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TECHNICAL REPORT

INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

Radio interference characteristics of overhead power lines and high-voltage equipment – Part 2: Methods of measurement and procedure for determining limits

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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Part 2: Methods of measurement and procedure for determining limits

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The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

CISPR 18-2, which is a technical report, has been prepared by CISPR subcommittee B: Interference relating to industrial, scientific and medical radio-frequency apparatus, to other (heavy) industrial equipment, to overhead power lines, to high voltage equipment and to electric traction.

This second edition cancels and replaces the first edition published in 1986. It is a technical revision.

This edition includes the following significant technical changes with respect to the previous edition: while the first edition of CISPR 18-2 only considered the direct distance D_0 for the establishment of standard profiles for the lateral radio noise field emanating from HV overhead power lines, this second edition now also allows for use of the lateral distance y_0 for these purposes. This way it allows for conduction of on-site measurements and simplified recording and use of measurement data obtained at lateral distances y slant to the pathway of modern HV and UHV overhead power line constructions with tall suspension towers.

The text of this technical report is based on the following documents:

DTR	Report on voting
CISPR/B/494/DTR	CISPR/B/502/RVC

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

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

A list of all parts of the CISPR 18 series can be found, under the general title *Radio interference characteristics of overhead power lines and high-voltage equipment*, on the IEC website.

The committee has decided that the contents of this 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.

A bilingual version of this publication may be issued at a later date.

INTRODUCTION

This technical report forms the second of a three-part publication dealing with radio noise generated by electrical power transmission and distribution facilities (overhead lines and substations). It contains recommendations for conduction of on-site measurements of electromagnetic noise fields in the vicinity of high-voltage (HV) overhead power lines and substations and for determination of limits for protection of radio reception.

The recommendations given in this part 2 of the CISPR 18 series are intended to be a useful aid to engineers involved in maintenance of overhead lines and substations and also to anyone concerned with checking the radio noise performance of a line to ensure satisfactory protection of radio reception. Information on the physical phenomena involved in the generation of electromagnetic noise fields is found in CISPR/TR 18-1. It also includes the main properties of such fields and their numerical values. CISPR/TR 18-3 eventually contains a Code of Practice for minimizing the generation of radio noise.

This second edition of CISPR/TR 18-2 was adapted to the modern structure and content of technical reports issued by IEC. The first edition of CISPR 18-2 underwent thorough edition and adaptation to modern terminology. Furthermore its content was adjusted such as to allow for use of the lateral distance *y* for the conduction of measurements in the field.

The CISPR 18 series does not deal with biological effects on living matter or any issues related to exposure in electromagnetic fields.

The main content of this technical report is based on historical CISPR Rec. No. 56 given below:

RECOMMENDATION No. 56

METHODS OF MEASUREMENT OF RADIO INTERFERENCE CAUSED BY OVERHEAD POWER LINES AND HIGH-VOLTAGE EQUIPMENT AND THE PROCEDURE FOR DETERMINING LIMITS

The CISPR

CONSIDERING

a) that a general description of the radio interference characteristics of overhead power lines and high-voltage equipment has been published in CISPR 18-1,

b) that the methods of measurement of these characteristics need to be established,

c) that national authorities require guidance on the procedure for determining limits of such radio interference.

RECOMMENDS

That the latest edition of CISPR/TR 18-2, including amendments, be used for methods of measurement of radio interference characteristics of overhead power lines and high-voltage equipment and for procedures for determining limits.

CISPR/TR 18-1 describes the main properties of the physical phenomena involved in the production of disturbing electromagnetic fields by overhead lines and provides numerical values of such fields.

In CISPR/TR 18-2 methods of measurement and procedures for determining limits of such radio interference are recommended.

The methods of measurement in CISPR/TR 18-2 detail the techniques and procedures for use when measuring fields on site near to an overhead line and also the techniques and procedures for making laboratory measurements of interference voltages and currents generated by line equipment and accessories.

The procedures for determining limits define the expected values of radio noise field and the width of the "disturbed" corridor following the route of the line.

This corridor takes into account the effective field strength of the wanted signal, the signal-to-noise ratio selected and the expected strength of the noise field for a given line.

The procedures are only valid for long and medium waves as the procedures applicable to VHF frequency-modulation broadcasting have not yet been decided, due to insufficient knowledge.

It is emphasized that this part of CISPR 18 does not specify a single set of limits to be applied internationally. Rather it details the procedures to enable national authorities to specify limits where it is decided there is a need for regulations.

RADIO INTERFERENCE CHARACTERISTICS OF OVERHEAD POWER LINES AND HIGH-VOLTAGE EQUIPMENT –

Part 2: Methods of measurement and procedure for determining limits

1 Scope

This part of CISPR 18, which is a technical report, applies to radio noise from overhead power lines and high-voltage equipment which may cause interference to radio reception.

The frequency range covered is 0,15 MHz to 300 MHz.

A general procedure for establishing the limits of the radio noise field from the power lines and equipment is recommended, together with typical values as examples, and methods of measurement.

The clause on limits concentrates on the low frequency and medium frequency bands and it is only in these bands where ample evidence, based on established practice, is available. No examples of limits to protect radio reception in the frequency band 30 MHz to 300 MHz have been given, as measuring methods and certain other aspects of the problems in this band have not yet been fully resolved. Site measurements and service experience have shown that levels of noise from power lines at frequencies higher than 300 MHz are so low that interference is unlikely to be caused to television reception.

The values of limits given as examples are calculated to provide a reasonable degree of protection to the reception of broadcasting at the boundary of the recognized service areas of the appropriate transmitters in the radio frequency bands used for a.m. broadcasting, in the least favourable conditions likely to be generally encountered. These limits are intended to provide guidance at the planning stage of the line and national standards or other specifications against which the performance of the line may be checked after construction and during its useful life.

The measuring apparatus and methods used for checking compliance with limits should comply with the respective CISPR specifications, as e.g. the basic standards series CISPR 16, see [1]*.

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.

IEC 60050-161, *International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility*

IEC 60060-2, *High-voltage test techniques – Part 2: Measuring systems*

* The figures in square brackets refer to the Bibliography.

CISPR 16-1-1, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus*

CISPR 16-4-3, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-3: Uncertainties, statistics and limit modelling – Statistical considerations in the determination of EMC compliance of mass-produced products*

CISPR/TR 18-1:2010, *Radio interference characteristics of overhead power lines and high-voltage equipment – Part 1: Description of phenomena*

CISPR/TR 18-3:2010, *Radio interference characteristics of overhead power lines and high-voltage equipment – Part 3: Code of practice for minimizing the generation of radio noise*

ISO/IEC Guide 99, *International vocabulary of metrology – Basic and general concepts and associated terms (VIM)*

NOTE Informative references are listed in the Bibliography.