



IEEE Guide for the Rewind of Synchronous Generators, 50 Hz and 60 Hz, Rated 1 MVA and Above

IEEE Power & Energy Society

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Electric Machinery Committee

1665TM

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

12 February 2010

IEEE Std 1665TM-2009

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Approved 11 September 2009

IEEE-SA Standards Board

Abstract: 50 Hz or 60 Hz synchronous generators driven by diesel engines, steam turbines, combustion gas turbines, and hydro-turbines are covered in this guide. The drive may be direct or through a gear box or other device that permits different speeds for the prime mover and the generator. The guide generally applies to the stator and rotor of generators with rated outputs of 1 MVA and above. The guide does not address machine auxiliaries or the excitation system.

This guide will provide the generator Owner with insight into the considerations that are necessary when rewinding or refurbishing a generator. Particular emphasis is placed on the complete rewind of the stator and rotor.

Keywords: cylindrical-pole rotor, insulation, rotor rewind, salient-pole rotor, stator rewind, synchronous generator

The Institute of Electrical and Electronics Engineers, Inc.
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PDF: ISBN 978-0-7381-6064-1 STD95970
Print: ISBN 978-0-7381-6065-8 STDPD95970

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Introduction

This introduction is not part of IEEE Std 1665-2009, IEEE Guide for the Rewind of Synchronous Generators, 50 Hz and 60 Hz, Rated 1 MVA and Above.

At the turn of the 21st century, many of the generators used by electric utilities and industrial plants had reached their design life. Because of today's economics, many of these generators may be called upon to supply reliable service for an additional 20 to 30 years, or more. Any generator Owner intending to significantly extend the life of the generating plant by rewinding and refurbishing the generator should address three key areas: economics, developing a technical specification, and performance upgrades through better materials/design.

A comprehensive economic study should be carried out (for the plant as well as the generator) before the investment of significant resources. This should include plant load forecasts, reserve margins, new capacity plans, cost benefit analyses, operating costs, capital costs, and continued reliability/availability.

Once a financial decision has been made to rewind, it is essential that a technical specification be developed. The technical specification should establish a clear understanding between the Owner and the Vendor, with regard to what the final product will be. Doing so creates an understanding of the level of performance and reliability expected by the Owner/user and what is required in the manufacturing process to achieve it. In addition, to ensure a quality product is achieved, specific tests, measurements and inspections that are to be required in the manufacturing process need to be clearly spelled out. The technical specification is a means for these requirements and expectations to be stated.

New materials, major component replacement, and other design changes may also affect the life extension decision. For example, the development of better insulation systems has been ongoing for many years in the industry. The ability to uprate the nameplate output with these new materials may make rewind and refurbishment cost effective.

Throughout this guide the term "generator" has been used, instead of "rotating machinery," in order to simplify the text. Many of the items contained herein are also appropriate for large synchronous motors. However, this guide does not address machine auxiliaries or the excitation system; nor does it address the generators found in modern wind turbines. The reader is directed to the latest version of the IEEE 421™ series of standards for excitation systems.

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1. Overview

1.1 Scope

The general parameters for this guide apply to 50 Hz or 60 Hz synchronous generators driven by reciprocating engines, steam turbines, combustion turbines, and hydro turbines. The guide generally applies to the stator and rotor of generators with rated outputs of 1 MVA and above. The guide does not address machine auxiliaries or the excitation system.

1.2 Purpose

This guide will provide the generator Owner with insight into the considerations that are necessary when rewinding or refurbishing a generator. Particular emphasis is placed on the complete rewind of each of the components of the stator and rotor.