

An American National Standard

IEEE Standard Procedures for the Measurement of Radio Noise from Overhead Power Lines and Substations

Sponsor
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of the
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Foreword

(This Foreword is not a part of ANSI/ IEEE Std 430-1986, IEEE Standard Procedures for the Measurement of Radio Noise from Overhead Power Lines and Substations.)

This standard was first issued as a trial-use standard in 1972 after a period of approximately 10 years in development. It became a full standard in 1976.

Experience with the previous edition of this standard indicated that a number of revisions and improvements were needed. The Accredited Standards Committee C63 on Radio-Electrical Coordination had adopted the IEC (International Electrotechnical Commission) CISPR (International Special Committee on Radio Interference) specifications for interference measuring apparatus for the frequency range 0.15–30 MHz. In addition, there was a need for the standard to be more specific as to measuring both the electric and magnetic field and as to what the measurement units should be. The previous version primarily covered ac lines, whereas this revision applies to both ac and dc lines. The section from 30–1000 MHz has been expanded to cover both short-term and long-term surveys. Because of the need for conducting radio noise measurements around substations, two trial-use sections have been added to cover the frequency range 0.010–30 MHz and 30–1000 MHz.

This standard was developed by a task force of the Radio Noise Working Group of the Corona and Field Effects Subcommittee. This task force had the following membership:

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IEEE Standard Procedures for the Measurement of Radio Noise from Overhead Power Lines and Substations

1. Purpose and Scope

The primary purpose of this standard is to establish uniform procedures for the measurement of radio noise generated by corona from overhead power lines with meters that conform to ANSI C63.2-1980 [1].¹ A uniform procedure is a prerequisite to comparisons or validation, or both, of the radio noise performance of various overhead power lines and substations. Measurement procedures in this standard are also valid for other power-line noise sources such as gaps and harmonics; however, most of the precautionary information, analysis, and data plotting techniques were written and developed primarily for corona discharges. The procedures are not valid for measuring transient radio noise sources that occur during breaker or disconnect switching operations. The procedure applies in the frequency range of 0.010–1000 MHz; however, the emphasis is on the standard amplitude-modulation broadcasting (0.535–1.605 MHz) and television broadcasting (54–72 MHz, 76–88 MHz, 174–216 MHz, and 470–906 MHz) bands. The procedures described for measurements in and near substations are suggested procedures at this time until further information is obtained. This standard is applicable to both ac and dc transmission lines and substations.

2. References

The following publications shall be used in conjunction with this standard. When American National Standards referred to in this standard are superseded by a revision approved by the American National Standard Institute, Inc, the revision shall apply.

[1] ANSI C63.2-1980, American National Standard Specifications for Electromagnetic Noise and Field-Strength Instrumentation, 10 kHz to 1 GHz.²

[2] ANSI/IEEE Std 100-1984, IEEE Standard Dictionary of Electrical and Electronics Terms.

[3] ANSI/IEEE Std 539-1979, IEEE Standard Definitions of Terms Relating to Overhead-Power-Line Corona and Radio Noise.

[4] IEC/CISPR Pub 16-1977, Specifications for Radio Interference Measuring Apparatus and Measurement Methods.³

¹The numbers in brackets correspond to those of the references listed in Section 2

²ANSI publications are available from the Sales Department, American National Standards Institute, 1430 Broadway, New York, NY 10018.

³IEC publications are available in the US from the Sales Department, American National Standards Institute, 1430 Broadway, New York, NY 10018.

- [5] IEEE Std 291-1969, IEEE Standards Report on Measuring Field Strength in Radio Wave Propagation.⁴
- [6] IEEE Std 473-1985, IEEE Recommended Practice for an Electromagnetic Site Survey (10 kHz to 10 GHz).
- [7] SAE Pub ARP 958, Broadband Electromagnetic Interference Measurement Antennas; Standard Calibration Requirements and Methods.⁵
- [8] IEEE Committee Report. Correlation of Various RI Meters and Reading Comparison of RI Meter Operators on a 735-kV Line. *IEEE Transactions on Power Apparatus and Systems*, vol PAS-87, no 5, May 1968, pp 1249–1259.
- [9] IEEE Committee Report. A Field Comparison of RI and TVI Instrumentation. *IEEE Transactions on Power Apparatus and Systems*, vol PAS-96, no 3, May/June 1977, pp 863–875.

3. Definitions

For additional definitions see ANSI/IEEE Std 100-1984 [2] and ANSI/IEEE Std 539-1979 [3].

background noise: The total system noise independent of the presence or absence of radio noise from the power line or substation.

NOTE — Background noise is presumed to be reduced to a level of insignificance.

impulse bandwidth: The peak value of the response envelope divided by the spectrum amplitude of an applied impulse.

lateral profile: The radio noise field strength at ground level plotted as a function of the horizontal distance from, and at a right angle to, the power line conductors.

longitudinal profile: The radio noise field strength at ground level measured at constant horizontal distance from the power line and plotted as a function of distance along the line.

radio noise: Any unwanted disturbance within the radio frequency band, such as undesired electromagnetic waves in any transmission channel or device.

radiated noise: Radio noise energy in the form of an electromagnetic field including both the radiation and induction components of the field.

4. Measuring Instrumentation

4.1 Radio Noise and Field Strength Meter

Radio noise meters employed shall conform to requirements of ANSI C63.2-1980 [1]. In the frequency range of 0.15–30 MHz, ANSI C63.2-1980 [1] allows the use of two quasi-peak (QP) detectors. The preferred QP detector has a 1 ms charge and 160 ms discharge time constant, a 9 kHz bandwidth, and conforms to the requirements of IEC/CISPR Pub 16-1977 [4]. Measurements of power line noise made with the optional QP detector, which has 1 ms charge and 600 ms discharge time constants and a 4.5 kHz bandwidth, shall be reduced by 2 dB to agree with CISPR QP [8], [9]. Table 1, which was derived from ANSI C63.2-1980 [1], shows the nominal circuit time constants and bandwidths for the entire frequency range of 0.010–1000 MHz.

⁴IEEE publications are available from the Sales Department, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854.

⁵SAE publications are available from the Society of Automotive Engineers, Inc, 400 Commonwealth Drive, Warrendale, PA 15096.