C37.90™

# IEEE Standard for Relays and Relay Systems Associated with Electric Power Apparatus

## IEEE Power Engineering Society

Sponsored by the
Power System Relaying Committee

IEEE
3 Park Avenue
New York, NY 10016-5997, USA

31 January 2006

**IEEE Std C37.90™-2005**
(Revision of
IEEE Std C37.90-1989)

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# IEEE Standard for Relays and Relay Systems Associated with Electric Power Apparatus

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**Power System Relaying Committee**
**of the IEEE Power Engineering Society**

Approved 22 September 2005
Reaffirmed 31 March 2011

**IEEE-SA Standards Board**

Approved 23 May 2012

**American National Standards Institute**

**Abstract:** Service conditions, electrical ratings, thermal ratings, and testing requirements are defined for relays and relay systems used to protect and control power apparatus. This standard establishes a common reproducible basis for designing and evaluating relays and relay systems.
**Keywords:** ac component in dc, contact rating, current range, derating, dielectric test, humidity, impulse test, insulation test, power apparatus, protection relay, temperature range, temperature rise, voltage range

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Print: ISBN 0-7381-4818-0 SH95381
PDF: ISBN 0-7381-4819-9 SS95381

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# Introduction

This introduction is not part of IEEE Std C37.90-2005, IEEE Standard for Relays and Relay Systems Associated with Electric Power Apparatus.

This revision of IEEE Std C37.90 contains significant changes in content and organization so it will harmonize more closely with currently published IEC standards whenever possible. The standard has also been updated to include many changes to provide for a more effective document that is now representative of currently manufactured relay products used in the industry. The changes are as described in the following list.

a) Clause 2, Normative references, has been added where required.

b) Clause 3, Definitions, has been revised to provide for alphabetical classification by function.

c) Clause 4, Service conditions, has been revised to provide categories for specific temperature ranges and differentiation of ambient and extreme temperature ranges. Relative humidity now specifies relay or relay systems. Other conditions have been changed to show numeric designations.

d) Clause 5, Electrical ratings, specifies additional standard current and voltage ratings and notes, applicable to Table 3. Table 4 specifies additional maximum design voltages for dc control. Table 7 and Table 8 specify coil resistance/burden at ambient temperature 25 °C. A subclause has been added to address latching current requirements.

e) Clause 6, Heating limits of temperature rise for coils, has been revised to add information on how the temperature rise of the coils is to be determined.

f) Clause 7, Mechanical requirements, has been added to provide information on the mechanical durability of relays, plug-in feature requirements, and relay setting controls to harmonize with current IEC requirements.

g) Clause 8, Insulation tests, was changed from Dielectric tests and now includes the requirement for an impulse voltage test as a design test. Table 9 and Figure 1 have been added to this clause.

h) An annex of International Electrotechnical Commission (IEC) standards, relevant to IEEE Std C37.90, has been added to provide additional information for clarification and harmonization with IEC standards. In preparing this standard, consideration has been given to the work of other committees, and especially to international standards that have been published or that are under preparation by Technical Committee 95 of IEC.

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# Contents

# IEEE Standard for Relays and Relay Systems Associated with Electric Power Apparatus

## 1. Overview

This standard specifies standard service conditions, standard ratings, performance requirements, and testing requirements for relays and relay systems used to protect and control power apparatus. The standard establishes a common reproducible basis for designing and evaluating relay and relay systems. Annex A provides a cross-reference to the applicable IEC standards. Certain specific tests required for relays and relay systems are covered in separate IEEE standards as noted below.

Required surge tests are documented in IEEE Std C37.90.1™-2002[1]. Standardized test waveforms that are representative of surges observed and measured in actual installations are applied to the terminals of the system. The relay or relay system must be able to withstand the applied surges without damage to components and without operating incorrectly.

Required susceptibility tests are documented in IEEE Std C37.90.2™-1995. The tests establish a method to evaluate the susceptibility of the relay under test to single frequency electromagnetic fields in the radio frequency domain, such as those generated by portable or mobile radio transceivers.

Required electrostatic discharge tests are documented in IEEE Std C37.90.3™-2001. Generators which that produce a standard waveform are used to apply discharges to conductive and non-conductive points on equipment under test. The test is performed to confirm that relays and relay systems will not misoperate or be damaged when installed, energized, and/or subjected to a specified electrostatic discharge.

### 1.1 Scope

This standard specifies standard service conditions, standard ratings, performance requirements, and testing requirements for relays and relay systems used to protect and control power apparatus. A relay system may include computer interface equipment and/or communications interface equipment, such as a carrier transmitter/receiver or audio tone equipment. It does not cover relays designed primarily for industrial control, for switching communication or other low-level signals, or any other equipment not intended for control of power apparatus.

[1] Information about the documents referenced in this clause can be found in Annex A.