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IEEE Recommended Practice for Testing Transformers and Inductors for Electronics Applications

STANDARDS

IEEE Power Electronics Society

Developed by the
Standards Committee

IEEE Std 389™-2020
(Revision of IEEE Std 389-1996)

IEEE

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IEEE Recommended Practice for Testing Transformers and Inductors for Electronics Applications

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Abstract: A number of tests are presented for use in determining the significant parameters and performance characteristics of electronics transformers and inductors. These tests are designed primarily for transformers and inductors used in all types of electronics applications, but they may apply to the other types of transformers of large apparent-power rating used in the electric power utility industry.

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Introduction

This introduction is not part of IEEE Std 389-2020, IEEE Recommended Practice for Testing Transformers and Inductors for Electronics Applications.

This recommended practice has been prepared to serve as a guide in the design, testing, and specifying of electronics transformers and inductors. This document contains many tests and experimental methods for evaluating almost every aspect of electronics transformer performance, including a number of tests for determining transformer environmental characteristics such as audible-noise generation. The tests and specifications included are aimed primarily at the testing and evaluation of transformers of relatively low apparent-power rating, such as those used in communications, instrumentation, control, small appliances, and computer applications. However, most of these tests are perfectly applicable to transformers of any rating. A useful feature of this recommended practice is the listing, in Clause 4, of all standard tests used in the specification of a transformer. This clause will provide a useful starting point for many users of this recommended practice.

Metre, kilogram, and second (MKS) units (Standard International or SI units) are used throughout this recommended practice; equivalent centimetre, gram, and second (CGS) units are sometimes given where their usage is still common practice. Definitions and symbols are in accordance with those of the International Electrotechnical Commission (IEC) wherever possible.

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IEEE Recommended Practice for Testing Transformers and Inductors for Electronics Applications

1. Overview

1.1 Scope

This recommended practice presents a number of tests for use in determining the significant parameters and performance characteristics of electronics transformers and inductors. These tests are designed primarily for transformers and inductors used in all types of electronics applications. Even though these tests may be useful to the other types of transformers used in power distribution applications in utilities, industry, and others, the tests discussed in this document may supplement or complement the tests, but are not intended to replace the tests in standards for transformers, such as those in the IEEE C57 series of standards. Some of the tests described are intended for qualifying a product for a specific application, while others are test practices used for manufacturing and customer acceptance testing. The tests described in this recommended practice include those most commonly used in the electronics transformer industry: electric strength, resistance, power loss, inductance, impedance, balance, ratio of transformation, and many others used less frequently.

1.2 Purpose

The following are the specific types of transformers and inductors to which this recommended practice is applicable:

a) Electronic power

1) Power
2) Isolating
3) Current limiting
4) Rectifier
5) Combination (rectifier and filament)
6) Ferroresonant
7) Converter