.6.2 Power-source.....	27
7.6.3 Electrode-assembly.....	27
7.6.4 Welding-system.....	27
8 EMF data sheet and assessment report.....	28
8.1 General.....	28
8.2 EMF datasheet of components.....	28

8.2.1	Power sources	28
8.2.2	Electrode assemblies	29
8.2.3	Other components	29
Annex A	(informative) Example of the weighted peak method in the time domain	30
A.1	General	30
A.2	Power source	30
A.2.1	General	30
A.2.2	Applied limits	30
A.2.3	Assessment of the electrode-assembly	32
A.2.4	Datasheets	33
Annex B	(informative) Example of the weighted peak method in the frequency domain	37
B.1	General	37
B.2	Power source	37
B.2.1	General	37
B.2.2	Applied limits	38
B.2.3	Assessment of the electrode-assembly	40
B.2.4	Datasheets	41
Annex C	(informative) IEC 62822-3 for users of IEC 62822-2	45
Annex D	(informative) Coupling coefficients for common arrangements	47
D.1	Single wire	47
D.2	Example of standardized loop configurations	48
D.2.1	0,5 m × 0,5 m	48
D.2.2	1,0 m × 1,0 m	50
D.2.3	1,0 m × 1,5 m	52
Annex E	(informative) Conservative approximation of coupling coefficients for rectangular loops	54
E.1	General	54
E.2	XY-plane	54
E.3	Z-direction	55
E.4	Correlation factors	56
Annex F	(informative) Example EMF datasheets	57
F.1	Example datasheet – Welding system	57
F.2	Example datasheet – Power source	59
F.3	Example datasheet – Electrode assembly	60
Bibliography	61
Figure 1	– Example of a reference system	11
Figure 2	– Conducting disk in a uniform, time variant magnetic flux density	12
Figure 3	– Electrical conductivity for homogeneous body models	13
Figure 4	– Example of the placement of the conductive disks	13
Figure 5	– Source model – Single cable	15
Figure 6	– Assessment configuration – Single cable	15
Figure 7	– Source model – Parallel cables	15
Figure 8	– Assessment Configuration – Parallel Cables	16
Figure 9	– Rectangular loop configuration	16
Figure 10	– Assessment distances for the loop configuration	17
Figure 11	– Piecewise linear and approximated limit amplitudes	21

Figure 12 – Piecewise linear and approximated summation function phase angles	22
Figure 13 – Field measurement at head position	24
Figure 14 – Field measurement at trunk position	25
Figure 15 – Field measurement at limb positions, hand and thigh	26
Figure 16 – Assessment of a complete welding system	27
Figure 17 – Typical component based assessment	27
Figure A.1 – Current waveform	30
Figure A.2 – Combined ELVs for the head [1]	31
Figure A.3 – Unity-coupling waveform	31
Figure A.4 – Geometry of the electrode assembly	32
Figure A.5 – Datasheet of the power source	33
Figure A.6 – Datasheet of the electrode assembly	34
Figure A.7 – Datasheet of the welding system	35
Figure A.8 – Datasheet of the welding system	36
Figure B.1 – Current waveform	37
Figure B.2 – Spectrum of the current waveform	38
Figure B.3 – Combined ELVs for the head [1]	39
Figure B.4 – Unity-coupling waveform	39
Figure B.5 – Geometry of the electrode assembly	40
Figure B.6 – Datasheet of the power source	41
Figure B.7 – Datasheet of the electrode assembly	42
Figure B.8 – Datasheet of the welding system	43
Figure B.9 – Datasheet of the welding system	44
Figure E.1 – Geometry of the electrode assembly – XY-plane	54
Figure E.2 – Geometry of the electrode assembly – Z-direction	55
Figure F.1 – Example datasheet – Welding system	57
Figure F.2 – Example datasheet – Power source	59
Figure F.3 – Example datasheet – Power source	60
Table 1 – Standardized distances	11
Table 2 – Radii for the 2D disk model	13
Table D.1 – Coupling coefficients – Single wire	47
Table D.2 – Coupling coefficients XY-plane – Loop 0,5 m × 0,5 m	48
Table D.3 – Coupling coefficients XY-plane – Loop 0,5 m × 0,5 m	49
Table D.4 – Coupling coefficients XY-plane – Loop 1,0 m × 1,0 m	50
Table D.5 – Coupling coefficients Z-plane – Loop 1,0 m × 1,0 m	51
Table D.6 – Coupling coefficients XY-plane – Loop 1,0 m × 1,5 m	52
Table D.7 – Coupling coefficients Z-plane – Loop 1,0 m × 1,5 m	53
Table E.1 – Correlation factors – XY	56
Table E.2 – Correlation factors – Z	56