C57.113™

IEEE Recommended Practice for Partial Discharge Measurement in Liquid-Filled Power Transformers and Shunt Reactors

IEEE Power & Energy Society

Sponsored by the
Transformers Committee

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Abstract: Wideband measurement of the apparent charge of partial discharges (PDs) that may occur in liquid-filled power transformers and shunt reactors excited by ac test voltages between 40 Hz and 400 Hz are discussed. The major components of the PD measuring circuit including the calibrator are specified in compliance with IEC 60270. The PD test procedure is described and recommendations for the evaluation of PD test results are presented.
Keywords: apparent charge, IEEE C57.113, partial discharge (PD), power transformer, shunt reactor, wideband PD measurement

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Introduction

This introduction is not part of IEEE Std C57.113-2010, IEEE Recommended Practice for Partial Discharge Measurement in Liquid-Filled Power Transformers and Shunt Reactors.

The detection of partial discharges (PDs) was introduced for quality assurance tests of high-voltage (HV) apparatus at the beginning of 1960. Originally this technique was based on the measurement of radio interference voltages (RIV) in terms of microvolts (μV) as recommended by NEMA TR1-1974 [B112], NEMA 107-1964 [B113], and CISPR 16-1-1993 [B42].[a] This quantity, however, is weighted according to the acoustical noise impression of the human ear, which is not a measure of the PD activity in the insulation of HV apparatus. As a consequence, Technical Committee No. 42 of IEC decided to prepare a separate standard for PD measurements associated with the apparent charge, which was first published in 1968. Since that time, this technology is considered as an indispensable tool for an enhancement of the reliability of HV apparatus. IEEE Std C57.113-2010 covers the wideband method for apparent charge measurements in compliance with the third edition of IEC 60270, published in 2000.[b]

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1. Overview

1.1 Scope

This recommended practice describes the test procedure for the detection and measurement by the wideband apparent charge method of partial discharges (PDs) occurring in liquid-filled power transformers and shunt reactors during dielectric tests, where applicable.

1.2 Purpose

PD measurements in transformers and shunt reactors should preferably be made on the basis of measurement of the apparent charge. Relevant measuring systems are classified as narrowband or wideband systems. Both systems are recognized and widely used. Without giving preference to one or the other, it is the object of this document to describe the wideband method. General principles of PD measurements, including the narrowband method, are covered in IEC 60270 and IEC 60076-3 [B71].[1, 2]

[1] Information on references can be found in Clause 2.
[2] The numbers in brackets correspond to those of the bibliography in Annex H.