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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL INSULATING MATERIALS AND SYSTEMS – ELECTRICAL MEASUREMENT OF PARTIAL DISCHARGES (PD) UNDER SHORT RISE TIME AND REPETITIVE VOLTAGE IMPULSES

FOREWORD

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- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC/TS 61934, which is a technical specification, has been prepared by IEC technical committee 112: Evaluation and qualification of electrical insulating materials and systems.

This second edition cancels and replaces the first edition, published in 2006, and constitutes a technical revision.

The principal changes with regard to the previous edition concern the addition of

- an Introduction that provides some background information on the progress being made in the field of power electronics;
- impulse generators;
- PD detection methods;
- a new informative Annex C covering practical experience obtained from round-robin testing (RRT);
- example of noise levels, as shown in new informative Annex D.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
112/163/DTS	112/175/RVC

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

Power electronics has developed along with both control theory and semiconductor technology. Switching is one of the essential features of power electronics control. For higher efficiency and smoother operation, switching times of the latest devices such as insulated-gate bipolar transistor (IGBT) tend to be shorter than microseconds. Such a short rise time may cause transient overvoltage impulses or surges in the systems. When the voltage impulses reach the breakdown strength of an air gap, partial discharge (PD) may occur. In addition, the impulses are repetitive from power electronics modulation such as pulse width modulation (PWM). Since PD may cause degradation of electrical insulation parts in the system, it is one of the most important parameters to be measured.

The first edition of IEC/TS 61934 was issued in April 2006. Because of rapid development in this field, the revision activity for the latest information was approved in TC112 at the Berlin meeting in September 2006. In addition to technical and editorial changes, practical experience obtained through round-robin test (RRT) is also presented in Annex C.

ELECTRICAL INSULATING MATERIALS AND SYSTEMS – ELECTRICAL MEASUREMENT OF PARTIAL DISCHARGES (PD) UNDER SHORT RISE TIME AND REPETITIVE VOLTAGE IMPULSES

1 Scope

IEC/TS 61934, which is a technical specification, is applicable to the off-line electrical measurement of partial discharges (PD) that occur in electrical insulation systems (EIS) when stressed by repetitive voltage impulses generated from electronic power devices.

Typical applications are EIS belonging to apparatus driven by power electronics, such as motors, inductive reactors and windmill generators.

NOTE 1 Use of this technical specification with specific products may require the application of additional procedures.

NOTE 2 The procedures described in this technical specification are emerging technologies. Experience and caution, as well as certain preconditions, are needed to apply it.

Excluded from the scope of this technical specification are

– methods based on optical or ultrasonic PD detection,
– fields of application for PD measurements when stressed by non-repetitive impulse voltages such as lightning impulse or switching impulses from switchgear.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60034 (all parts), *Rotating electrical machines*

IEC 60270:2000, *High-voltage test techniques – Partial discharge measurements*