

IEEE Standard for Radio-Frequency Energy and Current-Flow Symbols

Sponsor

**IEEE Standards Coordinating Committee 28 on
Non-Ionizing Radiation**

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Abstract: Symbols to inform people about the presence of potentially hazardous levels of radio-frequency energy or the presence of contact current hazards in the frequency range of 3 kHz to 300 GHz are specified. Guidance is given about how these symbols should be used on warning signs and labels.

Keywords: caution, contact current, danger, hazard, labels, microwave, radio frequency, shock, signs, symbol, warning

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Introduction

(This introduction is not part of IEEE Std C95.2-1999, IEEE Standards for Radio-Frequency Energy and Current-Flow Symbols.)

In 1960, the American Standards Association approved the initiation of the Radiation Hazards Standards project under the co-sponsorship of the Department of the Navy and the Institute of Electrical and Electronics Engineers.

Prior to 1988, C95 standards were developed by an Accredited Standards Committee and submitted to ANSI for approval and issuance as ANSI C95 standards. Between 1988 and 1990, the committee was converted to Standards Coordinating Committee 28 (SCC28) under the sponsorship of the IEEE Standards Board. In accordance with policies of the IEEE, C95 standards will be issued and developed as IEEE standards, as well as being submitted to ANSI for recognition.

The present scope of IEEE SCC28 is:

“Development of standards for the safe use of electromagnetic energy in the range of 0 Hz to 300 GHz relative to the potential hazards of exposure of man, volatile materials, and explosive devices to such energy. It is not intended to include infrared, visible, ultraviolet, or ionizing radiation. The committee will coordinate with other committees whose scopes are contiguous with SCC28.”

The IEEE SCC28 is responsible for this standard. There are five subcommittees concerned with

- I Techniques, Procedures, and Instrumentation
- II Terminology, Units of Measurements, and Hazard Communication
- III Safety Levels with Respect to Human Exposure, 0–3 kHz
- IV Safety Levels with Respect to Human Exposure, 3 kHz–300 GHz
- V Safety Levels with Respect to Electro-Explosive Devices

Two standards, two guides, and one recommended practice have been issued. Current versions are

IEEE Std C95.1, 1999 Edition, IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz (incorporating IEEE Std C95.1-1991 and IEEE Std C95.1a-1998).

ANSI C95.2-1982 (Reaff 1988), American National Standard Radio Frequency Radiation Hazard Warning Symbol.

IEEE Std C95.3-1991 (Reaff 1997), IEEE Recommended Practice for the Measurement of Potentially Hazardous Electromagnetic Fields—RF and Microwave. (Replaces ANSI C95.3-1973 and ANSI C95.5-1981.)

ANSI C95.3-1973 (Reaff 1979), American National Standard Techniques and Instrumentation for the Measurement of Potentially Hazardous Electromagnetic Fields—RF and Microwave.

ANSI C95.5-1981, American National Standard Recommended Practice for the Measurement of Hazardous Electromagnetic Fields—RF and Microwave.

IEEE Std 1460-1996, IEEE Guide for the Measurement of Quasi-Static Magnetic and Electric Fields.

ANSI C95.4-1971, American National Standard Safety Guide for the Prevention of Radio-Frequency Radiation Hazards in the Use of Electric Blasting Caps.

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IEEE Std C95.2-1999 was prepared by Subcommittee II on Terminology, Units of Measurements, and Hazard Communication of IEEE SCC28. The following persons participated in the Subcommittee II Working Group that approved this standard:

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IEEE Standard for Radio-Frequency Energy and Current-Flow Symbols

1. Overview

1.1 Scope

This standard defines the design of symbols denoting the incidence of radio-frequency (RF) electromagnetic energy in the frequency range from 3 kHz to 300 GHz. The standard also defines the use of these symbols in signs and labels intended to warn workers or the public of the presence of potentially hazardous levels of RF energy and other hazards that may arise from RF energy, such as RF induced currents, shocks, or burns. Guidance on the application and placement of these signs in operational settings is not within the scope of this document.

1.2 General

The purpose of this revision is to be consistent with the ANSI Z535 series¹ of standards addressing the design and use of environmental warning signs and labels, and IEEE Std C95.1, 1999 Edition. This standard addresses environmental and facility safety signs, and product safety signs and labels where the symbols specified in this standard may be used. Accident prevention tags are not addressed here because accident prevention tags used for protection against RF energy have no unique features. (See ANSI Z535.5-1998 for guidance concerning accident prevention tags.) This standard provides a single reference source for the design of signs and labels for RF hazards.

2. References

This standard shall be used in conjunction with the following publications. When the following publications are superseded by an approved revision, the revision shall apply. The safety level of RF energy with respect to personnel is contained in IEEE Std C95.1, 1999 Edition.

ANSI Z535.1-1998, American National Standard for Safety Color Code.²

ANSI Z535.2-1998, American National Standard for Environmental and Facility Safety Signs.

¹Information on references can be found in Clause 2.

²ANSI publications are available from the Sales Department, American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036, USA (<http://www.ansi.org/>).

ANSI Z535.3-1998, American National Standard for Criteria for Safety Symbols.

ANSI Z535.4-1998, American National Standard for Product Safety Signs and Labels.

ANSI Z535.5-1998, American National Standard for Accident Prevention Tags (for Temporary Hazards).

IEEE Std 100-1996, IEEE Standard Dictionary of Electrical and Electronics Terms.³

IEEE Std C95.1, 1999 Edition, IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

3. Definitions

For the purposes of this standard, the following terms and definitions apply. IEEE Std 100-1996 should be referenced for terms not defined in this clause.

3.1 hazardous levels of radio-frequency (RF) energy: Term used to describe incident RF energy that may be biologically detrimental or may directly or indirectly cause ignition of explosive materials or vapors.

3.2 radio-frequency (RF) energy: Includes RF fields and radiation with frequencies between 3 kHz and 300 GHz, and includes microwave frequencies.

3.3 safety sign: A visual alerting device in the form of a sign, label, decal, placard, or other marking that advises the observer of the nature and degree of the potential hazard(s), which can cause injury or death. It can also provide safety precautions or evasive actions to take, or provide other directions to eliminate or reduce the hazard.

3.4 signal word: The word or words that designate a degree of safety alerting. The words shall always be located in a distinctive panel located in the uppermost portion of a safety sign or label.

3.5 symbol(s): The radio-frequency (RF) energy and/or the RF current advisory symbols.

3.5.1 radio-frequency (RF) electric current hazard advisory symbol: Refers to the overall design and shape shown in Figure 1.



Figure 1—RF electric current hazard advisory symbol

³IEEE publications are available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA (<http://www.standards.ieee.org/>).