

ICS 29.160.01
CCS K 20



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 20833.2-2025

Replacing GB/T 20833.2-2016

**Rotating electrical machines - Winding insulation - Part 2:
On-line partial discharge measurements on the stator winding
insulation**

(English Translation)

Issued on: August 1, 2025

Implemented on: February 1, 2026

**Issued by: State Administration for Market Regulation, Standardization
Administration of China**

Table of Contents

Preface	
Introduction	
1 Scope	
2 Normative references	
3 Terms and Definitions	
4 Causes and effects of online partial discharge	
5 Noise and Interference	
6 Measurement methods and instruments	
7 Installation of the measurement system	
8 Standardization of Measurements	
9 Measurement Procedures	
10 Visualization of Measurements	17
11 Explanation of online measurements	
12 Test Report	
Appendix A (Informative) Characteristics of partial discharge in rotating electrical machines	
Appendix B (Informative) Interference Suppression and Signal Separation	
Appendix C (Informative) Phase Recognition Partial Discharge (PRPD) Mode Example	
Appendix D (Normative) Technical Requirements for Conventional Partial Discharge Coupling Capacitors	
Reference	
Figure 1 Partial discharge measurement system and its subsystems	
Figure 2 Frequency response channel step-by-step process	
Figure 3 Idealized frequency response of partial discharge pulses at the PD source and motor end	
Figure 4 Test sample for standardization	
Figure 5 Sensitivity check circuit	
Figure 6 Recommended test procedure for continuous load and temperature	
Figure 7 Example of peak trends in three-phase partial discharge activity of generators using periodic measurements over an 18-year interval	18
Figure 8 PRPD spectrum example	
Figure 9 PRPD diagram of interphase partial discharge caused by insufficient end spacing between phases B and C	
Figure B.1 Example of time domain separation of pulse arrival times	

Figure B.2 Interference separation combining time domain and frequency domain (time-frequency diagram)

Figure B.3 Three-phase star diagram for multi-channel measurement

Figure C.1 Phase-to-ground partial discharge - partial discharge after phase voltage zero crossing is mainly concentrated at 45° and 225°

Figure C.2 Partial discharge patterns not centered at 45° and 225° after the relative ground voltage passes zero, and other non-PD sources

Figure C.3 Example of PRPD spectrum of internal gap discharge recorded in laboratory simulation 34

Figure C.4 Example of internal layered PRPD spectrum recorded in laboratory simulation 35

Figure C.5 Example of a PRPD spectrum of delamination between conductor and insulation recorded in a laboratory simulation

Figure C.6 Laboratory simulation record of slot partial discharge and corresponding PRPD spectrum

Figure C.7 Corona phenomenon and corresponding PRPD spectrum of the groove conductive layer and the end anti-corona layer recorded in laboratory simulation

Figure C.8 Laboratory simulation recording of surface tracking discharge along the end arm and the corresponding PRPD spectrum

Figure C.9 Surface discharge at the junction of the end anti-corona layer and the groove conductive layer. a) Insulating tape simulates the groove conductive layer and the end anti-corona layer

A) Poor electrical connection between the PRPD and the corresponding PRPD; b) and c) Complete interruption of the connection

Figure C.10 Gap discharge and corresponding PRPD spectrum recorded in laboratory simulation

Figure C.11 Example of an online recorded PRPD spectrum of an internal gap discharge

Figure C.12 Example of an internal layered PRPD profile recorded online

Figure C.13 Example of PRPD spectrum of delamination between conductor and insulation recorded online 40

Figure C.14 Phase 2 partial discharge image recorded online in April.2012 without any filtering

Figure C.15.A picture of the slot scanned with a TVA probe in January.2014.The second phase with the highest potential and close to the

Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document is Part 2 of GB/T 20833 "Insulation of rotating electrical machines windings". GB/T 20833 has been published in the following parts.

- Part 1: Offline partial discharge measurement;
- Part 2: On-line partial discharge measurement of stator winding insulation;
- Part 3: Measurement of dielectric loss factor;
- Part 4: Measurement of insulation resistance and polarization index;
- Part 5: Off-line measurement of partial discharge inception voltage under repetitive impulse voltage.

This document replaces GB/T 20833.2-2016 "Rotating electrical machines - Insulation of stator windings of rotating electrical machines - Part 2: On-line partial discharge Compared with GB/T 20833.2-2016, in addition to structural adjustments and editorial changes, the main technical changes are as follows.

- Added the characteristics of signal transmission in online measurement of partial discharge of rotating motors (see 6.3);
- Changed the design requirements of PD sensors (see 6.4, 6.4 of the 2016 edition);
- Added standardization requirements for partial discharge measurement systems (see Chapter 8);
- Changed the limiting conditions of the insulation structure to be evaluated in Figure 1 (see Figure 1, 4.2 of the 2016 edition);
- Changed the partial discharge online measurement parameters, results, and partial discharge mode assessment rules (see Chapter 11, 2016 Edition Chapter 11);
- Changed the test report requirements (see Chapter 12, Chapter 12 of the 2016 edition);
- Added Table 1 to obtain the stable operating conditions of the effective trend of partial discharge (see Table 1);
- Added Figure 1 partial discharge measurement system and its subsystems (see Figure 1);
- Added Figure 2 frequency response channel hierarchy (see Figure 2);
- Changed Figures 5, 7 and 9 (see Figures 5, 7 and 9, 2016 edition);
- Added Figure 8 PRPD spectrum example (see Figure 8);
- Added normative Appendix D Technical requirements for conventional partial discharge coupling capacitors (see Appendix D).

The following minimal editorial changes have been made to this document.

--- In order to coordinate with the existing standards, the name of the standard is changed to "Insulation of rotating electrical machines - Part 2: Insulation of stator windings" Internal Discharge Measurement.

This document is equivalent to IEC 60034-27-2:2023 "Rotating electrical machines - Part 27-2.On-line partial discharge in stator winding insulation" Measurement".

Introduction

Since online measurement of partial discharge (PD) of rotating electrical machines can reveal local weaknesses in the stator insulation structure and various arc and spark phenomena, However, several studies have shown that there are not only many different measurement methods, but also many different ways to analyze and ultimately evaluate the measurement data.

The standards and methods used for data collection are often very different and cannot be truly compared. Therefore, it is necessary to develop an international standard for online local amplification.

It gives clear guidance to users of electrical measurements to assess the condition of their insulation structures.

On-line partial discharge measurements are performed when the rotating machine is subjected to all the operating stresses, thermal, electrical, environmental and mechanical.

The winding will be affected by real stress during the measurement process, and the measurement is carried out under the normal action of basic load and peak load.

Partial discharge online testing can identify changes in winding insulation structure at an early stage and make real-time condition assessment a key component of predictive maintenance strategies.

Part.

It is recommended to use the same test equipment to measure partial discharges on motors of similar design and insulation structure under similar conditions.

Trend evaluation and comparison to ensure reliable assessment of stator winding insulation condition. Trend information provides a good metric to Indicates changes in insulation condition at an early stage. This provides the opportunity for further visual inspection at rest and offline testing during the next outage inspection.

Plan your time.

This document does not cover on-line partial discharge measurements of inverter-driven motors, as different measurement techniques are required to distinguish between the partial discharge from the inverter and the Noise from partial discharge between windings.