



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

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**Power & Energy Society**

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Transformers Committee

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IEEE  
3 Park Avenue  
New York, NY 10016-5997, USA  
11 December 2009

**IEEE Std C57.15™-2009**  
(Revision of  
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# **IEEE Standard Requirements, Terminology, and Test Code for Step-Voltage Regulators**

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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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The Institute of Electrical and Electronics Engineers, Inc.  
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PDF: ISBN 978-0-7381-6088-7 STD95982  
Print: ISBN 978-0-7381-6089-4 STDPD95982

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## 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.<sup>a</sup>
- 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 (100 BIL), 46 kV (250 BIL), and 69 kV (350 BIL) have been removed from the three-phase 50 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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<sup>a</sup> The numbers in brackets correspond to those of the bibliography in Annex C.

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

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## 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.