BS EN 55016-1-5:2015+A1:2017

BSI Standards Publication

Specification for radio disturbance and immunity measuring apparatus and methods

Part 1-5: Radio disturbance and immunity measuring apparatus – Antenna calibration sites and reference test sites for 5 MHz to 18 GHz (CISPR 16-1-5:2014)

bsi.

National foreword

This British Standard is the UK implementation of EN 55016-1-5:2015, including amendment A1:2017. It is identical to CISPR 16-1-5:2014, including amendment 1:2016. It supersedes BS EN 55016-1-5:2015, which will be withdrawn on 20 January 2020.

The text of CISPR amendment 1:2016 has been provided in its entirety at the beginning of this document. BSI's policy of providing consolidated content remains unchanged; however, in the interest of expediency, in this instance BSI have chosen to collate the relevant content at the beginning of this document.

The UK participation in its preparation was entrusted to Technical Committee GEL/210/11, EMC - Standards Committee.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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ICS 33.100.20; 33.100.10

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 28 February 2015.

Amendments/corrigenda issued since publication

Date	Text affected
31 March 2018	Implementation of CISPR amendment 1:2016 with CENELEC endorsement A1:2017

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 55016-1-5

February 2015

ICS 33.100.10; 33.100.20

Supersedes EN 55016-1-5:2004

English Version

Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-5: Radio disturbance and immunity measuring apparatus - Antenna calibration sites and reference test sites for 5 MHz to 18 GHz (CISPR 16-1-5:2014)

Spécification des méthodes et des appareils de mesure des perturbations radioélectriques et de l'immunité aux perturbations radioélectriques - Partie 1-5: Appareils de mesure des perturbations radioélectriques et de l'immunité aux perturbations radioélectriques - Emplacements d'étalonnage d'antenne et emplacements d'essai de référence pour la plage comprise entre 5 MHz et 18 GHz (CISPR 16-1-5:2014)

Anforderungen an Geräte und Einrichtungen sowie Festlegung der Verfahren zur Messung der hochfrequenten Störaussendung (Funkstörungen) und Störfestigkeit - Teil 1-5: Geräte und Einrichtungen zur Messung der hochfrequenten Störaussendung (Funkstörungen) und Störfestigkeit - Messplätze für die Antennenkalibrierung und Referenz-Messplätze für den Frequenzbereich von 5 MHz bis 18 GHz (CISPR 16-1-5:2014)

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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

Foreword

The text of document CISPR/A/1086A/FDIS, future edition 2 of CISPR 16-1-5, prepared by CISPR SC A “Radio-interference measurements and statistical methods" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 55016-1-5:2015.

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)	2015-10-21
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2018-01-21

This document supersedes EN 55016-1-5:2004.

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The text of the International Standard CISPR 16-1-5:2014 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 16-1-1:2010	NOTE	Harmonized as EN 55016-1-1:2010 (not modified).
CISPR 16-1-1:2010/A1:2010	NOTE	Harmonized as EN 55016-1-1:2010/A1:2010 (not modified).
CISPR 16-2-3:2010	NOTE	Harmonized as EN 55016-2-3:2010 (not modified).
CISPR 16-2-3:2010/A1:2010	NOTE	Harmonized as EN 55016-2-3:2010/A1:2010 (not modified).
CISPR 16-4 Series	NOTE	Only Part 4-2 harmonized as EN 55016-4-2.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 55016-1-5:2015/A1

May 2017

ICS 33.100.10; 33.100.20

English Version

Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-5: Radio disturbance and immunity measuring apparatus - Antenna calibration sites and reference test sites for 5 MHz to 18 GHz (CISPR 16-1-5:2014/A1:2016)

Spécification des méthodes et des appareils de mesure des perturbations radioélectriques et de l'immunité aux perturbations radioélectriques - Partie 1-5: Appareils de mesure des perturbations radioélectriques et de l'immunité aux perturbations radioélectriques - Emplacements d'étalonnage d'antenne et emplacements d'essai de référence pour la plage comprise entre 5 MHz et 18 GHz (CISPR 16-1-5:2014/A1:2016)

Anforderungen an Geräte und Einrichtungen sowie Festlegung der Verfahren zur Messung der hochfrequenten Störaussendung (Funkstörungen) und Störfestigkeit - Teil 1-5: Geräte und Einrichtungen zur Messung der hochfrequenten Störaussendung (Funkstörungen) und Störfestigkeit - Messplätze für die Antennenkalibrierung und Referenz-Messplätze für den Frequenzbereich von 5 MHz bis 18 GHz (CISPR 16-1-5:2014/A1:2016)

This amendment A1 modifies the European Standard EN 55016-1-5:2015; it was approved by CENELEC on 2017-01-20. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment the status of a national standard without any alteration.

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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/A/1183/FDIS, future CISPR 16-1-5:2014/A1, prepared by CISPR SC A "Radio-interference measurements and statistical methods" of CISPR "International special committee on radio interference" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 55016-1-5:2015/A1:2017.

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) 2017-11-26
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2020-05-26

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The text of the International Standard CISPR 16-1-5:2014/A1:2016 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, 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

Publication	Year	Title	EN/HD	Year
CISPR 16-1-4 +A1	2010 2012	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 +A1	2010 2012
CISPR 16-1-6 + 1	2014 2017	Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-6: Radio disturbance and immunity measuring apparatus - EMC-antenna calibration	EN 55016-1-6 + A1	2015 2017
IEC 60050	Series	International Electrotechnical Vocabulary	-	-

CISPR 16-1-5

Edition 2.0 2016-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE

INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE
COMITÉ INTERNATIONAL SPÉCIAL DES PERTURBATIONS RADIOÉLECTRIQUES

BASIC EMC PUBLICATION
PUBLICATION FONDAMENTALE EN CEM

AMENDMENT 1
AMENDEMENT 1

Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-5: Radio disturbance and immunity measuring apparatus – Antenna calibration sites and reference test sites for 5 MHz to 18 GHz

Spécification des méthodes et des appareils de mesure des perturbations radioélectriques et de l'immunité aux perturbations radioélectriques – Partie 1-5: Appareils de mesure des perturbations radioélectriques et de l'immunité aux perturbations radioélectriques – Emplacements d'étalonnage d'antenne et emplacements d'essai de référence pour la plage comprise entre 5 MHz et 18 GHz

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
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ICS 33.100.10; 33.100.20

ISBN 978-2-8322-3713-7

FOREWORD

This amendment has been prepared by CISPR subcommittee A: Radio-interference measurements and statistical methods.

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

FDIS	Report on voting
CISPR/A/1183/FDIS	CISPR/A/1198/RVD

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

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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2 Normative references

Replace, in the existing list, the existing reference to CISPR 16-1-6 by the following:

CISPR 16-1-6:2014, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-6: Radio disturbance and immunity measuring apparatus – EMC antenna calibration*
CISPR 16-1-6:2014/AMD1:2016

Add, after the existing Subclause 5.3.4, the following new subclause:

5.4 Validation of a FAR for antenna radiation pattern measurements above 1 GHz

Annex I of CISPR 16-1-6:2014/AMD1:2016 introduces a method for antenna pattern measurement and the validation of the site to be used in the frequency range above 1 GHz.

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CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION
INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

SPECIFICATION FOR RADIO DISTURBANCE AND IMMUNITY MEASURING APPARATUS AND METHODS –

Part 1-5: Radio disturbance and immunity measuring apparatus – Antenna calibration sites and reference test sites for 5 MHz to 18 GHz

FOREWORD

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International Standard CISPR 16-1-5 has been prepared by CISPR subcommittee A: Radio-interference measurements and statistical methods.

This second edition cancels and replaces the first edition published in 2003, and its Amendment 1 (2012). It constitutes a technical revision.

It has the status of a basic EMC publication in accordance with IEC Guide 107, *Electromagnetic compatibility – Guide to the drafting of electromagnetic compatibility publications*.

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

– site validation methods for other sites covered in CISPR 16-1-6 are added;
– smaller step sizes are specified for swept-frequency measurements;
– the minimum ground plane size is increased;
– other miscellaneous technical and editorial refinements are included.

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

FDIS	Report on voting
CISPR/A/1086A/FDIS	CISPR/A/1097/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.

A list of all parts of the CISPR 16 series can be found, under the general title *Specification for radio disturbance and immunity measuring apparatus and methods*, on the IEC website.

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

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

INTRODUCTION

This standard describes validation procedures for Calibration Test Sites (CALTS) that are used to calibrate antennas in the frequency range 5 MHz to 18 GHz. The associated antenna calibration procedures are described in CISPR 16-1-6.

Due to problems with suppressing ground reflections in the frequency range 30 MHz to 200 MHz, the main function of a reflecting ground plane is for the calibration of dipole, biconical, and hybrid antennas over the frequency range for which their H-plane patterns are uniform. The free-space antenna factor, F_a, for dipole antennas may be measured in a free-space environment above 200 MHz. Because of the difficulty of reducing reflections from objects that surround an antenna, and in particular the ground surface, a flat metal ground plane is used to ensure reproducibility of results and to enable the ground reflected signal to be precisely removed mathematically.

Requirements for the construction of a CALTS are given in Annex A. The specifications and validation procedures for a CALTS are given in Clause 4. The most precise way of validating a CALTS is to use calculable dipole antennas, which are the basis of the validation procedure in this standard. The design principles of calculable antennas are given in Annex B, and the theory and methods for calculating site insertion loss (SIL) are given in Annex C and Annex D.

Validation procedures for other antenna calibration sites are given in Clause 5 through Clause 7. Where an antenna calibration method utilizes the ground reflection, a CALTS is required. The validation methods are summarized in Table 1 with reference to the associated antenna calibration methods in CISPR 16-1-6.

All site validation methods involve the measurement of SIL between two antennas. It is critical that the validation of the site itself not be unduly compromised by reflections from antenna supports; see A.3 for associated guidance.

Table 1 – Summary of site validation methods by subclause number

Calibration site(s)		CISPR 16-1-5 validation method(s) Subclause	CISPR 16-1-6:2014 calibration method(s) Subclause	Frequency range MHz	Antenna type(s)	Polarization	Notes
1	CALTS for monopoles	4.10	G.1	5 to 30	Monopole	VP	With tolerance of ± 1 dB
2	CALTS or SAC[a]	4, 7.2	8.4	30 to 1000	Biconical, LPDA, hybrid	HP	SSM
3	CALTS or SAC	4	9.2.2	30 to 300	Biconical, hybrid, dipole	HP or VP	At large height or with absorber on ground
4	FAR	5.3.2	9.2.2	30 to 300 60 to 1000	Biconical, hybrid, dipole Biconical, dipole	HP	
5	REFTS CALTS	4.7 4.9	9.3	30 to 300	Biconical, hybrid	VP	
6	Free space	6.1	9.4.2 9.4.3	200 to 18000	LPDA, hybrid, horn	VP	HP with greater height
7	Free space	6.2	9.4.4	200 to 18000	LPDA, hybrid, horn	VP (or HP)	With absorber on ground
8	FAR	5.3.3	9.5	1000 to 18000	Horn, LPDA	HP or VP	
9	FAR	5.3.2	9.2 and 9.4	140 to 1000	LPDA, hybrid	HP or VP	
10	CALTS	4.6	B.4, B.5	30 to 300	Biconical, dipole	HP	
11	Transfer of properties of a validated site to a site not validated by methods in other clauses	7.1 (excluding 5.3 FAR)	A.9.4	30 and above	Any, but not monopole or loop	HP or VP	Use primarily for SAM and FAR, for particular antenna types and frequencies, except 5.3

[a] A CALTS is well specified as being free of reflecting obstacles, and if the antenna supports have negligible reflections the ground plane itself is likely to provide results that agree with the theoretical performance to better than 0,5 dB. However for a Semi Anechoic Chamber (SAC), it is important that the entire allowed acceptance criterion of 1 dB is not taken up by wall reflections, leaving no latitude for other uncertainty components such as reducing reflections from masts and cables.

SPECIFICATION FOR RADIO DISTURBANCE AND IMMUNITY MEASURING APPARATUS AND METHODS –

Part 1-5: Radio disturbance and immunity measuring apparatus – Antenna calibration sites and reference test sites for 5 MHz to 18 GHz

1 Scope

This part of CISPR 16 specifies the requirements for calibration sites in the frequency range 5 MHz to 18 GHz used to perform antenna calibrations according to CISPR 16-1-6. It also specifies the requirements for reference test sites (REFTS) that are used for the validation of compliance test sites (COMTS) in the frequency range 30 MHz to 1 000 MHz according to CISPR 16-1-4.

It has the status of a basic EMC standard in accordance with IEC Guide 107, *Electromagnetic compatibility – Guide to the drafting of electromagnetic compatibility publications.*

Measurement instrumentation specifications are given in CISPR 16-1-1 [1][1] and CISPR 16-1-4. Further information and background on uncertainties in general is given in CISPR 16-4 [3], which can also be helpful in establishing uncertainty estimates for the calibration processes of antennas and site validation measurements.

2 Normative references

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.

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*
CISPR 16-1-4:2010/AMD 1:2012

CISPR 16-1-6:2014, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-6: Radio disturbance and immunity measuring apparatus – EMC antenna calibration*

IEC 60050 (all parts), *International Electrotechnical Vocabulary* (available at <http://www.electropedia.org>)

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050, as well as the following apply.

NOTE Full terms for abbreviations not already given in 3.1 are listed in 3.2.

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[1] Numbers in square brackets refer to the bibliography.