



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

**National foreword**

This British Standard is the UK implementation of EN 55016-1-5:2015. It is identical to CISPR 16-1-5:2014. It supersedes BS EN 55016-1-5:2004+A1:2012, which will be withdrawn on 21 January 2018.

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

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Antenna calibration sites and reference  
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(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  
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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)

This European Standard was approved by CENELEC on 2015-01-21. 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.

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## 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.

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

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## Endorsement notice

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).
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CISPR 16-4 Series	NOTE	Only Part 4-2 harmonized as EN 55016-4-2.

## 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](http://www.cenelec.eu)

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+A1	2012	Part 1-4: Radio disturbance and immunity measuring apparatus - Antennas and test sites for radiated disturbance measurements	+A1	2012
CISPR 16-1-6	2014	Specification for radio disturbance and immunity measuring apparatus and methods -	EN 55016-1-6	2015
		Part 1-6: Radio disturbance and immunity measuring apparatus - EMC-antenna calibration		
IEC 60050	Series	International Electrotechnical Vocabulary	-	-

## CONTENTS

INTRODUCTION.....	8
1 Scope.....	10
2 Normative references .....	10
3 Terms, definitions and abbreviations .....	10
3.1 Terms and definitions.....	10
3.1.1 Antenna terms .....	11
3.1.2 Measurement site terms .....	13
3.1.3 Other terms .....	14
3.2 Abbreviations .....	15
4 Specifications and validation procedures for CALTS and REFTS from 5 MHz to 1 000 MHz.....	16
4.1 General.....	16
4.2 Antenna calibration test site (CALTS) specification .....	16
4.2.1 General .....	16
4.2.2 Normative specification.....	17
4.3 Test antenna specification .....	17
4.3.1 General .....	17
4.3.2 Details of the required characteristics of the test antenna .....	18
4.4 Antenna calibration test site validation procedure .....	20
4.4.1 General .....	20
4.4.2 Test set-up .....	20
4.4.3 Test frequencies and receive antenna heights .....	22
4.4.4 SIL measurements.....	22
4.4.5 Swept frequency SIL measurements .....	25
4.4.6 Identifying and reducing reflections from antenna supports.....	28
4.5 Antenna calibration test site acceptance criteria .....	28
4.5.1 General .....	28
4.5.2 Measurement uncertainties.....	28
4.5.3 Acceptance criteria .....	29
4.6 Calibration site with a metal ground plane for biconical antennas and tuned dipole antennas over the frequency range 30 MHz to 300 MHz .....	30
4.7 Validation of a REFTS .....	31
4.7.1 General .....	31
4.7.2 Validation for horizontal polarization .....	31
4.7.3 Validation for vertical polarization .....	31
4.8 Validation report for CALTS and REFTS .....	33
4.8.1 General .....	33
4.8.2 Validation report requirements.....	33
4.9 Site validation for the calibration of biconical and dipole antennas, and the biconical part of hybrid antennas in vertical polarization.....	34
4.10 Validation of a CALTS using vertical polarization from 5 MHz to 30 MHz for the calibration of monopole antennas.....	35
4.10.1 General .....	35
4.10.2 Uncertainty evaluation .....	36
5 Validation methods for a FAR from 30 MHz to 18 GHz.....	36
5.1 General.....	36

5.2	Validation procedure 1 GHz to 18 GHz.....	37
5.2.1	Power transfer between two antennas .....	37
5.2.2	Measurement procedure for validation from 1 GHz to 18 GHz.....	37
5.2.3	Analysis of results .....	39
5.2.4	Acceptance criterion .....	40
5.2.5	Chamber performance versus polarization .....	41
5.2.6	Uncertainty .....	41
5.3	Validation of a FAR for the calibration of antennas by alternative methods.....	42
5.3.1	General .....	42
5.3.2	Validation of a FAR from 30 MHz to 1 GHz .....	42
5.3.3	Alternative validation of a FAR for the calibration of LPDA antennas above 1 GHz.....	42
5.3.4	Alternative validation of a FAR applying time-domain measurements above 500 MHz.....	43
6	Validation methods for sites used for the calibration of directive antennas .....	43
6.1	Validation of the calibration site minimizing ground reflection by a height ≥ 4 m .....	43
6.1.1	Measurement procedure .....	43
6.1.2	Uncertainties .....	45
6.2	Validation of the calibration site minimizing ground reflection by use of absorber .....	46
7	Site validation by comparison of antenna factors, and application of RSM to evaluate the uncertainty contribution of a SAC site .....	47
7.1	Use of SAM for site validation by comparison of antenna factors .....	47
7.2	Application of RSM to evaluate the measurement uncertainty contribution of a calibration site comprising a SAC.....	48
Annex A	(informative) CALTS characteristics and validation .....	50
A.1	General.....	50
A.2	The reflecting plane .....	50
A.2.1	Reflecting plane construction.....	50
A.2.2	Plane-edge effects and plane surroundings .....	51
A.3	Ancillary equipment .....	51
A.4	Additional stringent CALTS validation testing .....	52
A.4.1	General .....	52
A.4.2	Antenna-height scan measurements .....	52
A.4.3	Frequency scan measurements .....	53
Annex B	(informative) Test antenna considerations.....	56
B.1	General.....	56
B.2	Example and verification of a test antenna .....	56
B.3	Determination of balun properties .....	58
B.3.1	The ideal lossless balun .....	58
B.3.2	Relations between balun properties and <i>S</i> -parameters .....	59
B.3.3	Insertion loss measurements .....	60
Annex C	(informative) Antenna and SIL theory.....	63
C.1	Analytical relations.....	63
C.1.1	General .....	63
C.1.2	Total length of the test antenna .....	64
C.1.3	Theoretical SIL .....	65
C.1.4	Calculation example .....	69

C.2	Computations by the MoM.....	72
C.2.1	General .....	72
C.2.2	Antenna input impedance .....	73
C.2.3	Total length of the test antenna .....	73
C.2.4	SIL computations .....	73
C.2.5	Antenna factor (AF) computations.....	80
Annex D (informative)	Pascal Program used in C.1.4 .....	84
Annex E (informative)	Validation procedure checklist.....	88
Annex F (informative)	Evidence that field taper of VP site validation method has negligible effect on measured antenna factor .....	90
F.1	Investigation of vertical field taper.....	90
F.2	Calibration of biconical antennas using vertical polarization.....	90
Bibliography	.....	92
Figure 1	– Schematic diagram of the test antenna .....	18
Figure 2	– Adjustment of a telescopic wire element to the length $L_{we}$ .....	19
Figure 3	– Determination of $V_{r1}(f)$ or $V_{r2}(f)$ .....	23
Figure 4	– Determination of $V_s(f)$ with the wire antennas in their specified positions .....	23
Figure 5	– Example NSIL: horizontal polarization, antenna height 2 m, separation 10 m .....	26
Figure 6	– NSIL of the four pairs of calculable dipoles at 10 m separation and using the alternative heights for the 600 MHz to 1 000 MHz pair according to Table 5.....	27
Figure 7	– Relation between the quantities used in the SIL acceptance criterion .....	29
Figure 8	– Set-up of site validation for EMC antenna calibrations above 1 GHz in a FAR, also showing distance between antenna phase centres.....	38
Figure 9	– Example plots of $[A_{i m}(d) - A_{i m}(d_{3 m})]$ in dB against distance in m at 1 GHz to 18 GHz in 1 GHz steps, corrected for LPDA and horn phase centres .....	40
Figure 10	– Example of antenna set-up for an LPDA antenna calibration in the frequency range above 200 MHz.....	44
Figure 11	– Example of SIL versus antenna height measured at 200 MHz with two LPDA antennas in vertical polarization at 2,5 m distance between their midpoints above the reflecting ground plane of an OATS .....	45
Figure 12	– Illustration of distances of transmit horn to omni-directional receive antenna and reflective building, and transmitted signal paths A and B .....	45
Figure B.1	– Example of a test antenna .....	58
Figure B.2	– Diagram of the measurement of $S_{11}$ and $S_{12}$ , and of $S_{22}$ and $S_{21}$ , when generator and load are interchanged .....	59
Figure B.3	– Schematic diagram for determination of the insertion loss $A_1(f)$ .....	61
Figure B.4	– Schematic diagram for determination of the insertion loss $A_2(f)$ .....	61
Figure C.1	– Network model for $A_{i c}$ calculations .....	66
Figure C.2	– Equivalent circuit to the network in Figure C.1 .....	66
Figure C.3	– Definition of the mutual couplings, feed-terminal voltages and antenna currents of the antennas above the reflecting plane and their images .....	67
Figure C.4	– Cascade combination of the baluns and the site two-port network .....	74
Figure C.5	– Flow chart showing how SIL is obtained by combining the measured balun $S$ -parameters and the NEC calculated $S$ -parameters of the site two-port network .....	75
Figure F.1	– Field uniformity with height step 1 m to 2,6 m, normalized to field at 1,8 m height; monocone at 15 m range.....	90



Figure F.2 – Averaging of height steps, SAM, B.4.2 in CISPR 16-1-6:2014 .....	91
Table 1 – Summary of site validation methods by subclause number .....	9
Table 2 – Maximum tolerances for $d = 10$ m .....	18
Table 3 – Frequency and fixed receive antenna height data for SIL measurements at 24 frequencies, with $h_t = 2$ m and $d = 10$ m [specified in 4.4.2.3 and 4.4.2.4] .....	22
Table 4 – RSM frequency steps .....	25
Table 5 (informative) – Antenna heights for SIL measurements .....	26
Table 6 – Antenna set-up for the SIL measurement of the calibration site using horizontally polarized resonant dipole antennas (see also 4.4.4 for SIL at 250 MHz and 300 MHz) .....	31
Table 7 – Antenna heights .....	32
Table 8 – Example measurement uncertainty budget for SIL between two monopole antennas .....	36
Table 9 – Example measurement uncertainty budget for FAR validation method at and above 1 GHz .....	41
Table 10 – Example measurement uncertainty budget for the site validation method in 6.1.1 .....	46
Table 11 – Maximum tolerances for validation set-up at $d = 10$ m .....	49
Table A.1 – Example of fixed-length calculable dipole antennas and their subdivision of the frequency range 30 MHz to 1 000 MHz .....	51
Table A.2 – Receive antenna heights and centre frequencies .....	54
Table C.1 – Example numerical (analytical) calculation of $L_a$ , $A_{iC}$ (see C.1.4.2) .....	69
Table C.2 – Example numerical (analytical) calculation of $\Delta A_t$ (see C.1.4.3) .....	71
Table C.3 – Example numerical (analytical) calculation of $h_{rC}$ and $\Delta h_{rt}$ .....	72
Table C.4 – Example numerical (analytical) calculation of $f_C$ and $\Delta f_t$ .....	72
Table C.5 – MoM example calculation of $A_{iC}$ for vertical polarization, $h_t = 2$ m, except $h_t = 2,75$ m at 30 MHz, 35 MHz and 40 MHz .....	78

## 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 $\pm 1$ dB
2 CALTS or SAC <sup>a</sup>	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
<sup>a</sup> 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 1000 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]<sup>1</sup> 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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<sup>1</sup> Numbers in square brackets refer to the bibliography.