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IEEE Recommended Practice for the Measurement of Radio Frequency Emission from Industrial, Scientific, and Medical (ISM) Equipment Installed on User's Premises

Sponsor

**Electromagnetic Compatibility Society Standards Committee
of the
IEEE Electromagnetic Compatibility Society**

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Foreword

(This Foreword is not a part of ANSI/IEEE Std 139-1988 IEEE Recommended Practice for the Measurement of Radio Frequency Emission From Industrial, Scientific, and Medical (ISM) Equipment Installed on User's Premises.)

This is a major revision of IEEE Std 139-1952 . It recommends procedures for measuring the radio frequency (rf) energy emitted by industrial, scientific, and medical (ISM) equipment installed, ready for use, in the user's plant or laboratory.

The reader is assumed to be skilled in measuring radio frequency electromagnetic fields and familiar with the measurement equipment used.

This standard recommends techniques for measuring emissions from ISM equipment installed, ready for use, or actually being used, on user's premises; it is not intended for testing equipment on a test site, or as it comes off a production line. While there may be similarities in the measurement of emissions under these two conditions, there are major differences also. Some differences are:

- 1) The ISM equipment measured on user's premises may have been modified. These modifications may not always have the careful quality control that it is reasonable to expect from new equipment manufactured on a production line. Therefore, this standard provides more testing for prototype verification of compliance than might be considered necessary in a production environment. Hence the recommendation that all equipment be inspected, and its emission spectrum checked, with the "prototype" machines being subjected to more thorough emission tests.
- 2) The emission from installed ISM equipment may interact with emissions from other rf equipment installed nearby, generating spurious emissions at heterodyne, harmonically related, and other frequencies. The emission at these frequencies must also be checked.

At the time this standard was approved, the Working Group on ISM Equipment Emission Measurements had the following membership:

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An American National Standard

IEEE Recommended Practice for the Measurement of Radio Frequency Emission from Industrial, Scientific, and Medical (ISM) Equipment Installed on User's Premises

1. Scope

This document describes equipment inspection and radio frequency (rf) electromagnetic field measurement procedures for evaluation of rf industrial, scientific, and medical (ISM) equipment installed in the user's facility. The term, "ISM equipment," as used here, includes equipment that generates rf energy for purposes other than radio communications, to cause physical, chemical, or biological changes; for example, industrial heaters (dielectric and induction), medical diathermy, ultrasonic equipment, rf plasma devices, and rf stabilized welders. These procedures are designed to help ensure that the equipment does not interfere with radio communications, navigation, and other essential radio services. The engineer responsible for the measurements should take all reasonable precautions to ensure that the maximum emission from the ISM equipment under test (EUT) has been measured.

Radio frequency field-strength measurements of installed ISM equipment may be required if any of the following conditions exist:

- 1) The emission from the EUT was not measured by the manufacturer.
- 2) Because of its size or special operating conditions, the EUT could not be tested before installation.
- 3) Installed ISM equipment is suspected of causing interference.
- 4) ISM equipment has been modified in a way that could affect its rf emissions.
- 5) As the equipment ages, there is a question about its continued compliance.
- 6) There is a question about the safety to nearby personnel because of the emissions from the equipment.

Measurements should be made under the direction of an engineer skilled in making and interpreting rf field-strength measurements. These measurements are made after the equipment is installed and ready for use at its place of use, and after it has been inspected as described in 2.2. The measurement report should generally be kept on file for at least three years after new measurements are made or after the equipment is no longer in use.

There are significant differences between the "open field" or anechoic chamber measurements common in electromagnetic compatibility (EMC) and electromagnetic interference (EMI) work and the on-site measurements of installed ISM equipment. Some of these differences are described below.

- 1) The measurement conditions are usually more difficult because of crowded measurement locations, reflections from surrounding walls and equipment, and signals from other sources.