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IEEE Recommended Practice for Testing Insulation Resistance of Electric Machinery

IEEE Power and Energy Society

Sponsored by the

Electric Machinery Committee

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USA

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(Revision of
IEEE Std 43-2000)

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Abstract: The dc voltage tests procedures for the measurement of the insulation resistance and polarization index of insulated stator, and rotor windings and how to interpret the results are described in this recommended practice.

Keywords: armature winding, dc, field winding, IEEE 43™, insulated, insulation resistance, polarization index, rotor winding, stator winding, voltage

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Chuck Wilson
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William Bloethe
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Donald Campbell
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Malia Zaman
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Introduction

This introduction is not part of IEEE Std 43™-2013, IEEE Recommended Practice for Testing Insulation Resistance of Electric Machinery.

Insulation resistance measurement has been recommended and used for more than half a century to evaluate the condition of electrical insulation. Whereas individual insulation resistance measurements may be of questionable value, the carefully maintained record of periodic measurements, accumulated over months and years of service, is of unquestioned value as a measure of some aspects of the condition of the electrical insulation. Originally, in 1950, this recommended practice was published by the AIEE as a guide to present the various facets associated with the measurement and understanding of electrical insulation resistance. The guide was revised in 1961 and again in 1974. During the 1970s, several changes were made to the types of insulation used in electric rotating machines. The insulation resistance characteristics of these newer THERMOSETTING insulation systems are different from the older THERMOPLASTIC systems, and therefore required this substantial revision to the standard for measuring insulation resistance. Other changes include the addition of further description of the testing theory and the removal of suggestions regarding maintenance dry-out procedures for older windings (previously Annex A). Recommendations for maintenance procedures are beyond the scope of this document. With this publication as a recommended practice, the IEEE is presenting and recommending electrical insulation resistance measurement as an important factor in monitoring the condition of electrical insulation in rotating machinery.

This recommended practice describes the theory, procedure, and interpretation of the insulation resistance test. It is intended for the following:

- Individuals or organizations who manufacture rotating machines
- Individuals or organizations who are responsible for the acceptance of new rotating machines
- Individuals or organizations who test and maintain rotating machines
- Individuals or organizations who operate rotating machines

This recommended practice is designed to help organizations and individuals

- Evaluate the condition of the electrical insulation used in rotating machines
- Determine if the electrical insulation of a rotating machine is suitable for return-to-service
- Determine if the electrical insulation of a rotating machine is suitable for high-potential testing

This recommended practice is intended to satisfy the following objectives:

- Promote consistency for insulation test procedures and interpretations
- Provide useful information on proper application of the insulation resistance test
- Provide useful information on the technical theory of insulation resistance testing

Contents

IEEE Recommended Practice for Testing Insulation Resistance of Electric Machinery

1. Overview

1.1 Scope

This document describes a recommended procedure for measuring insulation resistance of armature and field windings in rotating machines rated 750 W or greater. It applies to synchronous machines, induction machines, dc machines, and synchronous condensers. It does not apply to fractional-horsepower machines.

The document also describes typical insulation resistance characteristics of rotating machine windings and how these characteristics indicate winding condition. It recommends minimum acceptable values of insulation resistance for ac and dc rotating machine windings.

Other IEEE standards that include information on insulation resistance measurement are listed in Clause 2.