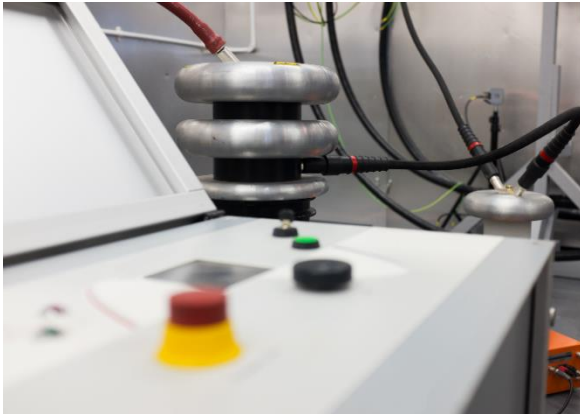


VLF Partial Discharge and Tan Delta Diagnostic Test Services



HVPD, as one of the established world leaders in the field of diagnostic on-line partial discharge testing of in-service MV and HV cables, are proud to offer a new service for the off-line commissioning and maintenance testing of MV cables. The technique utilises portable, Very Low Frequency (VLF) HV power supplies combined with Partial Discharge (PD) and Tan Delta (TD) diagnostic measurement modules.

Test Services Offered

TDR 'FINGERPRINTING'

To identify joint positions, and pulse propagation speeds along the cable

VLF MAINTENANCE WITHSTAND TESTING WITH DIAGNOSTICS

At $2U_0$, 38.2 kV_{rms} for 33 kV cable

VLF COMMISSIONING WITHSTAND TESTING WITH DIAGNOSTICS

At $3U_0$, 57.3 kV_{rms} for 33 kV cable

TAN DELTA (TD) DIAGNOSTIC TEST

To determine the quality of complete cable's insulation

PARTIAL DISCHARGE (PD) TEST

To indicate localised points of weakness and insulation imperfections

PARTIAL DISCHARGE MAPPING (PDM)

To locate points of PD activity along the cable length

VLF Test Set – Key Facts

- Portable, suitable for onshore and offshore use
- Uses sinusoidal, 0.1Hz HV waveform
- Testing to IEEE Standard 400.2
- Cables of voltage up to 33 kV can be tested up to $3U_0$ with a small, portable power supply

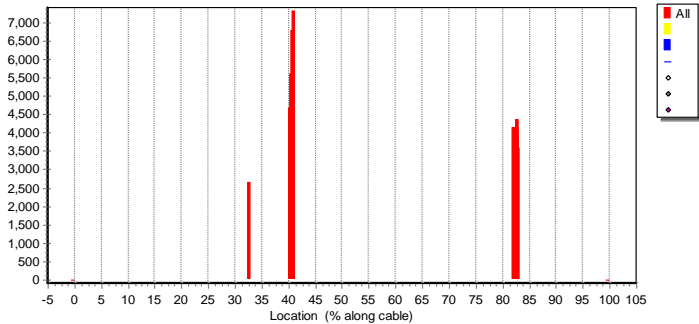


Benefits of VLF PD & TD Diagnostic Testing

- Off-line diagnostic assessment of the MV cable's condition
- Partial Discharge (PD) testing with PD mapping shows the cable defects and their location rather than just the simple pass/fail result that is obtained from normal VLF voltage withstand testing
- Tan Delta (TD) testing indicates degradation of the insulation, by measuring changes in the loss angle of the cable.
- By combining the PD and TD diagnostic testing, much better decision-making on the condition and future service life of the cable can be made.

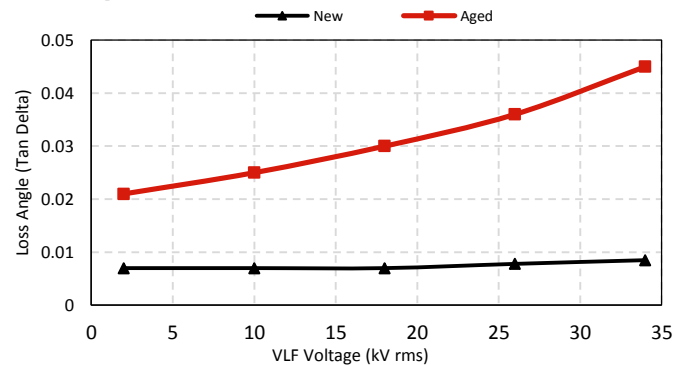
VLF Partial Discharge and Tan Delta Diagnostic Test Services

PDMap© Graph Waveform



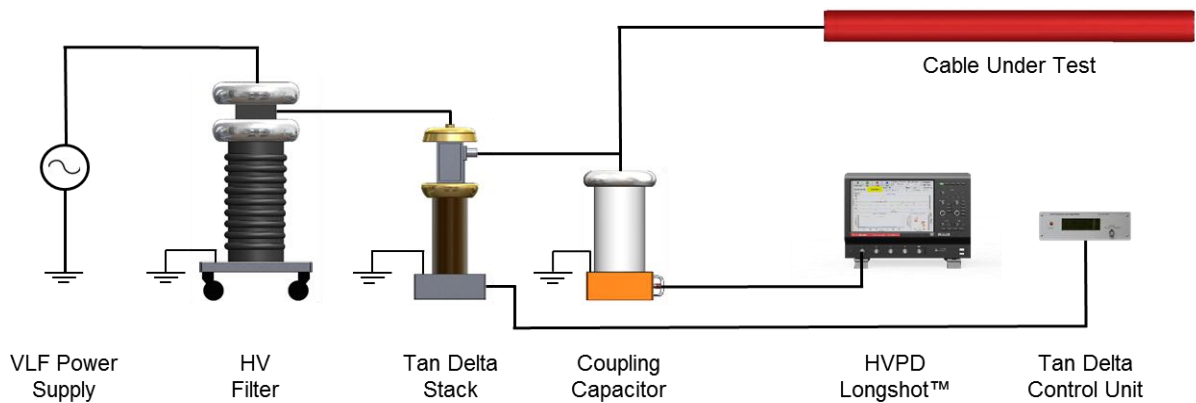
The locations of any defects along the length of the cable are clearly indicated on the automatically generated PDMAP© graph waveform.

TD Graph Waveform



The increasing loss angle with voltage applied in the aged cable (RED) reveals the existence of defective cable insulation. A new, defect free cable (BLACK) will have an almost constant loss angle measurement with voltage.

Connection Diagram for VLF PD TD Test



Technical Specification

- Max Output Voltage 90 kV_{peak} (64 kV_{rms})
- Max Test Voltage (11 kV Cables) 3 U₀ (23.3 kV_{rms})
- Max Test Voltage (33 kV Cables) 3 U₀ (57.3 kV_{rms})
- Max Capacitance at 0.1 Hz 1.0 µF (~3300 m of cable)
- Input Supply Voltage 100–240 V; 50/60 Hz
- Input Supply Power 3.0 kVA
- Tan Delta Max Voltage 90 kV_{peak} (64 kV_{rms})
- Tan Delta Resolution 0.00001 rad (0.01 mrad)
- Tan Delta Accuracy ± 0.0001 rad

Example Flight Dimensions – 4 Boxes

	VLF Power Supply	HV Filter Unit	TD Test Kit	Test Accessories
Dimensions	L: 650 mm W: 500 mm H: 750 mm	L: 350 mm W: 250 mm H: 200 mm	L: 350 mm W: 200 mm H: 15 mm	L: 800 mm W: 650 mm H: 450 mm
Weight	85 kg	60 kg	24 kg	30 kg