

Results of 10 years after installation tests combined with PD detection on MV cable systems

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In the Netherlands new installed MV extruded power cables are tested according NEN-HD 620 (Section J). The tests consist of a sheath test (5kV DC 5 minutes) and a voltage withstand test of the cable insulation ($3 \times U_0$ VLF 15 minutes). The main functions of these (destructive) tests are to check the quality of the installation work of the cable. PD measurements are mentioned as an option. The requirements for PD are not described in the standard.

In 2004 Alliander decided to add PD measurements in their after installation test policy. The benefit of the PD measurements as part of the after installation test are:

- To have insight in the start condition parameters of the cable system (fingerprint)
- To have insight in the condition of the cable system, after the voltage withstand test is performed
- In situations where high test voltages are not possible PD tests at lower test voltages can be a good alternative (e.g. internal breakdown when cable is connected to an old switchgear, external flashover in case of small size cable boxes).
- For some abnormalities in the accessories, a voltage withstand test might not be enough to force a breakdown

Since 2004 hundreds of PD measurements were performed on new installed cable systems. In the begin period the voltage withstand test was considered as the primary requirement. PD results were for information only. In 2010, knowledge rules for PD were developed and the PD behavior became a primary requirement for the after installation test at Alliander.

Over the last years, dozens of accessories and a few cable parts were taken out based on PD activity during after installation test. In many cases sever abnormalities were found which threatens the reliability of the cable system, but also cases were found where the reason for PD was not obvious. It is also discovered that cable systems can contain PD activity in accessories but still survive the after installation test.

The paper describes the experiences with PD measurements on new installed MV extruded power cables and the developed requirements for PD behavior. Also examples are given of PD behavior in relation to poor workmanship and the design of accessories.



Figure 1: Found defect in 20kV joint

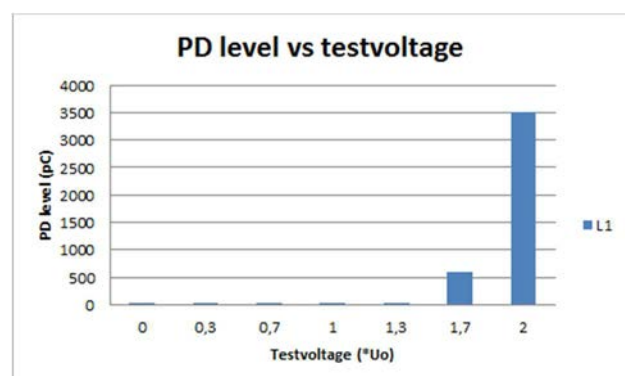


Figure 2: Related PD behaviour