

SERVICE, HIGH VOLTAGE PRODUCTS

## Partial discharge services

Expertise for enhanced reliability of your GIS



Partial discharge is a phenomenon that occurs in all types of high-voltage equipment. Its detection and interpretation is a specialized discipline which requires knowledge of both the measurement systems and ABB's GIS technologies.

### About us

ABB, the leading global player in high-voltage products, offers a wide range of electrical infrastructure solutions and services encompassing:

- Gas Insulated Switchgear (GIS)
- Hybrid Switchgear Plug and Switch System (PASS)
- Air Insulated Switchgear (AIS)
- Generator Circuit Breakers (GCB)
- Capacitor Banks and Filters
- Instrument Transformers
- Surge Arresters

As a globally operating technology organization and product manufacturer, we complement our offerings with a comprehensive range of round-the-clock support and life cycle services. The goal of ABB's product support services is to improve the reliability and extend the operating life of your high-voltage equipment, while reducing operation and maintenance costs in each life-cycle phase. To meet the challenges of the evolving high-voltage service market, we continue to develop our portfolio, increase customer satisfaction, and improve our operations.

### Partial discharge

Partial discharges are localized discharges within the high-voltage insulation system, typically associated with non-homogeneities or defects, but which do not bridge (breakdown) across the respective conductors. Partial discharge can cause deterioration of the insulation material and thus may lead to breakdown. Failure statistics show that more than half of all dielectric failures occurring during operation often produce Partial discharge (PD) which may be detected prior to breakdown. Defects in the insulation system which produce PD can be detected if appropriate PD assessment and/or monitoring solutions are applied.

Factors like modern manufacturing methods, better understanding and quality control of insulation materials, and careful attention to assembly, all contribute to make PD events quite rare today. The result is, equipment operators have less opportunity to become proficient in interpretation of PD data. ABB's PD know-how, collected from our globally installed equipment base, means we have the experience required to determine whether a PD signal requires immediate attention and to differentiate between signals which indicate actual PD or external interference.

### Measuring and interpreting PD signals

Typical PD sources include: moving particles, small voids or delamination in solid insulators, floating potential PD caused by loose components or contacts, and protrusions on the inner conductor or enclosure. However, electromagnetic interference ('EMI', e.g. radar, mobile communications signals, or even PD sources outside the GIS) can enter the GIS, causing alarms and posing a serious challenge to correctly interpret the measurement results.

Typically, for on-site PD assessment of GIS, two different methods for measuring PD signals are employed:

- Radio Frequency (RF) techniques = 'UHF method'
- Acoustic techniques

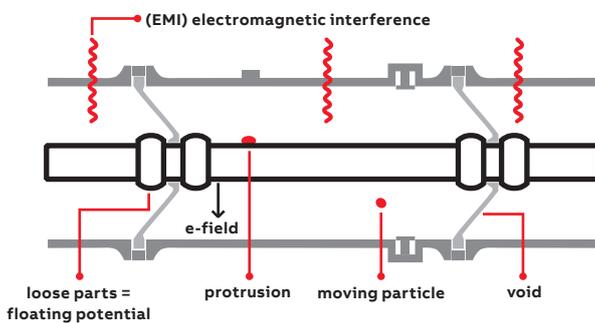


Fig. 1. Typical PD sources within a GIS

### PD services from ABB ensure several benefits:

- Early detection of emergent PD faults
- Avoidance of unnecessary shutdowns due to non-critical or external non-PD signals
- Modular service concept, enabling the best solution tailored to your individual needs
- Specialized PD engineers at your disposal

### PD service offerings

#### Start-up assessment

In order to get the most out of PD monitoring, an initial assessment is required. During this assessment, a 'fingerprint' of your GIS is created, providing a baseline for the assessment of future changes in PD behavior. The startup assessment is carried out on site by an ABB PD expert. Creation of a startup assessment is required if it has not already been done e.g., during the GIS HV commissioning test.

#### Periodic assessment

Detecting PD activities at an early stage can prevent GIS failures. Therefore, ABB offers periodic PD assessments. The primary output of each periodic assessment is a PD investigation report. In order to create this report, PD measurements are carried out for each respective GIS bay/interconnect bus and compared with the baseline fingerprint. These measurements ultimately lead to specific recommendations for the substation. The recommended frequency of the periodic assessments is semi-yearly or quarterly, and they are carried out remotely (e.g., via LAN or telephone link to the PDM system).

If critical PD signals should appear between the periodic assessments, ad-hoc support can be deployed. The signals are analyzed by an ABB PD specialist remotely in order to assess the criticality and draw the first conclusions.

Depending on the conclusions, the PD specialist recommends specific on-site activities in order to gather more detailed information or to initiate concrete mitigation measures.

#### PD monitoring equipment

We can provide the option for a permanent retrofit solution or a temporary installation for GIS which is not being equipped with continuous PD monitoring. Creation of an initial assessment is required if it has not been done already e.g., during the GIS commissioning test.

