INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE

Radio interference characteristics of overhead power lines and high-voltage equipment –
Part 1: Description of phenomena
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FOREWORD

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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 18-1, 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 1982. 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 18-1 only covered 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 the establishment of standard profiles for the lateral radio noise field also from modern HV overhead power line constructions with tall suspension towers.

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

<table>
<thead>
<tr>
<th>DTR</th>
<th>Report on voting</th>
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</thead>
<tbody>
<tr>
<td>CISPR/B/493/DTR</td>
<td>CISPR/B/501/RVC</td>
</tr>
</tbody>
</table>

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 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.

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

This technical report forms the first of a three-part publication dealing with radio noise generated by electrical power transmission and distribution facilities (overhead lines and substations). It contains information in relation of the physical phenomena involved in the generation of electromagnetic noise fields. It also includes the main properties of such fields and their numerical values. Its content was adjusted such as to allow for use of the lateral distance \( y \) for the establishment of standard profiles for the lateral radio noise field emanating from HV overhead power lines.

The technical data given in this part 1 of the CISPR 18 series are intended to be a useful aid to overhead line designers and also to anyone concerned with checking the radio noise performance of a line to ensure satisfactory protection of wanted radio signals. The data should facilitate the use of the recommendations given in its parts 2 and 3 dealing with

- methods of measurement and procedures for determining limits, and a
- code of practice for minimizing the generation of radio noise.

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

This technical report has been prepared in order to provide information on the many factors involved in protecting the reception of radio and television broadcasting from interference due to high voltage overhead power lines and associated equipment. The information given should be of assistance when means of avoiding or abating radio noise are being considered.

Information is mainly given on the generation and characteristics of radio noise from a.c. power lines and equipment operating at 1 kV and above, in the frequency ranges 0,15 MHz to 30 MHz (a.m. sound broadcasting) and 30 MHz to 300 MHz (f.m. sound broadcasting and television broadcasting). The special aspect of spark discharges due to bad contacts is taken into account. Some information is also given on interference due to d.c. overhead lines for which corona and interference conditions are different from those of a.c. power lines.

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

The clause on limits concentrates on the low frequency and medium frequency bands as it is only in these where ample evidence, based on established practice, is available. No examples of limits to protect 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 edges of the recognized service areas of the appropriate transmitters in the a.m. radio frequency bands, 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.

Recommendations are made on the design, routing, construction and maintenance of the lines and equipment forming part of the power distribution system to minimize interference and it is hoped that this publication will aid other radio services in the consideration of the problems of interference.
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 scope of this publication includes the causes, measurement and effects of radio interference, design aspects in relation to this interference, methods and examples for establishing limits and prediction of tolerable levels of interference from high voltage overhead power lines and associated equipment, to the reception of radio broadcast services.

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

Radio frequency interference caused by the pantograph of overhead railway traction systems is not considered in this technical report.

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*


CISPR/TR 18-2:2010, *Radio interference characteristics of overhead power lines and high-voltage equipment – Part 2: Methods of measurement and procedure for determining limits*


NOTE Informative references are listed in the Bibliography.