

EA Technology CableData Collector finds multiple problems in one test!

Partial discharge can lead to catastrophic failure of medium voltage cables. Offline testing of cables is prohibitively expensive and requires long periods of downtime. By performing online cable testing Buist Electric, found numerous problems, repaired them and verified the repairs with no unplanned outages.

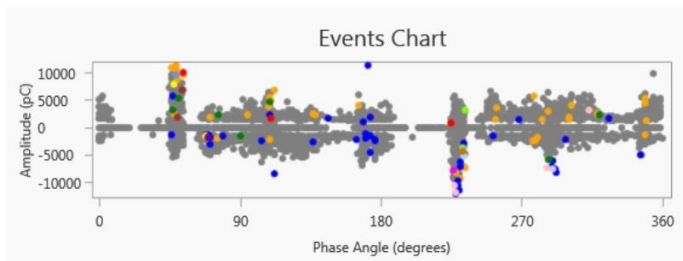


Background

Partial Discharge (PD) can occur in any electrical equipment operating above 2500V and can lead to devastating results. It occurs in the presence of high voltage field stress and is often undetected until it is too late.

Shielded cables often suffer from PD and give no outward indication until they fail. Conventional testing does not usually find PD and can give a false sense of security. Regular PD testing can prevent un-planned outages.

Buist Electric is a full-service electrical contractor, providing services in engineering, testing, service, and more. The organization is located in Byron Center and Kalamazoo, Michigan, USA. They were contracted to perform a condition assessment at an industrial facility. This effort included online testing of 12 7.9KV cables. Using the EA Technology CableData Collector, Buist ran the tests in September, 2018.



Transformer T1 Feeder Data - Before

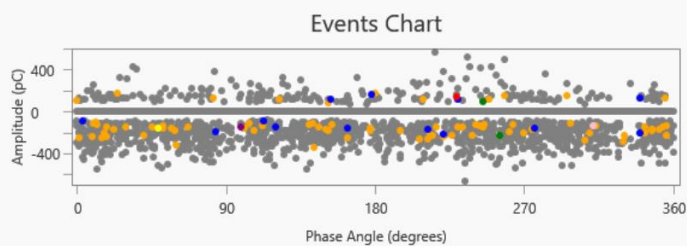
TXFMR 1
PD Source



Test Results

Partial discharge analysis of the collected data was performed by EA Technology. By having EA do the analysis, Buist was able to leverage our experience in cable testing to provide the best advice to the customer.

One of the points EA identified as a potential problem was the feed to transformer T1. There was clear indication from the data (Left) that something was going on. EA recommended a closer inspection. The picture above shows a line side component too close to the ground side of the termination. A clear violation that was degrading the insulation and would lead to eventual catastrophic failure.



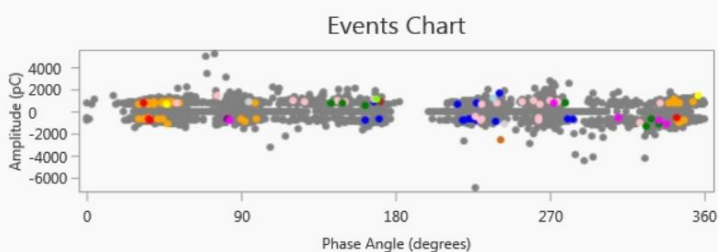
Transformer T1 Feeder Data – After repairs are made

Test Results - continued

The cable data was retaken after the repairs were made and the plot above is the same cable after the repair. Clearly there is no bi-phase grouping like the before picture. Instead of events corresponding to voltage peaks, only random data is visible after the repair. In addition, the values have dropped from ~2000-3000 pC to ~300 pC

The repair was successful and now PD will not lead to a failure of the system. The outage to make the repair could be planned in advance, avoiding a factory shutdown.

Below is the data from another cable at the same location showing PD. The subsequent visual inspection showed the damaged and dirty termination, which is shown to the right. Once this was cleaned and re-taped the CDC:



Phase resolved plot showing moderate PD



Degraded termination is obvious

Benefits

- Identify faults BEFORE they lead to failures – prevent injuries and equipment failure.
- Test for critical PD activity without taking outages – no need to de-energize.
- Test large numbers of cables in short timeframes – Each test takes under 10 minutes.
- Minimal training requirement – For collecting data, no PD expertise required.
- Expert, professional results – Let EA experts do the analysis for you.
- Low cost, high productivity – rugged and designed for many years of life



Degraded termination causing PD