



ANSI/NEMA C37.85-2002 (R2010)

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# American National Standard for AC High- Voltage Power Vacuum Interrupters - Safety Requirements for X- Radiation Limits



**National Electrical Manufacturers Association**  
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**ANSI C37.85-2002 (R2010)**

**American National Standard  
for Switchgear—**

**Alternating-Current  
High-Voltage Power Vacuum  
Interrupters—**

**Safety Requirements  
for X-Radiation Limits**





**ANSI C37.85-2002 (R2010)**  
Revision of  
ANSI C37.85-1989

American National Standard  
for Switchgear—  
**Alternating-Current High-Voltage  
Power Vacuum Interrupters—  
Safety Requirements for X-Radiation Limits**

Secretariat:

**National Electrical Manufacturers Association  
Institute of Electrical and Electronics Engineers**

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**Foreword** (This Foreword is not part of American National Standard C37.85-2002.)

This standard was developed initially by a task force of the NEMA Switchgear Section as a result of an industry study undertaken at the request of the Bureau of Radiological Health in order to meet the need as set forth in Public Law 90-602, identified as Radiation Control for Health and Safety Act of 1968.

Upon completion, the initial proposal was submitted to the American National Standards Committee C37 on Power Switchgear for further development and to obtain a consensus as an American National Standard. It was approved on April 28, 1972 as American National Standard for Safety Requirements for X-Radiation Limits for AC High-Voltage Power Vacuum Interrupters Used in Power Switchgear, ANSI C37.85-1972.

This standard set forth performance requirements relative to X-radiation emission and methods of test for high-voltage vacuum switching devices. The 1989 revision incorporated higher-voltage vacuum interrupters that have been developed, tested, and placed into service since the 1972 adoption of the standard. This revision incorporates editorial and minor technical changes from the 1989 version.

- “Dielectric withstand voltage test” (and similar phrases) have been changed to “power-frequency withstand voltage test” (or similar phrasing) throughout.
- ANSI/NBS 114-1974 has been superseded by ANSI N43.3-1993.
- Table 1 has been modified to add categories for 4.76kV, 8.25kV, and 15kV, so as to coordinate with the apparatus standards.
- Clause 7 has been modified to better conform to ANSI Z535.4, and to allow some latitude in the language and the placement of the label.
- Annex A incorporates some minor updates to reflect that this is now the third edition of the document, but nothing major was changed.
- The allowable limits for radiation are based on the occupational dose limits established by 10CFR835 for general employees, 5.0 rem (0.05 sievert) per year for the whole body. The limits for selected tissues and organs are much higher.
- Radiation exposures have been historically measured in rem units, and most of the references still use this unit of measure. Another unit of measure, the sievert (Sv) is coming into use as the SI unit of dose equivalent, but use of this unit is still not common. Therefore, it has been deemed reasonable to maintain all measures in terms of rem.
- For convenience, a few conversions among the more commonly used units are listed here:
  - 0.5 rem (roentgen equivalent man) = 5 mSv (millisievert) = 500 mR (milliroentgen)
  - 1 mR = 0.01 mSV
  - 1 R = 10 mSV

Suggestions for improvement of this standard will be welcome. They should be sent to the National Electrical Manufacturers Association, Inc, 1300 North 17<sup>th</sup> Street, Suite 1752, Rosslyn, VA 22209.

This standard was processed and approved for submittal to ANSI by Accredited Standards Committee on Power Switchgear, C37. Committee approval of the standard does not necessarily imply that all members voted for its approval. At the time it approved this standard, the C37 Committee had the following members:

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## Alternating-Current High-Voltage Power Vacuum Interrupters— Safety Requirements for X-Radiation Limits

### 1      General

This standard specifies the maximum permissible X-radiation emission from alternating-current high-voltage power vacuum interrupters that are intended to be operated at voltages above 1000 volts and up to 38,000 volts when tested in accordance with procedures described in this standard.

#### NOTES—

The test procedures prescribed in this standard are not necessarily applicable for higher-voltage vacuum interrupters.

In this standard, the term “interrupter” signifies “high-voltage power vacuum interrupter,” unless qualified by other descriptive terms.

### 2      Related American National Standards

The following standards are listed for information only and are not essential to complete the requirements of this standard.

ANSI N43.3-1993, General Radiation Safety - Installations Using Non-Medical X-Ray and Sealed Gamma-Ray Sources, Energies up to 10 MeV

ANSI/IEEE C37.100-1992, Definitions for Power Switchgear

### 3      Definitions

The definitions and terms contained in this standard, or in other American National Standards referred to in this standard, are not intended to embrace all legitimate meanings of the terms. They are applicable only to the subject treated in this standard. For additional definitions of terms used in this standard, see ANSI/IEEE C37.100-1992. An asterisk (\*) following a definition indicates that, at the time this standard was approved, there was no corresponding definition in ANSI/IEEE C37.100-1992.

**conformance tests:** Those tests that are specifically made to demonstrate the conformity of switchgear or its component parts with applicable standards.

**high-voltage power vacuum interrupter:** An interrupter in which the separable contacts function within a single evacuated envelope and that is intended for use in power switchgear.\*

**maximum interrupter operating voltage:** The highest steady-state alternating-current rms operating voltage that will appear across the open contacts of a vacuum interrupter in its application.\*

NOTE—The maximum interrupter operating voltage is a function of the highest system voltage on which a switchgear device employing vacuum interrupters is to be applied, the number of interrupters used in series, and whether the device is single-phase or three-phase.

**milliroentgen (mR):** The amount of X-radiation that produces  $2.58 \times 10^{-7}$  coulombs per kilogram of air.\*