DOBLE CONSULTING & TESTING SERVICES

Online Partial Discharge Testing for MV to EHV Cable Systems

Having an appreciation of the current status of assets within a power system is critical to ensuring reliability. This information is even more critical today given the demands put on our aging electric grid infrastructure. Partial Discharge (PD) detection is a critical tool in understanding the health of the dielectric and therefore the health of electrical assets. When performed online it offers a non-intrusive and non-destructive testing approach.

NFPA 70B, Recommended Practice for Electrical Equipment Maintenance, states that insulation breakdown is the number one cause of electrical failures. In an electrical asset, partial discharges provide an early indication of dielectric irregularities that can lead to insulation breakdown. PD testing is the best tool to evaluate the health of any electrical insulation. Performing the PD measurement with the asset connected to and energized by the power system (online) offers:

- Comprehensive analysis: Understand the true in-service condition (type and severity of defect while in service)
- Convenient: Without service interruption and non-destructive
- Flexible: Can be performed on any electric asset using a variety of sensors

Technology

Doble has over 30 years of experience employing online testing technology in assessing power cables. Our database contains thousands of results on a wide variety of cable systems PILC, PE, XLPE, TR-XLPE and EPR, all of which have been evaluated by our team of subject matter experts.

Benefits to the Doble Online Condition Assessment process include:

- Evaluation of longer lengths of cable because of reduced signal attenuation due to acquisition of electrical PD signal at a lower frequency (16kHz to 30MHz).
- Improved overall assessment of the cable as a result of proprietary noise rejection algorithms which permit the measurement to be performed at a lower frequency.
- Accurate assessment of the status of the cable by a team of highly experienced engineers.
- Clean data stream from Doble's proprietary sensors, designed and manufactured in house, that offer greater sensitivity than commercially available alternatives.
- Avoids costly outages and reduces the potential for damage resulting from switching transients and/or isolation from power system.
- Comprehensive assessment of the entire cable system: cables, terminations, splices, and connected assets.

Methodology

The Online PD Testing methodology encompasses the following:

- Data acquisition is performed without taking an outage.
- Online testing provides a true in-service assessment of the asset. This passive test approach eliminates risk of overstressing the dielectric system inducing further degradation.
- Signal analysis and pattern recognition allows for identification of defect types and extent of degradation.
- Doble's online assessment process measures signals that result during partial discharge.
- Evaluations are made at discrete locations between terminals.

Summary

Online Partial Discharge Test

- No outage/loss of production
- No switching transients
- No sensitive craftwork
- Complete in minutes

Passive Test

- No damaging overvoltages
- Data acquisition under normal operating conditions
- Proprietary sensors

Data Acquisition

- Using battery power to avoid interference/background noise
- Proprietary equipment, designed and manufactured in house
- Synchronous with the system to be analyzed

Analysis by Highly Experienced Engineers

- Proprietary analysis software (T-F Map)
- Amplitude
- Repetition
- Phase angle
- Shape
- Frequency
- Trending

Report

- Assessment of the complete cable system: Cables, Terminations, Splices and connected assets.
- Categories critically levels from 1 to 5.
- Specific recommendations for corrective measures.
- Personal consultation to review findings.

Related Professional Services

- EMI (Electromagnetic Interference) Online Diagnostics for Generators, IsoPhase Bus, Non-Seg Bus and MV Motors
- Partial Discharge Detection / Location for Large Power Transformers
- Power Transformer Health Assessment Services
- Power Transformer Procurement Services
- Electrical Apparatus RCA Forensic Failure Analysis
- Training

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