

TECHNICAL SPECIFICATION

CLC/TS 50217

SPECIFICATION TECHNIQUE

TECHNISCHE SPEZIFIKATION

August 2005

ICS 29.020

English version

**Guide for in situ measurements –
In situ measurement of disturbance emission**

Guide pour mesures in situ –
Mesure in situ des émissions
perturbatrices

Leitfaden für Messungen
am Aufstellungsort –
Störaussendungsmessungen
am Aufstellungsort

This Technical Specification was approved by CENELEC on 2004-07-31.

CENELEC members are required to announce the existence of this TS in the same way as for an EN and to make the TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

This Technical Specification was prepared by the Technical Committee CENELEC TC 210, Electromagnetic compatibility (EMC).

The text of the draft was submitted to the vote and was approved by CENELEC as CLC/TS 50217 on 2004-07-31.

The following date was fixed:

- latest date by which the existence of the CLC/TS
has to be announced at national level (doa) 2005-11-11
-

Content

| | Pages |
|---|-------|
| 1 Scope..... | 4 |
| 2 Normative references | 4 |
| 3 Definitions - Terms and abbreviations..... | 5 |
| 4 Overview of the methodology | 6 |
| 4.1 Measurement techniques..... | 6 |
| 4.2 Methodology in case of complaint..... | 9 |
| 5 Selection of measurement location and general condition..... | 10 |
| 5.1 General..... | 10 |
| 5.2 Frequency range up to 30 MHz..... | 10 |
| 5.3 Frequency range above 30 MHz..... | 10 |
| 5.4 Emission measurements in the presence of ambient signal | 11 |
| 6 Measurement of conducted emissions | 11 |
| 6.1 Disturbance below 9 kHz..... | 11 |
| 6.2 Disturbance in the frequency range 9 kHz to 30 MHz | 11 |
| 7 Measurement of radiated emissions | 12 |
| 7.1 General..... | 12 |
| 7.2 Frequency range above 9 kHz..... | 13 |
| 7.3 Field strength specific indoors measurement..... | 14 |
| 7.4 Radiated disturbance power in the frequency range above 30 MHz | 14 |
| 8 Measurement report | 14 |
| Annex A (informative) Investigation in case of complaint..... | 15 |
| A.1 Identification of the interference | 15 |
| A.2 Evaluation of the victim and characterisation of the source of interference | 20 |
| A.3 Evaluation of results..... | 22 |
| Annex B (informative) Protection of radio communications services | 24 |
| B.1 Radio services..... | 24 |
| B.2 Safety services..... | 25 |
| Annex C (informative) Measurement techniques | 26 |
| C.1 Rationale for excluding compliance testing | 26 |
| C.2 Measurement distance below 3 m..... | 26 |
| C.3 Active dipole | 31 |
| Annex D (informative) Low frequency phenomena | 32 |
| D.1 Measurement techniques for low frequency (below 9 kHz)..... | 32 |
| D.2 Disturbance emission from mains, or other power circuits | 32 |
| D.3 Measurement of conducted emissions | 32 |
| D.4 Radiated emission in the frequency range up to 9 kHz | 33 |
| Bibliography..... | 34 |

1 Scope

This guide describes analysis methods of disturbance emission to be applied in situ for identification of the disturbance source and resolution of complaint. Where applicable, the methods rely on already published documents either in CENELEC or in IEC. It is not intended to be used for type testing or any kind of conformity assessment.

Dealing with effects on living matter is excluded from this document.

The frequency range of interest is from d.c. to 400 GHz.

This document applies for analysing an interference complaint. It provides method for identification and characterisation in situ of the source(s) of interference. It proposes procedures to discriminate different kind of sources. Reference in situ measurement distances are defined. It allows comparison of the results and of technical characteristics of the interfered equipment with existing relevant standards. The result of the comparison is intended to help in the resolution of the complaint.

It is meant for verifying the emissions from fixed installations whatever equipment they contain, and whatever have been the type tests of these equipment. It may be used to describe the coupling path for interference between the victim and the source, and to compare the measurement results with the limits from the adequate standard, at a specific location and in a given frequency band.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 55011:1998, *Industrial, scientific and medical (ISM) radio-frequency equipment - Radio disturbance characteristics - Limits and methods of measurement* (CISPR 11:1997, mod.) [dow: 2001-01-01]

EN 55011:1998/A1:1999 (CISPR 11:1997/A1:1999) [dow: 2002-08-01]

EN 55011:1998/A2:2002 (CISPR 11:1997/A2:2002) [dow: 2005-10-01]

EN 55016-1-X, series, *Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-X: Radio disturbance and immunity measuring apparatus* (CISPR 16-1-X, series) [dow: 2007-09-01]

EN 55016-1-2:2004, *Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-2: Radio disturbance and immunity measuring apparatus - Ancillary equipment - Conducted disturbances* (CISPR 16-1-2:2003) [dow: 2007-09-01]

EN 55016-1-2:2004/A1:2005 (CISPR 16-1-2:2003/A1:2004) [dow: 2008-02-01]

EN 55016-2-X, series, *Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-X: Methods of measurement of disturbances and immunity* (CISPR 16-2-X, series) [dow: 2007-09-01]

EN 55016-2-1:2004, *Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-1: Methods of measurement of disturbances and immunity - Conducted disturbance measurements* (CISPR 16-2-1:2003) [dow: 2007-09-01]

EN 55016-2-1:2004/A1:2005 (CISPR 16-2-1:2003/A1:2005) [dow: 2008-08-01]

EN 55022:1998 + corrigendum July 2003, *Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement* (CISPR 22:1997, mod.) [dow: 2005-08-01]

EN 55022:1998/A1:2000 + corrigendum April 2003 (CISPR 22:1997/A1:2000) [dow: 2005-08-01]

EN 55022:1998/A2:2003 (CISPR 22:1997/A2:2002) [dow: 2005-12-01]

EN 61000-2-4:2002, *Electromagnetic compatibility (EMC) - Part 2-4: Environment - Compatibility levels in industrial plants for low-frequency conducted disturbances* (IEC 61000-2-4:2002) [dow: 2005-09-01]

ETSI EN 300 386:2001, *Electromagnetic compatibility and Radio spectrum Matters (ERM); Telecommunication network equipment; ElectroMagnetic Compatibility (EMC) requirements*

CISPR 18-2:1986, *Radio interference characteristics of overhead power lines and high-voltage equipment - Part 2: Methods of measurement and procedure for determining limits*

CISPR 18-2:1986/A1:1993

CISPR 18-2:1986/A2:1996

NOTE See also the bibliography.

3 Definitions - Terms and abbreviations

For the purpose of this document, the following definitions as well as the definitions of IEC 60050-161 apply, see particularly electromagnetic disturbance (161-01-05) and electromagnetic interference (161-01-06).

3.1

AMN

Artificial Mains Network

3.2

antenna reference point

geometric centre of the antenna or the reference point referred to in the antenna calibration procedure

3.3

characterised interference

interference the origin of which is an identified electromagnetic phenomena, and for which the disturbance level at a given point is characterised by a collection of technical data for example the spectrum

3.4

deviation from intended use regarding EMC

installation and/or operation of a device, equipment or system, deviating from the instructions of the manufacturer given in the user's manual

NOTE The installation refers to both the defined environment and electrical conditions including cabling.

3.5

distribution point

point on a data and communication network inside a system or an installation, electrically nearest to a particular communication equipment or terminal, at which other equipment or terminals are, or could be, connected

3.6

fixed installation

a particular combination of several types of apparatus and, where applicable, other devices, which are assembled, installed and intended to be used permanently at a predefined location

3.7

in-plant point of coupling (IPC)

point on a network inside a system or an installation, electrically nearest to a particular load, at which other loads are, or could be, connected [EN 61000-2-4]

NOTE The IPC is usually the point for which electromagnetic compatibility is to be considered.

3.8

point of common coupling (PCC)

point on a public power supply network, electrically nearest to a particular load, at which other loads are, or could be, connected [IEV 161-07-15, modified, EN 61000-2-4]

3.9

reference distance (for in situ measurement)

distance at which in situ measurement is performed in case of complaint, it is measured along a perpendicular line from the antenna reference point to a surface

NOTE 1 Two different values are defined according to the frequency range.

NOTE 2 The surface for measurement depends on different conditions.

3.10

system

set of interrelated elements considered in a defined context as a whole and separated from their environment [IEV 351-11-01]

NOTE 1 Such elements may be both material objects and concepts as well as the results thereof (e.g. forms of organisation, mathematical methods, programming languages).

NOTE 2 The system is considered to be separated from the environment and from the other external systems by an imaginary surface, which cuts the links between them and the system.

NOTE 3 For the purpose of this standard, the elements of the system are material objects: devices, equipment or sub-systems. They are interrelated for achieving an objective which is the performance of a function or a set of functions.

3.11

victim

interfered equipment having caused the complaint

4 Overview of the methodology

4.1 Measurement techniques

4.1.1 General

According to the established and standardised practice Figure 1 summarises the methods of measurement depending on the frequencies investigated.

The three frequency bands make the fundamental distinction to allow the analysis of the disturbance emission and the identification of the coupling path. They correspond to adapted measurement techniques.