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IEEE Test Procedure for Polyphase Induction Motors Having Liquid in the Magnetic Gap

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IEEE Test Procedure for Polyphase Induction Motors Having Liquid in the Magnetic Gap

Sponsor

**Rotating Machinery Committee of the
IEEE Power Engineering Society**

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Foreword

(This foreword is not a part of IEEE Std 252-1977, Test Procedure for Polyphase Induction Motors Having Liquid in the Magnetic Gap.)

In recent years, induction motors have found increasing usage in applications where the rotor operates in a liquid environment. Frequent applications include driving pumps in primary coolant loops in nuclear reactors, in boiler forced circulating systems, and in deep well pumping. From the viewpoint of testing and test procedures, motors designed for these applications differ from more conventional motors principally in having additional loss due to circulating currents in the metallic barriers in the air gap, in having higher friction loss, and in reduced accessibility to the windings and rotating parts. Because of these differences and the increasing usage of such motors, the Induction Machinery Subcommittee of the Rotating Machinery Committee undertook the preparation of this Test Procedure, which was derived from AIEE Std 500 (now IEEE Std 112A-1964) (ASA C50.20-1954), American Standard Test Code for Polyphase Induction Motors and Generators.

The Institute wishes to acknowledge its indebtedness to those who have so freely given of their time and knowledge, and have conducted experimental work on which many of the IEEE publications are based.

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IEEE Test Procedure for Polyphase Induction Motors Having Liquid in the Magnetic Gap

1. Scope

This Test procedure covers instructions for conducting and reporting the more generally applicable and acceptable tests to determine the performance characteristics of polyphase induction motors having liquid in the magnetic gap. Constants in several equations and forms apply to three-phase motors only and require modification for application to motors having another number of phases. It is not intended that the Procedure cover all possible tests or tests of a research nature. The Procedure shall not be interpreted as requiring the making of any or all of the tests described herein in any given transaction.

2. General

2.1 Kinds of Tests. These motors are normally given either a routine test or a complete test

2.1.1 Routine Test. The routine test includes measurement of speed, power input, and current input at no load, rated voltage and frequency; power input and current input with locked rotor; and, winding resistance, insulation resistance, and dielectric test. The locked rotor test may also be performed with single-phase power applied to the motor. Form 1 may be used for reporting such data.

2.1.2 Complete Test. The complete test includes a routine test plus additional tests necessary to determine efficiency, power factor, starting torque, breakdown torque, rated-load slip, and rated-load temperature rise.

Form 2 may be used for reporting such data. Additional tests, such as measurement of noise, vibration, and speed-torque characteristics

which are described in this Test Procedure, and other tests, such as measurement of shaft currents which are not covered in this Test Procedure, may be used.

2.2 Choice of Test. A complete list of tests covered by this Procedure is given in the Contents. Alternate methods are described for making many of the tests. In some cases the preferred method is indicated.

3. Electrical Measurements

3.1 General. Electrical measurements shall be made in accordance with the IEEE Std 120-1955, Master Test Code for Electrical Measurements in Power Circuits.

3.2 Power Supply. The supply voltage shall closely approach sine-wave form and shall provide balanced phase voltages. The frequency shall be closely regulated and shall be measured within an accuracy of 0.1 percent of rated value.

3.3 Instrument Selection. The instruments used in electrical measurements shall be selected to give indications well up on the scale, ie, where a fraction of a division is easily estimated and where such a fraction is a small percentage of the value read.

3.4 Instrument Transformers. When current and potential instrument transformers are used, corrections shall be made for ratio errors in voltage and current measurements and for ratio and phase-angle errors in power measurements.

3.5 Voltage. The phase voltages shall be read at the motor terminals. The arithmetic average of