

MAINTENANCE BROCHURE
HV Cable Partial Discharge Testing



H&MV Engineering is a leader in HV electrical contracting and consulting services

About Us

H&MV is a leader in HV electrical contracting and consulting services. High & Medium Voltage Engineering Ltd was established in 1997 and is now the leading specialist company in High Voltage Transmission and Distribution Systems in Ireland.

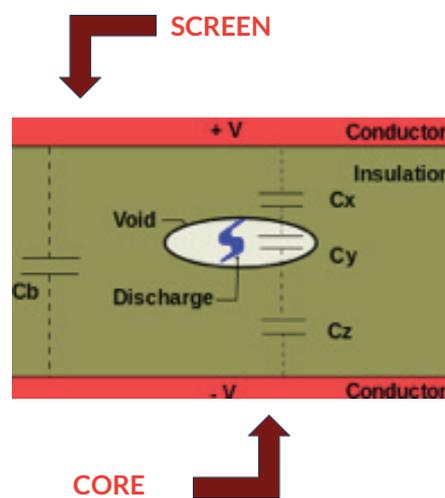
Introduction

Partial discharge mapping is a non-destructive technique for condition monitoring, assessment and commissioning of high voltage cables. The system uses quantitative measurement of partial discharge activity along cable lengths providing important engineering data. The main uses of the system have been in the condition assessment and commissioning of polymeric (XLPE) cables, where potential failure sites can be detected and located at an early stage. The results are presented graphically allowing easy interpretation and accurate fault location.

What is Partial Discharge?

Partial discharges within an insulating material are usually initiated within gas-filled voids within the dielectric. Because the dielectric constant of the void is considerably less than the surrounding dielectric, the electric field across the void is significantly higher than that across an equivalent distance of dielec-

tric. If the voltage stress across the void is increased above the corona inception voltage (CIV) for the gas within the void, PD activity will start within the void.



A partial discharge within solid insulation. When a spark jumps the gap within the gas-filled void, a small current flows in the conductors, attenuated by the voltage divider network Cx, Cy, Cz in parallel with the bulk capacitance Cb

Why PD Testing?

Partial discharge (PD) activity leads to deterioration and subsequently failures in high voltage insulation. This is particularly important for cables which often are not considered

as part of the asset base as they lie often hidden underground within a plant. Cables are a critical part of the asset base and should always be considered when installing a HV network.

PD Causes

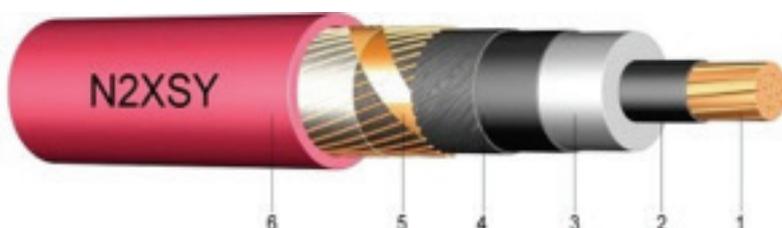
- Ageing
- Manufacturing defect
- Environmental
- Improper installation
- Third party damage

How It works.

The PD-TaD 60 portable PD and tan δ diagnostics system is used in combination with a BAUR VLF generator for carrying out:

- Partial discharge measurement and location
- Dissipation factor measurement* (simultaneously with the PD test)

Thus, two effective and proven methods for evaluating the ageing condition of medium-voltage cables and cable accessories have been combined in a single compact and portable device. The result is a one-step 360° cable analysis with early detection and localization of weak points through a PD test, in addition to the evaluation of dielectric ageing based on the dissipation factor values. The ability to perform partial discharge and dissipation factor mea-



1. Core
2. Inner semi-con layer
3. XLPE insulation
4. Outer semi-con layer
5. Screen earth
6. Outer sheet



measurements simultaneously saves a lot of time and leads to increased efficiency during inspection of the entire cable network. The simultaneous monitoring of $\tan \delta$ values and PD activities, also detects hidden faults (e.g. moist joints).

With the BAUR PD-TaD 60, the software-assisted measurement is performed automatically and the measurement results are visible immediately – precise and clear.

With the BAUR PD-TaD 60 combined with a BAUR VLF generator with $\tan \delta$ measurement function, you can measure dielectric losses and test the cable route for partial discharges during the VLF cable test. This combination of methods is called Full MWT and delivers significantly more information

than the cable test alone. While the cable test shows whether the cable system can withstand a load (e.g. 2 x U_0) over a specified test duration, the dissipation factor measurement enables an evaluation of the condition of the cable insulation. Moreover, a partial discharge measurement shows and precisely locates the PD faults.

Applications:

- Verify original manufacturers test data and identify damaged insulation that occurred from improper installation, poor design, and/or poor workmanship during or after installation.
- Identify premature failures and capture baseline data to trend asset health over the asset's life cycle to ensure maximum

return on investment.

- Allow replacement of potentially faulty cable during planned down time, minimizing cost and maximizing site activity.

Equipment Doesn't Get the Job Done Alone!

Our test equipment may be some of the most innovative and world leading on the market, but is redundant without the right people to operate it. At H&MV Engineering we combine our collective experience in the High Voltage installation industry with professional and safe work practices to ensure a constant level of high quality.

Contact us to discuss this service further and find out what H&MV Engineering can do for you.

Available Methods and Combinations

Method	Measurement sequence	Significance and benefits	BAUR equipment
VLF test		<ul style="list-style-type: none"> • Easy voltage test (Verdict: Pass/Fail) 	frida / viola
$\tan \delta$ measurement		<ul style="list-style-type: none"> • Evaluation of the dielectric condition of the insulation, indication of PD 	frida TD / viola TD
PD test		<ul style="list-style-type: none"> • Diagnosis of local weak points and their location 	PD-TaD 60 & frida / viola
Simultaneous $\tan \delta$ and PD test		<ul style="list-style-type: none"> • Combination of statements of a $\tan \delta$ measurement and PD test • Shorter test duration with simultaneous $\tan \delta$ and PD measurement • Better detection of hidden faults (e.g. moist joints) through the conditioning of weak points and simultaneous monitoring of $\tan \delta$ values and PD activities 	PD-TaD 60 & frida TD / viola TD



Failures such as this can be avoided with correct testing procedures.

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