

4th International Conference on Power and Energy Systems Engineering, CPESE 2017, 25-29
September 2017, Berlin, Germany

Case Analysis on Partial Discharge Signal of XLPE Cable T-Joint by Using High-Frequency Pulse Current Method

Zhang Hao^{a,*}, Duan Yubing^a, Wang Bin^a, Liu Hui^a, Lin Ying^a, Hu Xiaoli^a, Liu Rong^a,
Wang Miao^a

^a State Grid Shandong Electric Power Research Institute, Jinan 250002, China;

Abstract

The cable joint is a vital part of cable lines which cause defects and faults easily and through partial discharge (PD) test internal discharge can be noticed. In this paper, we study a suspected PD signal which was found in the T-joint and intermediate joints nearby during a 110kV XLPE cable partial discharge (PD) test. Through the high-frequency PD detection technology, the discharge signal was positioned from the inside of T-joint. A trace of discharge was found at the air gap of the metal ring and the epoxy sleeve in the front of the T-joint stress cone. It is further verified that high-frequency PD detection technique can be used to locate the position of discharge.

© 2017 The Authors. Published by Elsevier Ltd.

Peer-review under responsibility of the scientific committee of the 4th International Conference on Power and Energy Systems Engineering.

Keywords: XLPE; T-joint; Live Detection; Partial Discharge; High-Frequency detection; Analysis of Disintegration

1. Introduction

In recent years, with the continuous development and transformation of urban power grids, power cables are widely used because of the advantages of less land occupation and environment friendly character. In which, the Cross-linked polyethylene (XLPE) cable has become the mainstream of power cables for its electrical and physical performance excellency, transmission capacity and installation conveniences. However, due to the complex structure of the joint part (especially the terminal and the intermediate positions), let alone the installation is quite vulnerable

* Corresponding author. Tel.: +86-531-67982630.

E-mail address: sdqzzh@163.com

to the level of technology and environmental condition, the cable joint is defined as a most possible fault-occurring part[1-2].

Partial discharge of the cable is closely related to its insulation, and PD detection is considered to be the most effective means of detecting the development of cable insulation defects[3-6]. Partial discharge also accompanied by sound, light, electricity, heat, chemical decomposition and other phenomena[4]. Based on a variety of physical phenomena occurred during PD test, commonly used testing methods are ultrasonic, UV imaging, pulse current, ultrahigh frequency (UHF), infrared detection, chromatography analysis. And the most extensively adopted method of PD detection are ultrasonic, high-frequency pulse current and UHF[4].

When developing a 110kV cable live detection, an abnormal discharge signal was found in a T-joint. So we re-measure the T-joint and adjacent joints using high-frequency pulse current method. Through the analysis of the data, we think the source comes from inside the T-joint. Afterwards, the T-joint was disassembled in the laboratory, and it was found that there was a discharge trace between the metal ring and the epoxy casing of the stress cone. With this, the existence of the discharge point was determined. According to the results of live detection and disintegration analysis, the reason of the defect is that there is an installation problem in the T joint.

2. The basic situation of fault cable

The double-circuit 110kV cable lines were put into operation in February 2014 (the cable model is YJL02-1*630) . In July 2015, the double circuit lines were broken into four lines, which access C and D station through the #9 T-joints of two lines. The wiring diagram is shown in Figure 1.

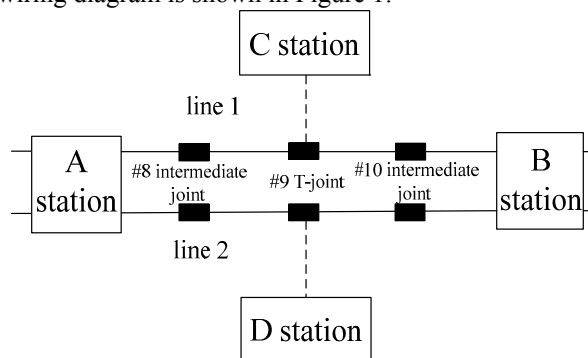
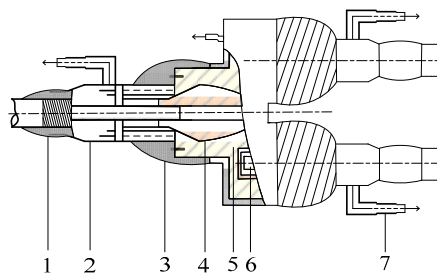


Figure 1 The 110kV cable line diagram

The T-joint is premoulded cold-shrinkable silicone power cable accessories. The design structure is shown in Figure 2.



1 lapped insulation;2 barrier sheath;3 lapped insulation;4 stress-cone;5 the body of branch-joint;6 connector;7 earth conductor

Figure 2 The Structure Diagram of T-joint

Shortly after being put into operation, the line 1 is tripped due to the breakdown of the # 9 T-joint. In order to prevent the line from failing again, we tested all joints of the cable lines by partial discharge test. Finally, we found

Download English Version:

<https://daneshyari.com/en/article/7917624>

Download Persian Version:

<https://daneshyari.com/article/7917624>

[Daneshyari.com](https://daneshyari.com)