

## Quick check

- ▶ Partial Discharge can occur within the insulation system of any electrical distribution asset
- ▶ The consequences of Partial Discharge can be severe, leading to disruptive failures that are unacceptable in critical electrical distribution equipment
- ▶ Partial Discharge Testing is a **cost effective** and **non-intrusive** technique for ensuring supply reliability and long term operational sustainability
- ▶ Analysis can be performed under normal operating conditions with no interruption to power supply - can you afford not to test?



## What is Partial Discharge?

In high voltage electrical engineering, a Partial Discharge is a localised dielectric breakdown of a small portion of a solid or liquid electrical insulation system under high voltage stress.

While a corona discharge is usually revealed by a relative steady glow or brush discharge in air, Partial Discharges within an insulation system may or may not exhibit visible discharges, and discharge events tend to be more sporadic in nature than corona discharges.

Electric corona together with the nitrogen and moisture in the air produces ozone and nitric acid - this in turn will break down the main insulation, causing disruptive failure of the termination.

Partial Discharge, as its name would suggest, is an electrical discharge which occurs across a portion of the insulation between two conducting electrodes, without completely bridging the gap.

Partial Discharge can occur in voids in solid insulation (paper, polymer etc), gas bubbles in liquid insulation, or around an electrode in a gas (corona).

Partial Discharge activity can initiate under normal working conditions in high voltage equipment where the insulation condition has deteriorated with age, and/or has been aged prematurely by thermal over-stressing. Partial Discharge can also be observed on equipment with an improper installation, design and/or workmanship. This is seen particularly in cable joints and terminations which are made-up on site.



## Why should we test for it?

After initiation, the Partial Discharge can propagate and develop into electrical trees until the insulation is so weakened that it fails completely with breakdown to earth or between the phases of a 3-phase system. Failure of high voltage insulation is the primary cause of HV system failures with IEE statistics indicating that electrical insulation deterioration causes up to 90% of electrical failures of certain high voltage equipment.

Partial Discharge testing is particularly important where HV plant has a high criticality. The occurrence of Partial Discharge may be due to the age of the plant, historical failures or the consequences of its failure (its position in the network).

Identification of the 'critical plant' within the plant owner's HV network can be achieved quickly and easily when carrying out partial discharge testing.



## The benefits of partial discharge testing

- ▶ It is truly a predictive test, indicating insulation degradation in advance of the failure
- ▶ It is a non-intrusive test, requiring no interruption of service and is performed under normal operating voltage and load
- ▶ It is a non-destructive test; it does not test to failure or adversely affect the equipment under test
- ▶ It need not use any over-voltages, thereby not exposing the tested equipment to higher voltage stresses than those encountered under normal operating conditions
- ▶ Trending can be accomplished by storing results to allow comparison with future tests
- ▶ In many instances the site of the Partial Discharge occurrence can be located within the test objective, thus enabling the localised problem to be repaired
- ▶ The cost to perform a Partial Discharge survey is relatively inexpensive compared with the off-line testing, allowing annual surveys to be performed economically at most facilities

Call our hotline now on **0845 644 4867** to arrange a consultation or email **[enquiries@hvms.co.uk](mailto:enquiries@hvms.co.uk)**