A Review Study on On-Line Partial Discharge Detection Techniques for High Voltage Power Cable Joints/Terminations

P. P. Chambela[1] and A. T. Mushi[2]

Department of Electrical Engineering, University of Dar es Salaam, Tanzania, P.O. Box 35131, Dar es Salaam, Tanzania

[1]priscapaul20@gmail.com

[2]aviti.thadei@udsm.ac.tz, aviti.bahati@gmail.com

ABSTRACT

Cable joints and terminations play a vital role in providing dependable electrical connection, mechanical support and physical safeguard. These provide electrical stress control to shielded power cables. Despite their usefulness, they suffer from partial discharges (PD) because of enhanced voltage stress, moisture ingress and poor workmanship (during installation). Therefore, it is necessary to undertake on-line PD detection to determine their state. Some of these techniques are capacitive coupler (CC); acoustic emission (AE); and high frequency current transducer (HFCT). This article undertakes a literature review of these techniques based on the cost, availability, and applicability. The comparative information is provided on location of their sensors, quantification and detection ability. The CC technique involves the quantification of the coupler sensor input measured in mV/pC by realizing the time of flight between two sensors for which the results are used to estimate location of PD. The AE technique has an advantage of immunity to electrical noise, with a caveat that acoustic signals are highly attenuated within the cable joints. Additionally, the combination of the acoustic sensors and PD electrical couplers can be used to discriminate PDs from electrical noise. The HFCT has two methods – with denoising (HFCT-WiD) and without denoising (HFCT-WoD). The HFCT-WiD technique can significantly reduce the sensor's detection sensitivity due to its high value of noise to signal ratio (NSR). Comparatively, the HFCT has the best results of quantification and detection ability for PDs among all three techniques investigated. However, in places where electrical noise is severe, PD activities may be detected effectively with AE technique. Further work is needed to systematically

		It requires expensive equipment and processors	Can prevent breakdown of HV system
3	HFCT	It needs a filter	Can give excellent PD detection
		Has low detection sensitivity	Can distinguish type of PD from noise

5 CONCLUSIONS

This article gives a general overview on on-line techniques of detecting PD activity in power cable joints or terminations. A review was done in three most applied techniques, namely; capacitive coupler, acoustic emission and high frequency current transducer. A study was conducted to compared their sensitivities, pulse shapes, frequency spectra and time flight between internal discharge and external noise.

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