Repeated Field Tests – Utility Case Studies of the Value of Trending

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Papers and Standards often mentioned the benefits of establishing a baseline measurement and then following up with repeat tests spaced some reasonable time apart. They describe how this provides the best indication of the condition of a cable circuit. Although an admirable goal such repeat testing is rarely if ever undertaken. The primary reason is that resources are scarce and consequently it is difficult to complete the initial test program let along return in a reasonable period to repeat the tests. As there has been little in the way of "practice" to show the benefit of such an approach the authors decided to undertake such a study.

Field tests have been performed on utility cable systems as part of the Cable Diagnostic Focused Initiative (CDFI) since 2006. In recent years (2010 to 2014), the authors have endeavoured to return to these circuits to repeat the same tests that were originally performed. The studies discussed in this paper make use of interpretation of the Dielectric Loss measured under VLF (Very Low Frequency) voltages.

This paper will describe
- Recent Advances in the deployment of VLF techniques following the release of the updated IEEE400.2
- Test Protocol in the field
- Determination of the Asset Health using a Diagnostic Based Health Index
- Changes in Asset Health
- Service Performance between tests
- Critical Utility decisions required to enable effective repeat tests in the future

The results suggest that:
- The initial degradation and the change in degradation of the service performance is best described in terms of a robustly calculated Health Index rather than classification (good / not good) or the measured data (Tan Delta, Voltage Stability (Tip Up) etc)
- The rate of degradation is not constant within a population of uniform age
- The rate of degradation is higher in those units with poorer health
- The impact of remedial actions (partial replacement, accessory renewal, rejuvenation) can be observed