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IEEE Guide for Installation and Maintenance of Liquid-Immersed Power Transformers

IEEE Power Engineering Society

Sponsored by the
Transformers Committee

IEEE
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IEEE Guide for Installation and Maintenance of Liquid-Immersed Power Transformers

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Transformers Committee
of the
IEEE Power Engineering Society

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IEEE-SA Standards Board

Abstract: This guide provides guidance and recommended practices on the installation and maintenance of liquid-immersed power transformers rated 501 kVA and above with secondary voltages of 1000 V and above. This guide covers the entire range of power transformers, including extra high-voltage (EHV) transformers. This guide does not cover special transformers such as furnace transformers, rectifier transformers, etc. Distinctions are made as required for various MVA ratings, voltage ratings, and types of liquid insulation.

Keywords: installation, liquid-immersed transformer, maintenance, oil-filled transformer, oil processing, testing, transformer

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Introduction

This introduction is not part of IEEE Std C57.93-2007, IEEE Guide for Installation and Maintenance of Liquid-Immersed Power Transformers.

Power transformers usually represent one of the most important and most costly single items in substations. Furthermore, particularly for large transformers, their failure usually results in lengthy outages or downgrading of service. For these reasons, a high degree of care is required to properly install and maintain them.

Because of these considerations, IEEE and other standards-developing organizations have published, since at least the early 1920s, various recommendations for testing, installing, and maintaining transformers. This guide consolidates and replaces IEEE Std C57.12.11™-1980 and IEEE Std C57.12.12™-1980, which cover large transformers, and ASA C57.93-1958, which covers smaller units.

The intention of this guide is to assist users and manufacturers in the shipping, handling, inspection, installation, and maintenance of liquid-immersed power transformers and to assure that the units are placed in service in acceptable condition to provide years of reliable service. This guide also provides information on developing a maintenance and monitoring program.

NOTE—The manufacturer may specify more stringent requirements than this guide. For transformer warranty validation and other reasons, the manufacturer's guidelines should be followed.

This guide discusses the following two sizes of transformers:

— 501 kVA to 10 MVA, or with primary windings less than 69 kV

— 10 MVA and above, or with high-voltage windings of 69 kV and above

The working group of this guide recognizes that substantial variations exist among transformer manufacturers on certain aspects of transformer installation requirements and that these vary with size and voltage. This guide attempts to accommodate these variations and facilitate a full understanding between manufacturer and user. Generally, the user must conform to the manufacturer's minimum recommendations in order to obtain a proper warranty.

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CONTENTS

1. Scope 1

2. Normative references 1

3. Liquid-immersed power transformers rated 501 kVA to 10 MVA, or with primary windings less than 69 kV 2

3.1 General 2
3.2 Inspection and receipt 2
3.3 Internal inspection 3
3.4 Handling 5
3.5 Assembly 6
3.6 Storage 6
3.7 Tests 7
3.8 Energization 7
3.9 Maintenance 9

4. Liquid-immersed power transformers rated 10 MVA and above or with high-voltage windings 69 kV and above 10

4.1 General 10
4.2 Shipping 10
4.3 Inspection and receipt 14
4.4 Internal inspection 15
4.5 Handling 16
4.6 Anchorage 17
4.7 Assembly 17
4.8 Vacuum treatment 19
4.9 Field drying of insulation 24
4.10 Reprocessing 27
4.11 Tests after the transformer has been assembled and filled with dielectric liquid 30
4.12 Energization 30
4.13 Maintenance 32
4.14 Storage guidelines 36

Annex A (informative) Bibliography 40

Annex B (informative) Figures and table 42

Annex C (informative) Field equipment for oil-filling EHV transformers and determination of insulation dryness 47

IEEE Guide for Installation and Maintenance of Liquid-Immersed Power Transformers

1. Scope

The recommendations presented in this guide apply to the shipping, handling, inspection, installation, and maintenance of liquid-immersed power transformers rated 501 kVA and above with secondary voltages of 1000 V and above. This guide covers the entire range of power transformers, including extra high-voltage (EHV) transformers. This guide does not cover special transformers such as furnace transformers, rectifier transformers, etc. Distinctions are made as required for various MVA ratings, voltage ratings, and types of liquid insulation.

Clause 3 contains information for use with transformers rated below 10 MVA with high voltages less than 69 kV. Clause 4 applies to transformers rated 10 MVA and above with primary voltages of 69 kV and above, including EHV transformers.

NOTE 1—For transformers with primary voltages that are less than 69 kV and larger than 10 MVA, users should follow Clause 4.[1]

NOTE 2—The user should carefully read the instruction book supplied by the manufacturer. Any conflict with this guide that may occur should be resolved with the manufacturer for each specific installation.

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

ASTM D1816-2004, Standard Test Method for Dielectric Breakdown Voltage of Insulating Oils of Petroleum Origin Using VDE Electrodes.[2]

[1] Notes in text, tables, and figures are given for information only and do not contain requirements needed to implement the standard.
[2] ASTM publications are available from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, USA.