C57.147™

IEEE Guide for Acceptance and Maintenance of Natural Ester Fluids in Transformers

IEEE Power & Energy Society

Sponsored by the
Transformers Committee

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

11 July 2008

IEEE Std C57.147™-2008

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Transformers Committee
of the
IEEE Power & Energy Society

Approved 9 May 2008

IEEE-SA Standards Board

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Figure B.2, Figure B.3, and Figure B.4 have been reprinted with permission from McShane, C. P., Luksich, J., and Rapp, K. J., "Retrofilling aging transfomer with natural ester based dielectic coolant for safety and life extension," *Proceedings of the IEEE-IAS/PCA Cement Industry Technical Conference,* Dallas, TX, USA, May 2003.

Abstract: The evaluation and handling procedures for natural ester transformer insulating fluids are covered. The transformer operator is assisted by the purpose of the guide, which is to evaluate the serviceability of new, unused fluids being received by the equipment manufacturer or service company and fluid in new equipment. The operator is also assisted by the guide in maintaining the fluids in serviceable condition.
Keywords: dielectric coolant, high fire point fluid, insulating fluid, less flammable fluid, natural ester fluid, transformer, vegetable oil

The Institute of Electrical and Electronics Engineers, Inc.
3 Park Avenue, New York, NY 10016-5997, USA

PDF: ISBN 978-0-7381-5426-8 STD95796
Print: ISBN 978-0-7381-5427-5 STDPD95796

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Introduction

This introduction is not part of IEEE Std C57.147-2008, IEEE Guide for Acceptance and Maintenance of Natural Ester Fluids in Transformers.

This guide was prepared by the Insulating Fluids Subcommittee of the Transformers Committee of the IEEE Power & Energy Society. The purpose of this guide is to identify standards for acceptance and maintenance of natural ester fluids in transformers.

The ASTM D27 Committee formed a working group in May 2006 to establish a method and value limits for oxidation stability of natural esters. Also, a power factor valued oxidation test method for the stability of mineral insulating oil used for decades by some in the electrical power industry, developed by a private testing firm, appears suitable to a wide range of natural esters dielectric coolants. See B.1 for details.

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IEEE Guide for Acceptance and Maintenance of Natural Ester Fluids in Transformers

1. Overview

1.1 Scope

This guide recommends tests and evaluation procedures, as well as criteria and methods of maintenance, for natural ester-based transformer insulating fluids. These base fluids are also known as vegetable seed oils. Methods of reconditioning natural ester-based insulating fluids are also described. Where instructions given by the transformer or fluid manufacturer differ from those given in this guide, the manufacturer's instructions are to be given preference.

1.2 Purpose

There is growing interest in and usage of natural ester dielectric coolants for transformer applications. These fluids are currently being used in the range of small distribution class transformers to medium power transformers. They are being applied in new equipment and for retrofilling existing equipment. It is important that a guide be developed to assist the transformer operator in maintaining the fluid in serviceable condition. This guide, therefore, recommends standard tests and evaluation procedures, methods of reconditioning and reclaiming natural ester fluids, and the analysis results at which reprocessing becomes necessary. It will also address the routines for restoring resistance to oxidation, where desired, by the addition of inhibitors.