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INTERNATIONAL STANDARD

IEEE Std C57.15™

Power transformers –
Part 21: Standard requirements, terminology, and test code for step-voltage regulators

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The text of this standard is based on the following documents:

IEEE Std	FDIS	Report on voting
C57.15-2009	14/688/FDIS	14/697/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

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The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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IEEE Standard Requirements, Terminology, and Test Code for Step-Voltage Regulators

Sponsor

Transformers Committee
of the
IEEE Power & Energy Society

Approved 11 September 2009

IEEE-SA Standards Board

Abstract: Description of design types, tables of 50 Hz and 60 Hz ratings, supplementary ratings, construction, and available accessories are provided. Methods for performing routine and design tests applicable to liquid-immersed single and three-phase step-voltage regulators are described. Winding resistance measurements, polarity tests, insulation power factor and resistance tests, ratio tests, no load loss and excitation current measurements, impedance and load loss measurements, dielectric tests, temperature tests, routine and design impulse tests, short-circuit tests, control tests, calculated data, and certified test data are covered.
Keywords: control, design tests, position indicator, routine tests, series transformer, tap changer, Type A, Type B, voltage regulator

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IEEE Introduction

This introduction is not part of IEEE Std C57.15-2009, IEEE Standard Requirements, Terminology, and Test Code for Step-Voltage Regulators.

The Working Group has undertaken the task to update this standard to:

a) Reflect the latest revisions of referenced documents IEEE Std C57.12.00™ [B13] and IEEE Std C57.12.90™ [B16], and eliminate references to these standards in this standard IEEE Std C57.15-2009 and duplicate applicable text. [1]

b) Adapt the new IEEE approved format to ensure compatibility with the latest ISO and IEC standards.

c) Include references to applicable IEC standards and keep IEEE standard references to a minimum. This assists in setting up document as a possible candidate for a dual logo (IEC/IEEE).

d) Update tables of preferred ratings; include 50 Hz ratings. Ratings of 2.4 kV (45 BIL), 46 kV (250 BIL), and 69 kV (350 BIL) have been removed from the three-phase 60 Hz voltage regulator rating Table 5 (Table 4 in 1999 edition) due to historical inactivity of requests from users for ratings.

e) Add bushing terminal connectors for current ratings of 669 A to 2000 A.

f) Clarify Type A and Type B designs and their resulting voltage regulation per extreme tap positions.

g) Review short-circuit requirements for distribution and substation applications and revise where applicable.

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[1] The numbers in brackets correspond to those of the bibliography in Annex C.

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POWER TRANSFORMERS –

Part 21: Standard requirements, terminology, and test code for step-voltage regulators

1. Overview

1.1 Scope

This standard describes electrical and mechanical requirements of liquid-immersed, single- and three-phase, step-voltage regulators, not exceeding a regulation of 3000 kVA (for three-phase units) or 1000 kVA (for single-phase units). This standard does not apply to load tap-changing power transformers.

1.2 Purpose

This standard is intended as a basis for the establishment of performance, limited electrical and mechanical interchangeability, and general requirements of equipment described. It also assists in the proper selection of such equipment.

1.3 Word usage

When this standard is used on a mandatory basis, the word *shall* indicates mandatory requirements. The words should or may refer to matters that are recommended or permitted but not mandatory.

2. Normative references

The following referenced documents are indispensable for the application of this standard (i.e., they must be understood and used; therefore, each referenced document is cited in text and its relationship to this standard is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

Where references to both IEC and IEEE standards are made, users shall specify the standard they require, and equipment shall be manufactured to meet that standard.

IEC 60068-2-1, Environmental testing—Part 2-1: Tests—Test A: Cold.[1]

IEC 60068-2-2, Environmental testing—Part 2-2: Tests—Test B: Dry heat.

IEC 60068-2-30, Environmental testing—Part 2-30: Tests—Test Db: Damp heat, cyclic (12 h + 12 h cycle).

IEC 60214-1, Tap-changers—Part 1: Performance requirements and test methods.

IEC 60255-5, Electrical Relays—Part 5: Insulation coordination for measuring relays and protection equipment—Requirements and tests.

IEC 60255-21-1, Electrical Relays—Part 21: Vibration, shock, bump and seismic tests on measuring relays and protection equipment—Section one: Vibration tests (sinusoidal).

IEC 60255-22-1, Measuring relays and protection equipment—Part 22-1: Electrical disturbance tests—1 MHz burst immunity tests.

IEC 60255-22-2, Measuring relays and protection equipment—Part 22-2: Electrical disturbance tests—Electrostatic discharge tests.

IEC 60255-22-3, Measuring relays and protection equipment—Part 22-3: Electrical disturbance tests—Radiated electromagnetic field immunity.

IEC 60255-22-4, Measuring relays and protection equipment—Part 22-4: Electrical disturbance tests—Electrical fast transient/burst immunity test.

IEC 60255-22-5, Measuring relays and protection equipment—Part 22-5: Electrical disturbance tests for measuring relays and protection equipment—Surge immunity test.

IEC 60255-22-6, Electrical relays—Part 22-6: Electrical disturbance tests for measuring relays and protection equipment—Immunity to conducted disturbances induced by radio frequency fields.

IEEE Std 4™, IEEE Standard Techniques for High-Voltage Testing.[2, 3]

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