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Rotating electrical machines -
Part 27-6: On-line partial discharge measurements of rotating machine windings supplied from a converter

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Rotating electrical machines - Part 27-6: On-line partial discharge measurements of rotating machine windings supplied from a converter

FOREWORD

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IEC TS 60034-27-6 has been prepared by subcommittee IEC technical committee 2: Rotating machines. It is a Technical Specification.

The text of this Technical Specification is based on the following documents:

Draft	Report on voting
2/2282/DTS	2/2308/RVDTS

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Specification is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 60034 series, published under the general title *Rotating electrical machines*, can be found on the IEC website.

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

– reconfirmed,
– withdrawn, or
– revised.

INTRODUCTION

The on-line measurement of partial discharges (PD) is a well-established technology to help assess if deterioration has occurred in the electrical insulation of form-wound stator windings in motors and generators rated 3 kV and above that are directly connected to the 50/60 Hz power system. Such on-line testing helps machine owners determine when stator winding maintenance is required.

IEC 60034-27-2 provides methods for on-line PD detection, as well as advice on interpretation. However, the methods described in IEC 60034-27-2, in general, are not effective when applied to machines connected to most common types of AC frequency converters. This is because the AC fundamental frequency is not fixed, and since some types of drives (and the voltage source PWM converter in particular) produce high voltage impulses that in many respects have the same shape as PD pulses but are orders of magnitude higher than the PD pulses. The interference from the voltage impulses from operating converters can obscure the winding PD and make on-line measurement difficult if not impossible using the methods intended for machines fed from industrial sinusoidal AC voltage.

IEC TS 60034-27-5 is concerned with the off-line measurement of PD in windings caused by voltage impulses from specialized impulse test supplies. Usually, these voltage impulses are few in number per second, and the impulse waveform is well-behaved, reducing the risk of false indications. In contrast there are often thousands of impulses per second from converters, and a variety of impulse voltage waveforms occur, even from the same converter. Although some of the methods in IEC TS 60034-27-5 can produce good results when applied on-line, it is important to apply special provisions if they are used for on-line PD detection in windings supplied by converters.

On-line testing can be relevant for type I windings to confirm that frequent PD caused by converter switching is not occurring in service. On-line testing of type II windings can also be used for insulation condition monitoring to detect if aging processes are increasing the PD activity. Since some machine vendors are being asked to supply on-line PD systems for converter-fed machines, this document is intended to make users aware of the technical reasons why the methods in IEC 60034-27-2 are usually inadequate. It also provides guidance on methods that can be more effective.

Due to the high magnitude sparking that occurs with slip rings, at this time there are no on-line PD systems usable with converter-fed windings supplied via brushes/slip-rings.

This is a rapidly evolving technology with minimally proven systems available at the time of publication. Revisions to this document are expected in the near future as technology advances.