

Scope

Partial discharges (PD) represent tiny little arcs that, only partially bridge small portion of electrical insulation between phase conductor and ground or between two phase conductors which occurs in the voltage and insulation domain.

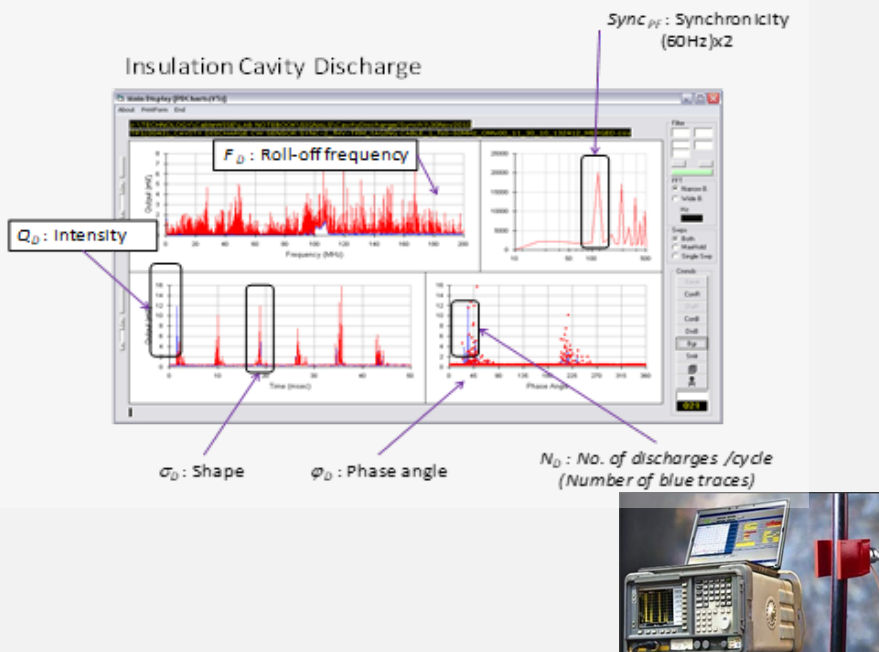
Partial Arcing (PA) is a term coined by Martec to explain multiple findings. It is best described as an equivalent, in the current and conductor domain.

Breakdown process caused by electrical discharges within MV terminations

Component	Defect type	Progression	End Result
Termination lug	High resistance connections	Overheating	Fusing/welding or full arc flash
Incorrect or no sealing tape applied (Lug)	Water Contamination	Tracking (PD)	Flashover with full arc flash
Dry electrical voids	Delamination and voids	Internal Partial Discharge	Dielectric breakdown with full arc flash
Stress control tape	Voids due to incorrect application of stress control tape		
Electrical interface	Moist increase due to incorrect installation		
Stress control area	Incorrect installation of stress control	Tracking	Flashover with full arc flash
Anti-tracking tube	Leakage current flow	Tracking, air gap discharge	Flashover with full arc flash
Air gap incorrect between phases	External and internal partial discharge		

Key features

Cost effective technology to identify defects before they can turn into failures. By implementing PDFSA on-line condition assessment methods. (On-line assessment method = Component in operation at system voltage and operating temperature under mechanical and electrical stresses.)



Tools and technologies

PD Detectors are hand held indicators of the presence of PD activity. Their purpose is to advise the operator of PD activity either for safety reasons or as an early warning to maintenance personnel that unwanted PD activity has started.

When PD activity has been detected several questions usually follow,

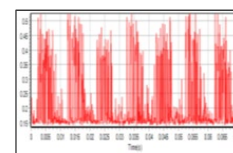
- Where is the PD taking place? (Eg Which phase?)
- What component in the switchgear cubicle?
- What is the magnitude or severity of the PD?
- What type of PD is it?
- What are the implications for equipment life?
- What action should be taken in light of the finding?

In order to answer these questions it is often necessary to employ more sophisticated equipment and techniques.

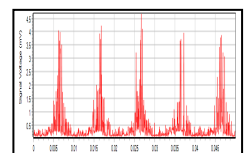
The key to the solution is the use of special sensors and purpose designed instrumentation that allows accurate measurement and analysis of PD in terms of,

- pulse magnitude and shape
- repetition rate
- power and pattern in relation to the applied power voltage wave
- analysis which may be conducted in the time or frequency domain or both.

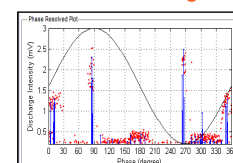
Surface Tracking



Insulation PD



Contact Discharge



Corona

