

**ELEKTROMAGNETILINE ÜHILDUVUS. NÕUDED
MAJAPIDAMISMASINATELE, ELEKTRILISTELE
TÖÖRIISTADELE JA NENDESARNASTELE SEADMETELE.
OSA 1: EMISSION**

**Electromagnetic compatibility - Requirements for
household appliances, electric tools and similar
apparatus - Part 1: Emission**

EESTI STANDARDI EESSÕNA**NATIONAL FOREWORD**

See Eesti standard EVS-EN 55014-1:2017 sisaldab Euroopa standardi EN 55014-1:2017 ingliskeelset teksti.	This Estonian standard EVS-EN 55014-1:2017 consists of the English text of the European standard EN 55014-1:2017.
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 28.04.2017.	Date of Availability of the European standard is 28.04.2017.
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 33.100.10

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

EUROPEAN STANDARD

EN 55014-1

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2017

ICS 33.100.10

Supersedes EN 55014-1:2006

English Version

**Electromagnetic compatibility - Requirements for household
appliances, electric tools and similar apparatus -
Part 1: Emission
(CISPR 14-1:2016 + COR1:2016)**

Compatibilité électromagnétique - Exigences pour les
appareils électrodomestiques, outillages électriques et
appareils analogues - Partie 1: Emission
(CISPR 14-1:2016 + COR1:2016)

Elektromagnetische Verträglichkeit - Anforderungen an
Haushaltgeräte, Elektrowerkzeuge und ähnliche
Elektrogeräte - Teil 1: Störaussendung
(CISPR 14-1:2016 + COR1:2016)

This European Standard was approved by CENELEC on 2016-09-14. 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

European foreword

The text of document CISPR/F/681/FDIS, future edition 6 of CISPR 14-1, prepared by SC CISPR/F "Interference related to household appliances, tools, lighting equipment and similar appliances" of IEC/TC CISPR was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 55014-1:2017.

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) 2017-10-28
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2020-04-28

This document supersedes EN 55014-1:2006.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] 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.

Endorsement notice

The text of the International Standard CISPR 14-1:2016 + COR1:2016 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

CISPR 11	NOTE	Harmonized as EN 55011.
CISPR 12	NOTE	Harmonized as EN 55012.
CISPR 15:2013	NOTE	Harmonized as EN 55015:2013 (not modified).
IEC 61140	NOTE	Harmonized as EN 61140.
IEC 61558-2-7	NOTE	Harmonized as EN 61558-2-7.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 When 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>
CISPR 16-1-1	2015	Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-1: Radio disturbance and immunity measuring apparatus - Measuring apparatus	EN 55016-1-1	201X ¹⁾
CISPR 16-1-2	2014	Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus - Coupling devices for conducted disturbance measurements	EN 55016-1-2	2014
CISPR 16-1-3	2004	Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-3: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Disturbance power	EN 55016-1-3	2006
+A1	2016		+A1	2016
CISPR 16-1-4	2010	Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-4: Radio disturbance and immunity measuring apparatus - Antennas and test sites for radiated disturbance measurements	EN 55016-1-4	2010
+A1	2012		+A1	2012
CISPR 16-2-1	2014	Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-1: Methods of measurement of disturbances and immunity - Conducted disturbance measurements	EN 55016-2-1	2014

¹⁾ To be published.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
CISPR 16-2-2	2010	Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-2: Methods of measurement of disturbances and immunity - Measurement of disturbance power	EN 55016-2-2	2011
CISPR 16-2-3	2010	Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-3: Methods of measurement of disturbances and immunity - Radiated disturbance measurements	EN 55016-2-3 +AC	2010 2013
+A1	2010		+A1	2010
+A2	2014		+A2	2014
CISPR 16-4-2	2011	Specification for radio disturbance and immunity measuring apparatus and methods - Part 4-2: Uncertainties, statistics and limit modelling - Measurement instrumentation uncertainty	EN 55016-4-2	2011
+A1	2014		+A1	2014
CISPR 32	2015	Electromagnetic compatibility of multimedia equipment - Emission Requirements	EN 55032	2015
IEC 60050-161	1990	International Electrotechnical Vocabulary (IEV) - Chapter 161: Electromagnetic compatibility	-	-
+A1	1997		-	-
+A2	1998		-	-
+A3	2014		-	-
+A4	2014		-	-
+A5	2015		-	-
IEC 60335-2-76 (mod)	2002	Household and similar electrical appliances - Safety - Part 2-76: Particular requirements for electric fence energizers	EN 60335-2-76	2005
			+A12	2010
			+A11	2008
+A1	2006		+A1	2006
+A2 (mod)	2013		+A2	2015
IEC 61000-4-20	2010	Electromagnetic compatibility (EMC) - Part 4-20: Testing and measurement techniques - Emission and immunity testing in transverse electromagnetic (TEM) waveguides	EN 61000-4-20	2010
IEC 61000-4-22	2010	Electromagnetic compatibility (EMC) - Part 4-22: Testing and measurement techniques - Radiated emission and immunity measurements in fully anechoic rooms (FARs)	EN 61000-4-22	2011

CONTENTS

FOREWORD.....	7
1 Scope.....	9
2 Normative references.....	10
3 Terms, definitions and abbreviated terms	11
3.1 General.....	11
3.2 General terms and definitions	11
3.3 Terms and definitions related to click analysis	12
3.4 Terms and definitions related to types of ports.....	13
3.5 Terms and definitions related to parts and devices connected to the EUT.....	14
3.6 Terms and definitions related to operating conditions.....	15
3.7 Terms and definitions related to toys	16
3.8 Other terms and definitions	17
3.9 Abbreviations	17
4 Limits of disturbances	18
4.1 General.....	18
4.2 Application of limits	18
4.3 Continuous disturbances	19
4.3.1 General	19
4.3.2 Frequency range 9 kHz to 30 MHz.....	19
4.3.3 Frequency range 150 kHz to 30 MHz.....	21
4.3.4 Frequency range 30 MHz to 1 000 MHz.....	23
4.4 Discontinuous disturbances.....	26
4.4.1 General	26
4.4.2 Limits.....	26
5 Test equipment and methods of measurement.....	26
5.1 Test equipment	26
5.1.1 General	26
5.1.2 Measuring receivers.....	26
5.1.3 Artificial Mains Network (AMN)	27
5.1.4 Voltage probe	27
5.1.5 Current probe	27
5.1.6 Artificial hand.....	27
5.1.7 Disturbance analyser for discontinuous disturbance.....	27
5.1.8 Absorbing clamp	27
5.1.9 Radiated emission test sites.....	28
5.2 Conducted disturbances set-up and measurements.....	28
5.2.1 Arrangement of the EUT.....	28
5.2.2 Arrangement of the leads at the ports of the EUT.....	29
5.2.3 Arrangement of EUT having associated devices.....	30
5.3 Radiated disturbances set-up and measurements	31
5.3.1 General	31
5.3.2 Magnetic field strength – 9 kHz to 30 MHz.....	31
5.3.3 Disturbance power – 30 MHz to 300 MHz	31
5.3.4 Radiated emission – 30 MHz to 1 000 MHz.....	33
5.4 Measurement procedures and interpretation of results	35
5.4.1 Continuous disturbance.....	35

5.4.2	Discontinuous disturbance	36
5.4.3	Exceptions from the click definition	37
6	Operating conditions	39
6.1	General	39
6.2	Mains operation	39
6.2.1	Voltage at the mains port	39
6.2.2	Frequency at the mains port	40
6.3	Battery operation	40
6.4	Speed controls	40
6.5	Multifunction equipment	40
6.6	Equipment with built-in luminaires	40
7	Interpretation of CISPR radio disturbance limits	41
7.1	Significance of a CISPR limit	41
7.2	Type tests	41
7.2.1	Equipment producing continuous disturbance	41
7.2.2	Equipment producing discontinuous disturbance	41
7.3	Compliance with limits for equipment in large-scale production	42
7.3.1	General	42
7.3.2	Method based on a general margin to the limit	42
7.3.3	Test based on the non-central <i>t</i> -distribution	43
7.3.4	Test based on the binomial distribution	44
7.3.5	Larger sample size	44
7.3.6	Non-compliance	45
8	Measurement uncertainty	45
Annex A (normative) Standard operating conditions and normal loads for specific equipment		60
A.1	Motor operated equipment for household and similar purposes	60
A.1.1	Vacuum cleaners	60
A.1.2	Floor polishers	61
A.1.3	Coffee grinders and coffee makers	61
A.1.4	Kitchen machines	61
A.1.5	Massage apparatus	61
A.1.6	Fans	62
A.1.7	Extractors and range hoods	62
A.1.8	Hair-dryers, fan heaters	62
A.1.9	Refrigerators and freezers	62
A.1.10	Washing machines	62
A.1.11	Dish-washers	63
A.1.12	Tumble dryers	63
A.1.13	Centrifugal dryers	63
A.1.14	Razors and clippers	63
A.1.15	Sewing machines	63
A.1.16	Electro-mechanical office machines	63
A.1.17	Projectors	64
A.1.18	Milking machines	64
A.1.19	Lawn mowers	64
A.1.20	Air conditioning equipment	64
A.2	Electric tools	65
A.2.1	General	65

A.2.2	Handheld (portable) motor-operated tools	66
A.2.3	Transportable (semi-stationary) motor-operated tools	66
A.2.4	Soldering equipment, soldering guns, soldering irons and similar	66
A.2.5	Glue guns	66
A.2.6	Heat guns	67
A.2.7	Power staplers	67
A.2.8	Spray guns	67
A.2.9	Internal vibrators	67
A.3	Motor-operated electro-medical apparatus	67
A.3.1	Dental drills	67
A.3.2	Saws and knives	67
A.3.3	Electrocardiograms and similar recorders	67
A.3.4	Pumps	67
A.4	Electrical heating equipment.....	67
A.4.1	General	67
A.4.2	Hobs and hotplates	68
A.4.3	Cooking pans, table-type roasters, deep-fat fryers	68
A.4.4	Feed boilers, water boilers, kettles and similar boilers.....	68
A.4.5	Instantaneous water heaters	68
A.4.6	Storage heaters	68
A.4.7	Warming plates, boiling tables, heating drawers, heating cabinets.....	68
A.4.8	Cooking ovens, grills, waffle irons, waffle grills	68
A.4.9	Toasters	69
A.4.10	Ironing machines.....	69
A.4.11	Irons	70
A.4.12	Vacuum packagers.....	70
A.4.13	Flexible electrical heating equipment.....	70
A.4.14	Air convection room heaters	70
A.4.15	Rice cookers.....	70
A.5	Thermostats.....	71
A.5.1	General	71
A.5.2	Thermostatically controlled three-phase switches	71
A.5.3	Thermostats – Alternative procedure to that specified in A.5.1	71
A.6	Automatic goods-dispensing machines, entertainment machines and similar equipment.....	72
A.6.1	General	72
A.6.2	Automatic dispensing machines.....	72
A.6.3	Juke boxes	73
A.6.4	Automatic entertainment machines incorporating a winnings-payout mechanism	73
A.6.5	Automatic entertainment machines with no winnings-payout mechanism	73
A.7	Electric and electronic toys.....	74
A.7.1	Classification	74
A.7.2	Application of tests.....	74
A.7.3	Operating conditions	75
A.8	Miscellaneous equipment	76
A.8.1	Time switches not incorporated in equipment.....	76
A.8.2	Electric fence energizers	76
A.8.3	Electronic gas igniters.....	76

A.8.4	Insect killers	77
A.8.5	Radiating equipment for personal care.....	77
A.8.6	Air cleaners	78
A.8.7	Steam generators and humidifiers	78
A.8.8	Battery chargers	78
A.8.9	External Power Supplies (EPS) and converters.....	78
A.8.10	Lifting devices (electric hoists)	78
A.8.11	Robotic cleaners	79
A.8.12	Other robotic equipment.....	80
A.8.13	Clocks	80
A.9	Induction cooking appliances.....	80
A.9.1	General	80
A.9.2	Operating conditions for EUT with fixed cooking zone(s).....	80
A.9.3	Operating conditions for EUT with many small coils	81
A.10	Operating conditions for particular equipment and integrated parts.....	81
A.10.1	Integrated starting switches, speed controls, etc.	81
A.10.2	Regulating controls and external power controller	81
A.10.3	Equipment operated from External Power Supplies (EPS).....	82
Annex B (normative)	Click rate of special equipment	87
Annex C (informative)	Guidance for the measurement of discontinuous disturbances/clicks	88
C.1	General.....	88
C.2	Measuring apparatus.....	88
C.2.1	Artificial mains network	88
C.2.2	Measuring receiver	88
C.2.3	Disturbance analyser	88
C.2.4	Oscilloscope	88
C.3	Measurement of the basic parameters of a discontinuous disturbance	89
C.3.1	Amplitude	89
C.3.2	Duration and spacing	89
C.4	Measuring procedure of discontinuous disturbances	90
C.4.1	Determination of the click rate	90
C.4.2	Application of the exceptions.....	91
C.4.3	Upper quartile method.....	91
Annex D (informative)	Example of the use of the upper quartile method	93
Bibliography	95
Figure 1	– Possible issue due to a high standard deviation when using method 7.3.3	44
Figure 2	– Examples of discontinuous disturbances whose duration and separation meet the definition of clicks (see 3.3.3)	46
Figure 3	– Examples of discontinuous disturbance whose duration or separation do not meet the definition of click.....	47
Figure 4	– Flow chart for emission measurements of mains operated equipment in the frequency range from 30 MHz to 1 000 MHz	48
Figure 5	– Flow chart for emission testing of battery operated equipment in the frequency range from 30 MHz to 1 000 MHz	49
Figure 6	– Flow diagram for measurements of discontinuous disturbance.....	50
Figure 7	– Artificial hand – RC element	51

Figure 8 – Application of the artificial hand – Portable electric drill	51
Figure 9 – Application of the artificial hand – Portable electric saw	52
Figure 10 – Cable bundling	52
Figure 11 – Voltage probe measurement for mains powered EUT	53
Figure 12 – Radiated emission – Location of the EUT on the turntable and measuring distance	54
Figure 13 – Radiated emission – Example of test set-up for table-top EUT	54
Figure 14 – Radiated emission – Example of test set-up for table-top EUT	55
Figure 15 – Radiated emission – Example of test set-up for table-top EUT (top view)	55
Figure 16 – Radiated emission – Example of test set-up for floor standing EUT	56
Figure 17 – Radiated emission – Example of the test set-up for an EUT made of multiple table-top parts	57
Figure 18 – Radiated emission – Example of the test set-up for an EUT in SAC or OATS, made of a combination of table-top and floor standing parts	58
Figure 19 – Radiated emission – Height of the EUT in the FAR	59
Figure A.1 – Arrangement for measurement of the disturbance voltage produced at the fence port of electric fence energizers (see A.8.2)	83
Figure A.2 – Measuring arrangement for toys running on tracks	84
Figure A.3 – Radiated emission – Test set-up for floor operated vacuum cleaner	85
Figure A.4 – Example of an idle roller for the measurement of radiated emissions of robotic cleaners	85
Figure A.5 – Measurement arrangement for two-terminal external power controller	86
Table 1 – Application of limits	19
Table 2 – Disturbance voltage limits for induction cooking appliances	20
Table 3 – Magnetic field strength limits	20
Table 4 – Limits of the magnetic field induced current	21
Table 5 – General limits	23
Table 6 – Limits for mains port of tools	23
Table 7 – Disturbance power limits – 30 MHz to 300 MHz	24
Table 8 – Reduction applicable to Table 7 limits	25
Table 9 – Radiated disturbance limits and testing methods – 30 MHz to 1 000 MHz	25
Table 10 – General margin to the limit for statistical evaluation	42
Table 11 – Values of the coefficient as a function k_E of the sample size	42
Table 12 – Factor k for the application of the non-central t -distribution	43
Table 13 – Application of the binomial distribution	44
Table B.1 – Application of factor f for the determination of the click rate of special equipment	87