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Condition Assessment of Triple Extruded MV XLPE Cables

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Condition assessment of XLPE-cables is becoming increasingly important for the utilities, due to a large number of old cables in service with high probability of failure caused by water tree degradation. The commercial available diagnostic techniques for detection of water tree degradation are generally based upon measurements of the dielectric response, either by measurements in the time or frequency domain.

Previous results from a large Nordic research project comparing different commercial diagnostic methods, showed that most of the techniques could assess the status of old cables equipped with graphite painting and semiconductive tapes relatively correctly. However, for the 1st generation triple extruded cables, incorrect predictions of the cable condition were made, especially by the methods based on measurements of time domain dielectric response.

The condition of more than 100 triple extruded MV cables has been assessed on-site. Some of these cables have been further examined in the laboratory. This includes dielectric response measurements, AC breakdown test and water tree analysis. The results so far show that high sensitivity of the measuring equipment is needed to detect few and long water trees, which is typically observed for this cable design. One of the matters, which have been specially investigated, is the influence of joints and terminations on the response. The results also show that some types of accessories have losses as that observed for water trees bridging the insulation as indicated in Figure 1.

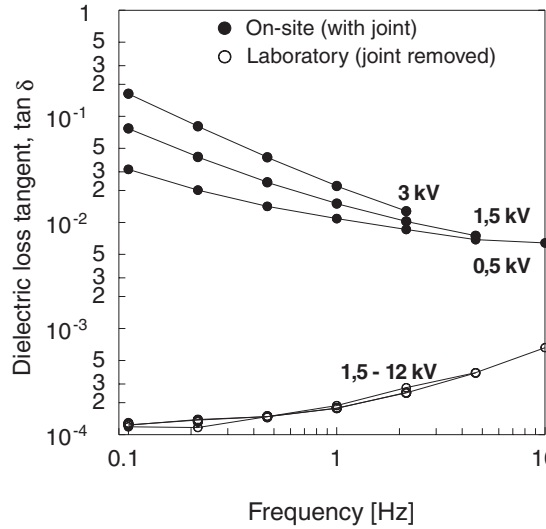

Fig. 1. Results from on-site (with joint) and laboratory measurements (joint removed) of tan on a triple extruded XLPE cable.